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SOUTHEAST ASIA SUBREGIONAL REPORT

Asia-Pacific Forestry Sector Outlook Study II



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ASIA-PACIFIC FORESTRY COMMISSION

SOUTHEAST ASIAN FORESTS AND FORESTRY
TO 2020

SUBREGIONAL REPORT OF
THE SECOND ASIA-PACIFIC FORESTRY SECTOR OUTLOOK STUDY

FOOD AND AGRICULTURE ORGANIZATION OF THE UNITED NATIONS
Bangkok, 2011

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FOREWORD

Twelve years after the publication of the first Asia-Pacific Forestry Sector Outlook Study in 1998, FAO welcomes this opportunity to once again contribute, at the behest of the Asia-Pacific Forestry Commission, to the regional forestry dialogue. Countries and their forestry sectors are becoming ever more closely linked as economic liberalization and regional integration accelerate. Since the first outlook study, it has become increasingly clear that a regional perspective is essential in negotiating a better position for forestry and the values with which it is associated. With the advancement of globalization some of the most important effects on forests and forestry in many countries in the region are the result of international and regional developments.

Heightened awareness of the values of forests and their greater inclusion in international climate change agreements has increased the importance of linking spatial levels and broadening understanding of issues and opportunities likely to affect forestry in the coming years. Identification of key trends in forestry – both physical and political – and construction of scenarios for the future adds a valuable dimension to regional forestry discussions. Building responsiveness into institutional mechanisms and adapting to change constitutes one of the most important steps in creating a robust sector in a fast-evolving world.

Great changes have occurred and major advances have been made in Asia-Pacific forestry since the first outlook study was published. Significant challenges remain in many parts of the region and it is increasingly evident that countries cannot develop forestry policies in isolation – rights and responsibilities are increasingly spilling across borders and across sectors as populations increase, demands on resources heighten and economies integrate. The collegial nature of the process through which this outlook study was developed gives credence to the success of collaborative regional action and sharing in a common future. By openly contributing information, the countries and organizations involved in the outlook study have demonstrated their commitment to the future of forests and forestry and their desire to improve upon the benefits from forests that the current generation has received.

Many organizations and individuals have put huge effort into this study and have gone to considerable lengths to share the fruits of their experiences. In bringing together this subregional report, eight country reports and over 15 thematic studies have been prepared. The first Asia-Pacific Forestry Sector Outlook Study provided a benchmark in regional and global forestry and was followed by a series of regional outlook studies around the world. We hope that this subregional study will be as well received and that this contribution to the region's forestry sector is both timely and appropriate and will challenge countries to build forests that future generations will value.



Hiroyuki Konuma

Assistant Director-General and Regional Representative for Asia and the Pacific
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EXECUTIVE SUMMARY

Shrinkage of the forestry sector in Southeast Asia threatens timber production, watershed protection, biodiversity, the global carbon balance and rural employment. Forest cover in Southeast Asia is projected to fall from 49 percent in 2010 to 46 percent in 2020 as a result of losses in the majority of countries amounting to 16 million hectares, an area just less than the size of Cambodia. Between 1990 and 2010 the forests of Southeast Asia contracted in size by just under 33 million hectares, an area greater than that of Viet Nam. The measured rate of forest loss in Southeast Asia increased after 2005 and degradation of natural forests, masked by broad definitions of “forest,” continued apace. Unless action is taken to address key drivers of change in forests and forestry, many countries will fall short of forest cover targets and values associated with forests will be lost. This study presents data and arguments supporting the assumption that this forecast will be realized without robust institutional intervention.

Projected reductions in forest area between 2010 and 2020 equate to estimated losses of 8.72 giga tonnes CO₂ equivalent – almost 20 percent more than China’s total CO₂ emissions for 2005 or, on a mean annual basis, around 85 percent of total European Union (EU15) transport emissions for 2010. With forest conversion the primary driver of biodiversity loss, estimates are that between 13 percent and 42 percent of species will be lost in Southeast Asia by 2100, at least half of which could represent global extinctions (Sodhi *et al.* 2004). While large tracts of forest have conferred an advantage to Southeast Asian forest products industries, declining roundwood production and competition from plantation-rich countries and well-equipped, low cost wood processors outside the subregion also threaten the long-term future of forest industries.

Infrastructure development, expansion of industrial agriculture and population growth have been primary drivers of change in the subregion and will continue to threaten forest resources. Across Southeast Asia, roading developments have provided access to markets for many isolated populations and have also increased opportunities for investment and trade. At the same time, forest resources have been depleted as loggers, farmers, agribusinesses and developers have moved in. Road development is having greater impacts on forests in continental Southeast Asia as compared with insular Southeast Asia. Areas particularly affected include the northwest and southern parts of Lao PDR and northeast Cambodia. In Lao PDR, Cambodia and Viet Nam, protected areas adjacent to areas of development are also threatened by biodiversity and resource loss.

With expansion of infrastructure, investment in agriculture has expanded and establishment of cash crop plantations has become a primary driver of forest conversion in Southeast Asia. Deforestation and loss of canopy cover has been particularly intense in Sumatra, Malaysia and Indonesian Borneo, West Papua and Myanmar. Smaller scale forest loss in Lao PDR, Viet Nam, Cambodia and remaining mountain forests in the Philippines has also been recorded. In the Mekong region the production of rubber, cashew nuts, coconut and sugar cane has been a major cause of forest conversion while in coastal areas shrimp ponds and agriculture have resulted in the loss of mangroves. At the subregional level, two of the most important crops in terms of forest conversion are rubber and oil-palm. In Indonesia in particular, logged-over forests are being cleared for the establishment of oil-palm plantations and in southern Thailand and southern Myanmar, oil-palm establishment has also been an important cause of forest conversion.

While road networks and industrial agriculture expand, populations are also increasingly rapidly and between 2010 and 2020, the population of Southeast Asia is projected to increase by 11 percent to 657 million. Pressure on resources is set to increase but several factors may attenuate tendencies towards deforestation and degradation. Structural changes in economies towards industry and services and away from agriculture, and migration towards urban centres could reduce pressure on land. In several Southeast Asian countries migration overseas for more remunerative employment is having a similar effect while remittance payments are increasing income in rural areas and allowing investment in low maintenance, longer term tree crops. Environmental shocks have played a pivotal role in reversing trends in forestry in several countries in the Asia-Pacific region, including in Southeast Asia, and similar responses may gain ground in the coming years.

Three countries in the subregion have begun to follow distinct forest cover trends, owing to these and other effects. In Thailand, the agricultural frontier has, to a lesser or greater extent, been closed and forests are regrowing on former agricultural land. Decoupling between forest area and key variables driving deforestation suggest that a forest transition is in its first stages. In Viet Nam, large government-supported afforestation and reforestation programmes are resulting in forest expansion, although, as in almost all countries in the subregion, primary forests are still being lost at high rates. In the Philippines, forest cover is estimated to be increasing due to suspected reduction of pressure on forest lands, private sector-planted forest expansion and rising demands for forest products. In other countries, relationships between forest area and key drivers of deforestation remain essentially unchanged.

While economic growth has progressed rapidly for much of the past decade, standards of governance have fallen across much of the subregion, with the exception of Indonesia where indicators have improved significantly. Despite increased attention to forest law enforcement and governance around the subregion, significant changes on the ground have been slow in developing. Largely to blame are conflicting priorities, lack of resources and the reluctance of vested interests to stem the flow of forest products. Trade measures implemented related to legality of wood and wood products imports in high-paying markets have considerable potential to influence the subregion's forestry sector and wood industries in the coming years. These efforts have the potential to revitalize efforts to strengthen forest law enforcement and governance efforts and stimulate action to improve forest management.

The forest product industry in Southeast Asia is likely to be particularly affected by growing concern over trade legality and sustainable resource management in the European Union (EU) and United States. By value, 10 percent of Southeast Asian forest products and 72 percent of total wooden furniture exports went to markets in the EU and United States in 2007. The most significant exporters to the EU and US include Viet Nam, Malaysia and Indonesia. In relation it is possible that if legality and sustainability standards do not improve, buyers may turn away from tropical timber products from these countries and others. Preferences for lighter coloured woods in these markets could also drive a more general shift away from tropical hardwoods. Under such a scenario, sustained high levels of economic growth in the Asia-Pacific region may maintain demand, although preference for domestic processing in China and current low wage rates could challenge less efficient wood products producers in Southeast Asian countries. Although the impacts of trade legality measures are not yet clear, efforts to improve forest law enforcement and governance will be valuable not only in maintaining access to markets but also in maintaining the value of, and conserving, remaining natural forest resources.

In addition to competition from plantation-rich countries and efficient, low cost wood processors outside the subregion, doubt over the economic viability of sustainable management of natural forests for production in Southeast Asia also constitutes a serious concern for production forestry in the subregion. Overharvesting and high grading, multiple re-entry to logging coupes and lack of implementation of reduced impact logging techniques have all reduced the value of forests. In many areas forest protection and rehabilitation are essential to increase growing stock and provide time to address destructive logging practices. Reversing current trends will require significant investment in resource supply, renovation of production facilities and improved governance and institutional performance.

Greater inclusion of forests and forestry in international climate change-related agreements is anticipated as a means of supporting a transition towards forest production and increased focus on forest environmental services in countries where exploitative use of forest continues and local demand for forest services remains undeveloped. **Reduced Emissions from Deforestation and forest Degradation (REDD)+** in particular offers the possibility of substantial income from reducing emissions from deforestation, forest degradation and conservation of forest carbon stocks, sustainable management of forests and enhancement of forest carbon stocks. High demand for land and forest products, low institutional capacity and poor governance, particularly in low income high forest cover countries, as well as the deeply entrenched social causes of deforestation and forest degradation, suggest, however, that reductions in deforestation and degradation will be hard won.

SCENARIOS FOR 2020

In view of the most influential drivers of change for forestry in the subregion, four scenarios for 2020 are presented. Scenarios are developed on the basis of varying levels of aggregate demand and institutional effectiveness. Associated factors such as agricultural expansion and infrastructure development as well as independent variables including environmental disasters and changes in international trade regimes are also considered. The four scenarios presented are as follows:

- **Socio-economic development stalls (*Hard times*).** A protracted recession unfolds and poor institutional performance maintains high income disparities and high levels of poverty. A greater proportion of the subregion's workforce remains employed in agriculture and weak environment policies mean that natural resources continue to be unsustainably exploited. Low rates of economic growth, however, relieve pressure on forests for wood products and for agricultural development. Despite lower rates of forest resource degradation, lack of investment and attention to institutional reform means that unsustainable practices reappear when more rapid economic growth resumes. Unsustainable growth (*Overburn*). Economic growth rates rapidly return to pre-crisis levels and economies are propelled by continued natural resource exploitation with low investment in human resources and environmental sustainability. Employment in industry and services increases as people leave rural areas to work in towns and cities. Little improvement is seen in implementation of environmental policies and natural resource exploitation rates remain high as does demand for land. Forestry sectors around the subregion contract and economic growth rates are eventually curtailed as social and environmental debts bear down.

- **Unsustainable growth (*Overburn*).** Economic growth rates rapidly return to pre-credit crunch levels and economies are propelled by continued natural resource exploitation with low investment in human resources and environmental sustainability. Employment in industry and services increases as people leave rural areas to work in towns and cities. Little improvement is seen in implementation of environmental policies and natural resource exploitation rates remain high as does demand for land. Forestry sectors around the subregion contract and economic growth rates are eventually curtailed as social and environmental debts become unmanageable.
- **Sustainable development (*Slow and steady*).** A protracted economic downturn takes years to lift but development continues at modest rates through reformed economic and social policies. Large proportions of the population remain employed in agriculture but green policies help to promote environmental sustainability while demand for land and natural resources remains at a low level. Forest area stabilizes as protection measures increase and plantations are established with the support of tenure-related reforms. Sustainable forest management (SFM) becomes more widely implemented with international funding playing a leading role.
- **High-growth development (*Living on the edge*).** Economic growth continues at high rates and although policy reforms contribute to improved environmental and social sustainability, demand outstrips supply and natural resources continue to be degraded. Many jobs are created in industry and services and movement away from agriculture is widespread. Economic development is seen as the main route to future sustainability but risks of overheating and unbalanced development are ever present. Forests are caught in a push and pull situation for many years as pressures for both conservation and exploitation are maintained at high levels. By 2020 the outcome is mixed and although resources are degraded in many areas, financing for environmental rehabilitation begins to make restoration of forest resources and their plant and animal communities a reality.

The unfolding global economic situation suggests that either the Hard times or Slow and steady scenarios are most likely to develop – the main difference between the two being institutional effectiveness. Implementation of forestry-related priorities and strategies aimed at sustainable development provide a potential bridge between the Hard times and Slow and steady scenarios.

Although dependent on the level of implementation of policy reforms, forests and forestry in Southeast Asia will have evolved considerably by 2020. The extent and quality of forest resources will have declined, although at slowing rates, and only in remote and inaccessible areas will significant areas of primary forest remain. In some countries, almost all forests will have been degraded by logging and resource extraction. In many countries protected areas will provide the mainstay for biodiversity. In lower income forest-rich countries, although pockets of primary forest in protected areas will remain, this may be mainly due to remoteness rather than enforcement of management plans. Forests will remain under threat from growing populations moving into more marginal areas although environmental shocks and increasing incomes may mean that greater effort is put into SFM.

In 2020, planted forests will be more widespread in countries where institutional frameworks are better developed and governance is stronger. Unclear tenure will continue to hamper expansion of large-scale plantations in many countries and allocation

of land to smaller local units will also mean that economies of scale in supplying wood products will not be easily attained. Main centres of forest products production will have moved outside the subregion, although some countries may maintain their positions where competitive advantages can be created. International forestry-related climate change mechanisms and financing will become more fully functional and, as rural land conversion rates slow and institutional jurisdictions become clearer, greater possibility will exist for investing in forestry for climate change mitigation. In the medium term, REDD-funded improvements in forest monitoring could have a pivotal effect on forestry as resource statistics become available in unprecedented detail.

Overall, SFM will not be widely practiced in terms of management of natural forests for production. Most countries in the subregion will focus on plantations for wood production while, at least nominally, placing natural forests under full protection. Complications with sustainable commercial logging will mean that it is only practised in a few model forests. Wood will continue to be in great demand, as will land, and illegal and uncontrolled logging will continue. A more efficient forest sector producing more and higher quality goods and services from smaller areas will, however, gradually develop. Higher productivity plantations, better protected 'protected areas' and more efficient forest products production will contribute to an overall improvement, but with significant reductions in natural capital.

PRIORITIES AND STRATEGIES

Within Southeast Asia's overall development framework, prevailing economic and demographic trends and national-level priorities suggest that forestry-related goals should centre on:

- (i) economic production; and
- (ii) biodiversity protection.

Trade-offs between these objectives should be carefully monitored and controlled, and as such a third cross-cutting priority is:

- (iii) improved governance.

Given that economic growth rates in the coming decade are likely to be below those of the past decade and assuming that international financing will remain available for improved forest management, the following strategies to improve the performance of forestry are outlined:

Recapitalize forest resources

To maintain ecosystem services, reduce carbon emissions, improve watershed protection and support biodiversity conservation and future economic production, recapitalization of Southeast Asia's forest resources is essential. Investing in forest resource recapitalization can also be seen as a means of generating rural employment and will be especially attractive if the economic downturn is protracted and returns from investments in industry and services fall.

With the advent of international mechanisms to finance the environmental services associated with forestry, and greater national awareness of the importance of forestry, the reality of linking environmental conservation and income generation is growing. Even without international financing, several countries in the subregion are beginning to see forest transitions and are demonstrating approaches that could be more widely

implemented. Mustering the political will, human resources, technical know-how and necessary financing to effect widespread forest transitions are likely to become the defining challenge for forestry in Southeast Asia to 2020.

Conserve forest biodiversity

Protected areas remain the cornerstone of forest biodiversity and although there are exceptions, deforestation and forest degradation within protected areas are lower than in surrounding landscapes. In particular, there is a great need to increase forest law enforcement and awareness-raising efforts and to improve financing for protected areas – particularly in relation to staffing and management planning. Establishment of checkpoints, patrols, border controls and other law enforcement interventions can provide effective support for protected areas although, without high-level political backing, time and effort are likely to be wasted. Several international financing mechanisms are available to fund national parks and should be utilized to the extent possible.

Utilize available incentives

Heightened global interest in forests and forestry constitutes the greatest opportunity in recent times for the forestry sector to deliver on society's priorities. Financial mechanisms aimed at reducing deforestation and degradation of forests, and legality-related regulations aimed at imports of forest products to high paying markets provide new incentives to promote SFM.

Marketing of forests and forestry as producers of valuable timber, carbon sinks, conservation values, watershed protection and rural employment could bring many direct and peripheral benefits that are not being realized through current marketing systems. Given the opportunities that now exist, funnelling start-up investment into accessing and acquiring additional financing would seem appropriate.

Involve stakeholders

The challenges that face forestry – with respect to climate change and otherwise – and the difficulty of implementing more complex forest policy through a regulatory approach suggest that much greater inclusion of forestry stakeholders at different levels is necessary. Public opinion should play a larger role in forestry development so that policies are appropriate, are broadly supported and can be more easily implemented in a rapidly changing region. Improving transparency, consultation and inclusiveness is also likely to promote greater ownership and support enforcement efforts.

Reinvent forestry institutions

Over past decades, forest and forestry policies have been formulated to encompass the principles of SFM in almost all countries in the subregion. Implementation has, however, been lacking in all but a few. Recognition of this deficiency and refocusing of institutions to play an appropriate role in effectively and efficiently meeting policy goals is essential to move the subregion's forestry sector in parallel with wider developments. Gradual shifts towards local participation, greater stakeholder involvement and expanding individual and household ownership of forests also mean that many more factors will play deciding roles forestry by 2020. This is likely to drive government institutions to adopt facilitative and regulatory, rather than direct management roles. Through this change, it is important that institutions engender responsiveness and flexibility. Rapid

responses to threats and opportunities and ability to redesign and realign objectives confer distinct advantages in maintaining forestry agencies and their contribution to society.

Revitalize field-level forestry

Many of the day-to-day field-level activities that physically determine the future of forests and forestry are often overlooked in national and international discussions. Without focus on practical aspects of forestry, implementation of any policy objectives will be undermined. For example, increased opening and drying of the subregion's forests, changing weather patterns and greater risk of anthropogenic ignition as habitation and accessibility increase mean there is a strong need to improve fire management to avoid large losses of forest and associated values. Other areas of importance include improved forest harvesting, planted forest establishment, forest rehabilitation and assessment of forest health and vitality.

Improve education

The long time scales over which national-level changes occur strongly suggest that education in relation to the values of forests and the opportunities and challenges faced should be a key focus in Southeast Asia. Without an 'environmentally smarter' next generation of consumers and decision-makers, it is likely that resources will be irretrievably eroded through population pressure and environmentally sustainable practices will not take off. More immediately, the current lack of human resource capacity in forestry and increasing complexity of forest management, including linkages with climate change especially, imply that high quality education and training should be made available to those working in forestry and related disciplines at local, provincial and national levels.

1

INTRODUCTION

Southeast Asia is growing rapidly while demands are diversifying

Southeast Asia has experienced an almost continuous rise in fortunes over the past ten years. Populations have become larger and wealthier and demand for land and resources has increased. Emerging from the Asian economic crisis, China has become a global engine of economic growth and key export destination for Southeast Asia. Levels of economic development have increased in all countries while improved institutional performance is being more widely demanded as the primary means to sustain and broaden achievements made to date.

Change is normality and the future remains uncertain

The breaking Asian economic crisis on the eve of publication of the first Asia-Pacific Forestry Sector Outlook Study in 1998 resulted in substantial and lasting adjustments to national economies and to the forestry sector. The 2008/2009 global economic slowdown has signalled another round of dramatic change: capital flight and reductions in foreign investment have again struck the subregion while export markets have also contracted. The impacts of the slowdown have yet to unfurl in their entirety but signs are that Asian markets will become much more important export destinations in the future. In association, the world is set to become increasingly dependent on a widening range of interacting powers in a multipolar world in which diverse interests pursue divergent aims (NIC 2008).

Global issues are confronting society and trade-offs are being struck

Again at the international level, climate change has topped the agenda while high oil prices prior to the 2008 downturn gave rise to the spectre of an uncertain global energy future. In Southeast Asia, transformations in economies, from subsistence-based to export-led to consumer-driven, have placed rapidly changing and often conflicting demands on forests. Trade-offs between economic development and environmental protection are ever more acutely experienced and seemingly unstoppable clearance and degradation of natural forests has questioned the effectiveness of efforts to promote SFM.

Forest resources are diminishing in the face of high demand for food, fuel and fibre

With the passing of Southeast Asia's era of 'peak timber' and demands for food, fuel and fibre increasing, a lack of financial and institutional support for SFM is jeopardizing the future of the subregion's natural forests and biodiversity. The legacy of high-impact logging has also undermined the future of SFM by reducing the present value of forest resources while harvest reductions may increasingly turn attention towards plantation-grown wood and wood products imports. As such, depletion of natural forest

Climate change, and responses to climate change, will increasingly affect forestry

resources is an increasing concern for the forest products industry and trade measures implemented in high-paying markets are now being seen as a new direction from which support for legal and sustainable timber production can be derived.

Excessive timber exploitation, associated forest drying and the frequent use of fire as a management tool threaten to act in concert with climate change to precipitate widespread degradation of forest ecosystems. Predicted increases in storm intensity and greater frequency of extreme meteorological events may also raise the incidence of environmental disasters such as floods, droughts and landslides. At the same time, global responses to climate change – both in relation to mitigation and adaptation – are set to have much more influence on forestry. REDD in particular holds great promise where institutional mechanisms can be established to effectively alter patterns of behaviour, monitor changes and provide equitable rewards.

Changing demands for land, resources and environmental services will affect forests

Growing demands for land and natural resources are, however, introducing doubt that pressure on forests and forest land can be significantly reduced. Between 2010 and 2020, the population of Southeast Asia is projected to increase by 10 percent to 657 million. With concomitant expansion in demand for environmental services from forests, both from domestic and international sources, the next decade will provide a test of the subregion's ability to integrate diverse causes in innovative ways.

Economic liberalization has not led to improved governance

Increased international focus on the quality of governance is bringing an additional dimension to forestry and national development. Governance improvements will be of key importance but have to date remained elusive in much of Southeast Asia. Economic liberalization without parallel increases in institutional capacity is raising concern for sustainability – not only in environmental terms but socially and economically as well. A singular reliance on growth to reduce poverty and boost socio-economic performance may prove costly in terms of loss of environmental services, and future economic performance, where institutional leadership does not emerge.

The roles of forests are diverse and their continued existence is in our hands

The many roles of forests – in providing timber and wood products, protecting biodiversity, providing food during times of scarcity, ameliorating local and global climate, reducing the impacts of natural disasters, providing a location and backdrop for ecotourism and a source of employment for rural dwellers – are among the areas discussed in the following Sections. The extent of forests and the benefits they provide in 2020 will result from decisions taken in relation to these multiple roles in the coming months and years.

1.1. BACKGROUND

The initial Asia-Pacific Forestry Sector Outlook Study (APFSOS I) drew together the many dimensions of forestry to provide a coherent description and analysis of the situation and prospects for forestry in the region. The study resulted in 50 working papers on a variety of forestry themes. The formal aspects of the study culminated in a comprehensive main report, published in November 1998. APFSOS I provided an important roadmap for forestry sector development in the Asia-Pacific region to 2010, which is still being used to guide policy-makers in the region today. Much of APFSOS I is now becoming outdated and, since 1998, a number of fundamental changes have taken place within and outside the forestry sector.

Asia-Pacific Forestry Towards 2020 (APFSOS II), aims to update and expand the work completed in 1998 and focuses on existing and emerging issues of importance to forestry in the region. The objectives of this study are to:

- Improve understanding of the forces that shape forests and the forestry sector in Southeast Asia and of trade-offs that are being and will be made in implementing policy and actions that affect forestry.
- Identify policy options at the national and subregional levels to improve the long-term flow of benefits from forestry and maximize flexibility in view of future uncertainty.

Specifically, the report seeks to identify existing and emerging trends in forests and forestry and link them to broader changes in society and in specific key drivers of change. Through scenario analysis, sketches of possible forestry futures are developed and recommendations are made to steer the sector towards more desirable outcomes.

1.2. SCOPE AND AUDIENCE

Eight countries in Southeast Asia are included in this study: Cambodia, Indonesia, Lao PDR, Malaysia, Myanmar, Philippines, Thailand and Viet Nam. Timor-Leste, Singapore and Brunei are not specifically included due to their limited forest resources and modest influence on the subregion's forestry sector. The report draws on papers produced as part of APFSOS II by each of the eight listed countries.

The study is based on the perception that forestry is a long-term, broadly-based activity, covering economic, environmental and social values at a range of levels – from local to global – and is influenced by a wide range of pressures both from within and outside the forestry sector. Within the report, past trends and influences on forestry are reviewed to build a frame of reference upon which future scenarios are constructed. In developing a picture of the likely future situation in forestry, recommendations and policy measures are drawn to guide the sector towards the more desirable outcomes.

This paper is aimed at policy-makers in Southeast Asia and people who influence them, at project developers, aid agencies and donors, at members of international forums and discussion groups and at investors in Southeast Asia whose actions may impact upon forests and forestry. It is also aimed at those interested in environmental and social issues in Southeast Asia and whose influence may be indirect or manifested in the future.

1.3. STRUCTURE OF THE REPORT

The report is split into five parts describing forests and forestry in the subregion, the influences that affect them and, given these influences, the scenarios that may play out by the year 2020. The final Sections outline what we may see in 2020 and possible ways to improve the situation.

Current status of forests and forestry in Southeast Asia

Presents the status and trends in forest resources and their management, wood and forest products, wood energy, non-wood forest products, service functions of forests, political and institutional frameworks.



What will influence the future state of forests and forestry?

Discusses changes in society that will have impacts on forests and forestry, such as demographic changes, changes in the economy and the political and institutional environment, the effects of infrastructure development and agricultural expansion.



Probable scenarios and their implication

Discusses the probable scenarios for socio-economic development and forestry towards 2020.



Forests and forestry in 2020

Provides a description of the probable state of forests and forestry in Southeast Asia in 2020, including forest resources, wood and forest products, forest services and forest policies and institutions.



Bringing about change

Discusses possible responses to the range of scenarios that are foreseen and to the most likely situation in terms of policy and institutions, technology, investment and regional and global collaboration.

2

FORESTS AND FORESTRY

The role of forestry is changing

Southeast Asia's forests have played a central role in the development of the region and continue to play an important role in the production of wood and other products, the conservation of global biodiversity, climate change abatement and protection of land and water resources. Forests also provide a home to a diminishing but significant number of people in the subregion and offer employment in, among other things, production of furniture and other wood products, protected area management and plantation development. Changes in the state of forests and forestry have widespread impacts, the costs and benefits of which are spread across society – from the local to the global scale and from now into the future. This chapter outlines and discusses the most important issues confronting the forest sector in Southeast Asia and provides an overall indication of broad trends in recent decades.

Forests and their constituent biodiversity are being lost

The forests of Southeast Asia qualify as some of the most species-rich in the world (**Figure 2.1**). The subregion contains four of the 25 global biodiversity hotspots¹ in which a significant proportion of the world's species are under significant threat (Myers *et al.* 2000). Forest clearance in the subregion has continued at a rapid pace in the last decade and shows little sign of abating. Between 2005 and 2010 the area of forest in Southeast Asia declined at 0.5 percent per annum, compared to 0.3 during the previous five years and 1.0 percent between 1990 and 2000. Between 1990 and 2010 the forests of Southeast Asia contracted in size by an area greater than that of Viet Nam (FAO 2010). With forest conversion the primary driver of biodiversity loss, estimates are that between 13 and 42 percent of species will be lost in the subregion by 2100, at least half of which could represent global extinctions (Sodhi *et al.* 2004).

1 Indo-Burma, the Philippines, Sundaland, Wallacea (see <http://www.biodiversityhotspots.org/Pages/default.aspx>). Conservation International now defines 34 global biodiversity hotspots as regions containing at least 1 500 species of endemic vascular plants (> 0.5 percent of the world's total), and having lost at least 70 percent of their original habitats.

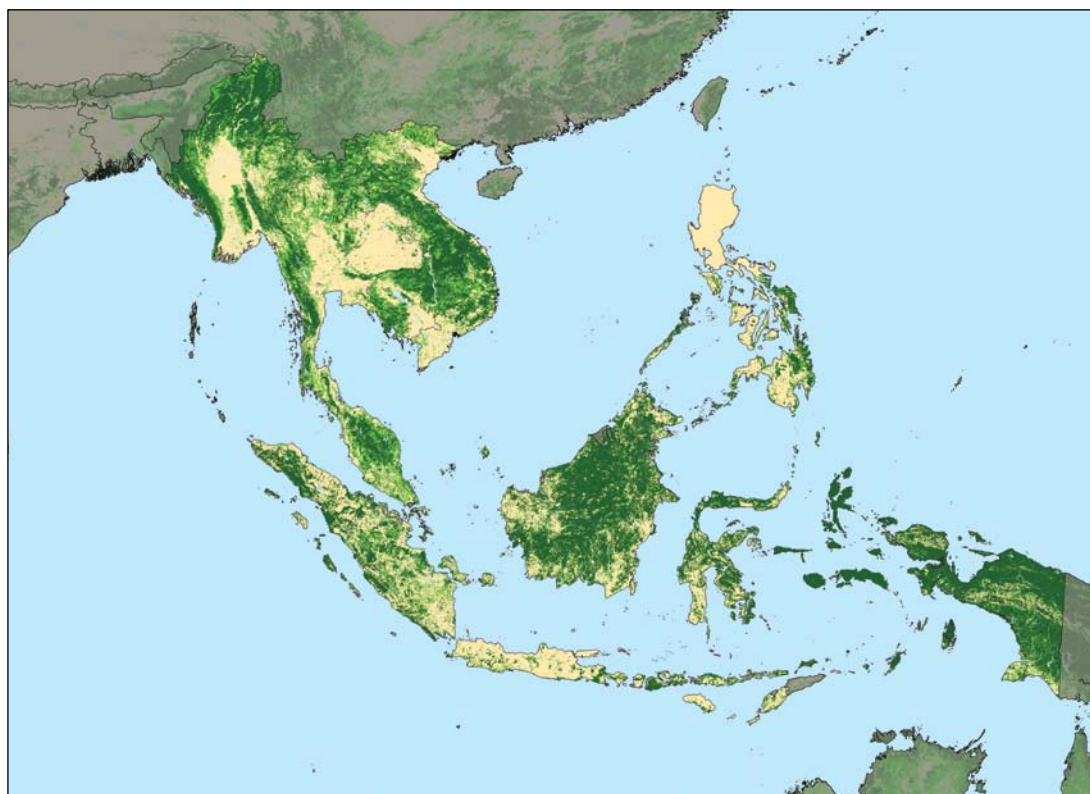


Figure 2.1. Forest cover in Southeast Asia 2005

Source: FAO

Deforestation and associated carbon emissions pose a serious problem

IPCC (2007a) estimated that during the 1990s, 17.4 percent of greenhouse gas emissions arose from forestry (mostly deforestation). Rates of deforestation and forest degradation in Southeast Asia were estimated to be around double those in tropical Africa or Latin America (Mayaux *et al.* 2005). Southeast Asia's forests have thus become an important focus of global climate change abatement efforts – particularly peat swamp forests where carbon emissions following deforestation and drainage contribute significantly to the global total (Uryu *et al.* 2008). 'Reduced Emissions from Deforestation and forest Degradation' (REDD) readiness activities, i.e., preparations for potential post-2012 inclusion of REDD in global climate change agreements, are already taking place in several countries in the subregion.

Forest product production is falling

In 2005, Southeast Asia accounted for 9.2 percent of the world's productive plantations, 4.7 percent of global industrial roundwood production and 5.1 percent of the global forest area (FAO 2005a; FAO 2009). All of these proportionate shares have fallen since 1990 when Southeast Asia accounted for 9.9 percent of productive plantations, 6.4 percent of industrial roundwood production and 6.0 percent of the world's forest area. Within the subregion, forest production centres have moved from Malaysia, the Philippines, Thailand and Viet Nam on to Indonesia and have more recently advanced into Lao PDR, Cambodia and Myanmar

as economic frontiers have advanced and existing resources have been exploited. Resources farther afield, particularly in Papua New Guinea (PNG), the Russian Far East and the southern hemisphere plantation countries are now increasingly supplying markets once served by Southeast Asia.

Forest management is advancing slowly

The values of forests are best realised through different ownership and institutional structures depending on the type of forest and nature of demands placed on them. In several countries in Southeast Asia, allocation of forests to non-state actors is expanding as supply-demand balances change and needs for greater tenure, regulatory and technical efficiency become apparent. Needs for increased investment and greater social and economic justice are also promoting this change. At the same time, institutions are adapting to accommodate the different roles of forests in production, protection and conservation, while in some cases beginning to separate regulatory and management roles.

2.1 TRENDS IN FOREST RESOURCES

Demands on forests are rising

Expanding road networks, rising demand for forest products and increased cross-border movement of goods, capital and labour are reducing the importance of national boundaries in determining trends in Southeast Asian forest resources. Growing demand for forest products will place increasing pressure on the subregion's forest resources as populations expand and become wealthier. Heightened recognition of the non-extractive values of forests as populations become more urbanized and international conventions and agreements are strengthened will increasingly confront society with the challenge of balancing demands for forest goods and forest services.

Forest product production has peaked and focus is turning towards plantations

Southeast Asia's period of 'peak timber' has passed and cultivation of other crops has generally proved more workable and more profitable than sustainable management of large areas of natural forest. To maintain production of forest products, efforts have been made to expand forest plantations. In general, the extent to which plantation establishment programmes have been pursued relates to the degree to which natural forest resources have been depleted (Katsigiris *et al.* 2004).

The following Sections outline changes in the status of forest resources in Southeast Asia. Particular attention is paid to the productive functions of forests and additional Sections outline patterns in forest ownership, management and the economic viability of forest management for wood production. Trends and issues associated with conservation forests are included in Section 2.4.1.

2.1.1 Changes in forest cover

Forest cover loss has slowed since the 1990s

Southeast Asia's forests cover 214 million hectares and constitute 29 percent of the Asia-Pacific region's total forest area (FAO 2010). Forests covered 49 percent of the land area in the subregion in 2010, with national forest cover ranging from 26 percent in the Philippines to 68 percent in Lao PDR. Several countries also have significant areas of other wooded land.² The overall rate of forest cover change is reported to have fallen from -1.0 percent *per annum* in the 1990s to -0.3 percent up until 2005 subsequent to which the rate of change again increased to -0.5 percent *per annum* (Table 2.1).

Table 2.1. Area of forest and other wooded land in Southeast Asia in 2010 and rate of change in forest area

	Forest area 2010 (000 ha)	Forest cover (%)	Annual change in forest area (%)			Area of other wooded land 2010 (000 ha)
			1990- 2000	2000- 2005	2005- 2010	
Cambodia	10 094	57	-1.1	-1.5	-1.2	133
Indonesia	94 432	52	-1.7	-0.3	-0.7	21 003
Lao PDR	15 751	68	-0.5	-0.5	-0.5	4 834
Malaysia	20 456	62	-0.4	-0.7	-0.4	0
Myanmar	31 773	48	-1.2	-0.9	-0.9	20 113
Philippines	7 665	26	0.8	0.8	0.7	10 128
Thailand	18 972	37	-0.3	-0.1	0.1	0
Viet Nam	13 797	42	2.3	2.2	1.1	1 124
SE Asia	214 064	49	-1.0	-0.3	-0.5	57 385

Source: FAO (2010).

Forest cover is increasing in some countries

Figure 2.2 shows the distribution of forest area between countries and the predominance of Indonesia, both in terms of absolute forest area and reduction in forest area. With the exception of the Philippines, Thailand and Viet Nam, other countries in the subregion are following the same trend.

² Land not classified as forest but with area > 0.5 hectare and height > 5 metres and 5-10 percent canopy cover.

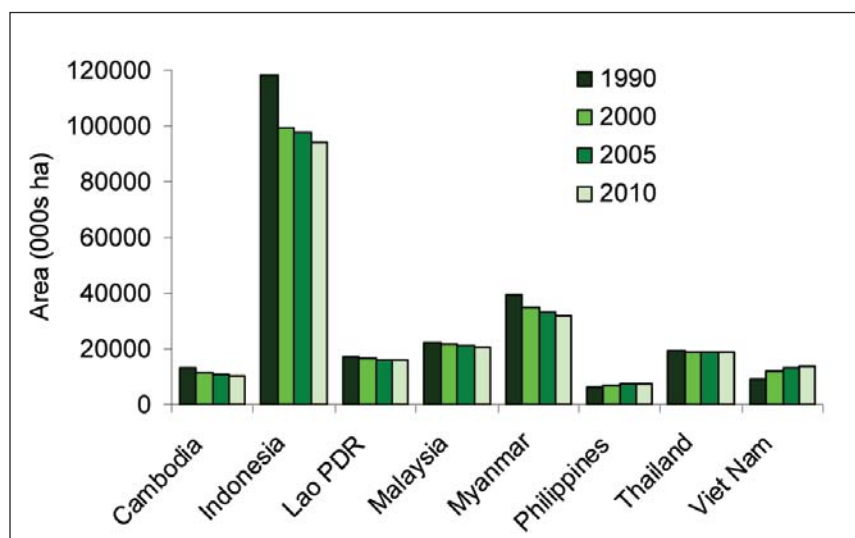


Figure 2.2. Forest area in Southeast Asian countries, 1990-2010

Source: FAO (2010).

Eight percent of the land area in Southeast Asia has been deforested since 1990

A total area of around 42 million hectares of forest is estimated to have been lost in Southeast Asia between 1990 and 2010 – equivalent to 8 percent of the land area. According to recent figures presented in the 2010 FAO global forest resources assessment, rates of forest loss in Southeast Asia fell immediately after the turn of the millennium but have increased since 2005, largely reflecting the trend reported by Indonesia. Losses in Southeast Asia between 2005 and 2010 equalled just over 1 million hectares per annum, having fallen from 2.4 million hectares per annum during the 1990s to 0.7 million between 2000 and 2005. Losses were proportionally highest in Cambodia (685 000 hectares/year) and Myanmar (310 000 hectares/year). Viet Nam reported an increase in forest area, amounting to around 144 000 hectares/year, while the Philippines and Thailand also reported modest increases of 55 000 and 15 000 hectares/year respectively (FAO 2010).

The qualitative values of forests are of central importance

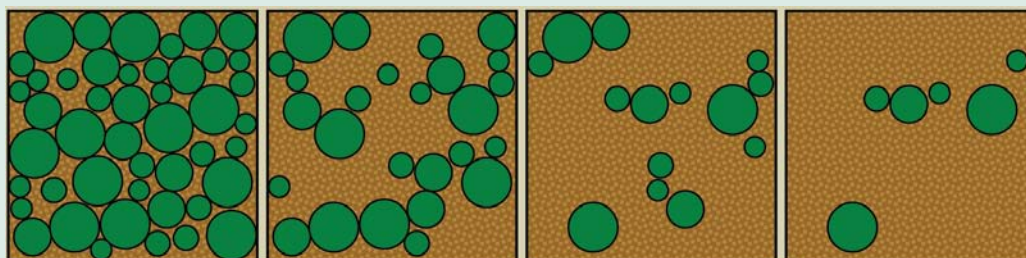
Although the overall rate of change in forest cover is useful as a headline guide, the global definition of forests as areas with as little as 10 percent canopy cover fails to capture more qualitative forest values. Forest degradation, for example, may take place without reflection of forest cover statistics, as outlined in **Box 2.1**. Similarly, forest types must be taken into account in assessing status and trends in forests, forestry and associated goods and services.

Box 2.1. Understanding forest resource statistics

As a basis for sound planning in the forestry sector, forest resource and forest product statistics in Southeast Asia still require significant improvement. Problems result from a range of issues, both technical- and management-related, and include the following:

- Forest quantity, type and quality vary greatly across locations such that high intensity surveys are necessary to collect accurate information – remote sensing simplifies matters but expensive ground truthing is still required.
- Many countries do not have the financial and human resources required to collect forestry data and countries where forests are most abundant are often the poorest.
- There is often poor coordination between institutions with an interest in the forestry sector (e.g., the military, village groups, forestry agencies, concession holders) and the benefit of information collection may be insufficient for any one party to justify collection.
- Forest product figures may be underdeclared or unavailable and forest-related information may not be collected where corruption and illegal or uncontrolled logging are prevalent.
- Information may be proprietary in nature – especially in relation to plantations.
- Measurement conventions and conversion factors create difficulties in comparing statistics across regions and over time.
- Forests are heterogeneous and have multiple users with different information requirements and forest resource definitions are therefore of great importance, for example:
 - » areas of different forest type, e.g., plantation forest, primary forest or agroforestry, and different species groups, e.g., bamboo forest, rubber, coconut or oil-palm plantation, may be aggregated to give a figure of limited use in relation to the different values of forest;
 - » inclusion of potential forest and area designated as forest but with no trees may similarly cause accounting problems in relation to forest values;
 - » low forest cover resolution may result in ‘hidden deforestation’ (see diagram below).

Problems remain with forest degradation going unseen, however, especially as degradation is difficult to identify in coarse grain satellite images usually used in forest cover assessments (Stibig and Malingreau 2003).



Representations of 70, 40, 20 and 10 percent canopy cover – all constitute ‘forest’ under the FAO definition

Planted forests are increasing while primary forests shrink

As natural forests have been logged and cleared in the subregion efforts have been put into planting forests. In most countries the proportion of planted forest³ remains low, however, and only in Thailand and Viet Nam do they make up a significant proportion of the total forest area (**Table 2.2**). Most countries also report only small remaining areas of primary forest, with the exception of Indonesia and Thailand.

Table 2.2. Natural and planted forest area in Southeast Asia in 2010 (000 ha)

	Total forest	Primary forest	% Primary	Other naturally regenerated	Planted	% Planted
Cambodia	10 094	322	3.2	9 703	69	0.7
Indonesia	94 432	47 236	50.0	43 647	3 549	3.8
Lao PDR	15 751	1 490	9.5	14 037	224	1.4
Malaysia	20 456	3 820	18.7	14 829	1 807	8.8
Myanmar	31 773	3 192	10.0	27 593	988	3.1
Philippines	7 665	861	11.2	6 452	352	4.6
Thailand	18 972	6 726	35.5	8 261	3 986	21.0
Viet Nam	13 797	80	0.6	10 205	3 512	25.5
SE Asia	214 064	63 992	29.9	135 540	14 533	6.8

Source: FAO (2010).

Planted forests are expanding – in Viet Nam and Thailand in particular

Great variation in the area of planted forests and rates of establishment are evident across Southeast Asia as **Figure 2.3** shows. The overall rate of planted forest establishment in Southeast Asia increased from 261 000 hectares *per annum* between 2000 and 2005 to 298 000 hectares *per annum* between 2005 and 2010. Rates in the 1990s, by comparison, averaged 531 000 hectares *per annum*. The differing trends between countries variously indicate public and private investment in plantation establishment for production and protection, conversion of rubber plantations to oil-palm and relative stagnation in plantation development. Viet Nam has the highest proportion of land area under planted forests (11 percent) and also the highest rate of expansion at 144 000 hectares *per annum* between 2005 and 2010. In Thailand, rates are also high at 108 000 hectares *per annum*. Within the Asia-Pacific region as a whole, 80 percent of the expansion in planted forest between 2005 and 2010 took place in China where establishment averaged 2 million hectares *per annum*. Further analysis of productive plantations is provided in Section 2.1.2.

³ Planted forests constitute plantations and the planted component of semi-natural forests.

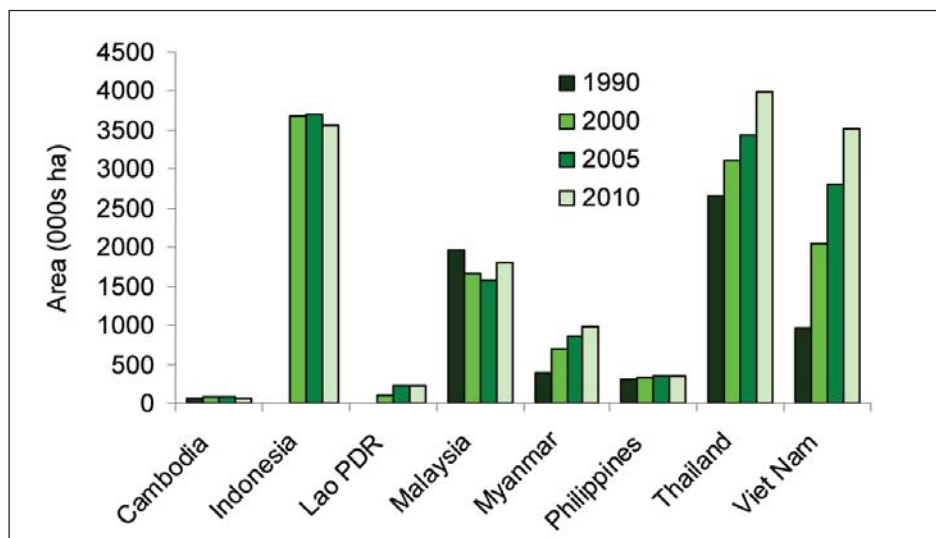


Figure 2.3. Extent of planted forests in Southeast Asian countries, 1990-2010

Source: FAO (2010).

How production and protection are integrated lies at the heart of forest management

Although all forests perform a range of functions, protection of forests, either for conservation of biodiversity or for provision of other environmental services, often means that production is excluded. Despite increasing demand for forest products in Southeast Asia, conservation and protection of forests have become a primary motivating factor in forest management in several countries. Implementing a switch towards forest protection has often been associated with complications at the field level – for example, forest product supply reductions; ‘export’ of logging to neighbouring countries; denial of local rights of access to resources; and illegal logging proliferation due to the lack of vested interest in forest conservation. Effectively managing these and associated transitions lies at the heart of SFM and will define the trends we will see in forest resources in the coming years.

Protection and conservation roles of forests are increasingly recognized

The *FAO forest resources assessment* divides forest area into the following designations: production, protection, conservation or multiple use (FAO 2010). Forest can also be designated for social services, other use or have no designation. **Figure 2.4** shows the predominance of production as the primary function of forests in Southeast Asia, accounting for 49 percent of forest area in 2010. The proportion has remained static since 2000 after rising from 39 percent in 1990. The proportion of forest designated for protection also remained constant between 2000 and 2010 at 20.5 percent while the proportion of conservation forest rose from 16 to 18 percent. Forest designated for other functions⁴ fell from 14 to 13 percent of the total forest area.

⁴ Multiple use, social services, other use or no/unknown designation.

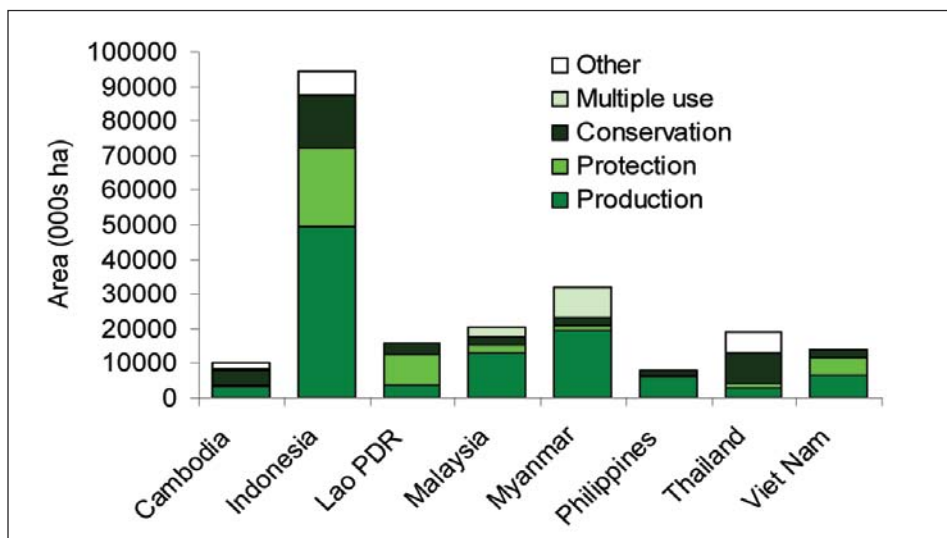


Figure 2.4. Extent of forest area by designation in Southeast Asian countries in 2010

Source: FAO (2010).

The area of conservation forest in Southeast Asia has increased by 20 percent since 1990

Conservation forests serve primarily to protect biodiversity and although a strong connection therefore exists with primary forests, the value of secondary forests in biodiversity conservation has also been discussed amid some controversy (Wright and Muller-Landau 2006; Butler 2007). The area of conservation forest has increased significantly since widespread establishment of protected areas following the 1992 Earth Summit in Rio. Between 1990 and 2010, the area of forest designated for conservation in Southeast Asia increased by 20 percent or 6.3 million hectares to reach 38.5 million hectares – 9 percent of the total land area and 18 percent of the forest area (see **Figure 2.19**). The largest increases between 2000 and 2010 were recorded in Myanmar followed by Malaysia, Cambodia and Viet Nam. Further analysis is provided in Section 2.4.1.

Protection forests account for 20 percent of the total forest area in Southeast Asia

Forests designated primarily for protection cover 43.4 million hectares in Southeast Asia and account for 10 percent of the land area and 20 percent of the total forest area (FAO 2010). Protective functions include climate amelioration, protection from erosion and protecting coastlines and water resources. Across the subregion, protection forests account for widely differing proportions of the total forest area from 4 percent in Myanmar to 58 percent in Lao PDR. However, designation may bear little resemblance to management. For example, a national protection forest area system has yet to be established in Lao PDR and in Indonesia protection forests are some of the least well-managed forests (CFPS 2009). Between 2000 and 2010 the area of protection forest in the subregion fell by 1.7 million hectares. Small reductions were recorded in many countries with the largest in Lao PDR (-1.2 million hectares) and Indonesia (-0.6 million hectares). Small increases were seen in Cambodia (0.5 million hectares) and Thailand (0.3 million hectares).

Forest cover change hotspots

Hotspots of forest conversion appear widely across the subregion

A review of forest cover change hotspots in Southeast Asia has highlighted the continuing loss of forest resources in many locations around the subregion. Major hotspots of forest conversion and loss of canopy cover were identified in Sumatra, Borneo (both Malaysian and Indonesian) West Papua and Myanmar, with many smaller patches also appearing in Lao PDR, Viet Nam, Cambodia and in remaining mountain forests in the Philippines (Stibig *et al.* 2007). Large areas of small and scattered change were also identified in the north of Thailand where encroachment into protected areas and paring back of forest edges are prevalent (Stibig *et al.* 2007; Lakanavichian 2006).

Upland and lowland forests and forests in border areas are all affected

In Lao PDR, Viet Nam, Myanmar and Cambodia most areas of forest loss are in the hilly zones and along the mountain ranges where evergreen and semi-evergreen forests are located. Changes to both evergreen and deciduous lowland forests have also been recorded in the flatlands of Cambodia, central Myanmar, central and southern Lao PDR and central Viet Nam. Additionally, forest change hotspots are frequently located in border areas such as between Myanmar and Yunnan, between Lao PDR, Cambodia and Viet Nam and between Thailand and Cambodia (Stibig *et al.* 2007). In Thailand, the 1989 logging ban had little initial effect on deforestation although other factors are playing important roles in forest cover change (**Box 2.2**).

Box 2.2. Forest cover change and the logging ban in Thailand

Despite the 1989 logging ban in Thailand, there was, at least initially, little effect on the rate of deforestation. The average forest loss in the seven years following the ban was almost 2 000 km² annually, which was comparable with forest loss during the seven years preceding the ban (Ongprasert 2009). Currently, reduction in forest area mainly results from:

- Forest clearance for agriculture and other land-uses;
- Intensified shifting cultivation; and
- Wood poaching.

Many areas around Thailand where shifting cultivation has been eradicated are, however, returning to forest, although official statistics do not reflect the changes unless there is an associated increase in forest land area. Plantations on private land are also expanding but are not included in official statistics as no detailed inventory of the existing plantation area has been carried out (RFD/DNP 2009).

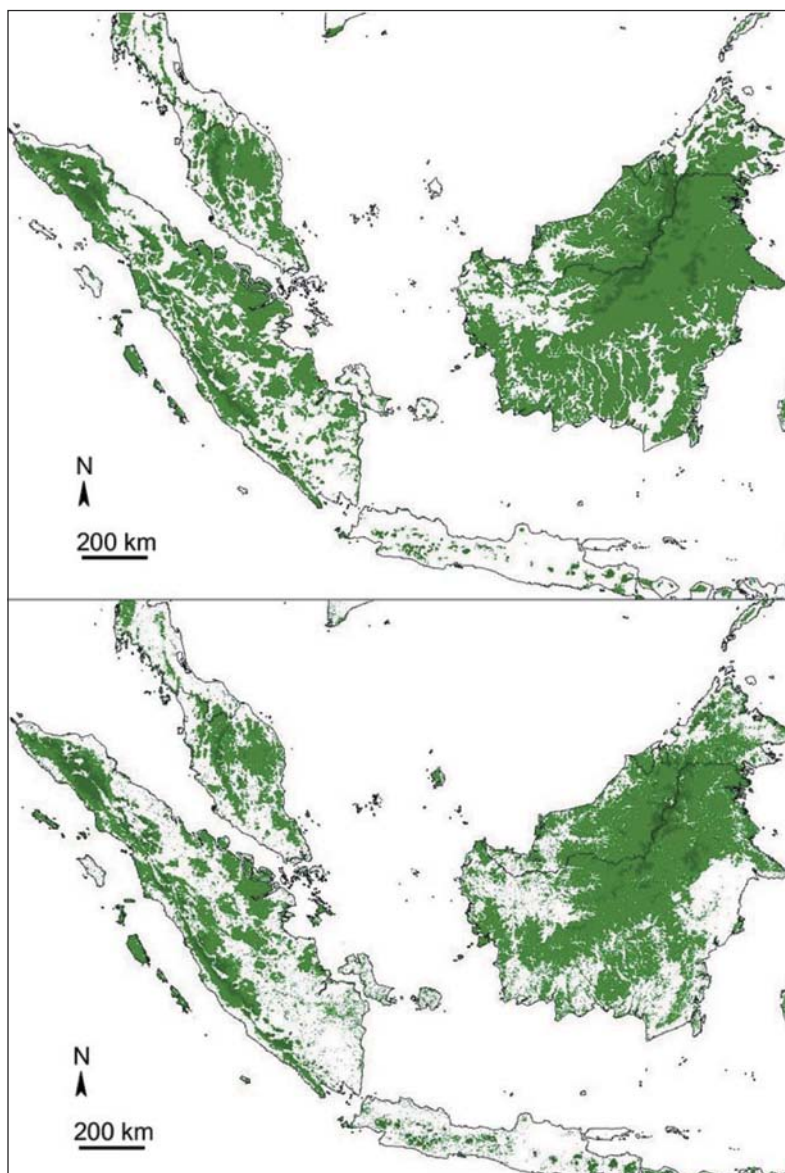


Figure 2.5. Forest cover of Peninsular Malaysia, Sumatra and Borneo in the mid-1980s (top) and for 2000 (bottom)

Source: Stibig and Malingreau (2003).

Although rubber is now considered a forest species, the expansion of rubber plantations within Permanent Reserved Forest in Selangor and Johor states in Peninsular Malaysia has nonetheless caused concern (FAO 2006a; Li 2009).

In Mindanao in the Philippines, analysis from 2004 showed that most remaining natural forests are located in protected areas, watershed reserves or inaccessible zones. Forest cover has increased over the last 14 years but most of this can be attributed to forest plantations established on former forest lands. Clearance of forest lands was accelerated by suspension of timber licence agreements in the late 1980s without provision having been made for adequate protection measures for remaining forests (Guiang and Castillo 2006).

In Sumatra, Borneo and west Papua forest loss and degradation are occurring in most lowland forests, particularly in the area of Sarawak close to the Kalimantan border. The main causes are commercial logging and forest clearance for establishment of oil-palm plantations (Stibig *et al.* 2007). West Papua marks an eastward movement of the logging frontier in Indonesia and logging is concentrated in the west and southeast (Stibig *et al.* 2007).

Figure 2.5 shows forest loss between the 1980s and 2000 in Malaysia, Sumatra, Java and Kalimantan. East Kalimantan and east Sumatra have undergone the most widespread conversion although few areas of forest are unaffected except where initial forest cover was low.

Mangrove forests have been hit disproportionately hard

Across the subregion, mangroves have been particularly susceptible to conversion and degradation owing to the high value of the land they occupy, easy accessibility and the value of wood from mangrove species for energy production from mangrove species. In Southeast Asia, the area of mangroves is estimated to have fallen from 5.1 million hectares in 2005 to 4.9 million hectares in 2010, representing loss of 0.9 percent per year, significantly higher than the overall rate of forest loss in Southeast Asia of 0.5 percent (see **Table 2.1**).

2.1.2. Changes in growing stock

Growing stock relates closely to timber availability and carbon storage

Growing stock is an important indicator of forest health and vitality and also of wood availability and carbon storage. Forests vary in productivity and density according to climate, soils, topography and species composition and level of degradation. By comparing changes over time or between similar forest types, estimates of forest degradation can be derived. Such information is of rising importance in light of increasing global commitment to reducing emissions from forests and in relation to biodiversity conservation.

Only Viet Nam has significantly increasing growing stock

Across the subregion changes in growing stock since 1990 closely reflect changes in the extent of forest resources (**Figure 2.5**). Only in Viet Nam has growing stock increased significantly, although marginal increases were also reported for Thailand

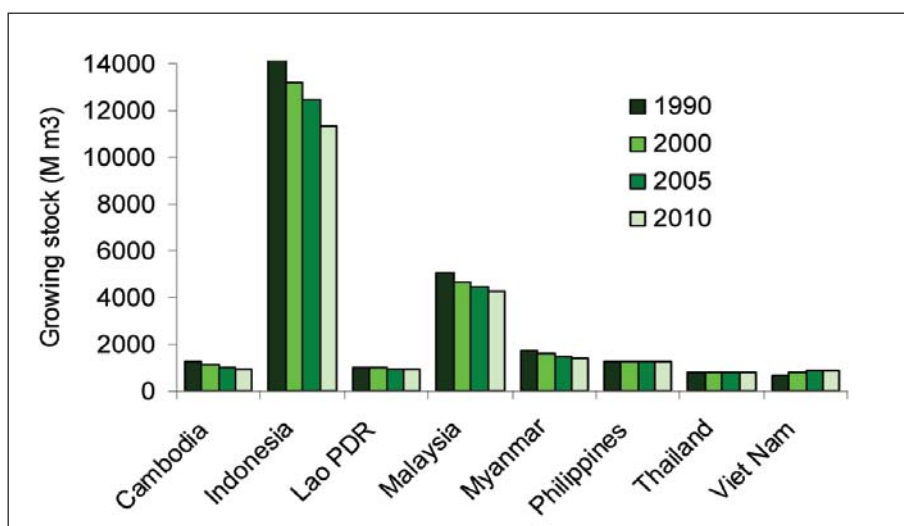


Figure 2.6. Growing stock in Southeast Asian countries, 1990-2010

Source: FAO (2010).

Growing stock data suggest forest degradation rates increased after 2005

Growing stock per unit forest area varies greatly between countries, although reasons for the differences are not entirely clear (**Table 2.3**). Natural stocking densities and levels of forest degradation play a part, although figures should be used with caution as other factors, including poor information availability, are probably

important. Changes in growing stock per unit forest area suggest that at the subregional level forest degradation accelerated after 2005 (**Table 2.3**). None of the countries in Southeast Asia reported increases in stocking density.

Table 2.3. Growing stock and change in growing stock per unit forest area

	Growing stock (m ³ /ha)	Change in growing stock (m ³ /ha/yr)	
	2010	2000-2005	2005-2010
Cambodia	95	-0.11	-0.10
Indonesia	120	-1.15	-1.44
Lao PDR	59	0.00	-0.06
Malaysia	207	-1.03	-1.03
Myanmar	45	0.00	0.00
Philippines	167	-1.07	-1.06
Thailand	41	0.00	0.00
Viet Nam	63	-0.47	-0.46
SE Asia	102	-0.69	-0.82

Source: FAO (2010).

Growing stock data will become increasingly important

Despite the limitations detailed here, growing stock figures are set to become increasingly important in national carbon accounting efforts related to potential post-2012 agreement on inclusion of REDD. More accurate figures are thus likely to become available in the near future. For this reason and others, implementation of a potential agreement on REDD will have repercussions throughout forestry and not just in relation to carbon as outlined in Section 2.4.2.

2.1.3. STATUS AND TRENDS IN PRODUCTION FORESTS

The area of production forests has increased in Southeast Asia

Southeast Asia's production forests constitute 8.7 percent of the global total and in 2008 contributed 5.1 percent of global industrial roundwood production (FAO 2010; FAO 2009). In most countries in Southeast Asia the production forest area has increased since 1990. In Southeast Asia as a whole, a net increase from 96 to 104 million hectares between 1990 and 2010 was reported (**Figure 2.7**). This contrasts with the perception that a widespread transition in forest management from production to protection is underway. In Myanmar in particular, 20 million hectares of forests were reclassified for production and an accompanying increase in industrial roundwood production was reported (FAO

2009). Conversely, large reductions in the 1990s and thereafter were reported in Indonesia as a result of conversion of forest land. The contraction was accompanied by a steady reduction in industrial roundwood production (FAO 2009). Between 2000 and 2010, subregional trends have been mixed. The overall area of production forests fell by 5.4 million hectares, although in Lao PDR, the Philippines, Thailand and Viet Nam increases were recorded – probably in relation to expansion of planted forests.

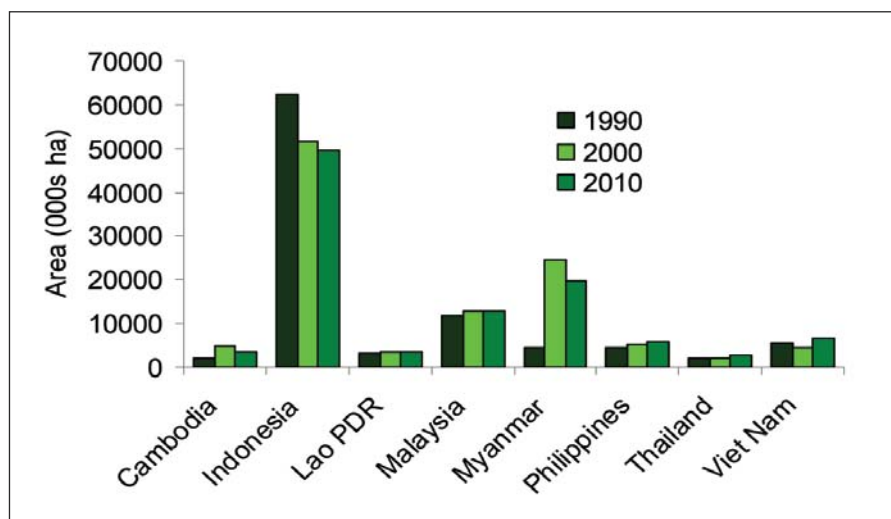


Figure 2.7. Extent of forest designated for production in Southeast Asian countries, 1990-2010

Source: FAO (2010).

Forest products supply has followed trends in forest clearance

Recent and historic trends in forest product manufacturing in Southeast Asia indicate a close correlation with forest clearance. The decline in timber production in Southeast Asia and loss of market share are summarized in **Box 2.3**. Reduction in supplies of timber and other products from natural forests and poor plantation performance in the face of increasing demand will have inevitable repercussions in the subregion. Increased pressure on conserved, protected and other forests both, domestically and abroad, has been reported as a result of logging bans in Thailand and more recently in China (Lakanavichian 2006; Katsigiris *et al.* 2004; Brown *et al.* 2001). Further contractions in supply are likely to have similar impacts unless alternative sustainable sources of forest products can be established or found.

Box 2.3. The decline of timber production in Southeast Asia

During the past 40 years, wood production has shifted from the natural forests of the traditional Southeast Asian producers to southern plantation countries (New Zealand, Australia, Chile and South Africa). Large tracts of natural forests are likely to confer an advantage in the short term, but that advantage will eventually diminish owing to advantages that plantations offer, that is, the ability to grow uniform trees quickly in accessible areas. Hence, the Philippines, having exhausted

its natural forests during the 1960s and 1970s, has become a minor player in forest product markets. Malaysia and Indonesia commenced logging in natural forests later and have exploited their natural advantage through the 1970s and 1980s. During the 1990s, the fast-growing plantations of the southern plantation countries began capturing the market share from Indonesia and Malaysia. At present, the southern plantation countries account for more than 60 percent of the roundwood production share of the seven countries, up from about 40 percent in the mid-1980s (McKenzie *et al.* 2004).

Reasons for the shift away from timber production in Southeast Asia include the increasing costs of production and falling competitiveness variously resulting from (see Sasatani 2009):

- Declining resource availability (depletion of forest resources/forest protection/lack of establishment of plantations);
- Out-of-date technology and low conversion efficiencies;
- Increasing wage rates and increasing attractiveness of urban employment;
- Inefficient policy and institutional frameworks combined with poor governance.

Reversing the trend will require significant investment in resource supply, renovation of production facilities and improved governance and institutional performance. Even then it may be that structural changes in economies, increasing wage rates and competing demands on forests reduce the competitiveness of Southeast Asia's timber industry.

Productive plantations

The area of productive plantations is expanding

Globally, plantations are becoming increasingly important in supplying forest products as the extent and stocking of natural forests is reduced and protection measures proliferate. In 1999, it was estimated that although constituting only 3 percent of the global forest area, productive plantations produced 35 percent of the global wood supply (ABARE and Jaakko Pöyry 1999). The proportion of wood from plantations is expected to increase in coming years. The total area of productive plantations in Southeast Asia was estimated at 10 million hectares in 2005,⁵ equivalent to 9 percent of the global area of productive plantations and just over 6 percent of the total forest area in Southeast Asia (FAO 2005a). In Southeast Asia as a whole, productive plantations constitute an increasing percentage of the total area of forest-designated production, rising from 6.8 to 9.7 percent between 1990 and 2005. Indonesia, Malaysia, Thailand and, more recently, Viet Nam have taken the lead, together accounting for 87 percent of the total area of productive plantations in 2005. In Viet Nam and Indonesia the area of productive plantations increased steeply, reaching 1.8 and 3.4 million hectares respectively in 2005, and increases were also reported in Lao PDR and Myanmar (**Figure 2.8**).

⁵ The area of productive plantations was not reported in the 2010 *FAO global forest resources assessment*.

Pulpwood and rubber plantations are expanding fastest

In Southeast Asia, plantations are established primarily for production of sawlogs, pulpwood, bioenergy and rubber production. The main 'traditional' forestry species planted are *Acacia mangium*, *Tectona grandis* and *Eucalyptus* spp. *A. mangium* is the main species grown for timber, panel products and pulp and paper – mainly in Indonesia and Malaysia – closely followed in area by teak, which is grown primarily in Indonesia, Myanmar and Thailand (FAO 2006a). The proportion planted for pulpwood production has climbed significantly in recent years and in Viet Nam and Indonesia, pulpwood plantations expanded from a negligible area in 1990 to over 1 million hectares each in 2005 (FAO 2006a). Rubber⁶ is a particularly important crop in the subregion and in Malaysia comprised 84 percent of the total area of productive plantations in 2005 and 63 percent in Thailand (Kiam 2005; Charupatt 2005; FAO 2005a). In Viet Nam, the area of rubber doubled between 1990 and 2005 and in northern Lao PDR considerable investment has gone into rubber plantation establishment in recent years (Khanh 2005; Alton *et al.* 2005). In Malaysia, the higher profitability of palm oil production and demands for rubberwood led to a reduction in area of rubber from 1.8 million hectares to 1.3 million hectares between 1990 and 2005.

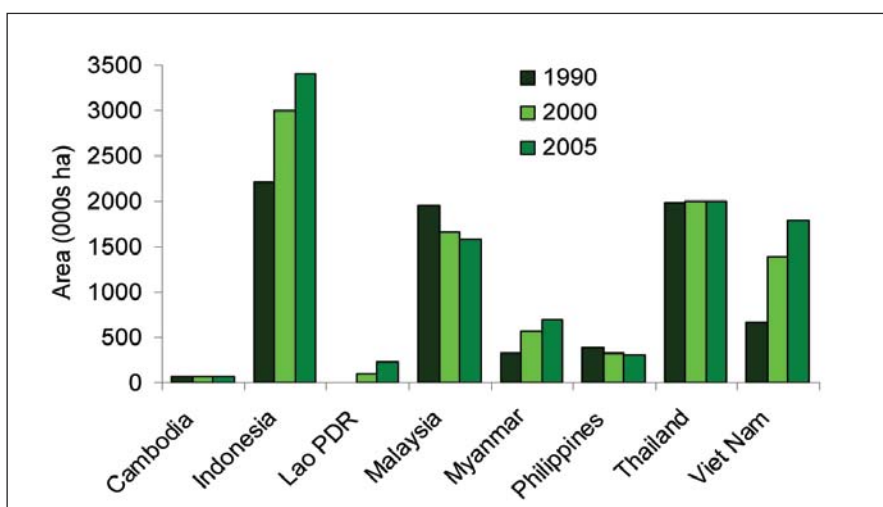


Figure 2.8. Extent of productive forest plantations in Southeast Asian countries, 1990-2005

Source: FAO (2005a)

⁶ As a result of increasing use of rubberwood as sawntimber, rubber plantations now qualify as forest under FAO definitions (FAO 2006a). Some countries do not, however, include rubber in their official submissions to FAO. For example, although 3.2 million hectares of rubber were harvested in Indonesia in 2007, rubber plantations were not included in FRA 2005 statistics (FAO 2005a).

In Indonesia community forest plantations are being supported

In Indonesia, *Acacia* spp., *Eucalyptus* spp. and *Pinus* spp. are planted for pulpwood and teak has been traditionally planted, mainly in Java, for sawlog production (CFPS 2009). The area of plantations in Indonesia increased rapidly from 2.2 to 3.4 million hectares between 1990 and 2005⁷ (FAO 2005a). Over the same period the area of rubber plantations increased from 1.9 to 2.7 million hectares. To increase timber production and encourage local economic growth, the Government of Indonesia has begun developing Industrial Community Forest Plantations (Hutan Tanaman Rakyat/HTR). The HTR programme will run until 2016 with the target of establishing 5.4 million hectares of plantations – especially in areas in which tenure is disputed (CFPS 2009).

Longstanding impediments to plantation establishment are being overcome in Thailand

Thailand's plantations are dominated by rubber, with teak being the second most important species (Enters *et al.* 2004). Plantation establishment rates in Thailand have been very low and total reforestation over the past 100 years amounted to just over 1 million hectares while between 1961 and 2004 almost 11 million hectares of natural forest were cleared (Lakanavichian 2006). Following the 1989 natural forest logging ban, which also covered most state-owned plantations, plantation development encountered several barriers: local resistance to plantation establishment in degraded forest reserve; resistance to monocultural plantations; onerous harvest and transportation procedures; and reluctance of farmers to make longer term investments (Lakanavichian 2006). More recently, however, expansions of investments in paper and pulp production in Thailand suggest that constraints have largely been overcome. Dependence on private plantations, confiscated logs and the limited areas of state plantation that are harvested, however, remains high and imports of logs and sawnwood are likely to continue. **Box 2.4** details the response to increased dependence on wood product imports in Thailand.

Box 2.4. Thailand's response to dependence on wood product imports

After the logging ban in 1989, domestic supplies of hardwood fell below domestic demand in Thailand. In 2007, 1 933 286 m³ of logs and sawnwood were imported to satisfy demand. Major imports came from Malaysia, Lao PDR and Myanmar. Thailand also exported 1 739 933 m³ of logs and sawnwood – mainly to China and Malaysia.

The Royal Forest Department (RFD) responded to increasing import levels by establishing the Master Plan for Economically Viable Tree Planting in 2006. The ten-year plan to promote reforestation is being jointly implemented by the RFD, the Economic Tree Organization and the private sector. The plan aims to increase plantation production but is also a response to planned reductions in government reforestation and transfer of responsibilities to the private sector. It is expected

⁷ Rubber plantations are not included in the FAO 2005 forest statistics submitted by Indonesia and shown in Figure 2.3 and Figure 2.8.

that the government will have to provide a budget of close to US\$5 billion over ten years with a target of planting 2.4 million hectares.

Source: Ongprasert (2009).

Allocation of land to families and households is influencing plantation development

Plantation development in Southeast Asia has been variously constrained by lack of investment, competition for land from cash crops, conflicting land claims, insufficient technical expertise, unnecessary government intrusion and poor regulatory environments, especially with respect to tenure and policy stability. Allocation of land to families, individuals and other private entities is, however, weakening the grip of governments over forest resources in several countries around the subregion. With the addition of private sector technical expertise and investment, plantation establishment in the subregion may be set for a brighter future. For plantation development to flourish a range of needs must be met and frameworks must be available to allow different actors to play effective roles. The situation in the Philippines is outlined in **Box 2.5**.

Box 2.5. Forest plantation development in the Philippines – time for a revamp?

From its position as a major log exporter from the 1960s to the mid-1980s the Philippines had, by the late 1980s become a net importer of wood products. About 165 000 m³ of logs were imported in 2005 while less than 1 000 m³ of plantation logs were exported. Plantation logs made up about 84 percent of total log production in 2005 with the bulk coming from smallholder farms; fewer and fewer logs are coming from natural forests (FMB 2009).

Since the early 1990s when plantation development reached more than 100 000 hectares *per annum* there has been a steady reduction in plantation establishment. Since 2000, private sector involvement has been increasing, but despite various plans and incentives, “no substantial wood resources are likely to be forthcoming from either private or government plantations unless policy and institutional frameworks are thoroughly revamped.”

Many interlinked factors constrain plantation development but key amongst them is poorly perceived financial viability. This has largely been brought about by lack of government provision of secure tenure, but also financiers’ perceptions that plantations are prone to fire, pests and diseases and constitute a high-risk venture. The low collateral value of plantations on leased state forest lands, which results from the difficulty of foreclosure in the event of creditor default, also contributes to credit scarcity. The financial attractiveness of plantations is further depressed by the ban on the export of logs and rough lumber from natural forests, which causes downward pressure on domestic wood prices and forest assets. Additionally, many ‘investors’ have also only been interested in harvesting remaining natural forests in designated areas rather than plantation development, and frequent reversals of government policy have also eroded investor confidence.

These issues have kept tree planting at very low levels and just 1 100 hectares *per annum* are estimated to have been established between 1999 and 2001. The net result has been an increasing national dependence on natural forests and forest product imports (Guiang and Castillo 2006). In confronting current impediments, the private sector is campaigning for greater tenure security or privatization of state forest lands. There are also persistent calls from forest plantation developers for deregulation of harvesting, transport and trade of plantation timber as regulations are currently restrictive and a significant disincentive to plantation development.

Source: Acosta (2004) except where otherwise cited.

Efforts are being made to further stimulate plantation production

The comparative success of rubber and oil-palm plantations in the subregion suggests that low profitability of wood/timber plantations is a key factor constraining expansion. Analysis conducted in Malaysia suggests that rates of return are considerably higher for rubber and oil-palm than for other plantation species (Adnan 2009). Lower margins and competition from countries with more efficient systems of production and from natural forests all weigh against profitability of plantation-produced wood. Unlike rubber and oil-palm, wood can also be produced at a much wider range of latitudes, which considerably increases competition. Efforts are, however, being made to increase rates of plantation development to meet growing demands and reduce future wood importation. Increased private sector and individual/family involvement has been seen as a way to increase production in recent years as state forestry budgets have fallen. Regulations have also been amended and confidence has grown in the private sector being able to outperform frequently failing state programmes. The situation in Viet Nam and Lao PDR is detailed in **Box 2.6**.

Box 2.6. Plantation development in Lao PDR and Viet Nam: struggling to meet demand

Lao PDR and Viet Nam are at different stages of forestry development and differ widely in terms of population pressure, labour availability, demand for land and resources and access to international markets. Natural forest cover is still high in Lao PDR, whereas in Viet Nam natural forests have been cleared to a much greater extent. Supported by low cost labour in Viet Nam and better access to international markets, the supply-demand situation has resulted in large flows of timber from Lao PDR to supply the export-oriented wood products manufacturing industry (Barney 2005; EIA/Telapak 2008). While natural forests are becoming increasingly depleted, plantation development in both countries has encountered technical and institutional constraints, resolution of which could reduce pressure on natural forest resources through product replacement and reduction of demand on forest land.

In Lao PDR, plantation expansion was relatively measured until rapid increases in foreign investment in rubber and pulpwood plantations after 2000 (Tong 2009a). Prior to the 2008/2009 economic downturn, demand for land for plantation establishment grew beyond government capacity to administer requests and

regulate activities. Granting of new concessions was therefore suspended to allow review of existing concessions and assessment of the approval process. In spite of enthusiasm for concessions, smallholder plantation production of pulp and sawlogs has been constrained due to: lack of tree-growing expertise; poor species/provenance selection; and limited understanding of and access to markets. Foreign investment and growing experience are likely to improve the situation but there is still a need for clear laws and regulations to facilitate investment and for effective mechanisms to be developed to resolve land tenure disputes.

In Viet Nam, the Five Million Hectare Reforestation Programme was launched in 1998 to reduce dependence on forest product imports and protect land resources. By 2005, 683 000 hectares of industrial roundwood plantations had been established, although production forest establishment reached only a quarter of the 2010 target (FSIV 2009). Problems included:

- Lack of investment due to long rotation lengths and perceptions that profits are low and risky in comparison with production of agricultural crops.
- Plantations have also been established mostly in poorly developed mountainous areas where competition with products from natural forests is greater.
- Allocation of forest land to families, individuals and other economic entities (see **Box 2.24**) has reduced efficiencies of scale and investors must negotiate with many parties.
- Allocation of forest land to smaller entities has resulted in a lack of uniformity in products and uneven supply.
- Smallholders' preferences for quick returns have reduced rotation lengths and the proportion of sawlogs, as opposed to pulp logs, produced is therefore falling.

Plantation productivity is also a major problem in Viet Nam and although growth rates have improved in recent years, plantation quality and yields remain low (FSIV 2009).

Many factors need to be addressed to support plantation development

Several publications have outlined requirements for improved support for plantation development (e.g., Carle and Holmgren 2008; Enters and Durst 2004). Key factors include:

- Improved extension services and attention to planting material; silviculture, forest health and fire and invasive species management;
- Improved coordination between financial and forestry sectors;
- Improved mechanisms for resolving conflicting land claims;
- Improved information dissemination in relation to markets.
- Advances in technology, particularly in:
 - » biotechnology to produce high-quality reproductive materials;
 - » silviculture, forest health, fire management and invasive species management.

Future plantation profitability will be affected by supply from natural forests

In the medium term, it is unlikely that plantation resources will provide a large-scale alternative to supplies from natural forests at the subregional level without significant efforts to address these factors. In the longer term, improvements in markets for plantation-grown wood products can be expected as a result of reduction in supplies from natural forests. When this reduction takes place, and whether through forest protection or exhaustion of supplies, depends not only on effective forest protection but also on efficient and well-orchestrated institutional and market efforts to improve land-use planning and plantation production.

2.1.4. Forest health and vitality

Fires, pests, diseases and logging threaten forest health and vitality

The health and vitality of forests in Southeast Asia is threatened by several factors including fires, pests and diseases and degradation through forest fragmentation, excessive extraction and poor harvesting techniques. Fire has been a major cause of loss of forest vitality and in concert with logging and climate change poses a serious threat to forests in the subregion. Biodiversity losses associated with deforestation, forest degradation and collection of plant and animal products also threaten the health and vitality of the subregion's forests as detailed in **Box 2.13**. Measurement of forest degradation remains problematic, however, and although estimates of growing stock suggest that forest resources are being degraded in most countries in the subregion, the accuracy of available figures is insufficient for detailed analysis (see **Box 2.1** and **Table 2.3**). Forest health and vitality and degradation are also multifaceted concepts and cannot be captured by changes in stocking density alone.

Poor quality logging is a major concern

Logging has perhaps the most significant impacts on forest health and vitality in the subregion in view of the generally low quality of harvesting operations. Associated degradation has significantly reduced the present and future value of forests and along with other influences may jeopardize the future economic and ecological viability of the subregion's forests.

Reduced impact logging plays a role in few countries...

In general, reduced impact logging is not widely practised in the subregion despite efforts to introduce better practices (Wilkinson 2009). Cambodia is the only country where implementation of a national code of harvesting practice is mandatory, although in Malaysia a range of guidelines has been issued in support of reduced impact logging over the past 20 years. In Cambodia, the national code has been in place since 1999 and although evaluation is undertaken by the Forestry Administration, results have not been made public. Implementation of the code has also been curtailed by the logging moratorium. In Malaysia, forestry companies have the capacity to monitor logging operations but following harvesting under the Selective Management System, the second rotation is, in some areas, proving to be less productive than predicted due to poor recovery of commercial – mainly dipterocarp – species (Wilkinson 2009; Samsudin *et al.* in prep).

...but is not widely practised

In Lao PDR and Viet Nam, reduced impact logging regulations and guidelines are not yet widely implemented and the capacity of the logging companies is very limited as is supervisory capacity. In Indonesia, implementation of reduced impact logging guidelines is not widespread and although forest management units generally have the capacity to supervise operations, there has been little formal training and responsibilities need to be better defined (Wilkinson 2009). In Myanmar, although low impact elephant logging has been used in the past, it is doubtful whether sustainable logging techniques or an annual allowable cut are still being adhered to and degradation of forest resources is widespread (Thaung 2009).

Past high-impact logging threatens future sustainability

Capacity building and institutional strengthening in relation to forest harvesting are necessary across the subregion although, even with improvements, the legacy of high impact logging may curtail the economic viability of sustainable production in the future (Samsudin *et al.* in prep.). This is particularly likely in forest types where stocking densities are low or where commercial species are scarcer or disproportionately affected by logging.

Fire poses further significant threat

In combination with the effects of uncontrolled logging and subsequent forest drying, fire has become a major cause of forest loss in the subregion and poses a serious threat to remaining forest resources and to ecosystem stability. Across Southeast Asia, fire is used by farmers as a low cost way of clearing land and by cattle farmers to stimulate vegetation regrowth. Low intensity fires are also used to reduce forest fuel loads and prevent devastating fires. Uncontrolled and unmanaged fires, however, lead to large-scale forest damage every year and in Thailand, for example, fire prevention is one of the Royal Forest Department's most important and most costly activities (RFD/DNP 2009).

Changing weather patterns have increased the incidence of fire

The increasing frequency of El Niño Southern Oscillation (ENSO) events over recent decades and the dry periods with which they are associated in Southeast Asia may, if trends continue, have devastating effects on the subregion's forests (**Box 2.7**). Droughts have normally been associated with El Niño years in Myanmar, Lao PDR, Philippines, Indonesia and Viet Nam (Cruz *et al.* 2007, see **Box 2.16**). In addition to possible rainfall reductions, increased road development in previously isolated areas and rising levels of human activity – including logging, use of fire as a management tool and accidental fires – are likely to increase vulnerability to forest fire in the coming years. Rowell and Moore (2000), among others, have suggested that the changing weather patterns and increased levels of anthropic fire ignition may result in increasing cycles of forest devastation as burned areas become progressively drier and recovery intervals contract.

The ASEAN transboundary haze agreement has yet to be ratified

Forest loss and degradation due to fire is a major factor in Kalimantan and Sumatra and fire remains a widely used tool for land clearance. The ASEAN Trans-boundary Haze Agreement followed fires in 1997/1998 in Indonesia which affected 11.7 million hectares of land and forest mainly in Kalimantan and Sumatra. Fires were started predominantly to clear land for oil-palm plantations and agricultural cultivation and were exacerbated by ENSO-related drought (Tacconi 2003; Rowell and Moore 2000). In reaction, Indonesian legislation forbidding all forest and land fires was implemented and a National Fire Management Plan received legal status in 1999 (Wadojo and Masripatin 2002). The Trans-boundary Haze Agreement was signed by ASEAN members in 2002 and entered into force in 2003, but has, however, not been ratified by Indonesia and annual forest fires continue to affect neighbouring countries.

Box 2.7. Forest degradation, climate and ecosystem stability in Kalimantan – a vicious spiral?

The effects of forest loss and degradation have been observed to affect ecosystem-scale stability in Kalimantan, Indonesia, where protected lowland forests declined by more than 56 percent (>2.9 million hectares) between 1985 and 2001. Several factors combined to increase the consequences of deforestation and forest degradation on the remaining forest, including intact forests within protected areas.

Recruitment of the commercially- and biologically-dominant dipterocarp tree species, which constitute >90 percent of the commercial timber in Kalimantan, has been severely disrupted by a combination of factors and the effects have been exacerbated by increasingly frequent ENSO events. These include heavy and uncontrolled logging, forest clearance for plantation establishment, reduction of the extent of remaining intact stands of dipterocarps and resulting increase in intensity of seed predation.

The cycle of logging, forest drying, use of fire for clearing forest and increasing frequency of ENSO-related dry periods has established successive rounds of accelerating ecosystem degradation. Changes in the frequency and intensity of ENSO events in concert with anthropogenic changes in climatic conditions may also be resulting in reduced or asynchronous seed production. This effect is likely to further compound impacts on ecosystems, economies and people both locally and at global scales.

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

Fire management mechanisms have not generally improved

Since 1997/1998, when fires swept across large areas of Australia, China, Indonesia, Malaysia and PNG, responses have been limited and the sources of problems have, in many cases, remained untackled. For example, forest managers or local inhabitants usually do not hold responsibility for fire control and land tenure arrangements may promote short-term strategies and excessive use of fire as a management tool. Weak governance and ineffectual legal and regulatory systems may also hinder law enforcement with respect to fire (Rowell and Moore 2000). Furthermore, increasing focus on palm oil in export strategies suggests that the economic incentives for much of the burning that has taken place in recent years will remain.

Adaptation of forest management will be necessary to maintain environmental values

Addressing forest health and vitality and forest degradation in particular has become a topic of much debate in anticipation of a global mechanism to reduce emissions of carbon dioxide from deforestation and forest degradation. Improving the climate change mitigation potential of forests and increasing stocking densities are closely allied processes and, as such, climate change funding could go far to improve the health and vitality of forests in the subregion (Broadhead *et al.* 2009). Adaptation of forest management is also likely to be necessary to achieve mitigation goals. For example, maintaining ecosystem integrity such that carbon is not lost through forest drying and fire or ensuring the security of pollinators and reproductive capacity are likely to be necessary long-term measures in utilizing forest potential for climate change mitigation. Currently, however, there is no globally agreed definition of forest degradation and forest cover definitions will also have to be considered to ensure that carbon loss through forest thinning does not go unnoticed (RECOFTC 2009; see also **Box 2.1**).

2.2 WOOD AND WOOD PRODUCTS

Forest products production has fallen steeply and then risen

Over past decades forest product production in Southeast Asia has risen and then fallen as new frontiers have been opened and existing production areas have become exhausted. The Philippines, once a major producer of wood products, reported industrial roundwood production levels in 1980 three times higher than in 2007. Malaysia and Indonesia reached production peaks in the early and mid-1990s, but subsequently production has declined (Katsigris *et al.* 2004). There has, however, been resurgence in wood production in several countries in the subregion since 2001 as a result of rising levels of demand following the Asian economic crisis (**Figure 2.9**). Thailand's production in particular has risen in connection with increased plantation production. Production has also increased in Viet Nam and Myanmar, while in Cambodia a sharp reduction in 2000 is likely to have been connected with the logging moratorium. Reasons for reductions in production in Lao PDR are less clear and under-reporting may be a significant issue (EIA/Telapak 2008).

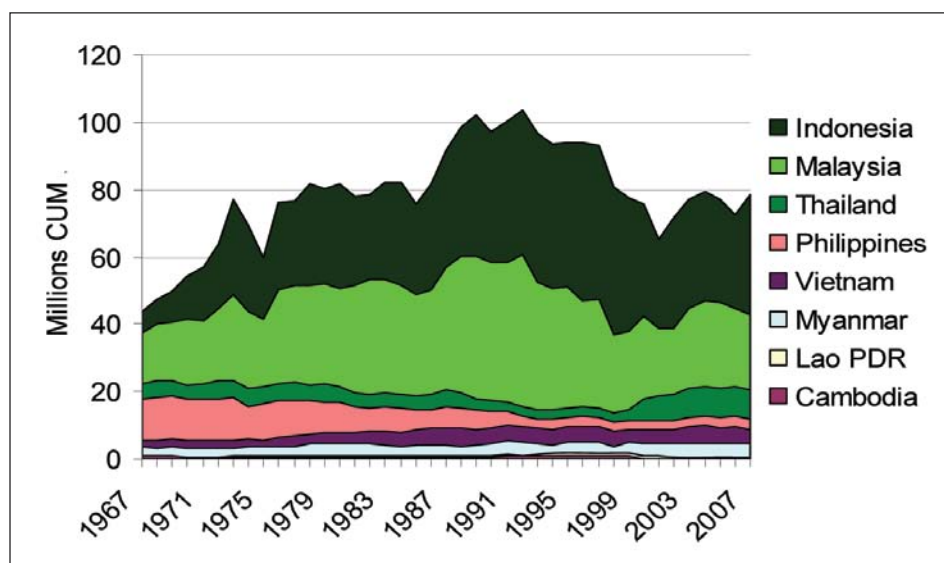


Figure 2.9. Production of industrial roundwood in Southeast Asian countries, 1967-2007

Source: FAO (2009).

Note: Values displayed in the chart are stacked

China's production and consumption have ballooned and focus has moved to more processed products

Wood product production and markets changed significantly in the aftermath of the Asian economic crisis as China's consumption of industrial roundwood and other wood products ballooned and Japan's fell. Between 1997 and 1998, Asia-Pacific consumption of the five major forest products fell by over 10 percent and differing trends subsequently emerged among the product groups. By 2002, production and consumption of industrial roundwood and sawnwood were still below 1997 levels whereas for more highly processed products, production increased (**Box 2.8**; Broadhead 2006). Wood-based panel consumption has risen steeply in recent years, particularly with respect to more processed panel types such as medium density fibreboard (MDF) rather than plywood and veneer. Similarly, growth in woodpulp and paper and paper board consumption has been very rapid. By 2002, wood product trade volumes had regained pre-crisis levels for most product groups, although prices have been slow to recover (ITTO 2003; Broadhead 2006).

Box 2.8. Forecasts and reality – how good were forest products production predictions made in 1998?

The 1997/1998 crisis impacted production of major forest products in different ways. Overall levels of wood products production fell, with less processed products more significantly affected (Broadhead 2006). The production of more processed products increased – presumably in response to supply constraints, switching to plantation grown wood and more concerted value addition efforts. Wood products trade in the subregion generally fell in the immediate aftermath before levelling out.

Comparison of forecasts published in the first Asia-Pacific Forestry Sector Outlook Study in 1998 with actual production figures shows that production of industrial roundwood, sawnwood and panels in the Asia-Pacific region was overestimated whereas pulp and paper production has risen beyond expectations. The following specific predictions were made under the economic downturn scenario. Points in italics outline the revealed situation:

- Industrial roundwood production would increase from 89 to 120 million cubic metres per year between 1994 and 2010.
 - » *By 2007 production had fallen to 78 million cubic metres.*
- Sawnwood production was expected to rise from 19.6 to 20.2 million cubic metres by 2010.
 - » *In 2007 sawnwood production stood at 11 million cubic metres.*
- Panel production was expected to fall from 16.7 to 15.5 million cubic metres.
 - » *By 2007 production had fallen to 14.5 million cubic metres.*
- Paper and paper board production was expected to increase from 5.9 to 9.0 million cubic metres.
 - » *By 2007 production had soared to 15.2 million cubic metres.*

In general, the volume of trade in wood products in Southeast Asia was underestimated, although industrial roundwood exports fell well below expectations. Panel imports and trade in paper and paper board exceeded expectations. Overall, however, the value of wood products exports fell significantly – partly as a result of currency realignments.

Source: Broadhead (2006).

Roundwood consumed in the Asia-Pacific region is increasingly begin sourced outside Southeast Asia

In recent years, production in Cambodia, Lao PDR and Myanmar has increasingly supplied the region's wood product manufacturing centres in Viet Nam and China (Katsigris *et al.* 2004; EIA/Telapak 2008). Despite increased production in Southeast Asia, China, the Asia-Pacific region's main consumer, has to a large extent satiated soaring demand with supplies from elsewhere – the Russian Far East in particular. Supply from Myanmar has risen but is poorly recorded as most imported timber is harvested by Chinese companies working in areas outside of government control (Kahrl *et al.* 2004). As supplies of the main commercial timbers from natural forests in Southeast Asia have fallen, intermittent efforts have been made to increase buyers' interest in lesser known tree species, but preferences have generally remained conservative.

Value addition has increased and processing centres have moved

In general countries that have passed their logging peak have made efforts to add greater value to wood products than those with larger timber reserves (Katsigris *et al.* 2004). The rise of China as the region's major importer has, however, signalled increasing demand for less processed products – industrial roundwood, sawnwood and woodpulp – due to low wage rates and emphasis on domestic manufacturing. For the same reason, demand from China for more processed products, including plywood and paper and paper board, has been constrained.

2.2.1. Recent market developments

The global economic slowdown has shaken the forest products sector

The wood and wood product sector in Southeast Asia is undergoing major adjustment following the 2008/2009 global economic slowdown. Consumption and trade dropped as demand in major markets fell in 2009. Reductions in housing starts in Japan and the United States are particularly important and furniture markets in the United States also continue to affect manufacturers in Southeast Asia (ITTO 2009i). At the beginning of 2009, Malaysian and Indonesian timber prices suffered sharp declines, although some recovery was taking place during the second quarter of 2010 (ITTO 2010b). China's log imports fell in 2008 and by February 2009, the downturn had led to the closure of 7 000 furniture factories (ITTO 2009a; ITTO 2009d). The plywood and forest product trade in China was also hit, while EU sawnwood and plywood markets stagnated (ITTO 2009a; ITTO 2009b). In Malaysia, timber exports fell to a 28-year low in January 2009 with low sawnwood demand from Europe and furniture demand from the United States being chiefly to blame (ITTO 2009a; ITTO 2009e). In Myanmar, log sales also fell to lows in January 2009 (ITTO 2009b; ITTO 2009e).

Trade volumes and prices have fallen

Timber product prices have since remained weak in both Indonesia and Malaysia and the wood product industry faced further declines in exports during 2009 (see **Box 2.9**; ITTO 2009d; ITTO 2009e; ITTO 2010b). Despite maintaining import levels during 2008, China's wood product demand slowed in 2009 as markets for wooden furniture and other finished products fell (Ze Meka 2009). Indonesia's furniture and pulp and paper exports were also hit hard (ITTO 2009j). Some recovery in trade volumes and prices was taking place during the first quarter of 2010, with China showing the most activity while the EU and United States continued with low demand (ITTO 2010b).

Rapid responses were seen in Indonesia and Malaysia

In Malaysia, a national wood industry policy was announced in early February to increase competitiveness and output by reducing waste and increasing production of value-added products for export (ITTO 2009c). In April, however, a 50 percent increase in the levy on foreign workers threatened wood product manufacturers who rely heavily on imported labour (ITTO 2009f). In Indonesia, increasing unemployment was expected to place additional pressure on natural forests for conversion to agriculture and several decisions were introduced during the first quarter of 2009 to assist the forestry sector (ITTO 2009b):

- A decision banning use of natural forest for pulp manufacture was reversed due to a lack of plantation supply (ITTO 2009a).
- Permission was given for export of plantation-grown logs due to low returns from domestic consumption – 85 percent by the pulp and paper manufacturers Asia Pulp & Paper and Riau Andalan Pulp and Paper (ITTO 2009c).
- Seven million hectares of natural forest concessions were provided to assist the pulp and paper sector and permits were issued to allow use of timber waste as raw material (ITTO 2009f).

The future path for the region's wood products producers is not yet clear

Although stimulating the economy, lifting the ban on export of plantation-grown logs and replacing supply to the domestic pulp and paper industry with wood from natural forests could act to undermine SFM (ITTO 2009a; see **Box 2.17**).

It is not yet clear how the forest product industry will weather the economic turbulence. Countries best able to cope are expected to be those with less focus on traditional export markets (especially the United States/Europe), with a diverse product range, flexible labour forces and relatively robust domestic markets. However, even countries meeting many of these criteria are facing problems (Ze Meka 2009). Against the general trend, however, China's forest industry showed output value gains in 2009 and increased export of wood products to ASEAN countries following the removal of tariffs at the beginning of 2010 (ITTO 2010a).

Restructuring of timber markets could significantly affect Southeast Asia's forests

A major concern for the Southeast Asia forest products sector is that the depth of reductions in demand in higher paying markets – the European Union and the United States of America in particular – will precipitate a restructuring of markets to the detriment of tropical timber producers. Preferences for lighter coloured woods, demands for legally verified and sustainably produced products and competition from non-wood substitutes could further contribute to such a scenario. At present, the situation does not look promising and the repercussions of reduced demand on Southeast Asia forests could be substantial.

The following sections review longer term trends in the knowledge that the subregion is in a period of transition.

Industrial roundwood⁸

Industrial roundwood production rose after 2001

Following the Asian economic crisis, production of industrial roundwood in Southeast Asia began a gradual recovery after 2001 as shown in **Figure 2.10**. The subregion's emergence from recession combined with the stimulating effect of exchange rate realignments in 1997/1998 and increasing demand – primarily from China – resulted in roundwood production increasing slowly up to 2007. Southeast Asia's exports remained relatively constant after 2001 at between 7 and 8 million m³, with over two-thirds coming from Malaysia.

Indonesia faces supply constraints and declines in production

Reflecting a reported decline in production since the mid-1990s, Indonesia, the largest producer in the subregion, is threatened with future supply constraints and is unlikely to be able to supply the extensive wood-processing sector without accelerated industrial plantation development (Katsigris *et al.* 2004; MoF 2007). Currently, all of Indonesia's major processing facilities are operating far below capacity and the pulp and paper industry

⁸ Roundwood used in the production of other goods, comprising: (i) sawlogs and veneer logs; (ii) pulpwood; and (iii) other industrial roundwood, excluding wood fuel. Measured in cubic metres, excluding bark.

continues to rely on harvesting of natural forests. **Box 2.9** profiles the rise and current situation of the Indonesian wood-processing industry. It should be noted, however, that under-reporting may impede analysis of wood product production in Indonesia. For example, illegal roundwood consumption was estimated at 42.2 million m³ in 2002, falling to 20.3 million m³ in 2005 (MoF 2007). These figures suggest that there has been little or no reduction in Indonesian wood production over the past 10-15 years as official reports submitted to FAO suggest.

Production in the Mekong countries has climbed since 1997

Production in the Mekong countries has climbed as a proportion of total production in Southeast Asia from 13 to 22 percent between 1997 and 2007. Thailand's production tripled over this period, while in Myanmar production rose by 30 percent. Production in Viet Nam remained steady while in Lao PDR and Cambodia recorded production fell. Increased production in Myanmar corresponds to increases in the area of forest designated for production, whereas in Thailand, production from plantations has supported the increase. In Cambodia, the logging moratorium is likely to have been the main cause for production decline and in Lao PDR under-reporting may play a role in production trends (see EIA/Telapak 2008).

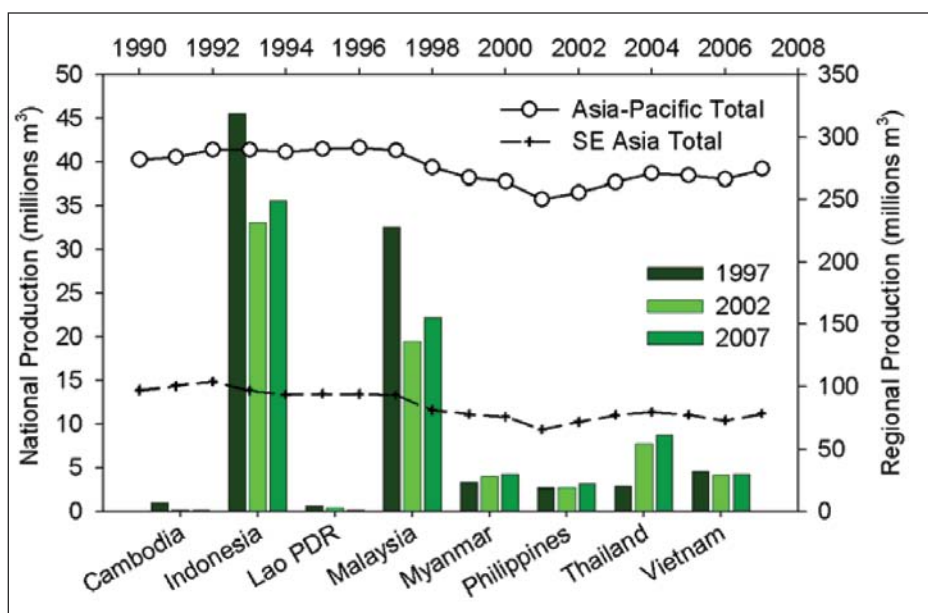


Figure 2.10. Industrial roundwood production in Southeast Asian countries and the Asia-Pacific region, 1997-2007⁹

Source: FAO (2009).

⁹ Production figures for some countries may have high error margins, for example, it has been estimated that around 500 000 m³ of logs move every year from Lao PDR to Viet Nam, despite a log export ban, and that at least 600 000 m³ were harvested in 2006 (EIA/Telapak 2008). Industrial roundwood production reported to FAO by Lao PDR, by contrast, was only 194 000 m³. Industrial roundwood production figures reported to FAO by Cambodia were similarly low at 113 000 m³ in 2006. DAI estimated 4.3 million m³ of industrial roundwood were harvested in 1997 when the figure provided to FAO was 1.04 million (DAI 1998 cited in Nophea 1999).

Box 2.9. The Indonesian wood-processing industry

The Indonesian wood-processing industry has experienced both rapid growth and structural change in the period 1980-2006. This has, for the most part, been the result of government policies rather than market forces. Policies that had important impacts were: the log export ban announced in May 1980 and imposed fully in 1985; the sawnwood export tax imposed in November 1989; a prohibitive log export tax enacted in June 1992 in place of the log export ban; and reducing the log export tax to 10 percent in late 2000 followed by elimination in 2003.

Industrial wood consumption rose sharply from 11.7 million m³ roundwood equivalent in 1980 to 24.1 million in 1985, peaked at 52.7 million m³ in 2003 and then fell to 39.2 million m³ in 2006. The installed capacity utilization rate for the sawnwood industry rose from 86 percent in 1980 to 97 percent in 1989, and then fell to 14 percent in 2006. For the plywood industry, the installed capacity utilization rate increased from 51 percent in 1980 to 99 percent in 1997, before falling to 44 percent in 2006. These trends demonstrate an increasing roundwood deficit since 1997. In contrast, the installed capacity utilization rate for the pulp industry rose from 65 percent in 1989 to 88 percent in 2006.

Source: ITTO (2009e).

Sawnwood

Sawnwood production in Southeast Asia has fallen steadily

Sawnwood production in Southeast Asia has fallen steadily since 1990 as shown in **Figure 2.11**, although there is doubt over the accuracy of figures from Indonesia.¹⁰ Sawnwood production in Myanmar and Viet Nam has increased steeply and increases have also been seen in Malaysia. In Myanmar, clearance of forest areas has resulted in increased production whereas in Viet Nam, vigorous plantation establishment programmes are yielding benefits, although productivity has been below expectations (Tun 2009; FSIV 2009). In the Asia-Pacific region as a whole, growth at around 5 percent *per annum* has been seen since 2001 – a reflection of rising production in China.

Trade is playing an increasing role

Trade has played an increasing role in Southeast Asian sawnwood markets in the past decade. Imports have provided an increasing proportion of sawnwood consumed since the 1990s while exports accounted for a growing proportion of production between 2001 and 2006. Over half of total sawnwood production is now exported – up from around a third prior to the Asian economic crisis.

¹⁰ Sawnwood production of 525 000 m³ reported to FAO by Indonesia in 2007 is presumably in error given that exports of 1 934 200 m³ were reported for the same year.

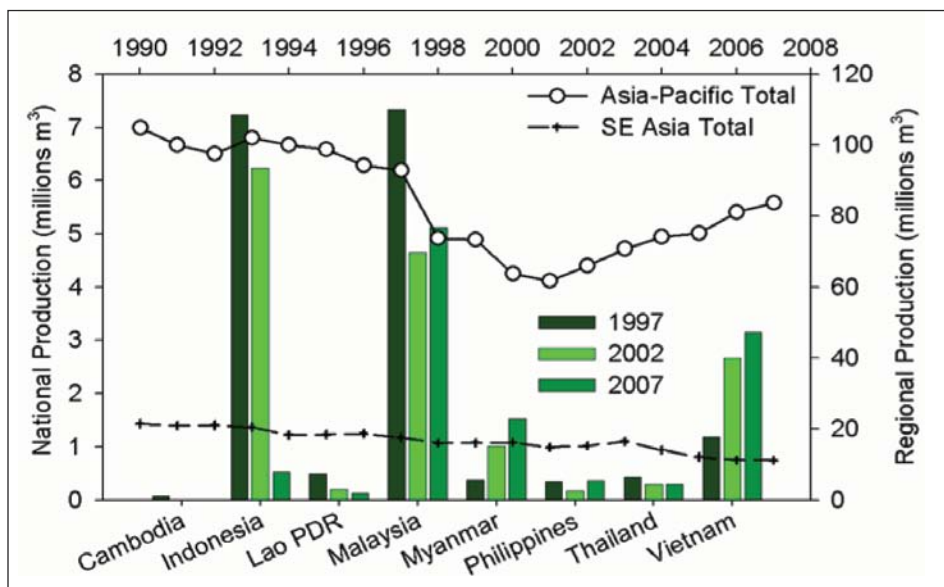


Figure 2.11. Sawnwood production in Southeast Asian countries and the Asia-Pacific region, 1997-2007

Source: FAO (2009).

Panels

Plywood's dominant position in Southeast Asian panel markets is waning

In volumetric terms, plywood dominates wood-based panel production in Southeast Asia, although since the mid-1990s, overall production has been falling as has the proportion accounted for by plywood (**Figure 2.12**). Production of veneer has not shown a consistent trend while production of MDF and, to a lesser extent, particle board has risen. The rapid increases in Asia-Pacific panel production in recent years are shown in **Figure 2.13**. The bulk of the increase is attributable to China, where production of all board types has increased rapidly since 1998. In particular, production of plywood and MDF were recorded at over 30 million m³ each in 2007.

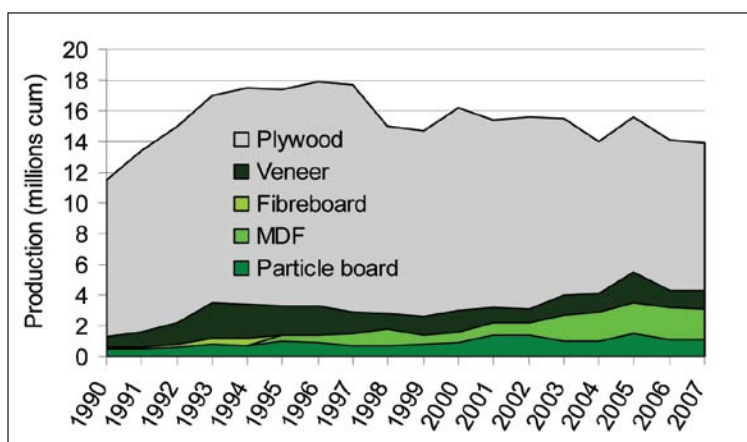


Figure 2.12. Panel production by type in Southeast Asian countries, 1990-2007

Source: FAO (2009).

Note: Values displayed in the chart are stacked

Indonesia's panel output is falling while Malaysia's rises

Wood-based panel production in Southeast Asia is dominated by Indonesia and Malaysia (**Figure 2.13**). Malaysia's total panel production in 2007 was accounted for by plywood (71 percent), followed by MDF (17 percent) and veneer (8 percent). The proportions are similar in Indonesia: 80 percent plywood, 5 percent MDF and 7 percent veneer. Contrasting trends have been evident in the two countries in recent years – of rapidly falling production in Indonesia and a steady rise in output in Malaysia.

Indonesia's competitiveness in plywood production has fallen

In response to growing demand, Malaysia's plywood production between 1997 and 2007 rose from 4.5 to 5.5 million m³ and increasing quantities are expected from Sarawak in the future. In Indonesia, plywood production fell from 9.6 million m³ in 1997 to 3.5 million m³ in 2007. The value of plywood exports declined from a high of US\$3.4 billion in 1997 to US\$1.5 billion in 2008 and the plywood industry was expected to contract significantly in 2009 (ITTO 2009h). Reductions have resulted from reduced supply of logs for plywood production as well as falling industry competitiveness related to the lack of financing to retool in the wake of the 1997/1998 economic crisis (**Box 2.10**).

China's plywood production has soared

China's plywood production in 2007 at 32 million m³, eclipsed production in both Malaysia and Indonesia, having risen from around 5-8 million m³ in the late 1990s. The bulk of production from both Indonesia and Malaysia is exported while in China, exports increased from less than 20 percent in 1997 to almost a third in 2007.

Box 2.10. The Indonesian plywood industry

The Indonesian plywood industry was facing the prospect of a further decline in exports by at least 40 percent in 2009. The industry hit its peak in 1993, when manufacturers employed up to 455 500 workers and manufactured 10 million m³ of plywood, with 90 percent destined for export markets. Since then, production declined to 3.1 million m³ in 2008 – dropping 27 percent from 2007. In 2008, 2.5 million m³ of plywood, worth US\$1.5 billion, were exported from Indonesia.

The industry's problems are compounded by ageing machinery and high production costs. Although exchange realignments following the 1997/1998 economic crisis increased the profitability of export markets, the high price of imports held back retooling in the industry and efficiency with resulting sacrifices in efficiency. Of the 130 existing plywood factories in Indonesia, only 64 were operating in 2008. This may be further reduced to 20 in 2009. Stiff competition from China and Malaysia are further contributors to the decline in Indonesia's plywood industry.

Source: ITTO (2009e).

Panels production in the Mekong countries is rising

In the Mekong countries, Thailand accounted for two-thirds of panel production in 2007, although the entire production in the subregion only accounted for 14 percent of the Southeast Asian total. Particle board (chip board), MDF and plywood account for the bulk of production and, driven by Thailand, production of both increased rapidly between 1998 and 2002 before levelling off. Production of several board types has also expanded in Viet Nam since 2003, with production reaching 559 m³ in 2007.

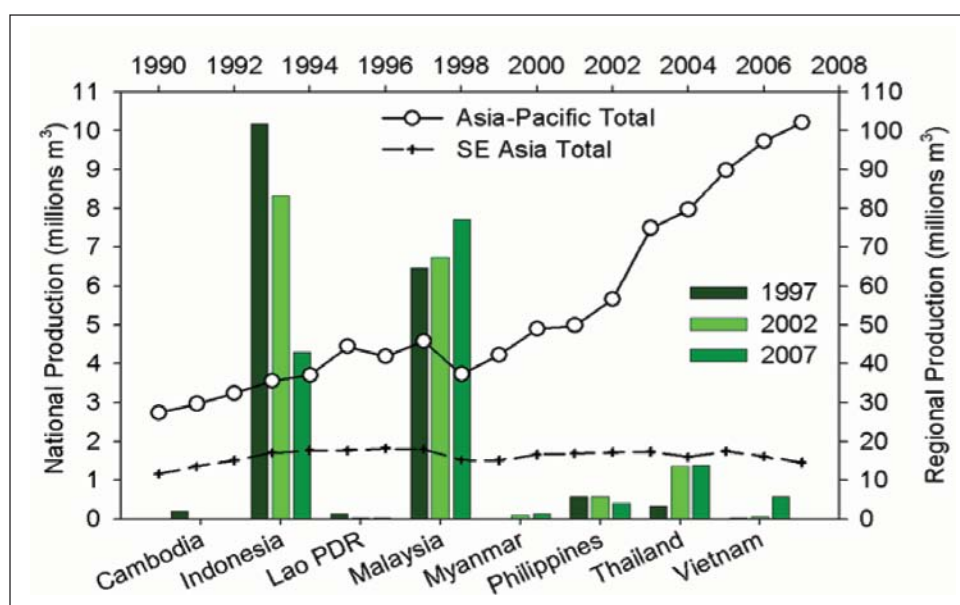


Figure 2.13. Panel production in Southeast Asian countries and the Asia-Pacific region, 1997-2007

Source: FAO (2009).

Imports of panels have increased – primarily from China

Since steep increases in production capacity in the late 1980s, wood-based panels manufactured in Southeast Asia have been primarily destined for export markets, with between 70 and 90 percent of production going overseas. While exports showed no clear trend between 2000 and 2007, imports as a percentage of consumption increased from 13 to 58 percent – reflecting increases in Viet Nam, Indonesia, Malaysia and Thailand. Panels are primarily sourced from China, which increased exports from around 1 million m³ in the late 1990s to over 15 million m³ in 2007 – equivalent to almost half of the panel consumption in Southeast Asia.

Veneer production in Southeast Asia has remained stable

Veneer production in Malaysia – traditionally the subregion's largest producer – has stabilized at around 650 000 m³/year after reaching over 2 million m³ in 1993. Over the same period, production in China rose from just 50 000 m³ to over 3 million m³ in 2007. Whereas a large proportion of Malaysia's production has been exported, particularly after the Asian economic crisis, much of China's increased production has supplied domestic markets.

Production of particle board and MDF is rising slowly in comparison with China

Particle board (chip board) production in Southeast Asia amounted to just over 1 million m³ in 2007; around half was accounted for by Thailand, a diminishing proportion by Indonesia and the remainder by Malaysia and, increasingly, Viet Nam. MDF production in Southeast Asia has seen more rapid increases since 2000, especially in Malaysia, which in 2007 accounted for over half the subregion's production and 43 percent of exports. As with particle board, MDF production in Southeast Asia at 2 million m³ in 2007, expanded much more slowly than in China where production reached 25 million m³ in 2007 from nil in 1994.

Woodpulp

Woodpulp production is rising across the subregion

Woodpulp production in Southeast Asia is dominated by Indonesia, although Thailand and Viet Nam are also increasing in stature (**Figure 2.14**). Production in both these countries rose rapidly between 1997 and 2007 from 10 to 24 percent of total woodpulp production in Southeast Asia. Expansion of pulpwood plantations has begun to yield results in both countries, whereas in Indonesia, the largest producer in the subregion, natural forests remain crucial in supplying the industry.

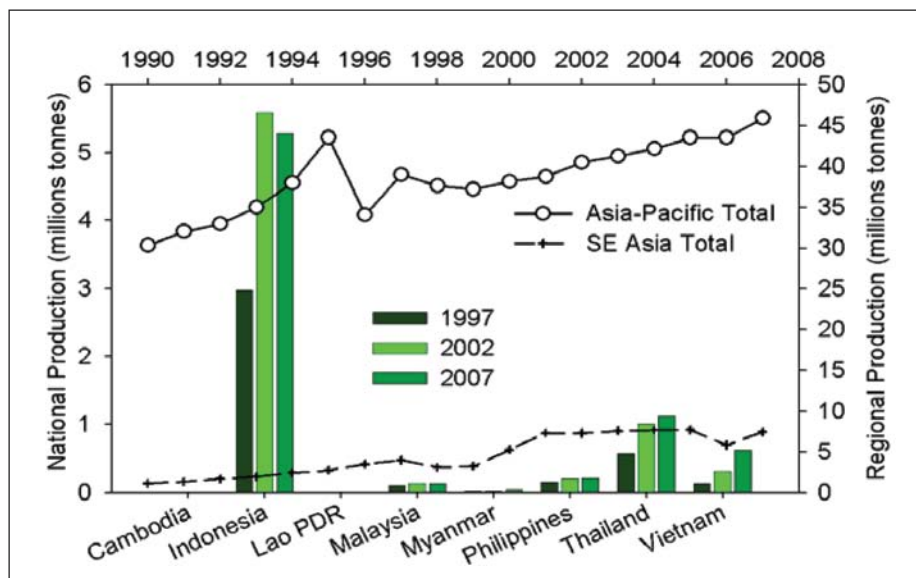


Figure 2.14. Woodpulp production in Southeast Asian countries and the Asia-Pacific region, 1997-2007

Source: FAO (2009).

Paper and paper board

Paper and paper board production has grown slowly

Paper and paper board production in Southeast Asia is dominated by Indonesia, followed by Thailand and Viet Nam. Growth in production in Southeast Asia slowed after the turn of

the millennium, whereas in China, output increased substantially as reflected in the Asia-Pacific trend (**Figure 2.15**). Production in Indonesia has been constrained by increasing difficulty in accessing pulp logs and the inadequacy of past efforts to establish a sustainable supply. Recent changes in policy may ease the situation and increases in pulp and paper capacity are also underway. Supply is likely to continue to be drawn from natural forests, although plans to increase plantation production through Industrial Community Forest Plantation establishment may allow increasing substitution if dominant buyers can gain growers' confidence (see Section 2.1.3). The Thai pulp and paper industry has been blighted in the past by supply problems but recent capacity increases suggest that problems have to some extent been overcome, although debate continues (Bangkok Post 2009). Significant investments in the pulp and paper industry have also been made in Viet Nam and expansion to supply the growing domestic market looks set to continue.

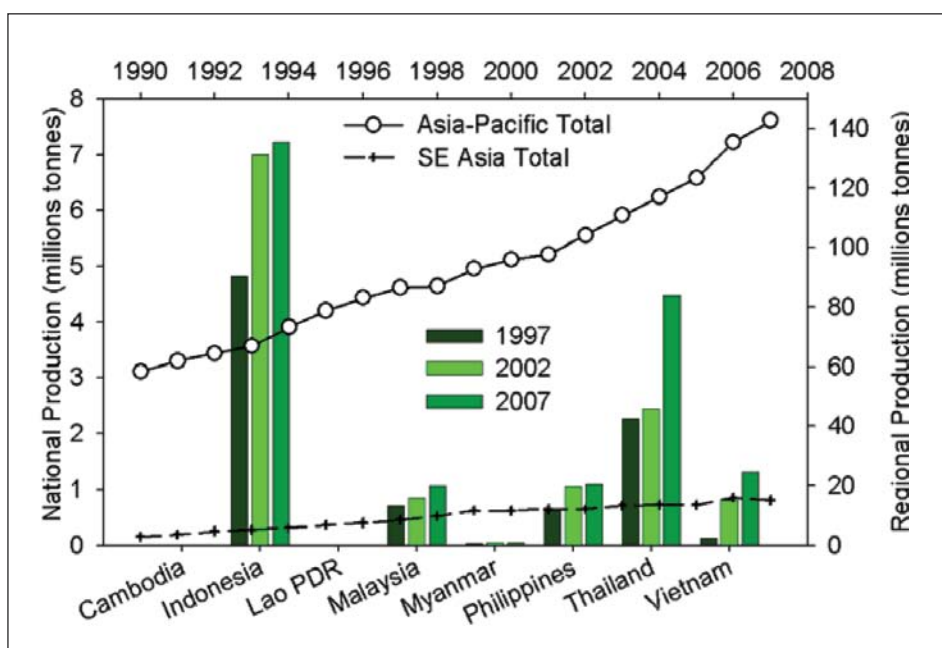


Figure 2.15. Paper and paper board production in Southeast Asian countries and the Asia-Pacific region, 1997-2007

Source: FAO (2009).

2.2.2. Trade in forest products

The huge influence of trade on forestry looks set to continue

Trade has been seen as a primary culprit for tropical deforestation in Southeast Asia and as such is a highly important driver of change. Developments in relation to trade are likely to have significant effect on forests and forestry in Southeast Asia during the next decade. In particular, changes in trading regimes in high-paying markets may cause significant changes in forestry – either

by encouraging greater legality and sustainability or by closing off import markets where countries fall short of requirements for market entry. The impacts of general alterations in trade and trading regimes are covered in Section 3.3. This Section reviews patterns in trade over the last decade and current status of forest products markets.

China has become the Asia-Pacific's primary importer of forest products

In 1998, APFSOS I predicted that Japan would remain the main driving force in determining patterns of forest supply, demand and trade within the region. By the time of publication, however, China had already become the primary importer by value. By 2002, China's share of regional imports had risen to 44 percent by value compared to Japan's 26 percent. Major wood product trade flows in the region in 2006 included exports of Malaysian roundwood to China, Japan and India and of roundwood from Myanmar to India and China (ITTO 2007). Significant amounts of sawnwood were exported from Indonesia to China and Malaysia and from Thailand to China. China and Japan were also significant importers of Indonesian and Malaysian plywood. Trade flows involving the lower Mekong countries and the Philippines were relatively minor.

The value of Southeast Asia's forest product trade has fallen

By value, Southeast Asia's forest product trade contracted significantly after 1997 – partly as a result of currency adjustments following the Asian economic crisis (**Figure 2.16**). Between 1998 and 2007, wood product import value increased by a third in real terms with Thailand, Malaysia and Viet Nam behind the subregional trend. Export value dropped by a quarter over the same period, although in Malaysia, Thailand, the Philippines and Viet Nam export value has increased against the overall trend (**Figure 2.16**).

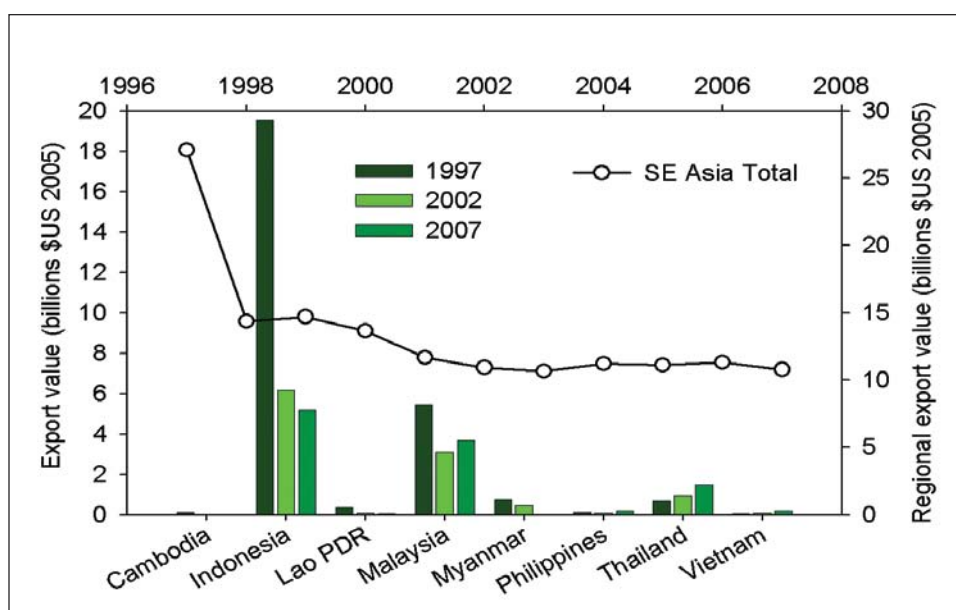


Figure 2.16. Forest product export value for Southeast Asian countries, 1997-2007

Source: FAO(2009).

Other players are supplying China's increased demand

Southeast Asian exports have only partially followed the rise of China as the Asia-Pacific's leading wood product importer. For example, as China's domestic production of plywood has soared and imports have fallen, imports from Indonesia and Malaysia have to a significant extent been substituted by supplies from the Russian Federation. Overall, imports to China from Southeast Asia have fallen from their peak in the 1990s and are not tracking demand closely, although not all trade flows into China from Southeast Asia are monitored or recorded (Katsigris *et al.* 2004). Propensity for domestic product manufacture in China has also meant fewer imports of processed products from Southeast Asia.

Roundwood exports from Southeast Asia are falling

Industrial roundwood production in Southeast Asia fell from 32 to 29 percent of the Asia-Pacific total between 1997 and 2007. Despite increased demand and favourable exchange rates, exports of industrial roundwood from Southeast Asia fell as a percentage of production – from 40 percent in 1980 to level at around 8 percent between 1997 and 2007. This has variously resulted from increased domestic value addition, resource constraints, forest protection measures and log export bans. Focus on value addition in Indonesia has meant that exports have constituted only a small proportion of industrial roundwood production in official figures, although under-reporting due to illegal trade has also played a role in reducing official trade figures (MoF 2007). The falling trend also reflects a long-term decline in industrial roundwood exports from Malaysia resulting from increased processing in Sarawak and reduced log production in Sabah.

Thai roundwood imports have increased since the logging ban

In Thailand, imports have played a leading role in meeting demand for sawnwood and plywood following the logging ban of 1989. Rubberwood production is increasing and although suitable for plywood manufacture in purpose-designed mills, log imports are necessary to support the wider plywood industry (RFD/DNP 2009). Log imports are also necessary to supply construction timber as rubberwood is unsuitable. As a result, about two-thirds of consumed sawnwood is imported, mostly for construction. Thailand also exports (mainly eucalyptus) wood chips and sawn rubberwood to China and Malaysia. Rubberwood furniture is also exported – mainly to the United States, Japan and the EU.

Russian exports to China dwarf those from Malaysia and Myanmar

Other important trends in the past decade include Myanmar's increased export of industrial roundwood to China. In 2006, imports were valued at almost US\$1 billion or 3 percent of China's total industrial roundwood imports by value.¹¹ The value of this trade has more than tripled over the last decade but is dwarfed by US\$23.3 billion of imports from the Russian Far East and US\$2.6 billion from Malaysia.

11 According to trade statistics reported to FAO by China.

Southeast Asia is importing more sawnwood

Southeast Asia's sawnwood imports have increased over the last decade as production has fallen. Exports surged between 1998 and 2004, reflecting activity in Indonesia, but the subregional total has since fallen due to declining exports from Malaysia following many years of dominance in this market. By value, Thailand's importance as an importer of Malaysian sawnwood increased between 2002 and 2006. In contrast, despite China's increasing levels of sawnwood imports, Indonesia and Malaysia's shares by value had both fallen by 2006 to below a third of their 1998 levels. At the same time, Thailand's share increased from 2 to 12 percent suggesting an increasingly competitive sawmilling sector.

Malaysian panel exports have overtaken Indonesia's

Over the past decade Malaysia has overtaken Indonesia as the principal exporter of wood-based panels in Southeast Asia with over 7 million m³ exported in 2007 – more than double that from Indonesia. At the Asia-Pacific level, China's exports have, however, come to dominate and in 2007 China exported over 15 million m³ – 51 percent of the Asia-Pacific total. Increasing domestic consumption of plywood in China has increasingly been augmented by imports from the Russian Federation while imports from Indonesia and Malaysia have waned. Japan remained the main market for Indonesian plywood, accounting for 38 percent of exports by value in 2006.

Indonesia dominates Southeast Asia's woodpulp exports

In contrast to other products, exports of woodpulp from Southeast Asia have expanded rapidly as production has increased. Indonesia accounts for over 60 percent of Asia-Pacific woodpulp exports, as it has for more than a decade. China, by contrast, where production of woodpulp is four times that of Indonesia, exported only 4 percent of production in 2007 as domestic markets expanded. Similarly, production increase in Thailand has not been accompanied by increased exports.

Indonesia's paper exports are also expanding

Production of paper and paper board in Southeast Asia has risen steeply and exports have grown as a percentage of production. Indonesia accounted for 20 percent of Asia-Pacific exports in 2007 compared to China's 38 percent. Indonesia's exports rose from 24 to 52 percent of production between 1997 and 2007, while China's remained at around 9 percent. In Indonesia, increased paper and paper board exports reflect a shift from plywood, veneer and sawnwood exports prior to the 1997/1998 economic crisis (CFPS 2009).

2.2.3. State of forest industries and wood-processing technology

Forest industries have faced and are facing rapid change in Southeast Asia

As timber supply constraints have emerged across Southeast Asia, the importance of industrial efficiency and value addition has increased. Southeast Asian countries have switched progressively from export of unprocessed logs to value addition – particularly in Indonesia, Viet Nam, Malaysia and Thailand – as supply constraints have emerged and labour rates have increased. Many countries,

however, suffer from out of date, inefficient machinery, low skill levels, low investment, poor techniques and poor penetration of higher paying markets. Most are also burdened with excess processing capacity. This is particularly true for Indonesia where the pulp and paper sector is running on mixed tropical hardwoods despite heavy investment in plantation establishment (Katsigris *et al.* 2004). Retooling after the Asian economic crisis was also curtailed in Indonesia by adverse exchange rates, stunting industry competitiveness and reducing growth in panel production in particular (**Box 2.10**).

Overcapacity and out-of-date technology threaten SFM

In general, overcapacity in the sawmilling sector is threatening SFM in most countries. Efforts to reduce capacity and focus on value addition have been successful in some countries where skilled or semi-skilled labour and infrastructure exist and investment is available. In other countries, supplies have been imported, helping to maintain operating capacity. Viet Nam, for example, has a large and diverse wood-processing industry with installed capacity exceeding production due to diminishing domestic timber extraction (FSIV 2009). The technology used in Viet Nam's wood-processing industry and pulp and paper industry has improved, although there is still a big gap in comparison with the most advanced countries.

Wood-processing centres are increasingly focused on a few countries

While Indonesia, Malaysia and Viet Nam, and to some extent Thailand, have invested significantly in processing, the lower income countries – Cambodia, Myanmar and Lao PDR – have very limited capacity (Katsigris *et al.* 2004). Processing has therefore taken place in adjacent countries or overseas and value addition has been low. The rise of the outdoor furniture industry in Viet Nam, which depends on imported timber and overseas markets, contrasts with the decline faced in the Philippines where processing facilities have closed as wood supplies have dried up. In 1980, there were 209 sawmills whereas in 2005 there were only 30, while over the same period the country turned from a huge producer and exporter of logs to a net importer (FMB 2009).

Further shifts are likely to occur as business conditions change

In coming years, it is likely that investment in the wood-processing industry and wood-processing technology will increase in some countries as shifts occur in supply, investment and labour costs. This is particularly likely in the higher income countries which may continue to process wood supplied by lower income countries. The focus on domestic processing in China is likely to support this trend, although in the medium term, rising wage rates in both China and Viet Nam may mean that processing moves elsewhere.

2.2.4. Contribution of forestry to national economies

Employment in forestry and the wood industry has fallen

An analysis of the contribution of formal¹² forestry activities to Southeast Asian economies showed that employment in forestry¹³ and the wood industry¹⁴ fell over the past decade, whereas employment in the paper and furniture industries increased (Figure 2.17; FAO 2008c). In Malaysia, employment in forestry activities has increased since 2000 whereas in Indonesia, Thailand, Cambodia and Lao PDR fewer people are working in forestry as forest resources become depleted or protected and interest moves to other economic sectors. In the wood industry, the subregional employment trend has been significantly influenced by reductions in Indonesia since 2001, and also in Malaysia, the Philippines and Lao PDR.

Employment in wood processing has increased in Viet Nam and the subregion's paper industry has also expanded

By contrast, employment in Viet Nam had been rising at over 26 percent per annum between 1996 and 2006 due to an abundance of cheap skilled labour, a high rate of economic growth and good availability of forest resources. The rising trend in employment in the paper industry in Southeast Asia is largely due to increases in Thailand and Viet Nam, at 7 and 14 percent per annum respectively between 2001 and 2006. Some increase was also seen in Malaysia while in Indonesia, employment has been static for some years. The expansion of the subregion's furniture industry has, in large part, been due to growth in Viet Nam, with employment increasing at 28 percent per annum over the period 2001-2006. In contrast, employment in Indonesia fell at an annual rate of 15 percent over the same period.

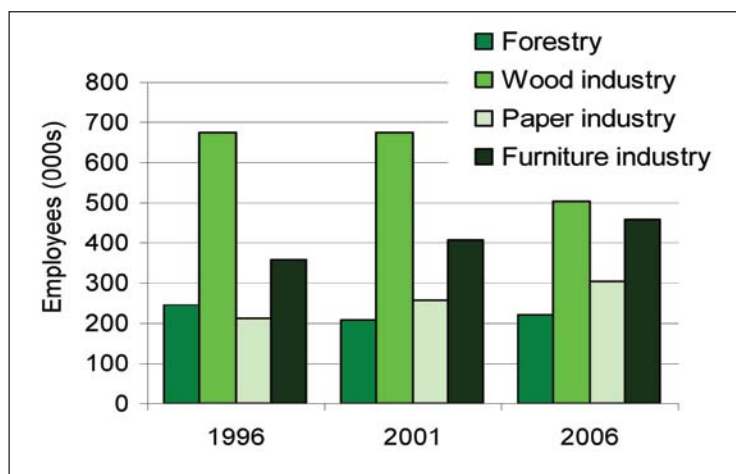


Figure 2.17. Forestry sector and furniture industry employment in Southeast Asia, 1996-2006

Source: FAO (2008c).

12 All informal forestry sector activities are excluded because they are significant in many developing countries, figures presented are an underestimate.

13 Defined as 'forestry, logging and related service activities'.

14 Defined as 'manufacture of wood and of products of wood and cork, except furniture; manufacture of articles of straw and plaiting materials'.

Viet Nam is the region's largest forestry sector employer

In absolute terms, forestry sector employment in 2006 was highest in Viet Nam where 407 000 people were employed, mostly in the furniture industry (**Figure 2.18**). In comparison with primary forestry activities, the importance of value addition in Viet Nam and Thailand is evident in **Figure 2.18**. Myanmar shows the opposite trend, whereas in Indonesia and Malaysia greater balance exists between production and processing.

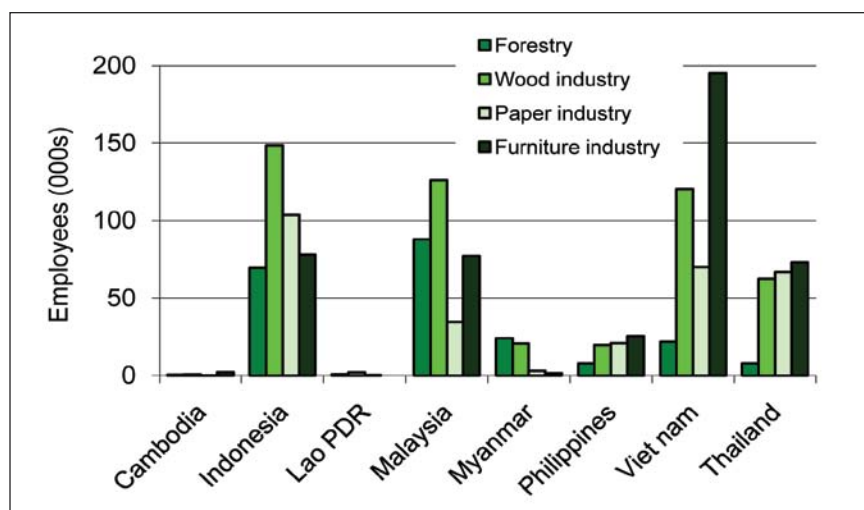


Figure 2.18. Forestry sector and furniture industry employment in Southeast Asian countries, 2006

Source: FAO (2008c).

Forestry sector proportions of GDP and employment are contracting

As a percentage of the total workforce, forestry sector employment in 2006 (excluding the furniture industry) was 2.3 percent in Malaysia – considerably higher than in other Southeast Asian countries where less than 0.5 percent of employment is in the forestry sector. In all countries except Myanmar, Viet Nam and Thailand the proportion of employment in the forestry sector is falling. Between 2001 and 2006, the contribution of the formal forestry sector to GDP (excluding the furniture industry) of all countries in Southeast Asia except Viet Nam also fell. In Myanmar, the Philippines and Thailand, forestry contributed less than 1 percent to GDP in 2006, whereas in all other countries in Southeast Asia the figure fell between 2 and 3 percent.

2.3. NON-WOOD FOREST PRODUCTS

NWFPs are diverse and cannot be managed as a single group

The *FAO forest resources assessment* groups non-wood forest products (NWFPs) into 16 classes as shown in **Table 2.4**. NWFPs differ greatly in relative importance to different groups and some of the least economically valuable products may at the same time be essential for local-level subsistence needs. This diversity of values together with the diversity of NWFPs themselves and the associated lack of statistical information makes formulation of appropriate policy a challenging task.

Table 2.4. NWFP classes adopted in the 2005 FAO forest resources assessment

Plant products
Food
Fodder
Medicine/aromatics
Colorants/dyes
Utensils/handicrafts/construction
Ornamental plants
Exudates
Other plant products
Animal products
Living animals
Hides, skins and trophies
Honey and beeswax
Bushmeat
Medicine
Colorants
Other edible animal products
Other non-edible animal products

NWFP groups may be classified according to production system (wild collection vs cultivation) and the economic strategy of producers (subsistence, diversified or specialized; Ruiz-Perez *et al.* 2004). Based on these categories the following groups may be identified: (i) *Subsistence* – including a wide range of NWFPs including many medicines and foods that are primarily collected from the wild are less frequently traded due to lack of demand or poor market development; (ii) *Commercial* – including foods, exudates, some medicines and many other products that are collected from the wild or cultivated on a small scale and traded in national and regional markets; (iii) *Industrial* – including some construction/handicraft materials – rattan and bamboo in particular – and some exudates and aromatics. These products are of higher economic value, and are mostly cultivated and traded formally in international markets. The three groups have differing production, trade and other characteristics as outlined in **Table 2.5**. As markets expand, some products are likely to advance through a succession from subsistence to commercial

to industrial. Inferior products and those which cannot be successfully managed are, however, likely to recede. Outcomes will depend on several factors including demand for individual products, ease of production/domestication, institutional frameworks and entrepreneurial activity.

Table 2.5. NWFP categories and characteristics

NWFP group	No. of products	Importance	Production	Supply	Economic value	Markets	Value addition
Subsistence	Many	Livelihoods	Gathered	Unstable	Low	Informal	Low
↓	↓	↓	↓	↓	↓	↓	↓
Commercial	Fewer	Intermediate	Intermediate	Intermediate	Higher	Informal	Low
↓	↓	↓	↓	↓	↓	↓	↓
Industrial	Few	Income	Cultivated	Stable	High	Formal	Higher

Rattan and bamboo are the most important NWFPs in Asia

In Asia, the most economically significant products, in order of importance, are rattan and bamboo, medicinal plants, essential oils, resins, pine nuts, mushrooms, spices and herbs (mainly cardamom and cinnamon), fodder, animal products, honey and lac (FAO 2002). **Table 2.6** shows the main NWFPs in Southeast Asian countries by importance. Global trade in NWFPs is dominated by China and India, followed by Indonesia, Viet Nam, Malaysia, the Philippines and Thailand.

Table 2.6. Main NWFPs in Southeast Asian countries

Country	Main NWFPs
Cambodia	Resin, rattan and bamboo, mushrooms, medicinal plants and incense
Indonesia	Rattan, bamboo, resins, tengkawang seed, sandalwood oil, cayeput oil, honey, shellac, fruits and medicinal plants
Lao PDR	Medicinal plants, food (nuts, fern roots, fruits), fibres, exudates (damar resin, oleoresin, benzoin), incense, spices, orchids
Malaysia	Rattan, bamboo, medicinal plants, wild fruits, vegetables, palms, resin, tannin, barks and wood-oil
Myanmar	Bamboo, rattan, edible bird nests, natural rubber, spices, medicinal plants, tanning barks, perfumes, exudates, honey and beeswax, bushmeat, lac and bat guano
Philippines	Rattan, bamboo, fibres, vines, palms, exudates, essential oils, dyes, wild food plants, medicinal plants, honey and butterflies
Thailand	Bamboo, rattan, lac, honey, gums and resins, spices, medicinal plants, food and bark for tanning and dyeing
Viet Nam	Handicrafts (rattan and bamboo), resin, essential oils, medicines, spices, mushrooms and honey

Source: FAO (2002).

Rattan prouction is falling and plantations are slow to take off

Rattan is the most important internationally traded NWFP. Indonesia has the largest global rattan stocks and is the largest supplier of cane, with an estimated annual production of 570 000 tonnes. Asian rattan resources are, however, being depleted through overexploitation and forest loss and only Indonesia, the Philippines and Malaysia, and, to a lesser extent, Lao PDR and PNG, still have significant resources. In Thailand, Myanmar, Viet Nam and Cambodia, the long-term sustainability of rattan-processing industries has been undermined by the depletion of stocks. Investment in industrial-scale rattan plantations is negligible and uncertainty surrounds future supply.

Rattan exports have fallen and subregional markets are in decline

In the Philippines, rattan has been a traditional and major source of raw material for furniture manufacture. It was also a major export until the export of unprocessed rattan was banned in 1988 due to falling supply (FMB 2009). For similar reasons, Thailand has banned harvesting of rattan in natural forest and export in its raw form and Indonesia has also recently limited export of raw rattan (RFD/DNP 2009; ITTO 2009j). Rattan has been planted on a small scale in Thailand, but private investment has been stemmed by a lack of technical expertise, the long rotation period and inadequate promotion. Nationwide, there are more than 200 rattan furniture factories but only three large factories export their products. Due to local supply shortages, rattan is imported from around the region, but volumes are falling and the value of rattan exports has declined considerably in recent years (RFD/DNP 2009).

Bamboo is increasingly grown as a crop and production has risen dramatically

Bamboo is by far the most commonly used NWFP in Asia and international trade in bamboo products has increased dramatically in the last decade (FAO 2002). China and Thailand are the main international suppliers of bamboo and Malaysia, Myanmar, Indonesia, Viet Nam and the Philippines also export. Bamboo shoots supply a rapidly expanding export market, with China being the world's largest producer and exporter followed by Thailand. Bamboo is also becoming more widely used as a raw material for industrial products including construction poles, panelling and flooring and pulp. Bamboo from natural forests is still important in Myanmar, Lao PDR and in mountain forests in Viet Nam but increasingly, bamboo is grown as a crop. In the Philippines, bamboo-based furniture exports are growing at around 15 percent annually, although bamboo resources are dwindling due to inefficient utilization, poor management and lack of effort to develop the resource.

Bamboo is increasingly grown in plantations

In Thailand, a 1998 survey estimated the national area of bamboo at 800 000 hectares (RFD/DNP 2009). About 80 percent of production is for non-industrial uses and 20 percent for pulp manufacture, although the latter has been declining. Unrestricted harvesting of bamboo from forests has led to supply shortages and farmers have begun planting on a large scale with around 10 700 hectares having been established through extension programmes (RFD/DNP 2009). Viet Nam also has extensive bamboo forests amounting to almost 1.5 million hectares, of which around 73 500 hectares are plantations (FSIV 2009).

Pine and dipterocarp forests provide resins and associated employment

Countless other products, many gathered from natural forests, are commercially important in the subregion. Extensive pine forests provide products including resins, seeds and mushrooms. China and Indonesia dominate world production of oleoresins (FAO 2002). In Thailand, resin has been tapped from pine trees for centuries and it is estimated that the pine resin industry has the potential to create 25 000 jobs in rural areas (RFD/DNP 2009). Oleoresin and gums are obtained from two native pine species, *Pinus kesiya* and *P. merkusii*, but only the latter is being tapped commercially. Pine forests are located mainly in the north and northeast and, allowing for mixed stands, amount to around 216 200 hectares. Tapping dipterocarp trees is another important source of income for many forest dwellers in Cambodia in particular and also Thailand, but the extent of the activity is not well quantified.

Lac, sago, kapok and spices are other important products

Thailand is the second largest lac-producing country after India, with supply coming from natural forests in the north and northeast of the country. Production peaked in the mid-1980s and in the early 1990s there were more than 50 000 families involved in production and 20 licensed lac-processing plants in operation (RFD/DNP 2009). Viet Nam also produces lac and exports around 300 tonnes annually (FAO 2002). Other important products include sago from Indonesia and also Malaysia, kapok (*Ceiba pentandra*) from Thailand and Indonesia and nutmeg and mace also from Indonesia.

Sustainably managing NWFPs constitutes a massive challenge

Many NWFPs important in local commercial activity are, along with purely subsistence products, also of importance in providing a safety net for the subregion's forest-dependent people – particularly in times of hardship. Deforestation, unsustainable use of forest resources and overcollection of NWFPs threatens this role. To achieve sustainable management of NWFPs and preserve subsistence values in the face of advancing markets constitutes a massive challenge in the subregion. Generally, with increases in demand, resources are depleted and benefits are infrequently captured by forest-dependent people.

Many obstacles face NWFP development

Many other problems face equitable NWFP development: poor statistical information; unpredictable harvest levels; unknown ecology and management; indistinct property rights; lack of market information and business expertise at the local level; poor quality control; and marketing and low investment. In Lao PDR, where NWFPs account for between 40 percent and 90 percent of household income, many of these issues have been revealed and confronted as the following trends confirm (UNDP 2001; Foppes and Phommasane 2005):

- A rapid increase in cross-border demand.
- Rapid depletion of some NWFP resources, e.g., bark, orchids and rattan.
- Increasing conflict between communities in relation to the shared use of forest resources.
- Local initiatives to domesticate NWFPs in gardens.
- Increasing awareness of the need for more efficient market regulations.

Many NWFPs are threatened but efforts are being made to improve management

Similarly in Myanmar, although production of NWFPs has increased for almost all officially recognized products, unsustainable harvesting has prompted inclusion of plans for systematic management of NWFPs in the National Forest Master Plan (Tun 2009). **Box 2.11** details the situation in Viet Nam where the potential of NWFPs has been recognized and efforts to facilitate NWFP development are at an advanced stage.

Box 2.11. NWFP management in Viet Nam – from national to local levels

The most important areas for NWFP production in Viet Nam include bamboo forests – mostly within natural forests – rattan stocks of around 382 000 hectares within natural forests, resin trees covering an area of 256 000 hectares and cinnamon trees covering 81 000 hectares. Pine resin and essential oils are also of significant importance. In 2004 the total export turnover of NWFPs was US\$200 million, 2.5 times that in 1999.

State management of NWFPs concentrates on creating a legal framework for NWFP conservation and development. At the provincial level, the Department of Agriculture and Rural Development grants licences for bamboo exploitation in production and protection forests. District People's Committees grant licences

to forest owners including households, individuals and communities and issue regulations concerning NWFPs. Since 1992, the government has encouraged investment in forests and preferential interest rates are given where NWFP management is included. Additionally, the government reduces taxes in relation to NWFP planting. Recently, the government has promulgated an action plan for 2007-2010 on NWFP protection and development and a project on NWFP preservation and development will run between 2006 and 2020. By 2020 the following changes are expected:

- NWFPs are expected to represent 20 percent of total forest product production, and export turnover is expected to increase at an average of 15-20 percent per year. Bamboo and rattan are, however, increasing at over 30 percent per year.
- 1.5 million mountainous rural labourers will be employed in collecting, processing and trading NWFPs, accounting for 50 percent of the total forestry sector labour force.
- 15-20 percent of income in rural households will come from NWFPs.

Results are, however, highly dependent on progress with national land allocation programmes. Delays in implementation are likely to undermine NWFP management and depletion of stocks is likely to result.

Source: FSIV (2009).

2.4. THE SERVICE FUNCTIONS OF FORESTS

Forest services are being eroded

Forests are the cornerstone of the subregion's flora and fauna and also protect watersheds, store carbon and provide locations for recreation and ecotourism. Forest conversion and degradation reduce the supply of forest services and collection of wildlife for consumption and trade also threatens biodiversity in the subregion. In the face of rapidly advancing economic frontiers and increasing consumption of natural resources the importance of protection forests and forests in protected areas is growing.

Calls for further forest protection are growing

In past decades, forest protection measures, including establishment of protected areas and logging bans, have constituted the most significant policy shifts to have occurred in Southeast Asian forestry development. Increasing awareness of the importance of the service functions of forests and of the diminishing extent of forest resources is likely to significantly affect the face of forest management in the subregion by 2020. Climate change-related policy and the direct effects of climate change on forests are particularly likely to drive forest sector development, but questions still remain over institutional mechanisms best suited to stimulating production of forest services.

Payments for environmental services have not yet taken off

Recently, payments for environmental services have gained popularity as a way to promote production of benefits from forests and other natural resources. Implementation, has, however, been constrained and analysis suggests that payments will only be successful in providing benefits under certain circumstances (**Box 2.12**). Other mechanisms supporting non-extractive utilization of forests, including state control and community ownership, are likely to be further refined in the coming years as demands on forests switch increasingly from products to services.

Box 2.12. Payments for environmental services

As a means of maintaining production of environmental services from forests, dedicated payments or 'payments for environmental services' (PES) have received much attention in recent years. Implementation of such schemes in Southeast Asia has, however, been limited. A number of practical problems outlined by Wunder (2007) suggest the scope for PES may be limited and that case by case analysis is necessary to determine the appropriateness of PES schemes relative to other mechanisms such as conservation and development projects or land purchase. Challenges include determining who should be paid, what they should be paid for, what the production baseline is and whether the services are actually being provided. Lack of clarity over tenure – especially in remote areas – and differences in de facto and de jure rights erode the operability of PES because it is not clear who should be paid to provide the service. Where many people benefit from the utilization of resources it is also not generally feasible to pay them all off.

In much of Southeast Asia, forests are located in more remote areas where ownership rights are unclear or de jure state ownership without enforcement creates open access or promotes corruption. Under such situations it is likely that those who exert practical control would have to be bought off – e.g., loggers, consumers and intermediaries and local government. Ironically, if local people do not actually threaten the forest, PES logic says that they should not themselves be paid. Furthermore, with high timber values and opportunity costs, it may be that adequate funds would not be available to cover losses and payments would also have to be made in perpetuity.

Because of these issues, PES may best target the margins of profitability where small payments to landowners can tip the balance in favour of the desired land use. As such, it may be that logged-over forests on poor soils would offer the greatest opportunity for PES schemes. As for who should be paid, actors with claims relating to the service provided may be best advised to form a conservation alliance which includes those with the right to exclude.

Source: Wunder (2007).

Forests provide many services in parallel

Undervaluation of forests due to the limited scope of market and institutional systems to manage non-commodity values continues to pose a threat to forests in the subregion. Institutional jurisdictions, both at the national and international level, are often

fragmented due to the array of goods and services produced by any one area of forest. The following Sections assess status and trends in the production of services related to conservation, climate change and protection of land and water resources. It is, however, emphasized that all forests serve these purposes to a lesser or greater extent.

2.4.1. Conservation of biodiversity

The biodiversity of Southeast Asia is exceptionally rich and increasingly threatened

Forests contain as much as 90 percent of the world's terrestrial biodiversity and levels of species richness and endemism are particularly high in tropical forests (Schmitt *et al.* 2008). Protected areas provide a recognized means of conserving ecosystems and species and much of the terrestrial biodiversity within Southeast Asia is contained within forests (Sodhi *et al.* 2004). Southeast Asia also contains four of the 25 global biodiversity hotspots – areas where biodiversity is both globally significant and under considerable threat,¹⁵ (Myers *et al.* 2000; see **Box 2.13**). Together, the four hotspots swathe the entire subregion. The Sundaland hotspot, which covers Malaysia and Indonesia as far east as Borneo and Bali, contains around 25 000 plant species, 15 000 of which are endemic, as well as many mammals, birds, reptiles and amphibians. The hotspots covering the Philippines, continental Southeast Asia and western Indonesia are home to flora and fauna of similar diversity, which is likewise threatened.

Box 2.13. Biodiversity crisis in Southeast Asia

Much of Southeast Asia's considerable biological diversity is contained within forests and with four of the world's 25 biodiversity hotspots adjoining in the subregion, forestry-related decisions and activities have considerable repercussions. Reduction of forest cover has significantly greater impact on levels of biodiversity than invasive species, climate change, nitrogen deposition or other threats. Species richness is also reduced by logging – in relation to intensity of operations – and regeneration of forest following clearance does not reach parity with primary forest in terms of species richness.

In combination with climate change and the increasing frequency of El Niño events, reduction in forest density and forest fragmentation can lead to increasing chances of catastrophic fire and a resultant acceleration of species losses. The wildlife and bushmeat trade has reached unprecedented levels in Southeast Asia with greater forest access and increasing demand behind the upsurge. The Convention on International Trade in Endangered Species (CITES) and other international agreements often remain unenforced and much of the supply originates in 'protected' areas.

15 Indo Burma, Philippines, Sundaland, Wallacea (see <http://www.biodiversityhotspots.org>).

In the midst of this predicament, the biodiversity of Southeast Asia remains underresearched in comparison with South and Central America and sub-Saharan Africa and protected areas often remain protected in name only. Containing and reversing losses will take a multinational and multidisciplinary effort involving public awareness raising, adequate protection and economic incentives for conservation.

Based on Sodhi *et al.* (2004).

'Empty forest syndrome' threatens in Southeast Asia

Worldwide, consumptive use of biological resources, predominantly poaching, along with habitat conversion and modification of ecological processes represent serious threats to conservation. The 'empty forest syndrome' threatens Southeast Asia and uncontrolled exploitation of wild plants and animals is having a devastating effect on biodiversity (Traffic 2008). Huge demand for wildlife for food, medicine, pets, display and fashion, particularly from China, has led to increased trafficking and many wildlife species with high commercial value are now rare, endangered or locally extinct – including the tiger, Javan and Sumatran rhinoceros, Asian elephant, pangolin, freshwater turtles and tortoises, agarwood and numerous wild orchid species. The trade not only undermines biodiversity but also curtails sustainable development and poverty alleviation for those dependent on wildlife for subsistence. This is particularly prevalent in lesser developed areas within the subregion. Development of roads and infrastructure, expansion of logging and encroachment into pristine areas have increased access to wildlife and levels of extraction have risen markedly in the past decade. Increasing wealth has been another key driver.

The extent to which different forests are protected is uncertain

The Convention on Biological Diversity (CBD) calls for the effective conservation of at least 10 percent of each of the world's forest types by 2010. The percentage of protected forest area within Southeast Asia's ecoregions is high in comparison with many other global areas (Schmitt *et al.* 2008). Due to deficiencies in assessment frameworks and limited data availability, levels of protection by forest type are, however, not fully known. A total of 28 (41 percent) of the 68 World Wide Fund for Nature's (WWF) ecoregions in Southeast Asia are estimated to have less than 10 percent of their area included in The World Conservation Union's (IUCN) category I-IV protected areas. Twenty-one of the ecoregions have more than 20 percent of their land area under protection (Birdlife International and IUCN 2007).

Designated IUCN category is of conservation significance

Designated IUCN category is closely related to the effectiveness of protected areas and there is usually a clear and explicit trade-off between biodiversity conservation and other human values in the less strictly protected areas (WWF 2004, 2007). In almost all countries across Southeast Asia protected areas are designated

Forest area designated for conservation is increasing

Primary forest areas are falling although data quality is low

across a broad range of categories.¹⁶ In Lao PDR, however, all protected areas are IUCN category VI,¹⁷ i.e., managed mainly for the sustainable use of natural ecosystems.

Statistics reported to FAO show that the area of forest designated for conservation in Southeast Asia increased by 6.4 million hectares between 1990 and 2010 to reach 38.7 million hectares – equivalent to 9 percent of the land area and 18 percent of the total forest area (**Figure 2.19**). In Myanmar and Viet Nam the area of conservation forest has almost tripled since 1990, while Malaysia has seen an increase of 74 percent. In Cambodia, Lao PDR and Thailand increases have been between 20 and 44 percent. In the Philippines the area has remained stable while in Indonesia, reductions have been reported.

In contrast to the increased area of conservation forest, the area of primary forest in the subregion has continued to fall, although no changes have been reported in Lao PDR, Malaysia, Myanmar, the Philippines or Thailand since 1990. In Viet Nam, the area of primary forest has fallen to 80 000 hectares while only 322 000 hectares remain in Cambodia. In Indonesia, although two million hectares were lost between 2000 and 2010 a reported 47 million hectares remained in 2010 – corresponding to exactly half of the total reported forest area. The subregional pattern of forest cover change shows that apart from less accessible and mostly mountainous areas, most of the remaining forest cover in Southeast Asia is affected by change. Furthermore, areas of change frequently overlap with protected areas and national parks (Stibig *et al.* 2007).

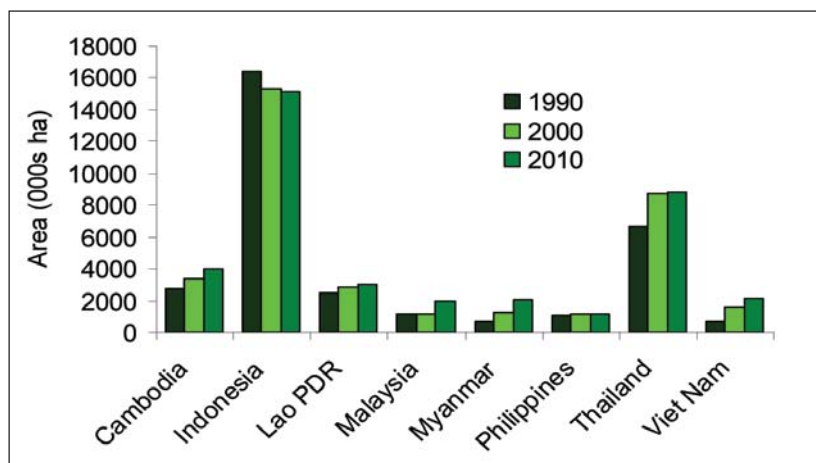


Figure 2.19. Change in the extent of forest designated for conservation in Southeast Asian countries, 1990-2010

Source: FAO (2010).

¹⁶ World database on protected areas (<http://www.wdpa.org/Default.aspx>)

¹⁷ Area containing predominantly unmodified natural systems, managed to ensure long-term protection and maintenance of biological diversity, while providing at the same time a sustainable flow of natural products and services to meet community needs (http://www.unep-wcmc.org/protected_areas/categories/index.html).

Many protected areas exist only on paper

The World Parks Congress in 2003 highlighted concerns that many protected areas exist only on paper, especially in developing nations, and that costs associated with protected areas are often borne locally while benefits accrue globally (IUCN 2003). Global financing for conservation of forests in the humid tropics is particularly necessary given the low level of domestic benefits that are generally available (Chomitz and Kumari 1998). According to IUCN, existing global protected areas suffer an annual funding gap of around US\$25 billion and while conservation funds are promoted they are often inaccessible or misdirected (IUCN 2003). The situation in the lower Mekong countries is outlined in **Box 2.14**.

...designation is only the first step. If protected areas are to be effective in fulfilling their aims of biodiversity conservation, environmental management and the protection of the world's cultural heritage, they must also be well managed (WWF 2004)

Box 2.14. Protected areas and investment in the lower Mekong countries

Protected area systems have expanded rapidly in the lower Mekong countries. Including locally and provincially managed areas, they cover close to a fifth of the total land area in Cambodia, Lao PDR and Thailand (**Table 2.7**). Protected areas are mostly located in forested uplands and have expanded from nothing over the past three decades. It was estimated that by 2005, around 53 percent of natural forests in the lower Mekong countries would be within protected areas (**Table 2.7**).

Table 2.7. Forests and protected areas in the lower Mekong Basin (2003)

	Cambodia	Lao PDR	Thailand	Viet Nam
Protected areas as a % of land area	21	21	19	8
Estimate of forests in existing and proposed protected areas as a % of total forest	40	39	65	26

In general, domestic investment in protected areas, especially relating to recurrent costs associated with staff and maintenance, has increased as new areas have been established. Overseas funding increased rapidly between 1990 and 2000 but fell off subsequently. In particular, international aid in Cambodia and Lao PDR dropped steeply in the second half of the 1990s due to political instability, a lack of progress and resource degradation. In Viet Nam, government funding for protected areas increased through the 1990s as 30 new areas were established. In contrast to government support, direct private sector investment in protected areas has been minimal and generally associated with tourism and hydropower schemes.

Despite their extent, limited capacity and relaxed enforcement at the community level mean that most protected areas in the lower Mekong Basin are multiple-use areas. The collection of NWFPs is eroding biodiversity values and most of the main trade routes from Lao PDR and Cambodia are directly linked to protected

areas. Additionally, encroachment by local communities and commercial interests is reducing the size of protected areas. Despite many small-scale logging infringements within protected areas, however, and notwithstanding a number of serious exceptions, destruction within protected areas has been less than that in surrounding landscapes in the lower Mekong countries.

Source: ICEM (2003).

Designation does not mean protection

The lack of financing for protected areas has been highlighted by many studies conducted around the world (WWF 2004; ACB 2008; Lacerda *et al.* 2005). In the Philippines, for example, forest allocated for biodiversity conservation and forest reserves covers at least 28 percent of the total classified forest land, but is poorly supported and only an eighth of legislated protected areas has an annual budget allocation (Agaloos 2005 cited in Guiang and Castillo 2006). Only half of the 430 protected areas have protected area management boards and most are highly centralized. In Myanmar, 45 protected areas covering over 3.5 million hectares or 5.4 percent of the total land area had been established by 2003. Only 22, however, have active management with wardens and staff present (Thaung 2009).

Progress has been made but protected areas are still threatened

Globally, protected area management issues related to legal definition, demarcation and biodiversity assessment are mostly satisfactorily addressed while measures related to people – both local communities and visitors – management planning, monitoring and evaluation, budgeting and awareness are less effective (WWF 2004). Key threats include poaching, encroachment and logging and unsustainable collection of NWFPs and biodiversity condition is most strongly correlated with monitoring and evaluation; resource management; staff numbers and legal status (WWF 2004). Biodiversity condition is strongly related to law enforcement, control of access and monitoring and evaluation (WWF 2007).

The importance of local people is unresolved

A consistently challenging issue in protected area management is the inclusion of local people in management decisions and aligning livelihood improvement activities with conservation objectives (WWF 2004). In Thailand, 8.1 million hectares or 16 percent of the total land area is included in the protected area system (Jantakad and Gilmour cited in Lakanavichian 2006). Management is complicated by the presence of forest-dependent people and illegal loggers and it is argued that involvement of local people and other agents in management is necessary for effective conservation and sustainable management (Lakanavichian 2006). Survey work has shown, however, that protected area effectiveness declines with the extent to which people have access and that participation of local and indigenous people in management decisions does not necessarily increase the effectiveness of protected area management (WWF 2004).

State commitment is essential for effective protected area management

In Lao PDR, Cambodia and Viet Nam, protected areas adjacent to areas of development are under serious threat of biodiversity and resource loss (Corbett 2008). Timber, wildlife and NWFPs are being severely overharvested causing damage to habitats and environmental services and also undermining local people's subsistence. The Song Thanh Nature Reserve in Central Viet Nam, Dong Hua Sao National Protected Area in southern Lao PDR and Peam Krasop Wildlife Sanctuary in southwestern Cambodia are all threatened – mainly by external commercial interests supplying distant markets. Degradation is resulting from logging, conversion to plantations, mining, unmanaged harvesting of NWFPs and organized hunting of wildlife for medicines, skins and meat. The trend is likely to worsen as investments close to the reserves such as roads, dams and electrification schemes expand in the absence of additional resource management, law enforcement and governance capacity. Similar problems in the Kulen Promtep Wildlife Sanctuary in Cambodia are outlined in **Box 2.15**.

Box 2.15. Protected area management in Cambodia

A long list of threats faces protected areas in Cambodia: illegal logging; encroachment; poaching; shifting cultivation; infrastructure development; illegal fishing; mining; and harvesting of NWFPs. Increased access, and particularly road development, is a major driver behind land encroachment in protected areas. This can be seen in the largest protected area in Cambodia, Kulen Promtep Wildlife Sanctuary, which is located in the region of the southern GMS economic corridor (**Figure 2.20**).

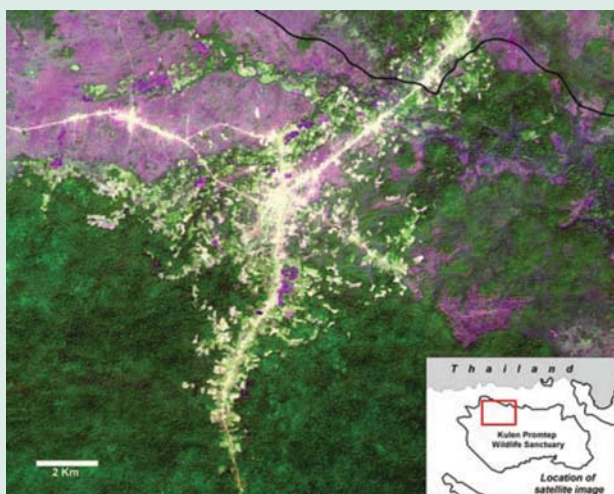


Figure 2.20. Satellite image showing forest clearing associated with a road in northwest Kulen Promtep Wildlife Sanctuary

Key: Darker greens indicate continuous forest cover; light green indicates disturbed forest or other secondary vegetation; purple indicates areas with decreasing vegetation cover; white areas are bare earth, concrete, or rooftops.

Key factors contributing to the pressures affecting protected areas in Cambodia include increasing national and regional demand for timber and inadequate law enforcement combined with a lack of alternative sources of income for local people. Illegal logging and wildlife poaching are the most pervasive threats across the protected area system. Analysis of forest cover in protected areas adjacent to Thailand has also shown increasingly rapid deforestation dating back to the Thai logging ban in 1989 when demand for timber from neighbouring countries increased sharply.*

At present, protected areas lack management plans, objectives and zonation and many have not been demarcated. There is also a general lack of financial and human resources at all levels and communication and infrastructure need to be improved. Increasing cooperation between protected area managers, local communities and other partners and improved communication between protected area staff and national authorities provide some cause for optimism, although underlying drivers of change also need to be addressed.

Source: Lacerda *et al.* (2005) except: * Rapid forest loss across the Thailand-Cambodia border. World Resources Institute, http://images.wri.org/treecoverchange/treecoverchange_kh.jpg

Future developments will have multiple effects

It has been suggested that the biodiversity crisis could be less severe than expected due to forest regrowth in abandoned upland areas where people have moved out to follow more lucrative pursuits (ENS 2009). The fraction of original biodiversity that secondary forest will sustain is disputed, but the role for protecting and expanding fragments of old growth forest is likely to increase greatly in the future. In spite of many weaknesses in the global protected area system, WWF (2004) reported that the biodiversity condition in 200 surveyed forest protected areas in 37 countries is perceived as good, even in areas that could be described as 'paper parks'.

Wildlife depletion is an immediate threat – logging and encroachment remain a chronic threat

Whether the issues that beset conservation initiatives in the subregion can be overcome will have important effects not only on the forest environment, but also on timber supply and poverty. Encroachment and logging are only likely to be resolved in the long term if monitoring and law enforcement efforts are increased. More difficult to address will be wildlife depletion. The variability and complexity of wildlife trade chains, the porosity of borders and difficulty in guarding large areas against the threat of wildlife removal makes wildlife depletion difficult to address (Traffic 2008). Governance improvements and increased sustainable resource management efforts along with law enforcement are the main means suggested to tackle the decline in wildlife (Traffic 2008). In particular, efforts need to be made to raise awareness among urban consumers and more wealthy groups.