

# 5 SCENARIOS FOR THE ASIA-PACIFIC REGION

The change drivers described in the previous chapter will collectively influence society's demands for forest products and services, as well as how these demands are met. Diversity of conditions in various countries and the multiple feedback loops that link various drivers make it difficult to identify a single path for likely social and economic development. Indeed, the current mosaic of situations, which reflects a wide array of society-forest interaction, will likely evolve into an equally or more complex mosaic, very different from that which currently exists. This chapter identifies some probable scenarios and major uncertainties for larger economic and social changes and potential implications for the forest sector.

## RATIONALE FOR DEFINING SCENARIOS

Changes in demographics and national economies, extra-sectoral policies and institutions, as well as environmental issues and developments in science and technology will all contribute to major changes in society. As a result demands for goods and services will be significantly altered as will capacities to provide them. Traditionally, econometric models have been used in forecasting demand and supply for different goods and services. However, such forecasts have important limitations:

- Projecting historical trends implicitly assumes that the underlying technical coefficients are valid during the time horizon for which forecasts are made. However, this may not be the case when social and economic developments result in fundamental changes.
- Several variables that impact on the future state of resources and levels of production and consumption are extremely difficult to quantify. For example, it is hard to provide a measurable indicator of policy and institutional changes that can be used to assess how these could affect the condition of forests and their effects on forestry.
- More importantly, there are considerable uncertainties in statistically evaluating some critical parameters. For example, it is difficult to reliably predict future changes in political developments, which often take place in an erratic and unpredictable manner. With long time horizons, uncertainties tend to multiply.

Scenario analysis (**Box 5.1**) helps to overcome some of the inherent difficulties encountered in conventional forecasting approaches, especially addressing the various uncertainties. The approach to scenario analysis in this report consists of:

- Broad grouping or clustering of the countries based on common characteristics. For example, the state and pace of economic development.
- Identification of key uncertainties relating to selected drivers of change.
- Description of how societies in different clusters of countries may evolve in the context of the impacts of uncertain drivers.
- Identification of ways in which forests and forestry may respond to change, specifically focusing on the state of forest resources and flows of various goods and services.

Box 5.1	Scenario analysis
<p>Scenarios are plausible, challenging and relevant stories about how the future might unfold, which can be told in both words and numbers. Scenarios are not forecasts, projections or predictions. They are about envisioning future pathways and accounting for critical uncertainties. They are stories about the future. They are built on a thorough analysis of social, political, economic, environmental and technological factors that could shape the future environment of a given business, region or policy area. They explore three or four diverse eventualities of how the world might look if the most uncertain and important drivers unfold in different ways.</p> <p>Sources: MEA (2005); World Economic Forum (2009).</p>	

## THE ASIA-PACIFIC REGION: DIFFERING INITIAL CONDITIONS

The way in which the future for forests unfolds will depend on initial conditions, especially the state of national economies and the overall resource situation. Taking into account the broad state of economic development, countries can be grouped into four clusters (**Table 5.1**). As small island countries face a number of unique economic and environmental challenges, they are included as a distinct cluster.

**Table 5.1. Asia-Pacific country clusters**

Subregion	Low-income economies	Middle-income and emerging economies	Developed economies	Small island countries
East Asia	DPRK	China, Mongolia	Japan, ROK	---
South Asia	Bangladesh, Bhutan, Nepal, Pakistan	India, Sri Lanka	---	Maldives
Southeast Asia	Cambodia, Lao PDR, Myanmar, Timor-Leste	Indonesia, Malaysia, Philippines, Thailand, Viet Nam	Brunei Darussalam, Singapore	---
Oceania	PNG, Solomon Islands	Fiji, Vanuatu	Australia, New Zealand	Kiribati, Samoa, Tonga, Tuvalu

Social and economic change occurs across a continuum, hence most country groupings that are based on only one or two characteristics tend to be arbitrary and with considerable overlaps among groups. However, the thrust of this analysis is to provide a broad framework that takes on board the enormous diversity that is characteristic of the Asia-Pacific region. Some of the important country characteristics that will have a bearing on their current and future situations are outlined below.

### Low-income countries

Low-income countries are the least economically developed countries in the region and have the following important characteristics:

- Low incomes – predominantly below US\$5 000 at purchasing power parity – limit the demand for many products and also imply limited ability to mobilize resources for investments.

- Although the industrial and services sectors in some low-income countries are growing rapidly, most of the countries are agrarian, with the agriculture sector accounting for a major share of employment and income. High dependence on land and other natural resources increases the potential for resource-use conflicts, especially in the more densely populated countries.
- In view of low incomes, the ability of most governments to invest in education and health care has been limited and most countries rank low in global human development indices as a consequence. Development of physical and human capital (especially infrastructure, including communications, transportation and education) remains neglected, partly on account of resource constraints and partly on account of weak policy and institutional environments.
- These weaknesses are also reflected in the state of science and technology, which remains undeveloped in many low-income economies. More importantly, in many cases even capacity to apply known technologies is very limited.
- Although the formal sector is expanding, in many countries and segments of economies, the informal sector tends to dominate. This is particularly the case in the forest sector. This dominance by the informal sector limits the scope for formal interventions.

Broadly, low-income economies can be divided into two subgroups, depending on the relative abundance of natural resources:

- 1) resource-rich, low-income countries
- 2) resource-poor, low-income countries.

### ***Resource-rich countries***

Several low-income countries in the region (for example, Lao PDR, Myanmar and PNG) have low population densities and very high levels of per capita natural resource availability, including land, water, forests and minerals. However, these resources are relatively less developed than many other countries for several reasons including limited domestic markets, tenure issues, low investment levels and technological constraints. Tapping natural resources and reinvesting in human and physical capital, thus building the base for future development, is an important option for many of these countries. However, the success of such an economic strategy depends on the robustness of policy and institutional frameworks. Poorly developed political and institutional environments lead to inequitable and unsustainable exploitation of resources, and seldom contribute positively to overall social and economic development. Resource utilization needs to be coupled with strong policies and institutional capacities to enforce regulatory requirements, ensure benefits are distributed equitably and make certain that development targets are met.

### ***Resource-poor countries***

The group of low-income, resource-poor countries consists of more densely populated nations with low per capita natural resource availability (for example, Bangladesh, Pakistan and DPRK). In such countries, natural resources have usually been exploited intensively with minimal reinvestment in maintaining or improving the resource base. Resource degradation remains a major problem in most of these countries. Limited resources and significant inequities in the distribution of wealth and income imply high levels of poverty. Most countries in this situation are prone to social conflicts with the potential for emergence of religious and political extremism, as is already happening in some locations. Governments in some of these countries are highly dependent on external assistance. Work-related migration and remittances have helped to reduce the pressure on resources in some instances.

## Middle-income and emerging economies

Middle-income and emerging economies constitute the largest grouping of countries, accounting for four-fifths of the region's population. Some important features of these countries include:

- Relatively high per capita incomes, well above US\$5 000 at purchasing power parity with most countries registering high GDP growth rates, notwithstanding some decline during the 1997/1998 Asian economic crisis and the recent worldwide downturn.
- Rapid growth in incomes that has led to a significant reduction in the proportion of those living below the poverty line, although the absolute number remains high.
- A rapidly expanding middle class, generating substantial demand for a wide range of products, and growing interest and investment in environmental rehabilitation.
- Maintenance of high growth rates as a critical strategy for reducing poverty. However, policies of 'inclusive growth' espoused by a number of these countries, largely remain focused on 'growth and trickle down' or 'growth and redistribution'; the latter depending on the effectiveness of public policies and institutions.
- In general, inequality is on the increase in most countries because of high growth rates combined with unequal access to resources and opportunities.

Although population growth rates are declining, the middle-income, emerging countries are some of the region's most populous and account for over 80 percent of the Asia-Pacific population. Some of these countries also have very high population densities with low per capita availability of natural resources – including land, water and forests – making them highly dependent on imported resources. However, most middle-income countries have been able to take advantage of globalization, especially improving their access to markets, including importing raw materials and exporting processed products. Rapid growth in industrial and services sectors has reduced the agriculture sector's share in national incomes and employment in most of these countries.

Rapid growth of economies in this cluster implies surging demand for energy, raw materials, food and water to meet increasing domestic consumption and to generate revenues from exports of manufactured goods. Such demand increase will be particularly challenging for countries with high population densities and limited resources and will likely increase import dependencies. Increasing competition for energy and raw materials, imported from other countries, will help to reshape global and regional geopolitics. Rapid economic growth is also raising concern about increased carbon emissions and their impacts on climate change. While per capita emissions in emerging economies remain relatively low, the large size of the cluster's total population implies a significant increase in emissions. A subsidiary problem is that industrial production in developed countries is increasingly shifting to less carbon-efficient (but more cost-efficient) production in emerging economies.

A number of countries have strengthened human and physical capital resources over recent years. Higher incomes have enhanced investments in science and technology leading to stronger and more sophisticated capacities. Nonetheless, dichotomous development is a major challenge facing many middle-income and emerging economies, especially on account of widening gaps between rural and urban economies and between rich and poor. Unbalanced development is increasing disparities between different regions in many countries. Failure to address these disparities will impair social and economic development.

## Developed economies

Countries ranked as developed economies in the region are Australia, Brunei Darussalam, Japan, New Zealand, ROK and Singapore. The main characteristics of developed economies in the Asia-Pacific region include:

- High levels of income (over US\$15 000 per capita at purchasing power parity) and, although economic growth rates may be low, absolute increases in income remain high. High incomes also imply increased ability (and usually willingness) to pay for ecosystem services. Consequently environmental protection is a major concern for most countries in this cluster.
- Highly diversified economies with well-developed industrial and services sectors. The agriculture sector's share in income and employment is very low in most countries. However, for several low population density countries – most notably Australia and New Zealand – agriculture and allied sectors, including forestry, play important roles in national economies.
- Low growth or even declining populations (in Japan). The ageing of developed country populations implies changes in patterns of consumption.
- Well-developed human and physical capital and strong science and technology capacities. These factors contribute significantly to transformations towards post-industrial, knowledge economies.
- Relatively well-developed policy and institutional frameworks. On the whole, democratic institutions are well developed and private sector and civil society organizations play important roles in most spheres of development.

In view of the significant reduction in dependence on land, the pressures on forests in developed economies are considerably lower than in most other countries. In general, forest loss in developed countries is not a major problem, although there are exceptions – as in the case of Australia, where severe droughts have seen the loss of a huge forest area (though proportionately to the national forest estate, relatively small) during the last decade. In general policy and institutional frameworks are robust and well enforced, so that forestry is effectively regulated and managed. Predominance of private ownership implies potential changes in ownership and land uses as owners respond to changing market opportunities. In some cases, the costs of logging in developed countries are sufficiently high to make most operations uneconomic – thereby transferring additional pressures to developing countries. Concerns about the environment are encouraging significant policy changes, especially as regards energy use, with a greater thrust on renewables. With better developed science and technology capacities, there is increasing emphasis on transforming developed economies into 'green economies' and this is likely to increase consumption of renewable resources – internally and externally.

## Small island countries

Small island countries are unique in view of their extreme economic and ecological vulnerability. Some of the key characteristics of small island countries are:

- Although total populations remain low, growth rates and population densities are often high. Work-related migration to neighbouring developed countries is high and remittances form an important source of income for many island countries (for example, remittances account for about one-fourth of Samoa's GDP; Table 4.3).
- The small size of many island economies and their dependence on a very few sectors (for

example, fisheries and tourism) leaves them highly vulnerable to exogenous changes. Even a small reduction in income from the main sectors of the economy may have devastating impacts.

- Distinct locational disadvantages in economic terms, due to their distance from large markets and, often, from well-developed trade routes. With small domestic markets and significant transportation costs, cost competitiveness is a major barrier to exports of most forestry products.
- Overall resource constraints and weaknesses in policies and institutions, which leave island countries highly dependent on external support. In the case of some countries, a significant share of the government's budget comes from overseas development assistance.
- Relatively unskilled human resources. In view of the limited opportunities, many qualified people opt to migrate to more developed countries.
- Potential exposure to climate change-induced impacts, especially rise in sea level. Adaptation to climate change will be a major thrust of development policy in most small island countries.

Countries in these various economic clusters interact with others within and outside the clusters, as well as with countries outside the region, including through trade, investments, travel and migration. Such interaction also impacts through shared resources such as atmosphere – for example, through emissions of greenhouse gases. Across many spheres, countries may compete or cooperate. For example, rapid industrialization in some countries may undermine or slow the pace of industrialization in others. Conversely, some countries may invest in industrialization in others.

## FOUNDATIONS FOR SCENARIOS

Scenarios are descriptions of possible pathways of development. Although the Asia-Pacific situation is extremely varied, with an enormous diversity of situations and countries, it is possible to identify broad scenarios taking into account the main uncertainties faced by most countries – particularly in the spheres of:

- 1) income growth; and
- 2) ecological and social sustainability.

### Income growth

Although there is considerable variation, the Asia-Pacific region's economies have generally been growing rapidly, taking advantage of favourable internal and external factors. High savings and investment rates and well-developed policies and institutions (which have significantly increased foreign direct investments [FDI] and trade) have been important internal factors contributing to high growth rates in many countries. Increasing openness to the global economy – and consequent access to markets, raw materials, investments and technology – is another important factor that has contributed to rapid growth in many Asian economies. With the exception of a few countries, especially some of the developed countries and among low-income economies, relatively high growth rates have been registered during the last two decades.

However, the 1997/1998 Asian economic crisis and the recent global economic downturn have exposed vulnerabilities in many Asia-Pacific economies. While the earlier recession had its origins in domestic financial markets, the current crisis was primarily precipitated externally, but has led to a reduction in inflows of investments and in demand for exports. Asian economies that have a

high degree of dependence on exports to the United States and Europe have been particularly affected. Interventions by governments, especially through economic stimulus packages aimed at boosting domestic demand, are having some impact with signs of improvement in early 2010. However, considerable uncertainty remains about future income growth in Asia-Pacific countries, which are largely dependent on a sustained global economic recovery.

### Ecological and social sustainability

The ecological and social sustainability of development is a major concern for most Asia-Pacific countries. Several countries are already facing severe resource constraints – especially with respect to arable land, water and energy – and current rates of economic growth will require accelerated exploitation of such resources, with potential significant undermining of ecological sustainability. Dependence on imports – especially food, raw materials and energy – is increasing in many countries. Other countries – especially those where access to outside resources is limited by political or economic constraints – are overexploiting domestic resources, thereby compromising long-term sustainability (**Box 5.2**).

Box 5.2	Decline of industrial forestry in Samoa
<p>“The combined effect of commercial exploitation for wood processing, tropical cyclones and agro-deforestation has left Samoa with only a few years of merchantable forests remaining. By all estimates, Samoa’s merchantable forest resource will run out in a few years, at most five years. The existing plantation resource will not reach harvestable diameters until around 2021 and a gap in sawlog supply will mean the demise of the existing sawmills. All of Samoa’s sawntimber requirements will then depend on imports. Matching the steady depletion of the forest resources, inevitably, is the decline in the sawmilling industry. Of the four sawmills operating in 2000, only two remained by the end of 2004, but in significantly reduced sizes.”</p> <p>Source: Sesega (2009).</p>	

Climate change will increase social and ecological vulnerability – at least for some people. Natural disasters may become more frequent as weather patterns change and rising population densities force people to live in more marginal areas. In forestry, increased roading and logging in steep sloping areas combined with more extreme weather events may precipitate landslides and mudflows while flooding may also become a more frequent occurrence. Erratic monsoon patterns and declining water supplies are already impacting agriculture in some countries, with potentially disastrous impacts on some economies and livelihoods if agricultural production is further compromised. On the other hand, some localities are likely to receive higher rainfall and increase crop yields. Climate change mitigation and adaptation will require significant departures from the business-as-usual approach to growth.

High levels of poverty, growing inequities in the distribution of income, and weak political and institutional frameworks leading to governance deficiencies, could enhance social vulnerabilities. Conflicts are likely to intensify in the context of poor governance, especially in resource-scarce situations. This is already evident in several countries in the form of religious and political extremist movements – or in strong ‘inter-class’ rivalries. Collective action could be undermined by divisive politics, exacerbating conflicts and undermining social and economic development. Robust policies and institutions with capacity to effectively deal with emerging challenges will be critical to sustained social and economic development.

## POSSIBLE SCENARIOS

Taking into account changes in national incomes and in overall social and economic sustainability, it is possible to identify several broad development paths, as illustrated in **Figure 5.1**. Every country will chart its own path depending on initial conditions, the choices made and differing challenges and opportunities. While three broad paths that potentially capture most of what is likely to occur are identified in the following analysis, a wide array of possibilities exist – as intermediate and hybrid pathways that encompass features of two or three of the identified scenarios, as well as more extreme pathways that fall outside the likely bounds drawn below. Some of these alternative scenarios are elaborated in APFSOS country and subregional reports.

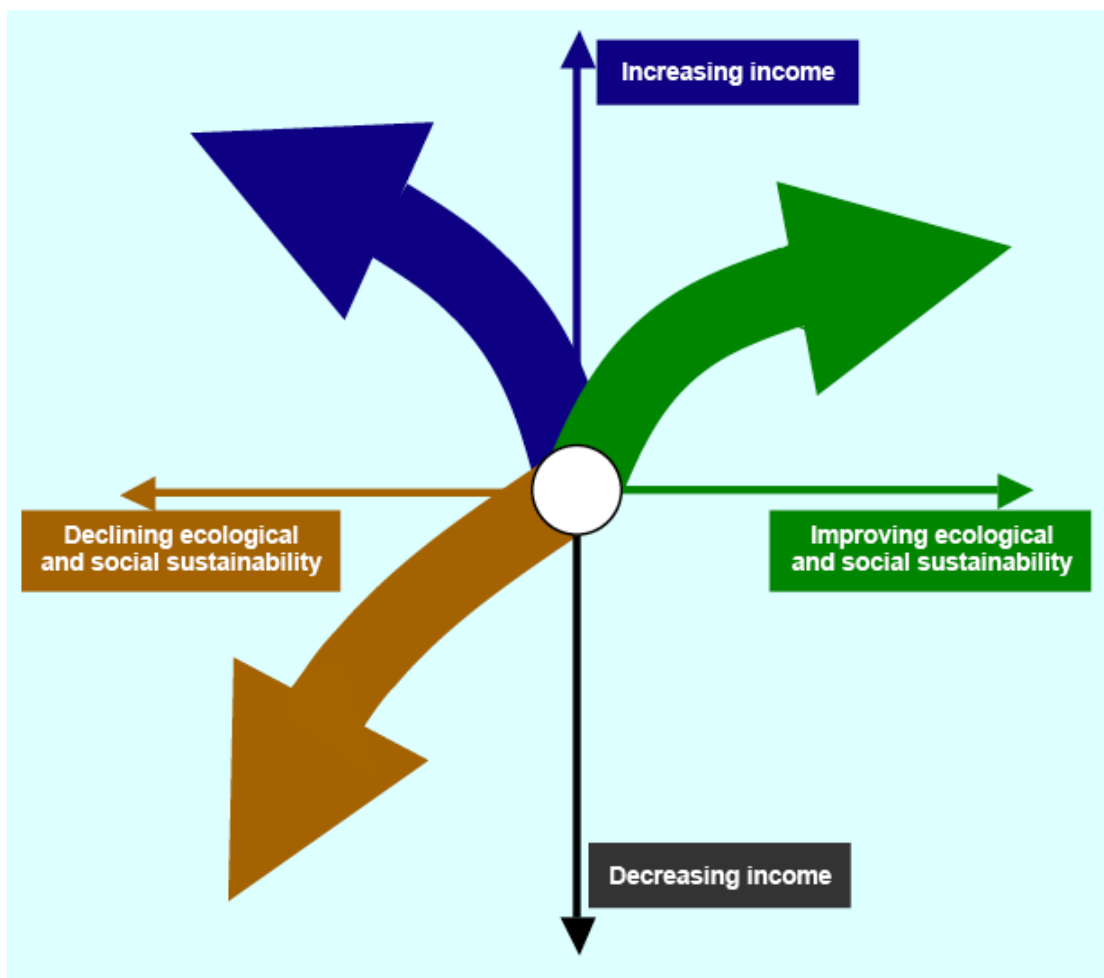


Figure 5.1. Potential development paths

### Three broad paths

This analysis focuses on three distinct scenarios. Two scenarios are driven by analysis of developments based on either: (i) high economic growth and recovery; or (ii) low economic growth and recovery. A more eclectic scenario focuses on: (iii) social and economic stability and development of 'green economies'.

- (i) High economic growth and recovery: the 'boom' scenario: Several low- and middle-income countries in the Asia-Pacific region are on a high economic growth path, but with social and ecological sustainability being accorded low priority, at least in the initial stages. High economic growth rates are being targeted as a prerequisite to poverty



alleviation through trickle-down processes. Environmental issues are accorded lower priority using the argument that these can be addressed later, when incomes rise, thus increasing the willingness and ability to tackle environmental issues. A rapid recovery from the 2008/2009 global recession and a buoyant global economy will lead many countries towards this scenario.

- (ii) **Low economic growth and stagnation: the 'bust' scenario:** A number of resource-poor countries are on a low income and low growth path owing to various constraints. While economic growth remains low, high population densities and low levels of human development promote unsustainable use of natural resources – land, water, forests, among others – enhancing social and ecological vulnerabilities. In some cases, resources are being exploited by outsiders, or by small elite groups, with most local people receiving few benefits including only marginal investments in infrastructure, education and health. Many rapidly growing economies, especially those with limited domestic resources, may also be vulnerable to shifts towards the low growth and stagnation scenario. Such shifts could stem from social conflicts, especially those driven by intense competition for various resources against a background of policy and institutional deficiencies. More generally, persistence of the 2008/2009 economic downturn into the next decade will draw many countries into pathways approximating this scenario.
- (iii) **Social and ecological stability: the 'green economy' scenario:** In contrast to the economic growth pathways, this is primarily an ideal development vision, requiring the pursuit of an inclusive approach that addresses social and ecological problems, paving the way for the development of green economies. Considerable thrust is given to human resource development and improving the efficiency of energy and raw material use. Countries currently on the high growth path, as well as countries in the low growth and stagnation scenario, could potentially move towards the green economy scenario provided significant changes are made in policy and institutional environments, thereby enhancing social and ecological stability.

The key characteristics of these scenarios are outlined below.

### **The high growth 'boom' scenario**

Despite the 1997/1998 crisis, the stagnation of the Japanese economy since 1990 and the recent downturn in the context of the global economic crisis, there is considerable optimism about continued growth in the Asia-Pacific region, largely led by the rapid economic growth in emerging economies. Under the high growth 'boom' scenario, the 2008/2009 downturn will be a short-lived event with global recovery occurring rapidly and the Asia-Pacific region rapidly returning to a pathway with economic growth at about 5 to 6 percent per annum. The region will continue to be led by very rapid growth in emerging economies, especially China and India. At the time of publication (May 2010) there is already some indication of an economic upswing suggesting that some countries may soon be back to their pre-crisis growth paths. Economic stimulus packages implemented in several countries are resulting in increases in domestic consumption, helping to compensate for falls in export demand.

The 'boom' scenario envisages much of the growth in emerging economies will continue to be due to expansion of the manufacturing and services sectors, catering to both domestic and external demand. Rapid growth in manufacturing and services will continue to reduce dependence on agriculture and allied activities as a major source of income and employment. Agriculture also becomes less remunerative in view of increasing costs of production and relatively low prices,

which are also kept down through increased imports and intensified practices. Meanwhile, rapid growth creates enormous demand for raw materials and energy providing lucrative markets for some natural resource-rich countries in the region. Increased public and private sector investments especially in emerging economies help to tap natural resources, often sourced from resource-rich exporting countries – wood, energy, minerals, arable land, etc. – generating substantial income. Energy use increases rapidly in line with GDP growth, although some reduction in energy input per unit of GDP might be anticipated. A shift from traditional woodfuels to more convenient fossil fuels will be expected, along with efforts to develop alternative energy sources, including bioenergy.

A high growth scenario would foresee concerns about economic protectionism in the context of the 2008/2009 global economic crisis addressed, through the conclusion of the Doha trade talks; paving the way for increased investments and global trade. The pace of globalization would accelerate, increasing FDI, trade, travel and access to technology. Growth in transport and information and communication technologies would improve contact and interaction among people and countries. Establishment of free trade zones and economic corridors would increase production and trade. Economic growth would be largely driven by the private sector, and in particular for forestry, by large transnational corporations. Government approaches are envisaged to increasingly focus on facilitating private sector involvement through appropriate policies and legislation.

Under the 'boom' scenario, increasing incomes create a surge in the size of the middle class, especially in emerging economies, but also in some low-income economies. This increases demand for a wide array of products, including industrial forest products, as well as ecosystem services. As incomes increase, there is greater concern over the quality of the environment and hence greater willingness in society to enhance provision of ecosystem services. However, in many countries 'growth and trickle down' remains the basic strategy for addressing poverty and environmental degradation; with the speed and volume of trickle-down effects depending on political and institutional structures. The pursuit of 'growth-first' approaches might well fail to take adequate account of growing social and environmental problems. Sustainability may be compromised, marginalized people and localities may precipitate civil unrest and irreversible losses in biodiversity and natural habitats may occur.

Other less positive impacts of the 'boom' scenario might also appear. The scenario might encompass failures in efforts to improve corporate social responsibility where short-term profitability remains the basic tenet of private sector operations. Under such circumstances, non-compliance with environmental and social regulations could be expected to remain widespread, especially where institutional structures are weak and incapable of adequately enforcing policies and regulations. Growth-focused policies and legislation in some emerging and low-income countries are likely to continue to assign low priority to social and environmental issues. Consequently, some high profile international initiatives may fail to have significant impacts. Notwithstanding wider concerns about climate change, conflicting priorities might be envisaged to lead to a highly watered down post-Kyoto agreement under which there is very little willingness to curtail growth and consumption to reduce carbon emissions.

The impacts of the high growth scenario will differ considerably among the clusters of countries as indicated in **Table 5.2**.

Table 5.2. High growth 'boom' scenario: country implications

Country cluster	Overall impacts
<b>Low-income economies with limited natural resources</b>	<ul style="list-style-type: none"> <li>• In view of limited natural and human resources, most countries in this group are unable to take advantage of high growth rates in emerging/middle-income countries.</li> <li>• A large segment of the economy – mainly focused on subsistence consumption – remains isolated from the changes taking place.</li> <li>• Demand for labour-intensive products and services from the middle-income/emerging/developed economies increases employment and incomes, especially in urban areas.</li> <li>• Increasing population pressures and low levels of technology result in intense pressure on natural resources, especially land and forests.</li> <li>• Work-related migration and related remittances help to moderate pressures on natural resources.</li> </ul>
<b>Low-income natural resource-rich economies</b>	<ul style="list-style-type: none"> <li>• Intense exploitation of resources – land, forests, minerals, etc. – primarily to meet growing demand from middle-income/emerging/ developed economies.</li> <li>• Long-term benefits from resource exploitation largely depend on the effectiveness of policy and institutional frameworks. In the context of weak governance and corruption, benefits from resource exploitation will be inequitable, environmentally unsustainable and will fail to result in long-term social and economic development.</li> </ul>
<b>Middle-income/emerging economies</b>	<ul style="list-style-type: none"> <li>• Rapid growth of the manufacturing and services sectors reduces pressure on land and forests.</li> <li>• Some reduction in poverty, which could reduce pressures on natural resources, including forests.</li> <li>• A swelling middle class with very different values, perceptions and consumption needs compared to traditional frameworks. Demands for ecosystem services increase significantly.</li> <li>• Investments in science and technology improve efficiency and productivity.</li> </ul>
<b>Developed economies</b>	<ul style="list-style-type: none"> <li>• Consumption-driven growth provides markets for a wide array of products from abroad. Most consumption comprises manufactured products and services.</li> <li>• Increases in demand from middle-income/emerging economies enable growth of transnational corporations (especially those based in developed economies).</li> <li>• Demand for ecosystem services continues to grow as does willingness to pay.</li> <li>• Increased ability to provide development assistance/FDI to low-income/middle-income/emerging economies.</li> </ul>
<b>Small island countries</b>	<ul style="list-style-type: none"> <li>• Growth in tourism and remittances strengthens small island economies.</li> <li>• Rapid expansion of tourism infrastructure increases ecological vulnerability.</li> <li>• Global warming and its associated impacts.</li> </ul>

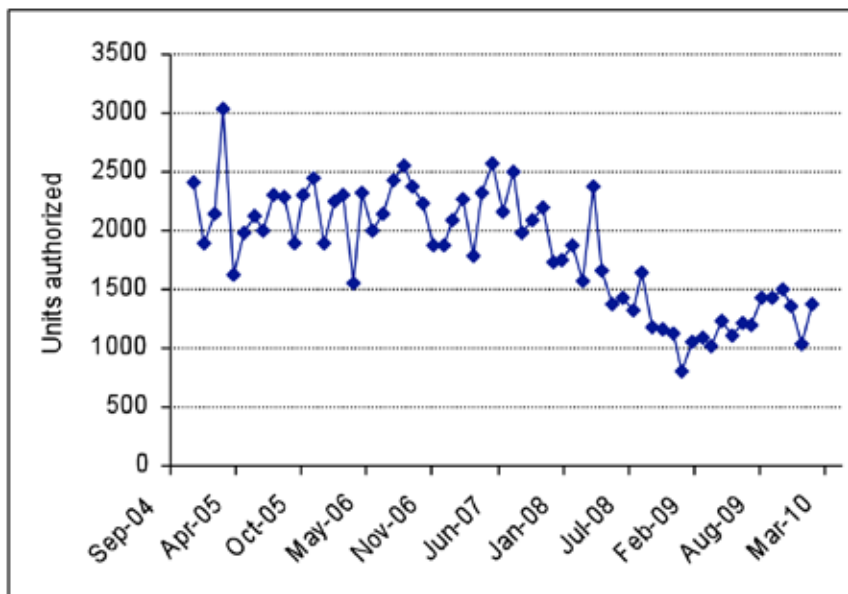
### The low growth and stagnation 'bust' scenario

The low growth and stagnation 'bust' scenario envisages a future in which economic growth stalls for a protracted period and the Asia-Pacific region takes a very long time to recover from the current economic downturn. Although there are presently signs of some recovery from the current economic crisis, most countries remain vulnerable to recession if the global economic situation fails to continue its improvement. Even if a rapid global recovery takes place, domestic social and environmental problems could push some developing country economies towards low growth and stagnation pathways.

The basic tenet of the 'bust' scenario is that despite all economic interventions, global economic recovery remains anaemic and recessionary conditions prevail for a significant part of the forthcoming decade. Consumption-driven economies drastically curtail expenditure, especially in the context of high unemployment and a credit squeeze. Construction and related activities stagnate at low levels (**Box 5.3**). Asia-Pacific economies that have thrived on exporting to North America and Europe experience significant contractions as these markets remain depressed. The global nature of the economic crisis means that export-dependent countries face severe competition in finding alternative markets. Efforts to bolster domestic consumption through economic stimulus in some countries have only short-term impacts.

**Box 5.3****Recession in 2008/09: Impacts on housing construction in New Zealand**

In New Zealand, forestry and construction statistics showed significant declines for 2008. The volume of New Zealand's sawntimber exports in the year to September 2008 declined by 14.7 percent on the previous September year. Similar declines were recorded for volumes of log exports (3.6 percent), wood-based panels (8.2 percent) and total value of forestry exports (6.6 percent). However, perhaps the most telling decline was in the monthly number of new dwelling authorizations issued.



**New Zealand monthly new dwelling consents (Dec. 2004 – Feb. 2010)**

In January 2009, just 812 new dwelling units were authorized, the lowest monthly total since records began in 1965. This was a 73 percent decline from the highest recorded level of authorizations in March 2005. Notably, however, there has been significant rebound from this low point in subsequent months.

Source: FAO (2010c).

The envisaged protracted economic downturn also affects inflows of external resources. The 2008/2009 crisis in financial markets has already led to a contraction in FDI, which remains subdued in the context of tighter financial regulations and reduced demand for goods and services. A low growth 'bust' scenario would foresee increasing unemployment forcing many migrant workers to return to their home countries. While this might create a short-term spurt in foreign exchange flows as savings are repatriated, remittances would decline significantly in subsequent years.

More subtle impacts of persistent economic stagnation might also be predicted. A protracted global recession might reinforce the voice of protectionism, putting globalization into reverse.

Although almost all countries are in principle committed to avoidance, protectionism in more subtle ways could emerge. This would have negative impacts on trade-dependent Asia-Pacific economies, significantly reducing their growth rates.

Stagnation and deceleration of growth would be likely to exacerbate ecological and social problems. While reductions in global demand for natural resources might have some positive impacts by reducing the pace of exploitation, several countries dependent on export of industrial products and services could experience severe impacts. As employment in manufacturing and services shrinks, pressure on land and other natural resources would increase, leading to unsustainable management. In some countries, people who have moved to urban areas for employment may be forced back to their rural homelands and into subsistence or semi-subsistence livelihoods, thereby aggravating land-use pressures. This would particularly be the case in countries where degradation of land and forests is already a major problem and population densities are high. With population increases and potential adverse impacts of climate change, the pace of degradation could be expected to accelerate, reducing productivity and increasing poverty and ecological stresses including loss of biodiversity and inadequacy of water supplies.

The 'bust' scenario would foresee key institutions including governments unable to stem the decline, especially in view of diminished government budget resources. Social conflicts could become pervasive in the context of the emergence of extremist political and religious movements taking advantage of widespread disillusionment.

The impacts of the downturn will to some extent depend on the effectiveness of countermeasures adopted by governments. While some countries are able to implement economic stimulus packages and could accelerate domestic demand and growth, this option is not available to many – especially less developed countries – whose domestic economic situations will remain unfavourable. Access to international assistance also remains problematic in the context of an overall decline in most developed economies, which have been the traditional source of development assistance.

The low growth and stagnation scenario will impact country groups in different ways as outlined below (**Table 5.3**).

**Table 5.3. Implications of the low growth and stagnation scenario**

Country cluster	Overall impacts
<b>Low-income economies with limited natural resources</b>	<ul style="list-style-type: none"> <li>• Demand for labour-intensive products and services from the middle-income/emerging/developed economies declines significantly affecting employment and income.</li> <li>• A large segment of the economy – mainly focused on subsistence consumption – remains isolated from the economic downturn.</li> <li>• Increasing populations and low levels of technology imply intense pressure on natural resources, especially land and forests.</li> <li>• Returning migrant workers and reduced inflow of remittances affect incomes and increase unemployment, with repercussions on land use.</li> </ul>

<b>Low-income natural resource-rich economies</b>	<ul style="list-style-type: none"> <li>• Reduced demand for products and services by middle-income/emerging/developed economies and consequent scaling down of exploitation of natural resources.</li> <li>• Lower incomes affecting the ability of society to invest in human and physical capital.</li> <li>• Land-use changes, especially on account of the growth of subsistence agriculture.</li> </ul>
<b>Middle-income/emerging economies</b>	<ul style="list-style-type: none"> <li>• Drastic reduction in the growth of manufacturing and services sectors, increasing the pressure on land and forests.</li> <li>• Poverty reduction through trickle-down effects ceases; numbers in the middle classes decline. This significantly affects the nature of demand for goods and services and ecosystem services become less of a priority.</li> <li>• Reduced prices for fossil fuels affect investments in alternative energy sources.</li> <li>• Investments in science and technology decline, affecting long-term prospects for improving production and processing.</li> </ul>
<b>Developed economies</b>	<ul style="list-style-type: none"> <li>• Significant reductions in consumption affecting demand for products and services.</li> <li>• Rapid increases in unemployment.</li> <li>• Reduced willingness to pay for ecosystem services.</li> <li>• Emergence of protectionist tendencies.</li> <li>• Reduced ability to provide development assistance/FDI to the low-income/middle-income/emerging economies.</li> </ul>
<b>Small island countries</b>	<ul style="list-style-type: none"> <li>• Declining tourism and remittances and increased economic vulnerability of small island economies</li> </ul>

### **Social and ecological stability: the 'green economy' scenario**

The economic downturn has helped to promote a rethinking of the development paths currently being pursued. Awareness of climate change and other environmental problems such as loss of biodiversity, land degradation and desertification, and declining water supplies are supporting articulation of ideas for development paths that are more sustainable, both ecologically and socially. There is increasing realization that the economic downturn is not merely a problem of lax regulation in financial markets, but also stems from failures to understand the ecological limits to current growth-focused and consumption-driven development. Efforts at various levels, often pioneered by local communities and civil society organizations, are providing 'green economy' models that are more focused on social and environmental values. A plethora of these efforts could coalesce into momentum for a major shift onto more sustainable development paths, as indicated below:

A 'green economy' scenario unfolding at a regional level would entail a major shift in the policy directions, attitudes and values that currently prevail throughout the region. Thus, to a large extent it provides an alternative target, rather than one of the more probable pathways to 2020. Under a 'green economy' scenario countries would embark on major policy and institutional reforms to provide stable social and political environments, providing equal opportunities and removing various inequities. 'Level playing fields' and transparent administration would provide the greatest opportunities for all citizens. Well-designed decentralization and devolution policies would enhance local community involvement in management of resources. Environment and energy policies and regulations – coupled with increased investments in renewable energy technologies

– would make solar, wind and biomass energy competitive with fossil fuels, thereby encouraging substantial energy switching. Wood and forest biomass would become important sources of energy as use efficiency improves (including through small-scale gasification plants) and second generation cellulosic biofuel production. Recycling technologies would significantly reduce raw material requirements for manufacturing. Energy-intensive products would be phased out and there would be much greater emphasis on using natural materials such as wood. This trend would be supported by adherence to, for example, green building standards. Considering the global nature of the challenges, instead of using technologies to maintain and improve competitiveness, countries would adopt open policies to share available technologies.

A 'green economy' scenario would envisage efforts at various levels, especially at the community level, to improve land and water management, improve productivity and conserve biological diversity. Water-scarce countries and regions would invest substantially in water conservation and rainwater harvesting. Mixed cropping systems, including agroforestry, would help to diversify production and increase stability in the context of potential climate change impacts.

Although the most recent negotiations (COP 15) did not produce any legally binding climate change agreement, a 'green economy' scenario would anticipate that future negotiations will lead to well-defined policies and action plans at international and national levels to reduce greenhouse gas emissions. Rather than pursuing low-cost, less effective options, countries would agree to significantly reduce emissions particularly focusing on the sectors and industries responsible for the largest emissions. At present, climate change and incontrovertible evidence – and acceptance – of a need for drastic change in current economic systems, seems the most likely driver that would push the Asia-Pacific region, along with the rest of the world, onto a 'green economy' pathway.

There would be some negative impacts associated with a shift to 'green economy' scenarios. For many industries, the costs of production would rise and force up overall costs of goods and services to consumers. This could be expected to have most severe impacts on the poor. There would be undoubted wealth redistribution impacts – among individuals and probably among countries – with more wealthy countries, with access to better technologies, likely winners. A 'green economy' scenario would anticipate the rise of numerous new green industries, which would provide some economic stimulus; however, the more regulated industrial environment that would surely prevail under such a scenario would almost certainly have negative impacts on global productivity and overall welfare. Consequently, there is significant reluctance by individual countries to move rapidly onto 'green economy' pathways, because such pathways will likely compromise at least short-term industrial competitiveness. In the absence of a catastrophic driver, incremental progress, with countries moving in a gradual and harmonized fashion towards greener pathways, seems the most likely outcome.

There are already some efforts to pursue green pathways especially in the context of the current economic crisis. A number of Asia-Pacific economies are already investing substantial resources in renewable technologies and improving material-use efficiency to move onto low-carbon growth paths (**Box 5.4**).

**Box 5.4****'Green economy' initiatives in the Asia-Pacific region**

- Several Asia-Pacific countries are making efforts to develop as green economies, giving particular attention to developing renewable energy. China, Japan and ROK have already initiated multibillion dollar investment programmes for clean energy including smart grids. A number of countries are in the process of developing emission regulations, including carbon markets through regional, federal and voluntary initiatives. Rapidly mounting concerns over global climate change, volatile fossil fuel prices and the recent economic crisis have been the main factors encouraging the pursuit of green paths. With a total installed capacity of 11-12.5 GW in 2008, China has become the regional leader in wind power. China has also become the world's largest photovoltaic (PV) manufacturer, with 95 percent of its production destined for the export market. In 2008, China added around 800 MW of biomass power-generating capacity, bringing the total installed capacity for agriculture waste-fired power plants to 2.88 GW.
- In India, the largest portion of new energy investment is currently in the wind sector, which grew 17 percent to US\$2.6 billion in 2008. A supportive policy environment stimulated growth in solar investments; from US\$18 million in 2007 to US\$347 million in 2008. The National Solar Mission envisages a target of 20 GW of solar generation capacity by 2020. Small-scale hydropower is another thrust area; small-scale hydropower investment grew nearly four-fold, to US\$543 million in 2008.
- Japan is also increasing investment in renewable energy. At the end of 2008, the country launched a US\$9 billion subsidy package for solar roofs, granting US\$785/kW for rooftop PV installation. Geothermal energy is also receiving increased attention and in early 2009, plans for a 60 MW geothermal plant were announced.
- ROK used the economic crisis to devise one the world's 'greenest' stimulus packages, one intended to stimulate job creation through green growth. Eighty percent of the initial overall US\$38 billion was dedicated to environmental measures. Of this, US\$7.7 billion is earmarked for clean energy, with improvements in efficiency as the main thrust. In mid-2009, an additional US\$85 billion was provided to encourage the growth of green industries and technologies over the next five years (Mee-young 2009).
- Australia has established a US\$436 million Renewable Energy Fund to accelerate development of renewable energy with particular focus on geothermal and wind energy. By 2030, geothermal energy is expected to provide about 7 percent of the country's baseload power, while wind energy will account for the 2020 target of 20 percent renewable energy.
- Other Asian countries, including the Philippines, Thailand and Malaysia, are taking steps to green their economies. In late 2008, the Philippines Government signed a new Renewable Energy Law, offering specific incentives (mainly tax breaks) for renewable energy generation. Thailand and Malaysia have discussed the introduction of renewable energy legislation. Some countries are also planning biofuel-blending mandates, similar to those introduced by the Philippines in 2007, and subsequently by Thailand.
- In the Pacific, Tuvalu has committed to becoming the world's first country to obtain 100 percent of its electricity from renewable sources by 2020. It is estimated that the programme will cost US\$20 million and will be based on solar and wind power.
- The drivers that have stimulated investment in the sustainable energy sector and in promoting more green economies throughout recent years are still in motion, including concern over global climate change, energy insecurity, and fossil fuel depletion as well as the advent of new technologies. Additionally, there is significant demand for clean energy based on mandates such as feed-in tariffs, renewable portfolio standards, renewable fuel standards, building codes and efficiency regulations. Clean energy also offers strong economic returns in some markets, particularly green jobs, even during periods of lower energy prices.

Source: UNEP SEFI and New Energy Finance (2009)



Depending on initial social, economic and environmental conditions, priorities and outcomes may vary among countries in each cluster and in different clusters. Particular areas where countries will apply emphasis to green efforts are listed below (**Table 5.4**).

**Table 5.4 'Green economy' scenario: areas for emphasis**

Country clusters	Areas for emphasis
<b>Low-income economies with limited natural resources</b>	<ul style="list-style-type: none"> <li>• Increased emphasis on resource conservation and efficiency-enhancing alternatives with particular focus on water and soil conservation.</li> <li>• Rehabilitation of degraded lands.</li> <li>• Simple and affordable technologies for improving efficiency of energy use.</li> <li>• Improvement of policy and institutional environment to strengthen governance.</li> <li>• Thrust on creation of green jobs to improve the natural resource asset base.</li> </ul>
<b>Low-income natural resource-rich economies</b>	<ul style="list-style-type: none"> <li>• Improved land-use planning to ensure the sustainability of resource use.</li> <li>• Wider application of sustainable forest management including reduced impact logging, certification, etc.</li> <li>• Resource-use governance improved to enhance equity and sustainability.</li> </ul>
<b>Middle-income/emerging economies</b>	<ul style="list-style-type: none"> <li>• Increased focus on improvement in efficiency of energy and resource use.</li> <li>• Thrust on recycling.</li> <li>• Substantial increase in investments in green technologies, especially renewable energy.</li> <li>• Stabilization and reduction in per capita carbon emissions.</li> </ul>
<b>Developed economies</b>	<ul style="list-style-type: none"> <li>• Increased investments in green technologies, including renewable energy sources and a significant reduction in the use of fossil fuels.</li> <li>• Significant reduction in per capita carbon emissions.</li> <li>• Greater interest in paying for ecosystem services produced in developing countries.</li> </ul>
<b>Small island countries</b>	<ul style="list-style-type: none"> <li>• Development of economies based on recycling and renewable energy.</li> <li>• Pilot exemplars of green economy.</li> <li>• Shift to green tourism ensuring long-term sustainability.</li> <li>• Climate change adaptation.</li> </ul>

## THE LIKELY SITUATION

While these three scenarios provide a picture of the possible, but divergent, paths of development, the enormous social, economic, political and institutional diversity in the region implies that what actually emerges will most likely be a mix of the three scenarios, depending on the policies pursued at the local, national and international levels. The overall situation in the region till 2020 could be:

- Most middle-income and emerging economies are likely to pursue the high growth scenario. Political and institutional conditions will encourage adoption of this path, except in the context of catastrophic problems (including a prolonged global recession or climate change-related events). However, some efforts will be made to develop green energy, especially in the context of increasing costs of fossil fuels and growing concern about energy security.
- Resource-rich low-income countries are likely to grow rapidly, taking advantage of the demand for raw materials from emerging economies. Given the thrust on rapid growth and natural resource exploitation, sustainability is unlikely to receive much attention, especially in those countries with inadequately developed policies and institutions.
- Low-income resource-poor countries (and poor regions within countries) are likely to face considerable challenges, with the likelihood of maintaining a low growth and stagnation

scenario, especially if there are no efforts to improve human resources and infrastructure. Continued growth of the global economy will provide some respite through migration and remittances and demand for labour-intensive products. This may reduce the pressures on land and other resources in some areas. A prolonged contraction of the global economy will have opposite impacts, aggravating unsustainable exploitation and use of natural resources (including land, water and forests).

- Most developed economies are likely to remain in a low growth (or even a stagnation) scenario, based on increasingly competitive global markets where countries with low labour costs accrue increased comparative advantage. However, in view of well-developed policy and institutional frameworks and capacities to invest in science and technology, there will be greater efforts to shift to a 'green economy' scenario.
- Small island countries will have fluctuating fortunes. While continued rapid growth of the global economy will keep the tourism sector vibrant, declining fisheries and absence of scale economies in other sectors may narrow their economic bases. Some may face an existential challenge in the context of climate change-linked sea level rise. A global economic decline implies a significant reduction in tourism with attendant consequences on economies.

The unfolding of the different scenarios will have important implications on the forest sector, as outlined in the next chapter.

# 6 THE ASIA-PACIFIC FOREST SECTOR IN 2020

The overall forestry situation in the Asia-Pacific region in 2020 will be determined by the dominant scenario that unfolds in the various clusters of countries. Although the region will continue to grow rapidly – probably at a slower rate than in the past, but still substantially faster than other global regions – there will be significant differences between countries on account of differences in initial conditions, differences in paths of development and differing interactions among countries. Emerging economies, especially China and India, will provide substantial momentum for growth. The huge populations involved and surging demand for forest products will remain the major factors impacting forests and forestry in the region. On the other hand there will be some countries that remain on a ‘low growth path’ on account of internal and external factors.

This chapter provides an overview of what is likely to happen to forests and forestry in the period to 2020. The principal assumption is that economic recovery in the region is rapid and robust; i.e., that the high economic growth and recovery ‘boom’ scenario will prevail during the forthcoming decade. At the time of publication (May 2010) many indicators are showing promising, though sometimes fragile, signs of recovery and the majority sentiment among economic commentators – though by no means unanimous – is of cautious optimism in regard to medium- and longer-run economic prospects (**Box 6.1**).

## Box 6.1

### World Bank ‘Global Economic Prospects 2010’

The World Bank’s ‘Global Economic Prospects 2010’ report published in January 2010 summarizes the world economic outlook for the short and medium term. Some key features include:

- The acute phase of the global crisis is over.
- Overall, after falling for two to three quarters, global GDP has begun recovering; output grew rapidly during the second half of 2009 and is expected to continue to do so during the first half of 2010... global GDP growth, which is projected to come in at 2.7 percent in 2010 (after an unprecedented 2.2 percent decline in 2009), is expected to accelerate only modestly to 3.2 percent in 2011.
- Combined, GDP growth in developing countries is projected to grow by some 5.2 percent in 2010, after a modest 1.2 percent rise in 2009 (-2.2 percent if India and China are excluded), and by a relatively weak 5.8 percent in 2011. Despite these relatively robust growth rates, the unusual depth of the recession will mean that spare capacity and unemployment will continue to plague economies in 2011 and some sectors may well still be shrinking.
- Over the medium term, international capital costs are going to be higher than they were during the boom period. As a result, developing-country growth potential will remain well below recent highs, which is likely to be a source of frustration for many countries. The rate of growth of potential output in developing countries may be reduced by between 0.2 and 0.7 percentage points annually over the next five to seven years as economies adjust to tighter financial conditions. Overall, the level of potential output in developing countries could be reduced by between 3.4 and 8 percent over the long run, compared with its pre-crisis path.

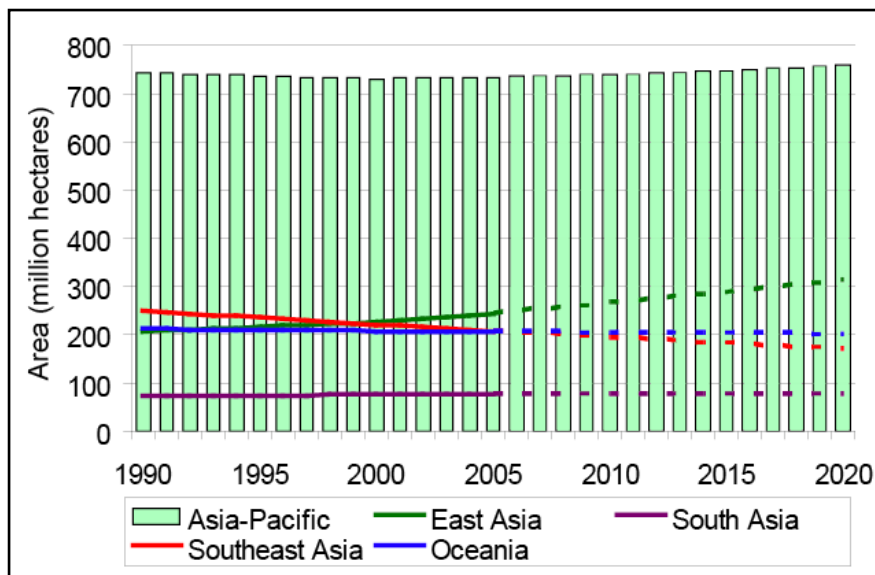
Source: World Bank (2010).

Consequently, the analysis in this chapter focuses primarily on a future that largely accords with a high *economic growth and recovery 'boom' scenario*. Implications under the alternative *low economic growth and stagnation 'bust' scenario* and *social and ecological stability 'green economy' scenario* are dealt with in lesser detail.

## FOREST AREA CHANGE

### Forest area change under the high growth 'boom' scenario

At the aggregate level, forests in the Asia-Pacific region are expanding (**Figure 6.1**), with forest area increasing, or stabilizing, largely on account of significant increases in afforestation and reforestation in China, India, Viet Nam and the Philippines. Rapid economic growth, dedicated policy measures, growing demand for forest products and, especially, ecosystem services are helping to bring about forest transition<sup>1</sup> in a number of countries. However, the overall statistics mask considerable losses of natural forests in several countries – especially in Southeast Asia and some of the Melanesian countries – as natural forests are cleared and converted to agriculture and other uses. The overall direction of changes in the various subregions is outlined below.



**Figure 6.1. Forest area change under the high growth scenario**  
Source: Løyche-Wilkie (2009).

### East Asia

East Asia comprises two developed economies (Japan and the Republic of Korea [ROK]), two middle-income, emerging economies (China and Mongolia) and the lower income, resource-constrained Democratic People's Republic of Korea (DPRK). In most countries, relatively high levels of income, declining importance of agriculture in income and employment and high or increasing levels of urbanization imply a continued decline in pressures on forest land. Policies and institutions are also better developed than in many other parts of the region and, in view of

<sup>1</sup>At its most basic, a forest transition is defined as a reversal in the forest cover trend (e.g. from negative to positive). However, qualitative aspects of change are also important and thus a transition from forest exploitation to sustainable management provides a more complete yet less easily measurable definition. In particular, forest transition in the Asia-Pacific region is used in the context of a transition in focus from exploitative uses towards greater focus on ecosystem services and other social and cultural values, as part of the broader socio-economic transitions occurring in the region.

relatively high incomes, society and governments are able to support substantive conservation efforts. East Asia is also experiencing greater emphasis on forest-derived environmental values, encouraging improved protection and management. While Mongolia and DPRK may face some further forest decline – in the context of both human and livestock pressures and natural events such as forest fires and pest incursions – forest area in East Asia will continue to increase, with most of the expansion taking place in China. China's emphasis on forest rehabilitation and enormous associated increases in forest area has dominated forest area statistics in the Asia-Pacific region during the past decade. Under a high growth scenario, forest area expansion in China can be expected to increase in accordance with national plans and, consequently, continue to drive expansions in forest area in the East Asian subregion and the overall Asia-Pacific region.

### **South Asia**

Most South Asian countries face severe resource constraints, primarily on account of high population densities, which are set to increase. Bhutan is exceptional in having a low population and a high proportion of forest area, although the scope for conversion to agriculture is limited on account of the difficult terrain and poor accessibility. As most of the forest area suitable for agriculture in South Asia has already been converted, further change is not expected on a large scale. Furthermore, there has been significant expansion in planting trees outside forests in recent times, especially through various agroforestry initiatives. This implies a future of relative stability in South Asian forest area, notwithstanding some forest clearance in the context of rapid expansions in mining and infrastructure development.

However, forest degradation will remain a major problem in South Asia, especially in view of widespread collection of woodfuel, fodder and other non-wood forest products (NWFPs). Many of these activities take place in the informal sector, which undermines the potential for implementation of sustainable management. Community management initiatives are attempting to provide a formal framework for forest management, but their effectiveness depends on significant institutional innovation, including improvements in technical and governance capacities at local levels and more equitable benefit-sharing arrangements.

A high economic growth scenario envisages increasing demand for forest products within the formal sector, but potential for reduced demand in the informal sector. With increasing potential for some 'formal' demand to be satisfied by imports, as well as prospects for greater investments in planted forests, the overall situation in regard to forest area – improvement or decline – will be dependent on which of these factors dominate. This will undoubtedly vary across countries and in different localities.

### **Southeast Asia**

The rapid growth of emerging and middle-income economies will continue to exert considerable pressure on forests in Southeast Asia, to supply food, fibre and fuel – particularly as growth begins to accelerate with economic recovery. Consequently, the pace of forest conversion witnessed in the past decade is likely to continue. This will present less densely populated forest-rich countries with opportunities to enhance incomes, resulting in continued forest degradation and clearance, including conversion of forests to plantations of rubber, oil-palm and other crops. Deforestation will be particularly severe in countries with limited policy and institutional capacities – for example Lao PDR, Cambodia and Myanmar – which are sandwiched by much larger, wood-importing economies including China, Thailand and Viet Nam. In low-income, forest-rich countries there will be some expansion of subsistence agriculture, but this will be of little significance in comparison with large-scale clearance for export-oriented cash crop production. In Indonesia, Malaysia and the Philippines, establishment of oil-palm, rubber and bioenergy crops is likely to continue to have significant impacts on forests and forest land, particularly under the high-growth scenario.

## Oceania

Overall change in forest area in Oceania will be determined by developments in the forested areas of developed economies – Australia (which dominates subregional forest resource statistics) and New Zealand – and the forest-rich developing countries in Melanesia, especially Fiji, Papua New Guinea (PNG), the Solomon Islands and Vanuatu. Low population densities, high levels of urbanization, well-developed policies and institutions and low dependence on agricultural expansion for economic growth ensures relative stability in forest area in Australia and New Zealand. This may fluctuate at the margins as the private sector (which manages most of the planted forests) responds to changes in profitability of alternative land uses. In Australia, droughts and forest wildfires also play a significant role in forest loss. In many island countries, particularly in forest-rich Melanesia, weak policies and institutions and poor governance have led to unsustainable management, including logging beyond sustainable limits, with resulting high rates of forest degradation and clearance.

Under a high growth scenario, demand for wood products may see accelerated logging in natural forests in Melanesian countries and, potentially in Australia. This could drive significant forest conversion and degradation. However, the dominant trend in Australia and New Zealand will more likely be acceleration in planted forest establishment and increased funding for protected area management. Economic growth would also have the potential to improve funding for forest rehabilitation programmes in Pacific Island Countries.

### Forest area change under the low growth and stagnation ‘bust’ scenario

In view of the complex interactions between growth, employment, consumption and land use, it is difficult to provide a clear indication of what may happen to forests in the context of a prolonged global recession. Often, change will depend on the relative strengths of income effects (reduced consumption as a result of reduced incomes) and substitution effects (shifts in consumption towards cheaper goods as a result of reduced incomes). Some likely changes are:

- Reduced incomes imply some reduction in demand for agricultural crops, including some plantation crops that are often grown after forest clearance. Substantial declines in prices of these commodities (notably oil-palm) could reduce the pace of forest conversion, especially in Southeast Asia and parts of Oceania.
- Reduced demand for forest products could also reduce logging in natural forests.
- On the other hand a slowing down of the global economy will reduce the demand for manufactured products and services and cause consequent increases in unemployment. In many countries, rapid growth in the manufacturing and services sectors has reduced dependency on land, helping in stability and recovery of forest area. A prolonged recession and stagnation could negatively affect the forest transition if people are forced back to rural areas and subsistence livelihoods although experience from the 1997/1998 Asian economic crisis suggested that return migration to rural areas did not result in accelerated deforestation.
- A prolonged recession could also reduce investments in forest management, including afforestation and reforestation efforts, by governments, the private sector and communities.

Thus while there may be some gains in certain localities and countries, there could be some losses elsewhere. The balance will largely be determined by policy pursued within forestry and other related sectors in the event of a prolonged downturn.

## Forest area change under the ‘green economy’ scenario

A ‘green economy’ scenario by definition encompasses greater attention to forest management and forest rehabilitation efforts. Consequently, under this scenario significant positive changes – in addition to those envisaged under the ‘boom’ scenario can be anticipated, while many negative impacts would be mitigated. For developing countries, the ‘green scenario’ would certainly anticipate successful and large-scale implementation of REDD. This would involve enormous changes in the way forestry is conducted in the region, although visible impacts in forests would be unlikely to become apparent until towards the end of the outlook horizon (2020; **Box 6.2**).

Box 6.2	Implications of REDD and REDD plus on forest area changes
<p>Reducing Emissions from Deforestation and Forest Degradation (REDD) is a potentially far-reaching development in post-Kyoto climate change arrangements that could have major impacts on forest clearance in developing countries. However, even with recent agreement on the significance of REDD in climate change strategies and the decision that REDD plus mechanisms should be immediately established (at COP 15 of the United Nations Framework Convention on Climate Change [UNFCCC] in December 2009), implementation requires a number of challenges be addressed:</p> <ul style="list-style-type: none"> <li>• A major technical challenge is determination of baseline emission levels and monitoring changes. In several countries with high deforestation rates, even basic inventory information is not available. Ramping up capacities to make countries ‘REDD-ready’ will take considerable time.</li> <li>• Most deforestation and forest degradation is taking place in countries with limited institutional capacities and poor governance. Bringing about necessary policy and institutional changes will take time and resources. Improvement in governance – a fundamental requirement – will be a major challenge in most countries where deforestation and forest degradation problems are severe.</li> </ul> <p>These issues will take considerable time and effort to overcome and, even if there is substantial international funding, which remains questionable, the likelihood of REDD making a significant impact on the ground by 2020 is rather limited. The experience of tapping the Clean Development Mechanism (CDM) for afforestation and reforestation, which is relatively less complex, suggests that REDD implementation will be an extremely slow process. Quite possibly, REDD may be a repeat of the experience of forest certification which, although initially aimed at addressing tropical deforestation, has been largely adopted in developed countries where deforestation is not a major issue and where standards of forest management are already high.</p>	

## IMPLEMENTATION OF SUSTAINABLE FOREST MANAGEMENT

### Sustainable forest management under the high growth ‘boom’ scenario

#### *Management of natural forests*

As indicated in Chapter 2, dependence on natural forests for wood production is declining in many countries, and for the whole region in general, due to various technical and economic reasons. Although multiple-use management for provision of a wide array of goods and services is an attractive concept, actual management tends to gravitate towards two extreme situations:

1. Where policy and institutional weaknesses persist, there is a strong tendency to log intensively, with very little consideration for sustainability of wood production or the provision of ecosystem services. In many countries, such uncontrolled logging has persisted, sometimes feeding the trade in illegally sourced wood and undermining the future economic viability of production forest management.

2. At the other extreme is a total ban on logging; ostensibly to enhance the provision of ecosystem services. In the context of increasing wood production from planted forests and technological advancements in wood processing, continued declines in managing natural forests for wood production are inevitable. With declining profitability, there is also a tendency to reduce investments in management. However, halting logging as a means of enhancing delivery of ecosystem services does not always halt the conversion of such forests. For example, large tracts of natural forests have continued to be cleared for cultivation of rubber and oil-palm or mining and infrastructural development, despite protection from logging.

Under a 'boom' scenario, increased demand for wood products can be expected to drive an acceleration in logging in both planted forests and natural forests. To this extent, where regulation is weak, economic growth and recovery will have detrimental impacts on natural forests and exacerbate the effects of poor forest management. On the other hand, as economic development reaches certain threshold points, trends in forest degradation tend to be reversed and economic growth begins to promote improved forest management. Experiences in China, where economic development has enabled reversals in severe deforestation and forest degradation trends, could provide a model for forest rehabilitation in other emerging economies and potentially some low-income countries.

### **Planted forests**

The Asia-Pacific region has been in the global forefront of forest plantation establishment during the past several decades, with countries such as China (1<sup>st</sup>), Japan (4<sup>th</sup>), Indonesia (7<sup>th</sup>), India (8<sup>th</sup>), Thailand (9<sup>th</sup>) and Viet Nam (10<sup>th</sup>) having among the world's largest national plantation estates. However, this trend may not persist given that forest plantation industries are mature and stabilizing in many of the countries that have invested heavily in plantation development. For example, in New Zealand (15<sup>th</sup> in the world list) there has been a marked decline in new planting in recent times, down from peaks of almost 100 000 hectares *per annum* in the mid-1990s, to just over 2 000 hectares *per annum* in 2007 (**Box 6.3**). Most planting in New Zealand is presently reforestation of harvested areas and there is very little increase in the net planted area.

Box 6.3	Economic viability of forest plantations in New Zealand
<p>Reductions in new planting rates and in the proportions of forest plantations subject to pruning and thinning have occurred in New Zealand in recent times. In general, these reductions reflect low returns to plantation forestry in the past decade, allied with increasing importance of reconstituted board products (especially MDF) relative to sawntimber. A notable trend is that, during the past five years, some areas of planted production forests have been converted to pasture, reflecting very high returns in dairy farming compared with forestry.</p> <p>Source: FAO (2010c).</p>	

A 'boom' scenario would most likely lead to an acceleration in forest plantation establishment, though in countries where planting is dominated by the private sector, this will be partially dependent on the perceived relative competitiveness of planted forestry *vis-à-vis* other potential land uses. Growth in populations and incomes will also increase demands for food – including demand for extensively-farmed beef and lamb. This is likely to intensify competition for land and water in more densely populated countries and affect the scope for expansion of plantations. Where land productivity is high, forest plantations will have to compete with more remunerative crops including oil-palm and intensive agricultural crops as well as dairying. Countries such as



China and India, where significant plantation expansion took place in the last decade, could also witness some leveling off, especially as availability of suitable land for afforestation declines. This will be particularly significant for large-scale industrial plantations.

Contract tree farming, whereby forestry companies commission smallholders to grow trees, is an alternative option being pursued in some countries to overcome land constraints. Some scope also exists for plantations to be expanded onto degraded lands including, for example, large tracts of *Imperata* grasslands in Southeast Asia. However, the costs of managing forest plantations in such areas tend to be substantial. Degraded areas in more densely populated countries (for example India) are also often used by local communities to meet basic needs for woodfuel, fodder, NWFPs and so forth. Expansion of forest plantations into such areas will have to first address potential negative impacts on the welfare of local communities.

With the exception of a few countries, plantation productivity remains far below potential. Public sector plantations are particularly prone to poor management and low productivity, largely stemming from institutional problems. Although substantial work has been done on productivity-enhancing technologies – including tree improvement, management of pests and diseases, silvicultural regimes and maintaining site productivity – there are considerable gaps in application of research in the field. Managing existing plantations more intensively to enhance productivity will be a better and more appropriate option than merely expanding plantation areas. This is most likely to occur under a high growth scenario where higher returns to forest growers are likely to encourage improved silviculture and tending regimes.

### **Sustainable forest management under alternative scenarios**

Under a low growth ‘bust’ scenario, lower demand for industrial wood products is likely to reduce harvesting pressure in natural forests while also reducing incentives for plantation establishment. Fewer resources will also be available to improve forest management and thresholds at which resources become available to improve forest management will be reached more slowly. Under such circumstances, forest management will be likely to stagnate, along with many other economic sectors.

Under a ‘green’ economy scenario, forest management will receive significantly increased attention. Forest management regulation and enforcement would be tightened and greater funding would be forthcoming for various management interventions. Planted forests could be expected to expand, especially in response to vigorous carbon markets, although some of the criticisms of planted forests in terms of their limited biodiversity, common association with clear-felling and other unpopular management practices may need to be further addressed.

## **DEMAND AND SUPPLY FOR WOOD AND WOOD PRODUCTS**

Supply and demand of wood products is one of the more quantifiable aspects of forestry and a variety of global-scale models have been developed to investigate these, including a suite of models developed by FAO and used in this analysis. Projections have been prepared based on statistical analysis and modeling of historical forest product production and consumption data as a means of describing the possible future situation for different products under a defined set of parameters (Jonsson and Whiteman 2008). Forecasts assume continuation of growth on the basis of trends in evidence prior to the 2008/2009 economic crisis. The projections do not take into account the effects of the recent downturn, but could be realized if the current economic rebound is strongly sustained. Consequently, the modeled results approximate a very robust *high economic growth and recovery ‘boom’ scenario*. The forecasts are based on multiple linear regression and, as such, are largely dependent on historical production data. Subsequent

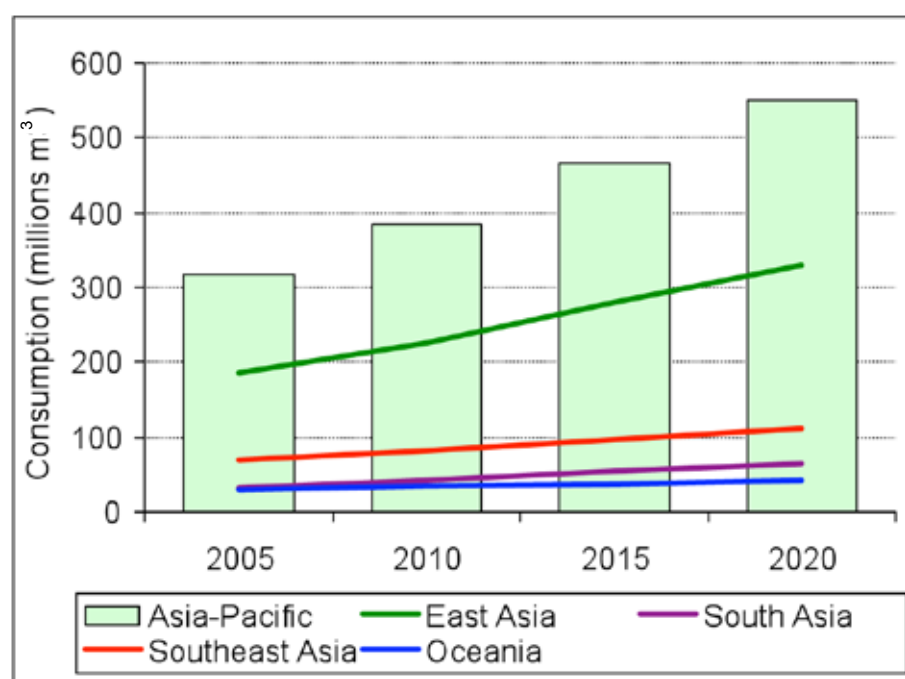
structural changes in many variables including forest depletion, policies and governance are not accounted for. Consequently the projections are aimed at providing a broad sense of production and consumption for different products and subregions to 2020 as a point of departure for policy discussions.

### Demand for wood and wood products under the high growth 'boom' scenario

Under the high growth scenario, demand for wood and all wood products is expected to increase significantly.

#### Industrial roundwood

Overall consumption of industrial roundwood in the Asia-Pacific region, taking into account demand for various processed products, is projected to increase from about 317 million m<sup>3</sup> in 2005 to nearly 550 million m<sup>3</sup> in 2020 (**Figure 6.2**), an increase of about 232 million m<sup>3</sup>. There will be significant subregional differences as outlined below.



**Figure 6.2. Forecasts of industrial roundwood consumption, 2005-2020**

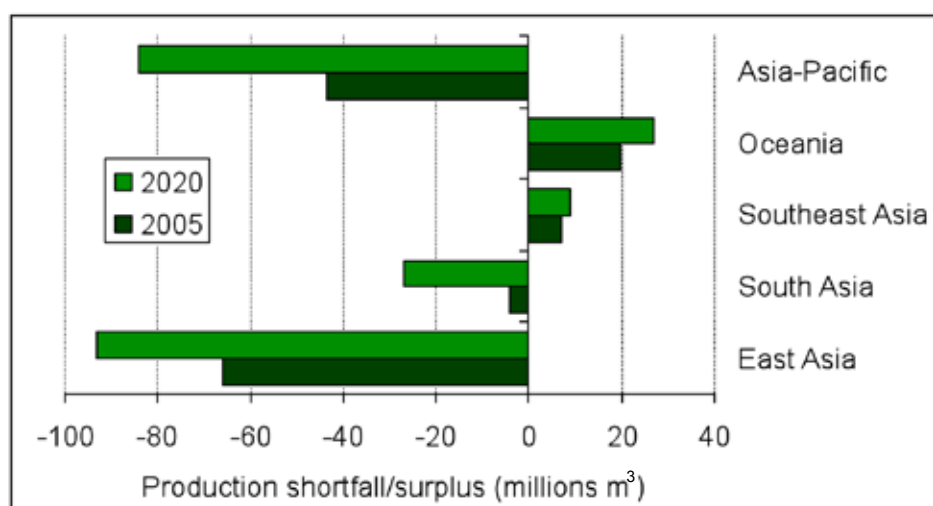
Source: Jonsson and Whiteman (2008).

- In East Asia, industrial roundwood consumption will increase from 185 million m<sup>3</sup> to 330 million m<sup>3</sup>. East Asia will account for most of the region's increase in demand, with China's share of industrial roundwood reaching 80 percent of the East Asian subregion's consumption. Japan, the other major consumer of industrial roundwood in the subregion, will reduce consumption from about 51 million m<sup>3</sup> in 2005 to about 49 million m<sup>3</sup> in 2020.
- Southeast Asia will continue to be a large industrial roundwood producing and consuming subregion, with industrial roundwood consumption predicted to increase from about 69 million m<sup>3</sup> in 2005 to about 112 million m<sup>3</sup> in 2020. Much of this increase will be accounted for by Indonesia, in view of internal increases in population and incomes. Malaysia, Thailand and Viet Nam will also witness significant increases in consumption.
- South Asia will experience an increase in industrial roundwood consumption of 62 percent between 2005 and 2020. The subregion's annual consumption will reach 66 million m<sup>3</sup> by 2020. Over 80 percent of total South Asian consumption will be accounted for by India.

- Oceania's consumption of industrial roundwood will register a modest increase of 11 million m<sup>3</sup>, reaching a total consumption of 41 million m<sup>3</sup> by 2020. More than 90 percent of consumption will be accounted for by Australia and New Zealand.

In many cases, increased consumption of industrial roundwood will be directed towards manufacture of wood products destined for sale in export markets, including some substitution of products currently produced in other regions.

While future demand can be estimated based on parameters such as population, income and price elasticity, there are significant difficulties in projecting levels of production, including predicting future relative prices for various forest products and for substitute commodities. The following analysis estimates future production by projecting past trends in the gaps between production and consumption (**Figure 6.3**). Notwithstanding some of the inherent problems relating to reliability of data, this gives a broad indication of emerging gaps in the various subregions.



**Figure 6.3. Industrial roundwood: changes in production shortfalls and surpluses**

Source: Jonsson and Whiteman (2008).

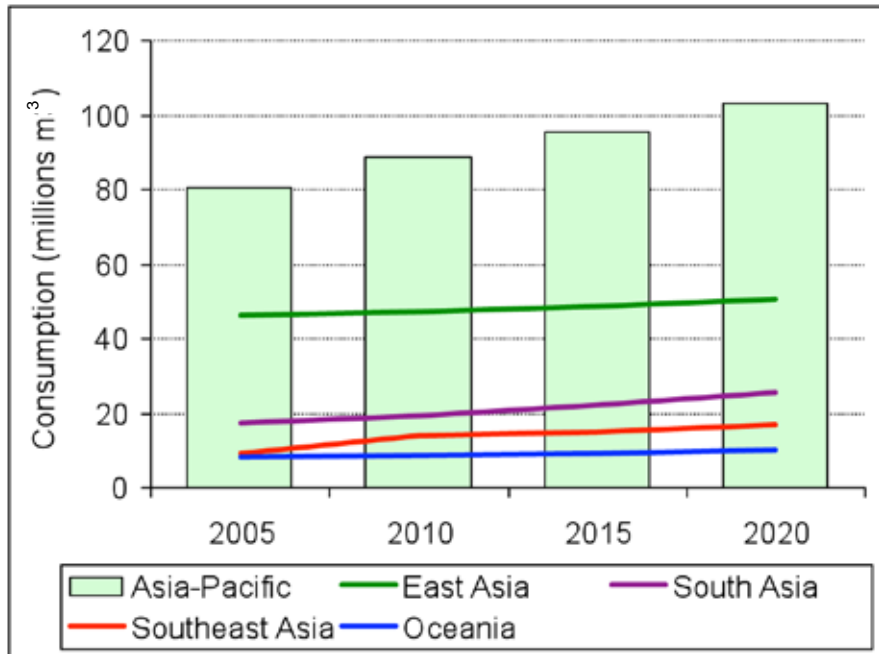
One of the most obvious trends, at the regional level, is a growing gap between consumption and production of industrial roundwood, which will increase from 44 million m<sup>3</sup> in 2005 to 84 million m<sup>3</sup> in 2020. This is mainly due to an increasing supply deficit in East Asia and South Asia, largely accounted for by China, Japan and India. Oceania will increase its industrial roundwood production surplus as a result of increasing plantation harvests in Australia and New Zealand. In Southeast Asia there is projected to be a marginal increase in the industrial roundwood surplus although diminishing supplies from natural forests may preclude this development.

As a consequence of the increasing supply gap, the region's dependence on imports will increase markedly, notwithstanding a significant expansion in wood production from planted forests.

### **Sawnwood**

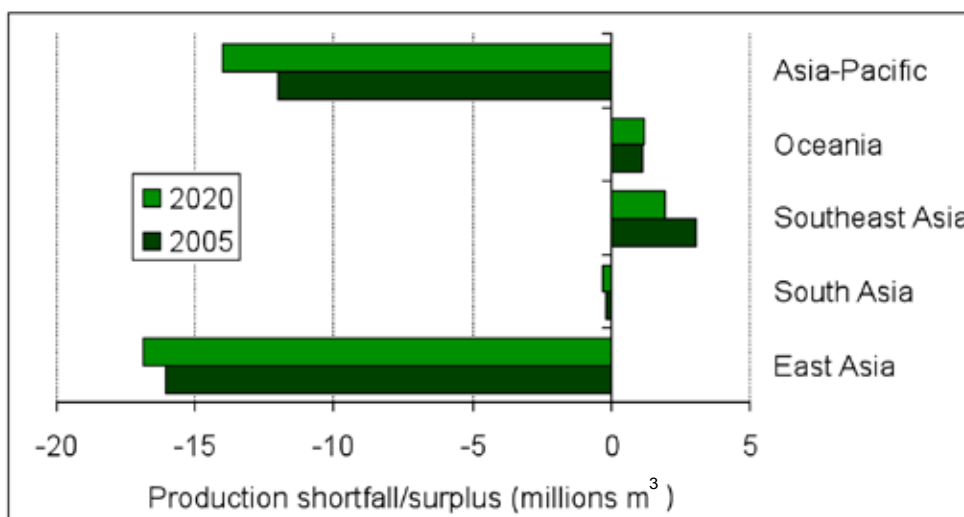
Demand for sawnwood is projected to increase from about 81 million m<sup>3</sup> in 2005 to about 103 million m<sup>3</sup> in 2020, with most of the increase taking place in South Asia and Southeast Asia (**Figure 6.4**). In East Asia and Oceania, sawnwood consumption is projected to increase only

marginally. However, data deficiencies make it difficult to draw definitive conclusions. As in the case of industrial roundwood production and consumption, a significant share of sawnwood production goes unreported in official statistics, especially in view of the preponderance of small and medium enterprises that largely operate in the informal sector.



**Figure 6.4. Sawnwood demand, 2005-2020**  
Source: Jonsson and Whiteman (2008).

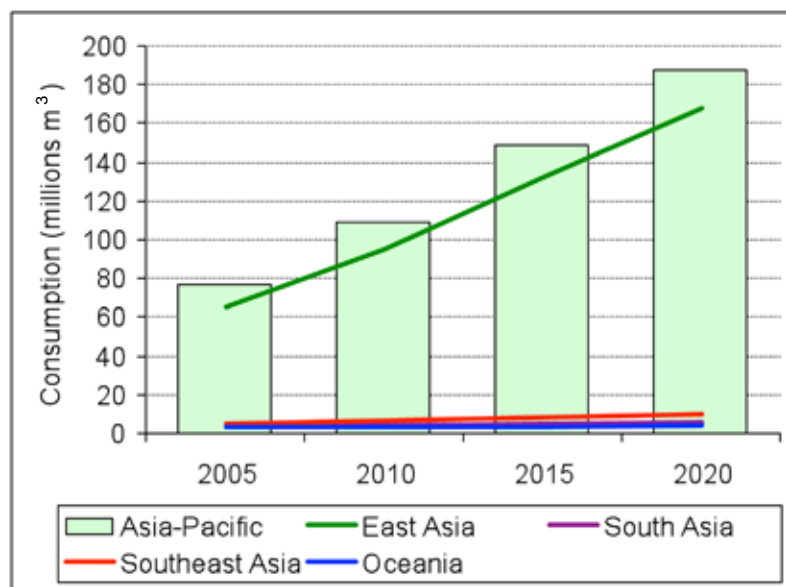
On the whole, production of sawnwood will fall significantly short of consumption (**Figure 6.5**). Projections of historical trends in sawnwood production indicate an increase in production from about 69 million m<sup>3</sup> in 2005, to 89 million m<sup>3</sup> in 2020. East Asia accounts for the most of the production shortfall in both 2005 and 2020. China and Japan have the highest deficits between production and consumption, while New Zealand, Malaysia and Indonesia will remain significant surplus producers of sawnwood. However, the East Asian sawnwood deficit far exceeds production surpluses in Southeast Asia and Oceania and hence the Asia-Pacific region will remain a net importer of sawnwood.



**Figure 6.5. Sawnwood: changes in production shortfalls and surpluses**  
Source: Jonsson and Whiteman (2008).

### Wood-based panels

The wood-based panel segment of forest product markets has witnessed unprecedented production and consumption growth in recent years, and is poised to further expand rapidly in the future. Panel consumption is projected to increase from about 77 million m<sup>3</sup> in 2005 to about 188 million m<sup>3</sup> in 2020 (**Figure 6.6**), with about 90 percent of the predicted increase taking place in China.



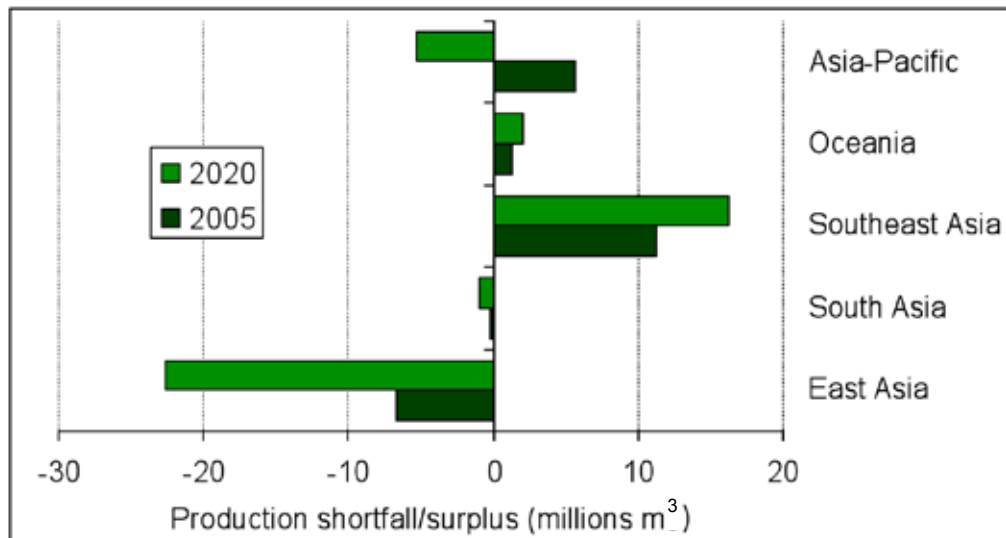
**Figure 6.6. Wood-based panel consumption in the Asia-Pacific region, 2005-2020**  
Source: Jonsson and Whiteman (2008).

However, while this analysis provides an overall indication of future demand for panel products, caution has to be exercised in view of potential inaccuracies stemming from production and consumption data (**Box 6.4**).

Box 6.4	Inconsistencies in demand projections for wood-based panels in India
<p>Projecting historical trends in demand for wood-based panels in India indicates consumption growth from 2.6 million m<sup>3</sup> in 2005 to about 4.1 million m<sup>3</sup> in 2020. This equates to an increase of about 58 percent over a period of 15 years, during which time, the population will increase from about 1.1 billion people to about 1.4 billion people. At the same time, incomes will also increase and rapid growth of construction is anticipated.</p> <p>However, it is likely that there is considerable under-reporting of past and current wood-panel consumption, which leads most forecasting models to underestimate future consumption. A Government of India study (Government of India, 1998 quoted in Pandey and Rangaraju 2008) forecast that demand for wood-based panels would increase to 14.7 million m<sup>3</sup> in 2005 and 30.5 million m<sup>3</sup> in 2020. This is almost ten times that estimated by FAO on the basis of past trends and official statistics.</p> <p>Source: Pandey and Rangaraju (2008).</p>	

While inaccuracies associated with weak baseline information are serious, an indisputable fact is that demand for panel products is growing rapidly. While China has become the lead consumer of panel products, significant increases in demand should also be expected in India and Indonesia, most likely much greater than indicated by the forecasts. Currently Southeast Asia produces a much greater volume of panel products than it consumes, while statistics reported in 2005 indicated that East Asia's production was inadequate to meet the subregion's consumption (although this figure includes the very significant volumes of wood-based panels that are eventually exported from

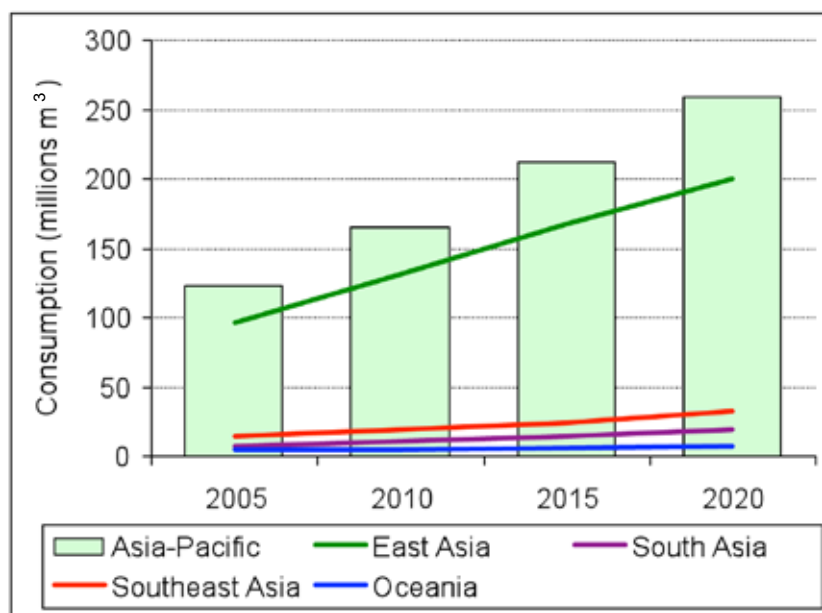
East Asia as finished products). However, wood-based panel capacity expansion in East Asia since 2005 already suggests major producer reaction to supply shortfalls, while declining wood supplies in Southeast Asia may inhibit the projected expansion of the subregion's surplus. As such there is considered to be great scope for significant reallocation of wood-based panel capacity between subregions.



**Figure 6.7. Wood-based panels: changes in production shortfalls and surpluses**  
Source: Jonsson and Whiteman (2008).

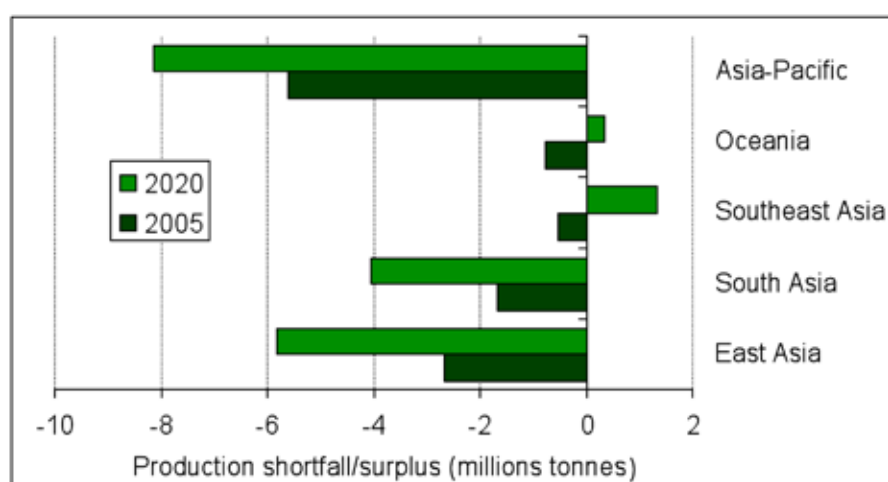
### ***Paper and paper board***

If past trends are maintained, consumption of paper and paper board will grow rapidly, with the emerging economies accounting for most of the increase (**Figure 6.8**). Paper and paper board consumption is projected to increase from about 123 million tonnes in 2005, to 259 million tonnes by 2020. The largest increase will be in China, (increase estimated to be about 96 million tonnes), followed by India and Indonesia.



**Figure 6.8. Forecasts of paper and paper board consumption, 2005-2020**  
Source: Jonsson and Whiteman (2008).

There is considerable uncertainty over future demand for paper and paper board, which is highly sensitive to changes in income and changes in information technology. Emerging economies in the Asia-Pacific region have very low levels of per capita consumption. As income and educational levels increase and trade-related consumption of packaging materials grow, paper and paper board consumption can be expected to grow. However, technological change could act to reduce consumption, especially in relation to the growth of electronic media. Newsprint consumption is already being particularly affected by this. Increased attention to recycling could also significantly deflect pulpwood consumption growth trends. The region's production shortfall in 2020 could also be significantly reduced by rapid increases in pulp and paper manufacturing capacities and recent data suggest that increases in capacity in China are already having such an effect (**Figure 6.9**).



**Figure 6.9. Paper and paper board: changes in production shortfalls and surpluses**

Source: Jonsson and Whiteman (2008).

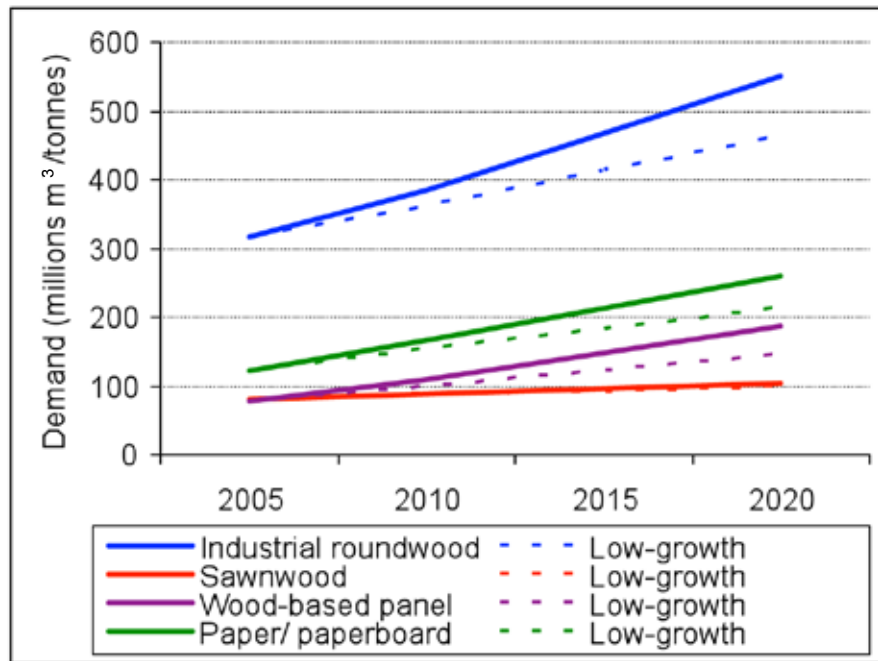
### **Demand for wood and wood products under the low growth and stagnation 'bust' scenario**

The forecasts of demand for wood and wood products estimated above assume continuation, to 2020, of high economic growth rates achieved in many Asia-Pacific economies during the past two decades. However, potential economic stagnation and slow recovery, including in developed economies outside the region, would impact on Asia-Pacific's demand for wood and wood products, as indicated below.

- Most Asia-Pacific economies have witnessed rapid growth in investments in housing and other building construction. An overall economic deceleration would likely reduce demand for sawnwood, panel products and other wood-based construction materials, depending on the income elasticity of demand for new buildings and renovations, as well as changes in the relative prices of competing products.
- Capacity expansion in the paper and paper board sector could slow significantly, especially in relation to expectations of slow growth in demand and, perhaps even more importantly, falling credit availability. In some countries – those in Europe included – there is already excess capacity in the paper and paper board sector and this will dissuade further capacity expansion. Continued stagnation in the sector could see some plants forced into closure along with likely consolidation through mergers and acquisitions.
- Some Asia-Pacific countries have become major producers and exporters of wooden furniture, largely taking advantage of lower wage costs and outcompeting traditional furniture

producers, especially in Europe. A drastic contraction in the housing sectors of many countries has led to a decline in furniture demand precipitating closure of many production units. Uncertainty in housing sector revival will continue to hamper growth in the furniture sector. This will also have significant impacts on demand for sawnwood and panel products used in furniture manufacturing.

**Figure 6.10** indicates likely changes in consumption of forest products under a low growth scenario, in which economic growth rates are dampened by 25 percent.



**Figure 6.10. Demand for wood products under high growth and low growth scenarios, 2005-2020**

Source: Jonsson and Whiteman (2008).

If national economic growth rates were persistently 25 percent below those anticipated under a high growth scenario, a significant decline in demand and consumption of all forest products would result. For example, projected industrial roundwood consumption would shift downwards from 550 million m<sup>3</sup> in 2020 to 462 million m<sup>3</sup>. As the largest consumer of industrial roundwood, China would account for a major share of the reduction under the low growth 'bust' scenario. Under the lower growth scenario, consumption of wood-based panels and paper and paper board will decline by around 23 percent and 18 percent respectively, with most of the reduction accounted for by China. Sawnwood is the product for which consumption is least affected by a reduction in growth rates given that the most important constraints on sawnwood markets are falling supplies of larger logs and preferences moving towards manufactured board types.

While a number of assumptions underlie these projections, the 'boom and bust' scenarios provide some likely boundaries for increases in demand for wood and wood products over time. With the exception of sawnwood, the Asia-Pacific region's share in global wood product consumption is expected to increase considerably between 2005 and 2020, even under a low growth scenario (**Table 6.1**).



**Table 6.1. Asia-Pacific's share of wood and wood product consumption in global consumption**

Products	Share in 2005 (percent)	Share in 2020 (percent)	
		High growth scenario	Low growth scenario
Industrial roundwood	18	25	22
Sawnwood	19	20	19
Wood-based panels	32	47	41
Paper and paper board	34	46	42

Source: Jonsson and Whiteman (2008).

### **Demand for wood and wood products under the 'green economy' scenario**

The pursuit of 'green economies' may have a mixed impact on demand for wood and wood products. Largely this depends on the state of technology relating to wood use. As indicated below, some developments could increase wood use while others could reduce demand.

- Increased thrust on recycling and reuse of wood will reduce demand as is already being seen.
- Several new technologies are emerging that could enhance efficiency in the use of wood and thus reduce raw material demand. Nanotechnology applications in forestry could lead to development of many new products, including structural products that are stronger, but use only a fraction of the raw material currently used.
- Demand for wood as a green building material – replacing energy-intensive materials such as steel, aluminium and cement – could significantly increase use of wood as a more environmentally friendly product (**Box 6.5**)

**Box 6.5**      **'Green' building in Asia and the Pacific**

The concept of green building is moving forward in several Asia-Pacific countries. Key aspects of the ongoing trend include:

- It is four-to-six times cheaper to design and build a green building in China than to build a conventional building with high heating, cooling and lighting costs.
- In Japan, ROK, Singapore and Taiwan, Province of China (POC) green codes are now well accepted and rigorous voluntary programmes are going beyond minimum regulated standards.
- Policies in Japan and Singapore are increasingly comprehensive regarding energy-efficient buildings, covering most stages of a building's life cycle and targeting building developers and eventual occupants.
- Recent energy efficiency policies for buildings in Asian countries include:
  - in Hong Kong Special Administrative Region(SAR): proposed mandatory building energy-efficiency standards – public consultation completed in 2008; and
  - in Singapore: establishment of a Green Mark Incentive Scheme (effective April 2007), requiring new public sector buildings and those undergoing major retrofitting work to be Green Mark certified.
- China and India are also regional leaders that are:
  - embracing international certification for green buildings; and
  - developing national standards and coordinating bodies.
- Joint public/private initiatives for green building have been implemented in China, India, Japan and ROK; and green commercial and residential developments are already established in China, Indonesia, Singapore and Hong Kong SAR.

Campaigns promoting wood as a green building material are helping to increase its use. For example, in 2007 New Zealand started a 'New Zealand Wood' promotional campaign to extol the environmental benefits of wood use. As a result, wood is regaining some lost ground in the framing market, from steel and concrete. The New Zealand wood programme also provides information to builders, architects and house owners on available choices, best applications and optimized maintenance.

Sources: Asia Business Council (2008); NZ Wood (<http://www.nzwood.co.nz>).

- Wood is increasingly seen as a raw material producing a wide array of green chemicals and energy. With the wider adoption of biorefinery technologies, the demand for wood as a natural product will increase.

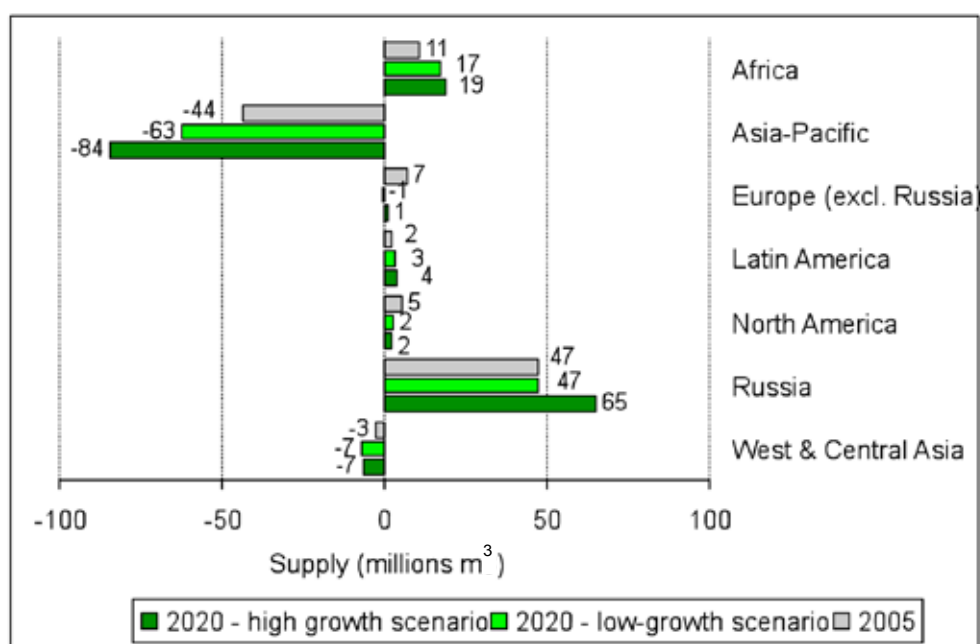
Consequently, the overall consumption of wood and wood products is unlikely to change very much under a 'green economy' scenario. Increased use of wood as a green product is likely to be balanced by improvements in efficiency of use, due to improved technologies.

### **Industrial wood supply situation under the high growth 'boom' scenario**

With demand far exceeding supply, the Asia-Pacific region is already in industrial roundwood deficit, largely on account of rapid growth in demand in East Asia and, to some extent, South Asia. In 2005, the supply shortfall is estimated at about 44 million m<sup>3</sup>. Under the high growth scenario, demand for industrial wood will be about 550 million m<sup>3</sup> in 2020, while estimated supply will be about 466 million m<sup>3</sup>, resulting in a deficit of 84 million m<sup>3</sup>. China, Japan, India and ROK are the countries with the greatest current and future deficits in industrial roundwood supply. These countries will rely on wood surpluses from elsewhere, within and outside the region, in addition to efforts to boost domestic supplies for the future. A major issue will be the extent to which the

global demand-supply balance will change to enable the region to bridge the gap, including the potential for significant price increases to lessen demand.

At present, global demand and supply projections indicate that the Asia-Pacific deficit could be largely met through imports from regions with substantial surpluses, especially the Russian Federation, Africa and, to some extent, Latin America and North America (Figure 6.11).



**Figure 6.11. Shortfalls and surpluses in global demand – supply of industrial roundwood**

Source: Jonsson and Whiteman (2008).

Russia is expected to continue to be an important source of industrial roundwood supply to the Asia-Pacific region. Considering the vast resources in Russia, and that Russian removals are far lower than the current annual allowable cut, the potential to increase supply is substantial (see **Box 2.2**); notwithstanding Russia's efforts to promote its own domestic processing industries. Latin America and North America are other potential sources of increased wood supplies to Asian wood-deficit countries. With drastic declines in demand in the United States, resulting from declines in house construction, Asia could become an important market for wood and wood products from Canada and Latin America.

The Asia-Pacific region, in particular wood-deficit countries including China and India, could considerably enhance wood production from existing planted forests, largely through improved management. The 130 million hectares of planted forests in Asia and the Pacific (in 2005) have an estimated potential production of about 542 million m<sup>3</sup>; almost twice the current estimated production of industrial roundwood from the entire region. Even giving conservative consideration to the unreliability of information on wood production and consumption, and the extent and productivity of planted forests, there is still scope to significantly enhance production from planted forests to help bridge the industrial roundwood deficit predicted for 2020 under both the high and low growth scenarios.

As such, wood supply is unlikely to be a major problem in coming years, unless there is massive diversion of wood for energy production or some catastrophic loss of standing stock. However, in some localities, and for the very poor who are unable to participate in markets, wood scarcity will remain a major challenge.

## Industrial wood supply situation under alternative scenarios

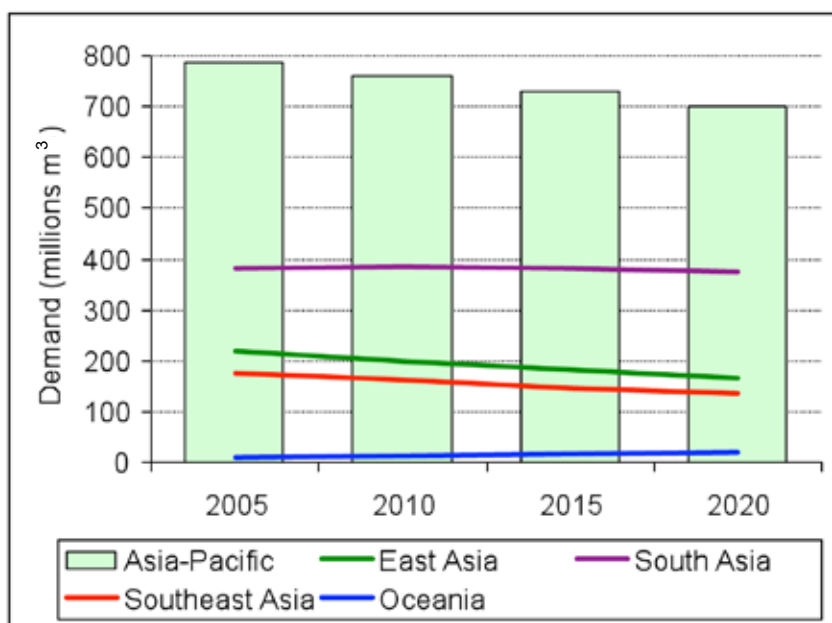
Wood supply dynamics will remain largely unchanged under high growth and low growth scenarios. For the next decade, most of the trees that will be harvested (excluding very short rotation pulp supplies) are already in the ground and wood will be supplied to meet demand at prevailing market prices. As shown in **Figure 6.11**, more sluggish economies under a low growth scenario reduce global demand for industrial roundwood (compared to a high growth scenario), resulting in decreases in surpluses and deficits in all global regions.

However, shifts in the Asia-Pacific region's 'wood supply curve' could be anticipated under a 'green economy' scenario. Green economies would likely encompass increased forestry regulation and higher environmental standards that would reduce wood availability, at least in the short and medium term. With a green economy also likely to promote greater demand for wood, significant price increases for industrial roundwood could be expected.

## WOOD ENERGY

### Wood energy implications under the high growth 'boom' scenario

Wood remains the most important source of energy for the majority of people in the Asia-Pacific region. However, with growth in incomes and increasing availability of alternative, more convenient fuels, the use of wood as a source of energy has been declining. If the high growth scenario persists, this trend is likely to continue to 2020 and beyond (**Figure 6.12**). Regional woodfuel consumption is estimated at about 790 million m<sup>3</sup> in 2005 and to be 699 million m<sup>3</sup> in 2020. Some of the key subregional trends are outlined below.



**Figure 6.12. Trends and forecasts for woodfuel demand, 2005-2020**

Source: Jonsson and Whiteman (2008).

- Most of the decline in woodfuel use will be accounted for by East Asia and Southeast Asia. Woodfuel consumption in these two subregions is expected to decline by about 92 million m<sup>3</sup> between 2005 and 2020. As indicated earlier, this decline will largely be an outcome of increased incomes and, more importantly, the availability of alternative, more convenient fuels.

- South Asia accounts for close to 49 percent of the region's woodfuel use and wood will remain the most important source of household energy in this subregion. Since 1980, demand for woodfuel has been increasing due to population increases and limited access to alternative fuels. However, there are signs of stabilization and decline in the context of higher incomes and increased supplies of alternative fuels.
- Oceania's woodfuel use is expected to increase slightly from about 10 million m<sup>3</sup> in 2005, to 20 million m<sup>3</sup> in 2020. Largely this relates to anticipated rapid expansion in production of wood pellets, particularly in Australia, much of which is likely to be exported. In most other Pacific countries, household use of woodfuel will remain important due to limited supplies of commercial fuels.

Overall, a high growth scenario anticipates moderate reductions in household woodfuel use, as well as modest increases in commercially produced wood-based biofuels. Depending on prices for fossil fuels, there may be significant expansion of dedicated biofuel plantations (if fossil fuel prices increase significantly), however most of these would not come onstream until post-2020.

### **Wood energy implications under the low growth and stagnation 'bust' scenario**

A prolonged economic downturn will have mixed impacts on the use of wood as a source of energy. A decline in national incomes would imply a slowing of investment in expanding commercial energy supplies. In addition, slow growth or a decline in household incomes will reduce abilities to move up the energy ladder. Households will have to continue – and even return – to using wood, which is regarded as an inferior fuel source in most developing countries. Costs of switching between energy sources – especially with respect to expenditure on equipment – will be a major consideration. However, high fossil fuel prices may also create disincentives for switching energy sources. If economic growth slows down and levels of poverty increase, dependence on woodfuel, especially wood collected from public lands in many developing countries, is likely to increase.

An economic slowdown could also reduce energy prices and hence improve accessibility. As growth declines, demand for energy may fall, triggering a reduction in prices and enhancing access for those to whom it was previously unaffordable. However, such price reductions are most likely to benefit those who have already switched to commercial fuels.

On the whole, aggregated woodfuel demand under a low growth scenario will probably remain more or less unchanged, on account of multiple feedback loops working in opposing directions.

### **Wood energy implications under the 'green economy' scenario**

Pursuit of a 'green economy' scenario will have significant impacts on the use of wood as a source of energy. Changes will again vary across countries and localities, as indicated below.

- Several countries are making efforts to reduce the use of fossil fuels as an important component of policies to combat energy dependence and climate change. Depending on the various policies, the share of biomass in total energy consumption could increase considerably. For example, production and use of wood pellets are poised to grow in response to policies aimed at reducing dependency on coal and other fossil fuels. Currently wood accounts for between 9 and 18 percent of total energy consumption in Asia depending on assumptions regarding conversion efficiency. Assuming that current patterns of use persist, an increase in the share of woodfuel – by about 5 percent by 2020 – would imply

an increase in woodfuel use by about 387 million m<sup>3</sup> – a 50 percent increase over 2010 consumption. However, if assumed conversion efficiencies are low, a 5 percent increase in the share of woodfuel in total energy consumption would equate to a 75 percent increase in woodfuel use.

- However, a shift to a ‘green economy’ scenario would envisage significant investment in the development and wider adoption of more energy-efficient technologies. Substantial work is underway to improve biomass gasification technologies, including development of gasifier stoves for household use. Commercial production of cellulosic biofuels will also bring about major improvements in efficiency of use, although this will largely be directed at the transportation sector, with its huge potential demand.

A ‘green economy’ scenario also implies that there will be significant investments in other renewable energy sources, especially wind and solar power. As pointed out earlier (**Box 5.4**), countries such as China and India (which account for a major share of woodfuel consumption in the Asia-Pacific region) are investing heavily in these technologies. As technologies in these areas improve, more households can be expected to adopt them, reducing demand for wood. Consequently, moving towards a ‘green economy’ scenario is unlikely to markedly increase woodfuel demand because part of energy demand shifts will be balanced by technological improvements and the use of other renewables.

## NON-WOOD FOREST PRODUCTS

### NWFPs: implications under the high growth ‘boom’ scenario

Rapid growth of Asia-Pacific economies will have several implications for production, processing and trade of non-wood forest products (NWFPs), as outlined below.

Collection of some NWFPs to decline: As poverty declines and incomes increase there will be much less interest in many subsistence NWFPs. Largely this relates to: (a) increased availability of alternative products; and (b) increases in incomes enabling purchase of superior products. Many NWFPs are often seen as inferior, especially in unprocessed forms and, as incomes increase, collection of products that generate low revenues will decline. Most subsistence use is in rural areas where poor access limits choice. Access to better alternatives will significantly reduce demand for subsistence products. Collection of most NWFPs from the wild is therefore likely to decline, except when such collection is linked with forest-based recreation.

Commercialization of selected products: While several subsistence products may lose importance, a few – especially ingredients in health and beauty products and some specialty foods – will gain prominence. A burgeoning middle class, with high disposable incomes, will create substantial demand for some ‘fashionable’ NWFPs. While a few high value NWFPs may continue to be sourced from the wild, most will be domesticated and cultivated in farms, where technically viable, due to the revenues available and requirements for stability in supply and product quality.

The few products that cater to niche markets and cannot be easily domesticated will continue to be collected from the wild. Managing these sustainably will remain a challenge, especially in the context of illegal harvesting and removal.

### NWFPs: implications under the low growth and stagnation ‘bust’ scenario

A prolonged economic downturn will have more-or-less opposite implications for NWFPs compared to the high growth scenario. Low incomes and persistent poverty will imply continued dependence on subsistence products as other income-earning opportunities remain limited. This

will be particularly true for a number of low income and emerging economies with high poverty levels. If people from urban areas are forced back to their rural homelands, some who return to areas near forests would likely seek to supplement their livelihoods through NWFP collection.

Under a low growth scenario, resources allocated to regulate collection from the wild would likely decline, encouraging illegal collection and trade in some NWFPs. Collection, processing and trade will continue to be largely dominated by the informal sector, especially as the capacity of formal institutions stagnates or declines.

### **NWFPs: implications under the 'green economy' scenario**

A green economy scenario would envisage more systematic efforts to manage NWFP resources sustainably and to ensure that benefits are shared equitably. Local community organizations would be strengthened and improved communications would allow them to tap into emerging markets for products grown under natural conditions. Certification and fair trade practices could be expected to be widely adopted, ensuring that products are grown under appropriate conditions and collectors and producers are fairly paid. A significant share of processing would be undertaken locally, with attendant increase in local incomes. Cooperatives and producer associations would ensure that markets operate in a transparent manner. Improved information and communication technologies would help to enhance market access enabling small-scale producers to easily supply products to distant consumers.

## **ECOSYSTEM SERVICES**

Provision of ecosystem services will vary significantly under different scenarios largely depending on economic development stages, as outlined below.

### **Ecosystem services: implications under the high growth 'boom' scenario**

The high growth scenario will have a mixed impact on various ecosystem services, primarily depending on how countries deal with the trade-offs involved. Largely, this depends on the overall state of social and economic development; and on political will to establish and enforce appropriate trade-offs between competing products and services.

#### ***Conservation of biodiversity***

- Developed economies are unlikely to face major challenges with regard to biodiversity conservation. Stability in land use, increased awareness, better developed policies and institutions, and greater willingness and ability to protect the environment ensure that biodiversity is already relatively well protected.
- Middle-income and emerging economies will face considerable challenges in establishing trade-offs between competing uses. While expansion of the industrial and services sectors could reduce pressures on land due to agricultural expansion, investments in infrastructure, mining and urban expansion – critical in achieving high growth rates – could have severe negative impacts on biodiversity. In particular, wetlands and coastal ecosystems (especially mangroves) could be under severe threat. Although many middle-income countries have relatively strong policies and institutions and resources available for conservation, the priority assigned to economic growth will likely adversely affect implementation of conservation policies. In the context of a decision on 'conservation versus economic growth', the latter is more likely to prevail, with only limited efforts to ameliorate the situation.
- Conservation of biodiversity – and other ecosystem services – will be particularly challenging

for low-income, resource-rich countries under a high growth scenario, in view of enormous internal and external pressures to supply resources. Extraction of wood and the conversion of forests to other uses will be important options for generating income and economic growth. Some tropical countries with high biodiversity, such as Lao PDR and Cambodia – situated in the midst of resource-hungry, emerging economies including China, Thailand and Viet Nam – are highly vulnerable to biodiversity loss.

- Low-income, resource-poor countries will face similar situations, although on much smaller scales. Degradation of available resources due to intense human pressures will remain a major problem, likely to be compounded by policy and institutional weaknesses.

### ***Watershed values***

As water is a critical commodity, protection of watershed values receives considerable attention in most countries. Improvement of water quality and – to some extent – stabilization of flow is a major function of upland and riparian forests in most countries. Better developed policies and institutions and the absence of significant land-use conflicts have enabled developed countries to address watershed management issues more effectively, compared with less developed countries. Clearly defined property rights and improved understanding of the linkages between land use and water also present potential for the development of market-based mechanisms to manage forests for watershed values, in countries where people have sufficient ability to pay. While such systems are still embryonic in most Asia-Pacific countries a high growth scenario would provide potential for more widespread implementation.

Most developing countries will face a mixed situation. Although there is recognition of the importance of improving watershed values, other pressing social needs are likely to be accorded higher priority. Many countries will also have to deal with challenges in strengthening policy and institutional frameworks. Improvements can be expected in countries where dependence on land and pressure to convert forests to more intensive land uses declines. In areas where resource pressures are higher, watersheds are likely to be further degraded, unless afforestation programmes such as those implemented in China and Viet Nam in the last decade can be similarly implemented.

### ***Land degradation and desertification***

Land degradation and desertification largely stem from poor land and water management. As in the case of biodiversity and watershed values, situations among countries and localities will be somewhat mixed, in view of divergent ecological and economic conditions.

Under a high growth scenario, developed and emerging economies will be in a strong position to deal with land degradation issues on account of:

- Increasing opportunities to earn incomes and gain employment in the manufacturing and services sectors, thereby reducing pressures on marginal lands. In some cases, this may pave the way for natural forest regeneration and rehabilitation.
- Better policy and institutional arrangements and increased financial resources, enabling governments to undertake both preventive and remedial measures including tree planting programmes.

However, land degradation and desertification will continue to be major problems for a number of low-income developing countries. Largely, this stems from policy and institutional constraints coupled with limited financial resources. Both preventive and remedial measures to combat land degradation and desertification require large-scale efforts (for example, regulating land users,



management of surface irrigation, regulation of groundwater extraction, reduction of grazing pressure, stabilization of sand dunes, etc.) and many governments may face severe constraints in mobilizing the various stakeholders for such collective action. A high growth scenario might enable greater resources to be devoted to rehabilitation efforts, but institutional weaknesses will more likely encourage an acceleration in demand-driven degradation.

### ***Landscape values and ecotourism***

Under a high growth scenario, recreational use of forests and woodlands is expected to grow rapidly. This is already evident in the growth of ecotourism – both domestic and international – in many countries. An increasing middle class, with higher disposable incomes, improved access to information and better infrastructure, will all contribute to continued growth in ecotourism in most countries in Asia and the Pacific. In a number of countries, at least in key localities, ecotourism is expected to become the most important source of income for local communities and forestry departments. However, under the rapid economic growth scenario, social and ecological sustainability could be significantly compromised. There are already signs of this happening with unplanned tourism accentuating resource degradation.

With more people living in urban areas and incomes increasing, there will be greater demand for urban landscape improvement, especially green zones. While many burgeoning metropolises will have large shanty towns and slums with very little green space, more affluent areas will be better planned and developed with adequate green areas.

### ***Carbon sequestration and storage***

A high growth scenario will have mixed implications for carbon sequestration and storage functions of forests as indicated below:

- Developed countries will increasingly rely on forest conservation and afforestation as important components in efforts to reduce carbon emissions and to compensate for emissions from other sectors. In view of relatively low opportunity costs (especially considering significant reductions in dependence on land as an important source of income), carbon sequestration and storage through forestry will likely expand significantly.
- A number of emerging economies are also likely to use forests and forestry as important components in emission reduction strategies. Much of the thrust will be to accelerate afforestation and reforestation to compensate for emissions arising from rapid growth of the agriculture and industrial sectors. For example, both China and India have launched large-scale afforestation programmes as integral parts of their climate change mitigation strategies.
- Low-income, forest-rich countries will face major challenges in managing forests for carbon. These countries have very low levels of industrial emissions and there will be very little domestic compulsion to conserve forests for carbon management. Their willingness to manage forests sustainably will largely depend on the relative costs and benefits of forest conservation *vis-à-vis* alternative uses. Under a high growth scenario, it is likely that mechanisms such as REDD will receive significantly greater funding than under a low growth scenario, hence there will be greater incentives for forest conservation based on carbon payments. The opposite side of the coin is that there will also be significantly higher demand (and prices) for wood, agricultural products and other natural resources creating pressures for deforestation and degradation. Unless carbon sequestration is seen as an economically better option, there will be very little willingness to manage forests for carbon sequestration and storage benefits. Institutional demands associated with conserving forests, and monitoring and accounting for reduced emissions at a national scale may also

be beyond the capability of low-income countries. Certainly, past failures – in many countries – to conserve forests for purposes such as biodiversity conservation, and landscape and intrinsic values, should serve as a warning that forest conservation for carbon sequestration will not be as straightforward and simple as some advocates anticipate.

- Low-income, resource-poor countries will continue to face challenges with regard to carbon management, largely on account of continued degradation of resources arising from intense human pressures. However, there is scope for improvement if carbon sequestration is regarded as a bundled service, encouraging farmers and other landholders to plant trees as part of a package of benefits, with carbon as one of the components.

### **Ecosystem services: implications under the low growth and stagnation ‘bust’ scenario**

A prolonged downturn and economic stagnation will have a number of direct and indirect effects on the provision of forest-derived ecosystem services, as outlined below.

#### ***Conservation of biodiversity***

- Long-term economic stagnation is unlikely to have any significant impact on biodiversity in developed economies. Land use has long since stabilized in these countries and very little change is expected on account of slower growth and economic stagnation. Lower government budgets may affect some more marginal conservation projects, but impacts would be at the fringes of national programmes.
- Emerging economies and some middle-income countries will face a very different situation. Many are in transition towards stabilization in land use. A prolonged downturn in the global economy, especially precipitating declines in the industrial and services sectors, would imply increased pressure on land and resources, adversely affecting biodiversity conservation efforts.
- In low-income, forest-rich countries, most large-scale forest clearance is driven by growing global demand for food, fuel and fibre. A widespread slowdown implies declines in demand for most commodities (for example, timber, rubber, palm oil, soybean) and this could, under certain circumstances, reduce the pace of forest clearance, helping to slow the loss of biodiversity. Increasing demand for food and other NWFPS could, however, push selected wildlife populations towards extinction and further deplete numbers of sought-after plant species.
- Low-income, resource-poor countries will witness continued degradation of forests; especially as opportunities for employment in the industrial and services sectors decline and pressures shift towards forests and woodlands for subsistence and employment.

#### ***Watershed values***

The flow of watershed values under the low growth and stagnation scenario will follow that of biological diversity as they are both closely related to stability in land use and changes in society’s ability and willingness to meet costs. As no major land-use changes are expected in developed economies, flow of watershed values in these countries will, on the whole, remain unchanged. A different situation will prevail in emerging and middle-income economies. A prolonged economic downturn will increase pressures on land, as employment in industrial and services sectors declines. On the other hand, a reduced pace of forest clearance in forest-rich, developing countries – in response to declining commodity prices – will act in opposition. Low-income, resource-poor

countries could, however, witness accelerated degradation of watersheds as the economic downturn increases land-use conflicts and institutional weaknesses become more pronounced. Overall, watershed rehabilitation programmes would likely suffer budget cutbacks, along with many other programmes.

### ***Land degradation and desertification***

Economic stagnation is similarly unlikely to have significant impacts on land degradation and desertification in developed economies in view of the relative stability of land use. However, the scenario could have some impact on emerging economies as public investment in afforestation and desertification control is scaled down in response to reduced government budgets. However, this would not necessarily be the case if investment in improved land management were seen as a possible economic stimulus and means to create employment in rural areas. A number of countries are already investing in land improvement, including soil and water conservation and afforestation.

Low-income countries would likely face the prospect of increased land degradation and desertification in the context of reduced ability of farmers and other players to invest in improved land management.

### ***Landscape values and ecotourism***

Along-term, economic slowdown will have significant impacts on demand for ecotourism, especially as households curtail expenditure on non-essential items. The tourism sector has witnessed a major decline since mid-2008, affecting many countries, in particular, some of the small island economies where a major share of income is derived from tourism.

### ***Carbon sequestration and storage***

A prolonged economic downturn will affect both market and non-market carbon mechanisms, although net impacts may be relatively small due to opposing income and substitution effects. Total global carbon emissions can be expected to decline in the context of an economic slowdown, consequently the demand for certified emission reductions should also decline; significantly reducing carbon prices. A decline in carbon prices will be a major disincentive to conserving forests and taking up afforestation and reforestation efforts, especially in relation to activities in voluntary carbon markets. However, a downturn in the global economy also implies a significant reduction in demand for other wood-based commodities, reducing the opportunity cost of forest-based carbon sequestration.

Lower economic growth rates may potentially affect international transfers in support of carbon sequestration, as developed countries could reduce the scale of international assistance. This would affect at least some afforestation and reforestation activities, as well as forest conservation prospects under REDD. However, as for developed countries, under a low growth scenario the lower returns available from industrial forestry and other economic activities that promote deforestation and forest degradation would also reduce the opportunity costs of REDD-based activities.

### **Ecosystem services: implications under the 'green economy' scenario**

The interaction of various factors – desire to reduce energy dependency, health concerns, environmental shocks, calls for social justice and international incentives to introduce sustainable resource management – will help to drive the adoption of green policy paths and move countries

in the direction of green economies. Large-scale investments in renewables, reforestation, clean technologies and energy efficiency have already been made in some economies in the region – although there is still a long way to go.

By definition, a ‘green economy’ scenario will have significant positive impacts on the provision of ecosystem services. In almost all countries, there are efforts, albeit sometimes isolated, to pursue green approaches to development, especially by civil society organizations and local communities. These include local level efforts to protect forests and sacred groves, manage watersheds and harvest rainwater, adopt improved cook-stoves and afforest degraded areas, among others. These efforts could form starting points for more coordinated efforts to chart courses towards green economies.

Policies and institutional arrangements under the ‘green economy’ scenario will be founded on improving the wide-ranging flow of ecosystem services. Through alteration of political and economic priorities, a fragmented approach to addressing diverse environmental problems would be replaced by more integrated approaches; simultaneously addressing biodiversity conservation, watershed protection, desertification control and climate change. With broader policy and institutional arrangements, geared to promote green development, existing isolated efforts could be scaled up considerably. These could be supported by investments in efficient technologies, thereby reducing carbon footprints and minimizing adverse effects on the environment. In general, the ‘green economy’ scenario will have implications similar to those outlined below. However, within a time horizon to 2020, only initial steps are likely to be possible.

### ***Conservation of biodiversity***

- In the developed economies the ‘green economy’ scenario is likely to lead to improved attention to conservation, including enhanced budgets for protected area management. Conservation programmes would be accorded higher priority at all levels, including programme areas that have to date been viewed as less critical. New arrangements, including greater focus on mechanisms such as public-private partnerships, might be expected. Tending of unmanaged forests to improve forest health would also become a priority in countries where such activities have been accorded lower priority in the past.
- In emerging and middle-income economies, greater attention will be paid to ecological diversity. Agricultural intensification rather than extensification will provide room for co-existence of natural habitats alongside more managed areas and improved technologies for utilization of forest and agricultural products will reduce the long-term need for expansion of large-scale monocultural crops. Expansion of markets for green products will provide a premium for sustainable (production) forest management while trade restrictions in high-paying markets will also support increased attention to legal trade in forest products and other FLEG-related activities.
- In low-income, forest-rich countries similar moves to those in emerging and middle-income economies would be expected. Additionally, political agreement over the importance of different land uses will attract funding from international sources to help pay for existence values and ecosystem services associated with biodiversity. Measures regulating trade in wildlife and endangered species will be better enforced while awareness of consequences of ecosystem mismanagement will be raised among consumers and funding for protected areas will be increased.
- In low-income, resource-poor countries, the ‘green economy’ scenario may have little effect due to scarcity of funding and continuing pressures driven by resource deficits. Policy improvements and greater commitment to a green path could, however, attract greater international funding for biodiversity conservation.

### ***Watershed values***

As in the case of biodiversity conservation, a clear approach to land management will help to improve watershed values.

- In the developed economies watershed values are unlikely to be greatly affected by a 'green economy' scenario as pressure on forests in upland areas is generally low and existing levels of watershed protection are adequate.
- In emerging and middle-income economies, the situation is likely to be similar to developed economies following major efforts in recent years to improve watershed management. Countries that have yet to implement strict watershed protection measures are likely to turn the corner, particularly if environmental catastrophes mobilize public opinion. Market and non-market mechanisms will help to ensure that upland communities are compensated to maintain watershed services.
- In low-income, forest-rich countries, watersheds are often affected by shifting cultivation, poor quality roads and forest degradation. Under the 'green economy' scenario, greater efforts are likely to be made to improve sloping land agriculture, often by introducing trees and perennial vegetation. Landslides and floods could also stimulate measures to improve management of protection forests and upland catchments.
- In low-income resource-poor countries the scope for improvements in watershed management will be somewhat dependent on budget availability. However, re-prioritization of government initiatives would likely see even greater focus on provision of safe water supplies and so some improvement of watershed management could be expected, especially in high population areas.

### ***Land degradation and desertification***

Land degradation and desertification will slow down considerably in the context of an integrated approach to land use, as will be expected under a 'green economy' scenario. As noted earlier, a wide array of preventive and remedial measures is available to prevent desertification of fragile lands. Careful land husbandry, including through water and soil conservation, will help to restore and improve land productivity and this will be accorded high priority in green economies.

- In developed economies the 'green economy' scenario is likely to lead to improved attention to issues such as desertification, soil salinization, overgrazing, establishment of riparian areas, landslide protection, fire management, and so forth through forest-related measures. Tree planting and implementation of agroforestry to address some of these will also increase carbon sequestration and improve biodiversity conservation.
- In emerging and middle-income economies, existing efforts to control land degradation and desertification are likely to be strengthened and efforts are likely to be made to reduce livestock numbers and introduce stall feeding to allow vegetation to regenerate.
- In most low-income, forest-rich countries, land degradation is not yet a serious problem yet and therefore the 'green economy' scenario may produce little change. However, where problematic, many of the activities noted above are likely to be given increased attention as budgets permit.
- In low-income resource-poor countries budgetary issues will remain a major constraint to implementing measures to arrest land degradation. However, a 'green economy' scenario could be expected to mobilize significant new and additional resources for international

development assistance and this could provide scope for significant improvements in the status quo.

### ***Landscape values and ecotourism***

Under the 'green economy' scenario, promotion of landscape values and ecotourism will become a central theme. Improved access to sites of biological and ecological interest will increase flows of visitors from developed and emerging economies. Huge newly wealthy populations in the region may begin to travel much more widely, eager to explore the cultures and natural wonders that abound in the region. Competition to attract visitors will increase and countries with the best preserved and most remarkable sites will become increasingly well known and ecotourism ventures in these areas will flourish. Direct incentives to promote development of ecotourism industries may be offered in some countries. Returning to the countryside – already a popular holiday pastime in much of Asia – will take on a new meaning as growing middle classes become ever more intrepid and seek to rediscover nature.

Provision of sites for recreation is a related ecosystem service that will witness a rapid increase in importance under a 'green economy' scenario, especially in developed and emerging economies, where demands for forest-based recreation will burgeon. Providing adequate recreational resources that are conveniently located near to population hubs will be challenging. Ensuring such recreational forests are managed sustainably, and that benefits are distributed equitably, will also pose a challenge where populations are very high and stakeholders abundant.

### ***Carbon sequestration and storage***









A 'green economy' scenario will promote more balanced approaches to land use that will reduce the pace of deforestation and degradation. Rather than shifting responsibilities to undertake carbon sequestration to other countries (especially developing countries with very low emission levels) and to other sectors that can sequester or conserve carbon at lower costs, most countries and sectors would incorporate carbon management as an integral part of all economic activities. This could significantly reduce the demand for forest-based carbon sequestration, although improved forest management under the 'green economy scenario' would nonetheless considerably enhance carbon sequestration.

- In developed economies, the 'green economy scenario' is likely to lead to increased attention to mitigating and adapting to climate change. Greater efforts at home and abroad would be expected from nations endeavouring to reduce carbon footprints. Efforts are likely to include forestry as a low cost means of increasing carbon emission reductions and greater use of wood products is likely to become a growing theme as the relative greenhouse gas implications of increased concrete, steel and brick use are calculated.
- In emerging and middle-income economies, afforestation and reforestation are likely to play a greater role in climate change mitigation. Expansion of forest areas may also play an important role in meeting demand for wood products as forests in low-income forest-rich countries are increasingly protected under climate change covenants. Forests are also likely to play a greater role in climate change adaptation, especially in coastal protection and watershed management.
- In low-income resource-rich countries, reduction of deforestation and forest degradation will be a major focus under robust and well-financed REDD programmes. However, widespread success in REDD-based forest conservation may prove elusive even with a change in policy focus due to institutional constraints and demand for land and resources around the region. It may be that the focus of climate change mitigation activities in forestry will be confined to countries with stronger governance and more developed institutional systems.

- Poorly developed institutional frameworks will also be likely to limit the scope of climate change adaptation and mitigation activities in low-income resource-poor countries.

The overall implications for provision of ecosystem services under the three scenarios are indicated in **Table 6.2**.

**Table 6.2. Forest situation in 2020: implications of various scenarios for forest-derived ecosystem services**

Ecosystem services	High growth scenario	Low growth and stagnation scenario	'Green economy' scenario
Conservation of biodiversity		.....➔	
Watershed values			
Mitigation of land degradation and desertification		.....➔	
Landscape and amenity values	.....➔		
Carbon sequestration and storage		.....➔	.....➔

## FORESTRY SITUATION IN 2020: A SUMMARY

The enormous diversity in economic, social, political and institutional conditions among the countries of Asia and the Pacific make it extremely difficult to provide a generalized description of changes in forests and forestry that are likely to be applicable to the whole region. In particular, much of what influences change in forests and forestry will be driven by changes outside the forest sector, rather than actions within the sector, and there is enormous variance in extra-sectoral conditions among countries in the region. The Asia-Pacific forestry situation in 2020 will undoubtedly continue to provide a mosaic of situations, reflecting larger changes in demography, economy, political and institutional environments and developments in science and technology. However, some of the overarching trends likely to dominate in the foreseeable future are described below.

### Deforestation and forest degradation will remain a major challenge

Forest clearance for production of wood, food and fuel will continue to be an intractable problem in several low-income, forest-rich countries. Much of this will be in response to demand from emerging and developed economies. Increased infrastructure development, and road construction in particular will bring immense pressure to previously isolated areas by increasing accessibility to markets, thereby raising the opportunity cost of land in these localities. This is likely to result in conversion of forest to more economically attractive land uses. In most cases, even with climate change-related funding and other incentives, forest conservation or sustained management for production are unlikely to be able to compete. Mining, the spreading of urban development, and encroachment of agricultural development into forests areas will also result in reductions in forest area, particularly in low-income forest-rich countries. Improved land-use planning and more open and transparent systems of land allocation will help to lessen potential social and ecological problems. International financing in relation to environmental or climate-related services may also result in some slowing of deforestation.

Forest degradation will also remain a major problem, especially in the densely populated low-income countries with limited resources. Demand for food, fibre and fuel will place increasing pressure on these limited resources, especially in the absence of income diversification opportunities. This will be the case especially in more geographically isolated and less globally integrated localities and countries.

Poor logging practices in more forested parts of the region are also causing severe forest degradation. The legacy of uncontrolled logging is likely to influence not only ecosystem integrity and robustness, but also future economic viability and therefore sustainability of natural forest management. Additionally, in equatorial areas where forests are less fire resistant, opening and drying of forests as a result of uncontrolled logging may act together with increased frequency of human-induced fires and climatic anomalies – drought in particular – to precipitate ecosystem collapse over large areas.

### **Sustainable forest management will remain elusive in practice**

Despite wide-ranging efforts to encourage sustainable forest management, actual implementation will continue to be a challenge. Undefined or overlapping property rights, weak governance (largely stemming from ineffective policies and poorly developed institutional capacities) and high demand for wood and wood products will continue to promote unsustainable logging, overexploitation of resources, and clearance of forests for agriculture and other land uses, particularly in less developed countries. The economic viability of management of natural forests for second and third cutting cycles is also likely to fall in many tropical areas given widespread changes in ecosystem composition towards non-commercial species and poor productivity resulting from excessive damage from past logging operations.

While there will continue to be much discussion of provision of ecosystem services, the least attention will be given in countries where it is most needed. Ecosystem services derived from production and protection forests are likely to fall most steeply in these countries, while conservation forests, although under threat, increasingly act as the last bastion for biodiversity. Watershed- and carbon-related services from trees outside forests may partially redress ecosystem service losses from continued forest degradation. In general, the best forest management will continue to occur in countries that have the greatest financial and technical capacities, while continued neglect will be the order of the day in the poorest and least developed countries.

<b>Box 6.6</b>	<b>Incidence of logging bans</b>
<p>Catastrophic environmental problems – especially floods and landslides – have often led to radical responses, logging bans in particular. These types of responses may proliferate in some countries, especially if predictions of extreme weather events come to fruition. However, the effectiveness of such radical measures in the past has been mixed and implementation of bans has often led to deforestation and degradation through abandonment of management, reduction in perceived value of forests and inadvertent creation of perverse incentives. In many cases such bans have also transferred forest degradation to other countries.</p> <p>Source: Durst <i>et al.</i> (2001).</p>	



## **No shortage of industrial wood supplies**

Notwithstanding increasing demand for wood and wood products, no major shortfalls are anticipated in regional supplies of wood. A slowing of wood demand in developed economies in Europe and North America will help to offset increasing demands from the Asia-Pacific region, especially wood-deficit subregions of East Asia and South Asia. Shifts in terms of sources of wood supplies to countries like Russia, Australia and New Zealand are already evident. With declining demand in North America, especially the United States, countries supplying the United States' markets will increasingly focus attention on the emerging Asian markets. There is also considerable scope for enhancing domestic wood production in high demand countries such as China and India through improved management of existing forest plantations.

While the overall wood supply situation seems to be satisfactory, there will be areas of acute deficit, especially in densely populated countries and where overall biological productivity is very low. Wood scarcity will be particularly challenging in such localities that are also poorly integrated with larger markets on account of geographical isolation, low purchasing power and governance problems.

## **Trade patterns will encompass new values**

Patterns in Asia-Pacific forest trade are likely to further alter in the next decade by at least as great an extent as during the past ten years. Considerable changes are likely to take place regardless of whether a high or low growth scenario is followed. Two main factors likely to play leading roles are: (i) levels of economic growth; and (ii) product preferences in high paying markets.

Burgeoning growth in emerging economies allied with enormous populations is likely to see enormous growth in demand for wood and wood products. In the same way that China has risen to prominence as a major importer and exporter of wood products and Japan's dominance of regional wood markets has dwindled, so too can marked change be anticipated in the forthcoming decade. Populous countries in South Asia could become major players, far beyond levels anticipated in this analysis, driving important changes in the types of products demanded and dominating consumer preferences and values.

Even with a rapid return to high rates of economic growth, legality-related regulations aimed at imports of wood to European Union and United States' markets are likely to significantly alter trade flows. Public procurement policies and corporate decisions are likely to have similar effects. With a large proportion of higher value-added products destined for these markets being manufactured in a few key countries, with wood sourced in low-income resource-rich countries, the leverage of such measures on regional trade is immense. Both producer nations and intermediate processing countries are likely to be significantly affected where capability does not exist along the market chain to meet legality and sustainability requirements. Under such circumstances, producers and manufacturers will need to find new markets either within or outside the region. Even where manufacturing is sustained, margins are likely to fall as a result of movement to lower paying markets.

## **Providing ecosystem services will be challenging**

In almost all countries, demand for ecosystem services will increase considerably. However, the nature of demands – and the ability to fulfill them – will differ considerably. In most agrarian societies, watershed values and arresting land degradation will be primary concerns. In situations of high population density and low incomes, establishing trade-offs between competing objectives will remain a challenge. In many countries, maintaining levels of biodiversity will pose almost insurmountable problems and some losses are inevitable. As well as deforestation and forest degradation, the porosity of national borders and park boundaries, and huge demands for wildlife and plants for food, medicine

and other uses will mean a constant drain on populations of desired species regardless of protection efforts. Increased accessibility of previously more isolated areas as roads are constructed is likely to exacerbate rates of depletion. Improved financing for protected area management and restoration efforts may provide some respite although institutional weaknesses in the most biologically diverse countries could mean slow progress at best. Prospects for maintenance of watersheds and arresting land degradation may be more promising, especially because the consequences of continuing degradation are readily apparent to local populations. Ecotourism prospects will increase in line with economic growth, but will mainly offer forest conservation potential in small areas with exceptional scenic values.

### **Where climate change goes, forestry will follow**

For a significant part of the last decade, some aspects of forestry have been largely in abeyance; awaiting the settlement and clarification of new climate change rules. Climate change undoubtedly offers enormous potential for forestry in Asia and the Pacific; in terms of both prospects for vast new resources to improve forest management, and prospects for enormous disappointment if such financing, and workable mechanisms to mobilize it, are not forthcoming. In the meantime, the forestry sector will continue to avidly watch climate change discussions. Governments will continue to defer policy development and implementation; the private sector will continue to defer investment decisions; and the forestry sector will continue to operate in a climate of hope, skepticism and uncertainty.

### **The policy focus will shift from formulation to implementation and enforcement**

Over past decades, forest and forestry policies have been formulated to encompass the principles of sustainable forest management in almost all countries in the region. Implementation has, however, been lacking in all but a few. This has largely resulted from a disjuncture between identified goals and capacities to achieve these. Despite all the credentials of 'good' forest policy, many examples in the region are largely textbook models of forest policy; sometimes inappropriate for the circumstances into which they were born, and with enormous shortfalls in capacities for implementation. Recognition of these deficiencies and refocusing on grass roots forestry and what can realistically be achieved will become inevitable in many countries. Capabilities in terms of human resources, available knowledge, political will and financial support will have to be taken into account much more seriously if widespread adoption of policy aims is to come about.

### **New roles and opportunities will emerge for all sector participants**

The current global focus on forest and forestry constitutes a unique opportunity in recent times for the forestry sector to deliver on society's priorities. Financing and trade-related stimuli to promote sustainable forest management offer prospects for new growth and directions in forestry in which many new participants will be involved. Decentralization, new trade instruments, carbon sequestration, conservation and watershed protection will involve a host of new actors and changed roles for existing forestry sector participants.

Gradual shifts towards local participation and individual and household ownership of forests mean that many more stakeholders will play deciding roles in the future of forestry by 2020. Facilitating and regulating the many, as opposed to the few, will be a very different task for forestry agencies in much of the region. Movement away from direct management of forests will also mean that high level integration and intersectoral coordination will be of much greater importance for forestry agencies to retain a *raison d'être*. Such a transition is likely to consolidate the role of forestry agencies even if the role is considerably altered.

Roles of civil society organizations and the private sector will also continue to evolve. Where relationships between these groups (and often with governments) have been adversarial, there is a marked trend towards more collaborative approaches. Cooperation rather than confrontation is likely to be increasingly the norm.

## SPECIFIC DEVELOPMENTS IN COUNTRY CLUSTERS

### Developed economies

Most developed economies have relatively stable forest situations and no major changes are expected if past trends continue. Climate change impacts and especially prolonged drought may, however, impact forests in Australia and elsewhere, with increased incidence of forest fire a particular challenge. Continued efforts to improve fire-related forest management and reduce incidence of arson will be necessary to maintain conservation values of forests and inhibit land degradation. Otherwise, dependency on land for income and employment has declined and economic fluctuations are unlikely to bring about major changes as regards the extent of forests and how they are managed. Service functions of forests will continue to gain pre-eminence. Many developed countries are evolving as post-industrial knowledge societies, with reduced emphasis on manufacturing and increased emphasis on knowledge-intensive services. This accelerates the process of evolution into 'green economies', although 'off-shoring' production may have negative environmental effects elsewhere.

While most developed economies are in a strong position to deal with the adverse impacts of a prolonged economic downturn, their forest sectors will not be immune to changing market conditions. Wood production and processing by the private sector will be particularly affected, as declining demand drives down investments in forest management and wood processing. In many cases this may encourage changes in ownership and consequent land-use changes. Long-term economic stagnation will also affect public spending on forestry which could increase damage from pest outbreaks and fires.

### Emerging economies

Under the economic growth and recovery scenario, the forest sector in most emerging and middle-income economies will change rapidly, especially in view of increasing demand for wood and wood products and renewed efforts to protect forest resources. Structural changes in economies, along with increased investments in afforestation and reforestation (and expansion of trees outside forests), will bring some stability to total areas under forests. However, in some cases, demand for wood and other raw materials may exceed domestic production, resulting in increased dependence on other countries. Under such circumstances, 'exported forest degradation' will continue to pose a threat to regional environmental security unless consuming countries move strongly towards preferential procurement of legally and sustainably produced products.

A slow growth scenario will have a number of direct and indirect implications on forests and forestry at national and regional levels. Within countries, reductions in growth imply a slowing of forest transitions, as manufacturing and services sectors contract and dependence on agriculture increases. At the same time, a prolonged downturn will affect governments' abilities to invest in management of forests; including afforestation and reforestation.

## **Low-income, forest-rich countries**

Rapid economic growth will put enormous pressure on low-income, forest-rich countries on account of overall increases in external demands for food, wood, fibre and fuel. Under a rapid economic growth scenario, these countries will likely witness significant reductions in forest area or significant forest degradation as pressures for resource exploitation mount in the face of dwindling natural forests elsewhere. While these countries can expect to benefit economically from new opportunities, there will be a need to ensure that forest conversion is effectively regulated through policy and institutional reforms, and that incomes from forests are utilized for effective socio-economic development. With better husbandry of natural resources, these countries have tremendous scope to leapfrog onto green economy pathways.

Conversely, a prolonged economic recession should generate a slowing of forest conversion in forest-rich developing countries, on account of reduced demands for food, wood, fibre and fuel. However, this would also curtail opportunities to use resources for better social and economic development and a return to growth without reform would also signal a return to forest conversion and unsustainable management.

## **Low-income, resource-poor countries**

Irrespective of economic growth rates, low-income, resource-poor countries face enormous constraints on account of the paucity of 'natural capital' on which to build strong economic foundations. High population densities, low levels of human and natural resources, and high incidences of poverty contribute to unsustainable use of forests and other resources. Degradation remains a major problem. Even if economies grow rapidly, absolute increases in incomes are likely to be inadequate to reduce dependence on forests. Challenges are compounded by poorly developed policy and institutional frameworks and a dearth of skilled human resources to manage resources sustainably at industrialized levels. Some improvements can be anticipated in the context of rapid growth, under which the pressure on resources diminishes on account of remittances and international assistance. However, continued low growth of economies is likely to exacerbate problems of resource degradation.

## **Small island countries**

Forests and forestry usually play a very limited role in the economies of small island countries, which tend to rely largely on tourism and fishing as the main sources of income. While provision of subsistence supplies of wood for construction, fuel and cultural purposes are important, provision of ecosystem services is the primary function of forests in most small island countries. These include protection of coastal zones, improvement of watershed values, shelter and, as an important component, contributing to ecotourism. Continued rapid economic growth implies expansion of tourism with both positive and negative impacts on forests and trees. Establishing trade-offs between development and conservation will continue to pose challenges. An economic downturn could, on the other hand, significantly reduce tourism income, presenting a different set of land-use challenges. Improvement of the forestry situation in small island nations depends on the specific situation in each country and the opportunities and challenges faced in pursuing available options.