GREATER MEKONG SUBREGION REPORT

Asia-Pacific Forestry Sector Outlook Study II

Asia-Pacific Forestry Commission

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FORESTS AND FORESTRY IN THE GREATER MEKONG SUBREGION TO 2020

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

FOOD AND AGRICULTURE ORGANIZATION OF THE UNITED NATIONS
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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, five 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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CONTENTS

BOXES

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The strong support given by member countries toward the completion of the APFSOS is reflected by the nearly universal preparation of country outlook studies by Greater Mekong Subregion member countries of the Asia-Pacific Forestry Commission. Many countries also provided comprehensive reports and recent documentation on national policies, strategies and actions and shared relevant data with the outlook team. Governments in the subregion nominated national focal points who met early in the process to discuss their roles and to agree upon a common national report structure. The national focal points were instrumental in running national-level outlook consultation processes, collecting country-level data and information, clarifying issues and verifying statistics and coordinating submission of country outlook papers.

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EXECUTIVE SUMMARY

Forest cover in the Greater Mekong Subregion (GMS) is projected to fall by 0.9% between 2010 and 2020. Losses totalling 4.8 million hectares are forecast for Lao PDR (-1.0m ha), Myanmar (-2.5m ha) and Cambodia (-1.3m ha) while in Thailand (1.0m ha) and Viet Nam (3.1m ha) forest area is predicted to increase by a total of around 4 million hectares. Between 1990 and 2010, excluding Viet Nam, the forests of the GMS contracted in size by 12.5 million hectares, an area greater than half that of Lao PDR. The annual rate of forest loss, however, fell from -0.8 to -0.6 percent. At the same time, forest area in Viet Nam increased by 4.4 million hectares. Despite these encouraging figures, the rate and extent of degradation of natural forests remains masked by broad definitions of "forest" and inadequate statistics. Available information suggests, however, that throughout the region forests are becoming increasingly degraded. 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.

Projected reductions in forest area between 2010 and 2020 equate to estimated losses of 0.27 giga tonnes CO_2 equivalent – 11% more than Viet Nam's total CO_2 emissions for 2005. With forest conversion the primary driver of biodiversity loss, estimates are that in Southeast Asia as a whole, between 13 percent and 42 percent of species will be lost 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 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 the GMS, 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. 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. Deforestation and loss of canopy cover has been particularly intense in Myanmar while smaller scale forest loss in Lao PDR, Viet Nam, Cambodia has also been recorded. 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. Rubber and oil-palm have been important crops in terms of forest conversion. In northern areas of the subregion rubber plantations are being established, particularly in sloping areas, and in southern Thailand and southern Myanmar, oil-palm establishment has been an important cause of forest conversion.

While road networks and industrial agriculture expand, populations are also increasing rapidly and between 2010 and 2020, the population of the GMS is projected to increase by 10 percent to 249 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 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 the GMS, and similar responses may gain ground in the coming years.

Two GMS countries 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 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. Despite increased attention to forest law enforcement and governance, 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 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 GMS forest product industry 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, 5 percent of GMS forest products and 75 percent of total wooden furniture exports went to markets in the EU and United States in 2007. The most significant exporter to the EU and US was Viet Nam with wooden furniture exports exceeding 2 billion dollars. In relation it is possible that if legality and sustainability standards do not improve, accessing these high paying markets may become more difficult and buyers may even 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 GMS 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 the GMS 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-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 the GMS 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 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 the Greater Mekong Region's overall development framework, prevailing economic and demographic trends and national-level priorities suggest that forestry-related goals should centre on:

- economic production; and
- biodiversity protection.

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

- 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 GMS 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 and expand forest transitions are likely to become the defining challenge for forestry in the GMS 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 greatest 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 in 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 the GMS. 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

The Greater Mekong Subregion is growing rapidly while demands are diversifying

The Greater Mekong Subregion[1] 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. 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 the GMS, 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.

1 Cambodia, the People's Republic of China (Yunnan Province and Guangxi Zhuang Autonomous Region), Lao People's Democratic Republic, Myanmar, Thailand, and Viet Nam.

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

With the passing of the era of 'peak timber' in the subregion and demands for food, fuel and fibre increasing, a lack of financial and institutional support for SFM is jeopardizing the future of 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 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.

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

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 the GMS is projected to increase by 10 percent to 249 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 the GMS. 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 the GMS and of trade-offs that have been 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

Five countries are included in this study: Cambodia, Lao People's Democratic Republic, Myanmar, Thailand, and Viet Nam. The two provinces in the People's Republic of China that form an additional section of the GMS (Yunnan Province and Guangxi Zhuang Autonomous Region) are not included. The report draws on papers produced as part of APFSOS II by each of the five 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 the GMS and people who influence them, at project developers, aid agencies and donors, at members of international forums and discussion groups and at investors in the GMS whose actions may impact upon forests

and forestry. It is also aimed at those interested in environmental and social issues in the GMS 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 STATUS AND TRENDS IN FORESTS AND FORESTRY

The role of forestry is changing

The Greater Mekong Subregion'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 GMS forest sector and provides an overall indication of broad trends in recent decades.

Forests and their constituent biodiversity is being lost

The forests of the GMS qualify as some of the most species rich in the world (**Figure 2.1**). The subregion covers an area identified as the Indo Burma biodiversity hotspot – one of the world's 25 global biodiversity hotspots[1] in which a significant proportion of the world's species are under significant threat (Myers *et al*. 2000). Forest clearance in the subregion has remained relatively constant over past decades. Between 2000 and 2010 the area of forest declined at 0.4 percent per annum, compared to 0.5 percent per annum between 1990 and 2000. Between 1990 and 2010 the forest area contracted by 8.0 million hectares (FAO 2010).

1 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 its original habitat.

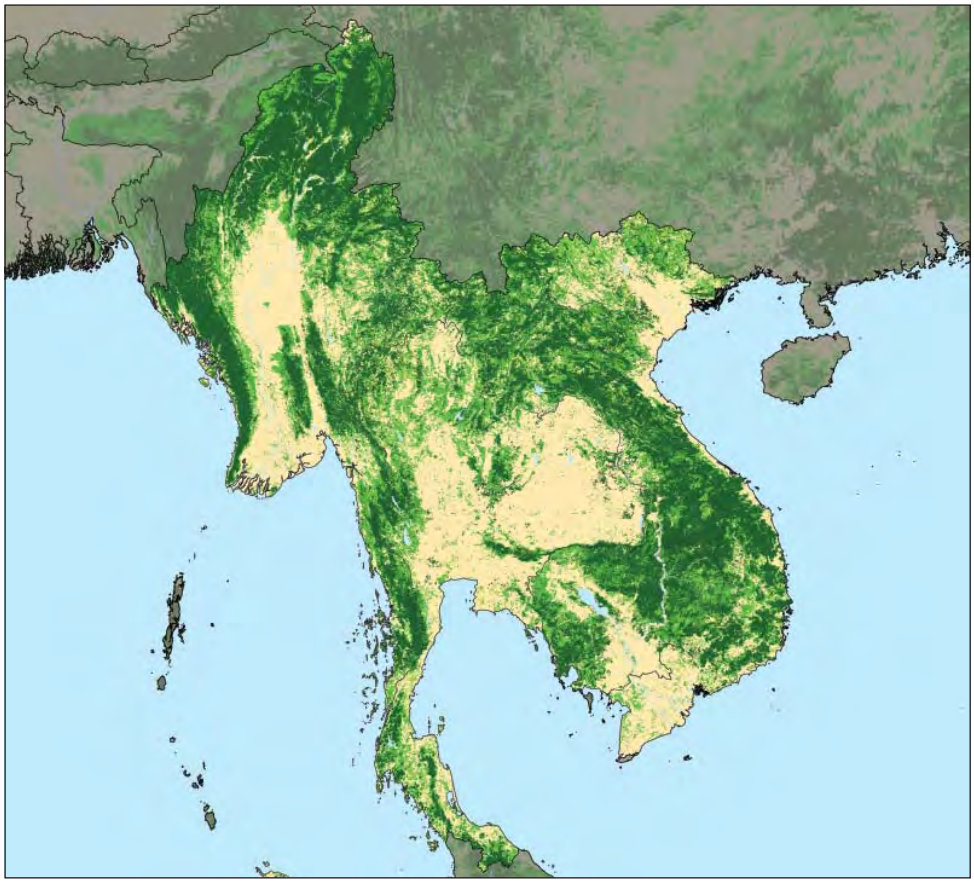


Figure 2.1. Forest cover in Southeast Asia 2005

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). 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). '**R**educed **E**missions from **D**eforestation and forest **D**egradation' (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

Within the subregion forest production centres have moved from Thailand and Viet Nam on to Lao PDR, Cambodia and Myanmar as economic frontiers have advanced and existing resources have been exploited. With timber supplies now falling in the remaining resource-rich countries, resources farther afield are now increasingly supplying forest products manufacturing centres inside and outside the subregion.

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 the

GMS, 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 GMS 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

The subregion's period of "peak timber" has passed and cultivation of other crops has 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 the GMS. 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 of forests are included in Section 2.4.1.

2.1.1 Changes in forest cover

Forest cover loss has slowed since the 1990s

GMS forests (excl. China) cover 90.4 m ha, equivalent to 48 percent of the land area, with national forest cover ranging from 37 percent in Thailand to 68 percent in Lao PDR. Myanmar also has a significant areas of other wooded land.[2] The overall rate of loss of forest area has been relatively constant since 1990 and stood at 0.4% per annum between 2005 and 2010 as shown in **Table 2.1**.

2 Land not classified as forest but with area > 0.5 ha and height > 5m and 5-10% canopy cover

Table 2.1. Area of forest and other wooded land in the GMS 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
Lao PDR	15 751	68	-0.5	-0.5	-0.5	4 834
Myanmar	31 773	48	-1.2	-0.9	-0.9	20 113
Thailand	18 972	37	-0.3	-0.1	0.1	0
Viet Nam	13 797	42	2.3	2.2	1.1	1 124
GMS	**90 387**	**48**	**-0.5**	**-0.3**	**-0.4**	**26 204**

Source: FAO (2010).

Forest cover is increasing in some countries

Figure 2.2 shows the distribution of forest areas between countries and the predominance of Myanmar, both in terms of absolute forest area and reduction in area. Except for Viet Nam, all countries in the region show the same decline in forest area.

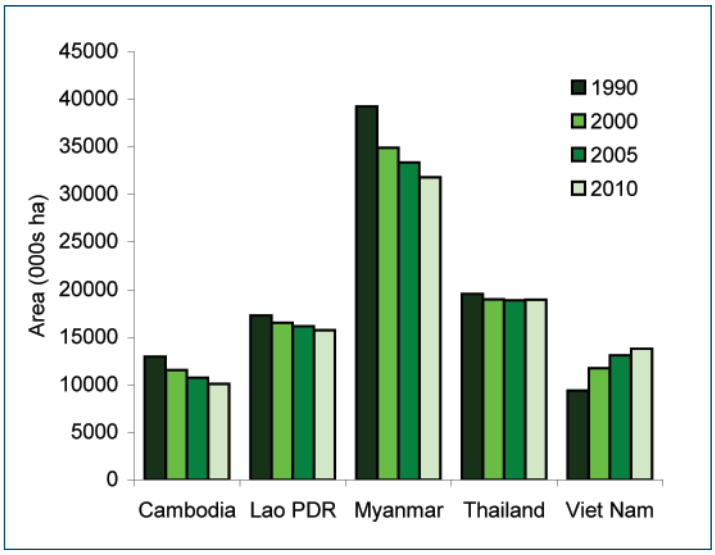


Figure 2.2. Forest area in GMS countries, 1990-2010
Source: FAO (2010).

Over four percent of the land area in the GMS has been deforested since 1990

A total area of 8 million hectares of forest is estimated to have been lost in the GMS between 1990 and 2010 – equivalent to 4.2 percent of the land area. 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 Thailand also reported a modest increase of 15 000 hectares/year (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.

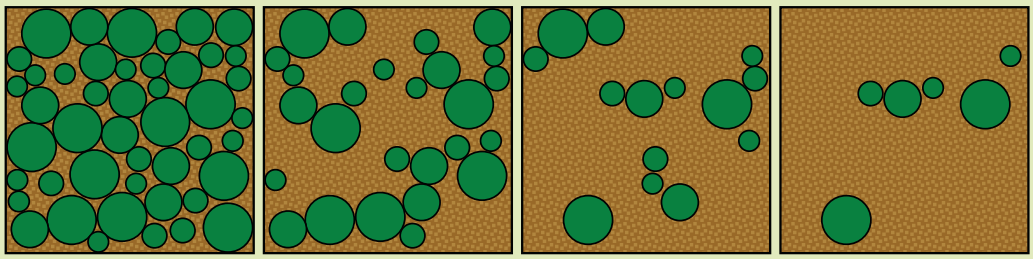
Box 2.1. Understanding forest resource statistics

As a basis for sound planning in the forestry sector, forest resource and forest product statistics in the GMS 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 types, (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 forests and areas 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). International forest cover

definitions also fail to capture changes in forest resources until forests are very highly degraded.



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 forest[3] 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 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
Lao PDR	15 751	1 490	9.5	14 037	224	1.4
Myanmar	31 773	3 192	10.0	27 593	988	3.1
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
GMS	90 387	11 810	13.1	69 799	8 779	9.7

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 the GMS as **Figure 2.3** shows. The overall rate of planted forest establishment in the subregion increased from 270 000 hectares per annum between 2000 and 2005 to 279 000 hectares per annum between 2005 and 2010. Rates in the 1990s, by comparison, averaged 194 000 hectares per annum. 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

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

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.

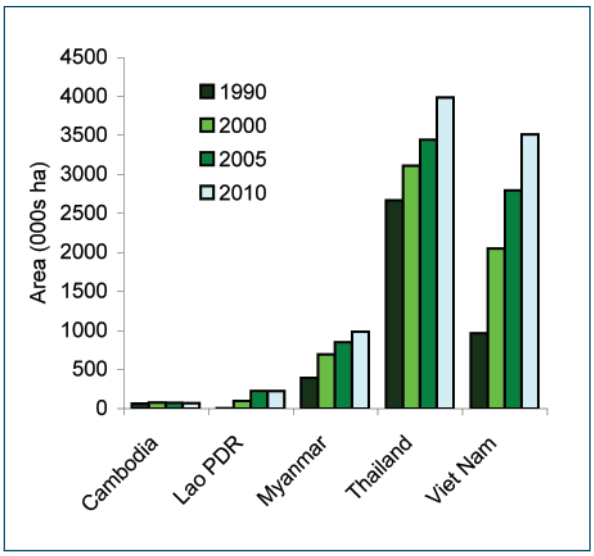


Figure 2.3. Extent of planted forests in GMS countries, 1990-2010

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 the GMS, conservation and protection of forests have become primary motivating factors 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 trends 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 uses or have no designation. **Figure 2.4** shows the predominance of production as the primary function of forests in the GMS, accounting for 40 percent of the forest area in 2010. The proportion has fallen from 42 percent in 2000 after rising from 18 percent in 1990. The proportion of forest designated for protection also remained constant between 2000 and 2010 at 19-20 percent, while the proportion of conservation forest rose

from 19 to 22 percent. Forest designated for other functions[4] remained stable at around 19 percent of the total forest area having dropped from 53 percent in 1990.

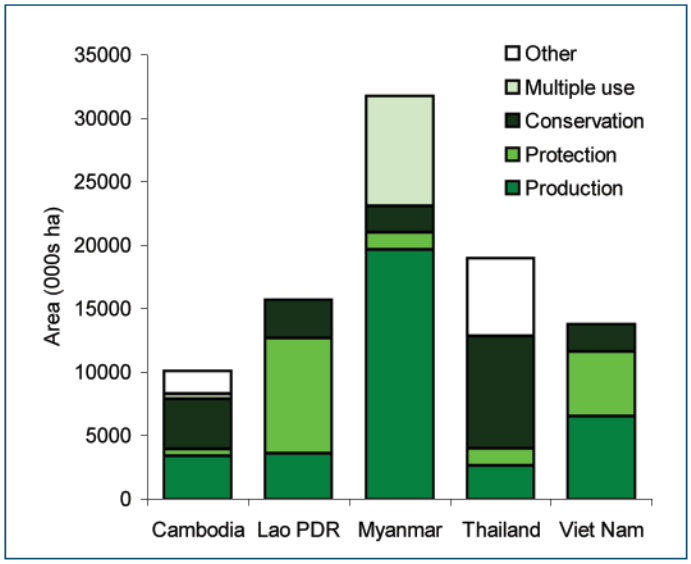


Figure 2.4. Extent of forest area by designation in Southeast Asian countries in 2010

Source: FAO (2010).

The area of conservation forest in the GMS 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 the GMS increased by 50 percent or 6.7 million hectares to reach 20.1 million hectares – 11 percent of the total land area and 22 percent of the forest area (see **Figure 2.17**). The largest increases between 2000 and 2010 were recorded in Myanmar followed by Cambodia and Viet Nam. Further analysis is provided in Section 2.4.1.

Protection forests account for nineteen percent of the total forest area in the GMS

Forests designated primarily for protection cover 17.4 million hectares in the GMS and account for 9 percent of the land area and 19 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, although a national protection forest area system has yet to be established in Lao PDR. Between 2000 and 2010 the area of protection forest in the subregion fell by 1.0 million hectares.

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

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 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 km^2 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).

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. In the GMS, the area of mangroves is reported to have fallen from 868 000 to 830 000 hectares between 2000 and 2010, representing an annual loss of -0.45 percent - marginally higher than the overall rate of forest loss (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.

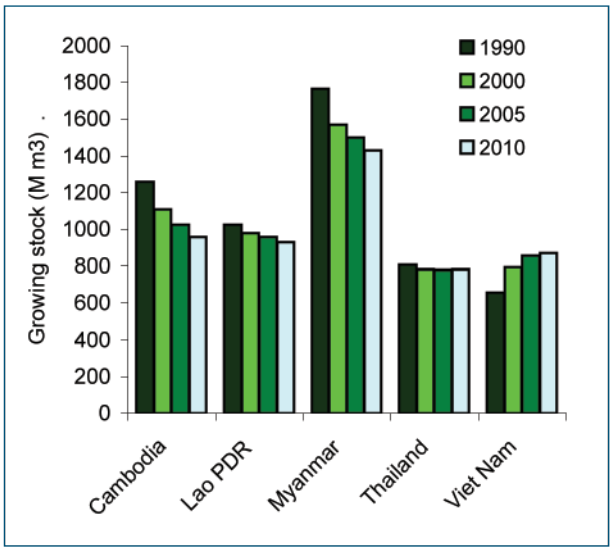


Figure 2.5. Growing stock in GMS countries, 1990-2010

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 probably 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 the GMS 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
Lao PDR	59	0.00	-0.06
Myanmar	45	0.00	0.00
Thailand	41	0.00	0.00
Viet Nam	63	-0.47	-0.46
GMS	55	-0.08	-0.10

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 the GMS

The extent of forest designated for production in the GMS increased by 18.3 million hectares between 1990 and 2010 (**Figure 2.6**). 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). 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.

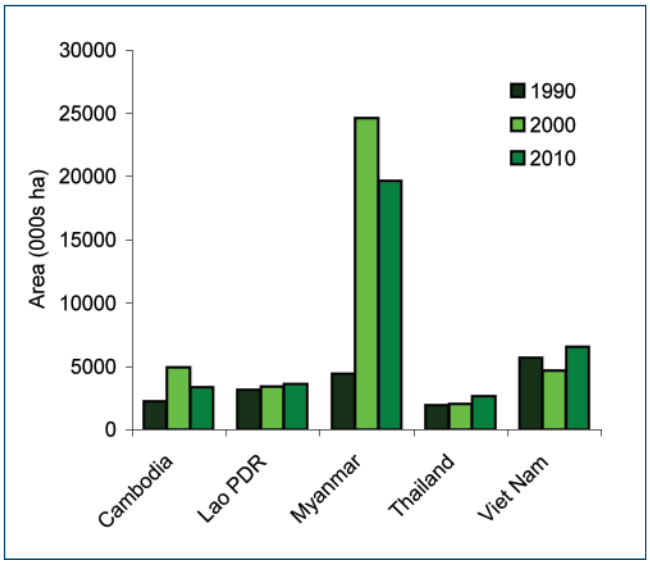


Figure 2.6. Extent of forest designated for production in GMS countries, 1990-2010

Source: FAO (2010).

Forest products supply has followed trends in forest clearance

Recent and historic trends in forest product manufacturing in the GMS indicate a close correlation with forest clearance. 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.

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 the GMS was estimated at 4.8 m ha in 2005, equivalent to 5.5 percent of the total forest area in the GMS (FAO 2005a). Thailand and, in recent years, Viet Nam have dominated plantation production in the subregion, together accounting for 80 percent of the total area in 2005. In Viet Nam the area of productive plantations increased steeply, reaching 1.8m ha in 2005, and increases were also reported in Lao PDR and Myanmar (**Figure 2.7**).

Pulpwood and rubber plantations are expanding fastest

In the GMS, 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, 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 pulpwood plantations expanded from a negligible area in 1990 to over 1 million hectares each in 2005 (FAO 2006a). Rubber[5] is a particularly important crop in the subregion and in Thailand comprised 63 percent of the total area of productive plantations in 2005 (Charuppat 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, Bluhm and Sananikone 2005).

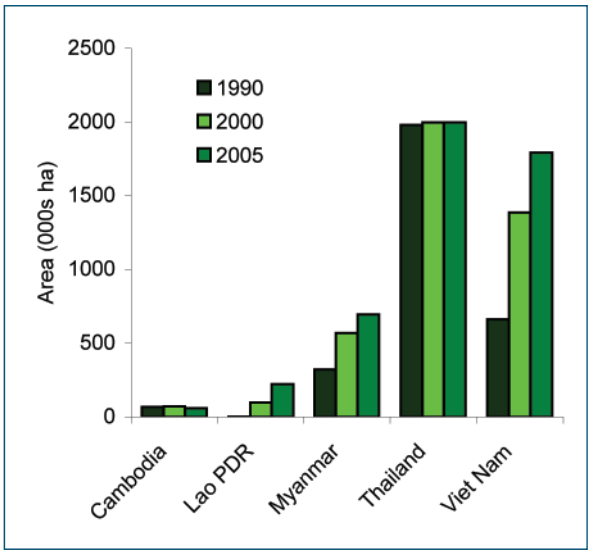


Figure 2.7. Extent of productive forest plantations in GMS countries, 1990-2005
Source: FAO (2005a)

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

5 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).

degraded forest reserves; 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 2.3** details the response to increased dependence on wood product imports in Thailand.

Box 2.3. 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 m^3 of logs and sawnwood were imported to satisfy demand. Major imports came from Malaysia, Lao PDR and Myanmar. Thailand also exported 1 739 933 m^3 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 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 the GMS 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.

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 2.4**.

Box 2.4. 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 2009). 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 2.17) 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 the GMS 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 2.9.** 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 a 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. The 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.

…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 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. 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 the GMS, 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 the GMS may, if trends continue, have devastating effects on the subregion's forests. Droughts have normally been associated with El Ninõ years in Myanmar, Lao PDR and Viet Nam (Cruz *et al*. 2007, see **Box 2.12**). 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 fires 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.

Fire management mechanisms have not generally improved

Over the past decade, 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).

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 the GMS has risen as new frontiers have been opened and existing production areas have become exhausted. In the GMS countries, there has been a resurgence in wood production since 2001 as a result of rising levels of demand following the Asian economic crisis (**Figure 2.8**). 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).

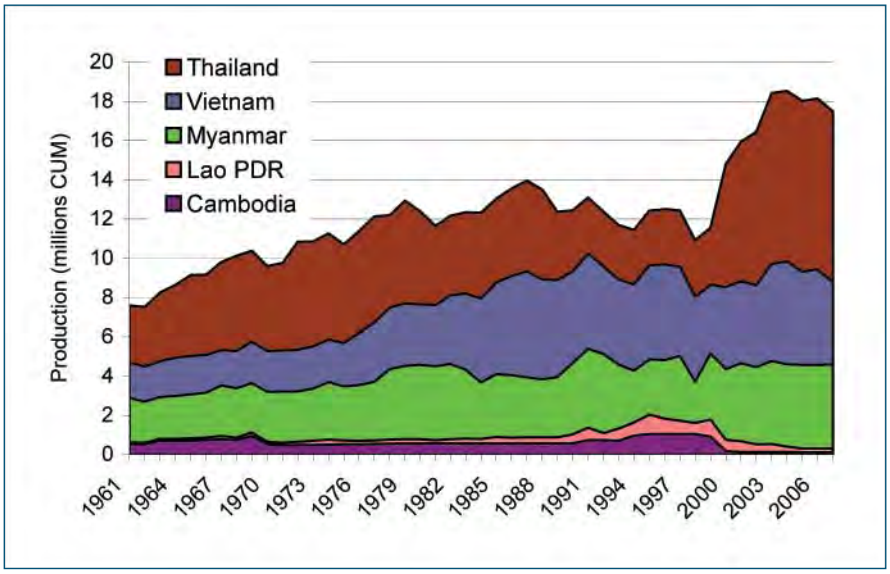


Figure 2.8. Production of Industrial Roundwood in GMS countries, 1961-2007

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 2.5**; 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 2.5. 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 the GMS

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 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 the GMS 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 2009f). 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). Around the region, trade has fallen, mill closures have been widespread with low sawnwood demand from Europe and furniture demand from the US being chiefly to blame (ITTO 2009a, ITTO 2009e). In Myanmar, log sales also fell to new lows in January 2009 (ITTO 2009b; ITTO 2009e).

Trade volumes and prices have fallen

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). 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).

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

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; see **Box 2.6**).

Box 2.6 Guangxi's forest products industry booms despite market conditions

The forest products industry in Guangxi Autonomous Region has been booming despite the financial crisis. This is evidenced by the following:

(1) The output of wood-based-panels has continued to increase, with 946 000 m³ of wood-based panels produced in first quarter of 2009, up 61 percent over the same period of last year. Eucalypt plywood for interior decoration sells well because of good quality and supply has even fallen short of demand.

(2) Production capacity for wood-based panels continues to expand. Nine projects producing wood-based panels with a capacity of 300 000 m³ and an investment of RMB 200 million yuan have been approved by the Forestry Bureau of Guangxi. Another four projects with a capacity of 350 000 m³ and an investment of RMB 750 million yuan remain to be approved.

(3) Outputs of paper and paper board amounted to 135 900 tons, up 61 percent.

(4) Rosin production jumped nearly 30 percent, with 22 000 tons of rosin produced.

(5) The number of closed wood-based panel enterprises declined. Only 10 of the 128 plywood mills in Guangxi stopped production despite the economic conditions.

Source: ITTO (2009g)

Restructuring of timber markets could significantly affect GMS forests. Sawnwood production in Southeast Asia has fallen steadily

A major concern for the GMS 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 GMS forests could be substantial.

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

Industrial roundwood[6]

Industrial roundwood production rose after 2001

Following the Asian economic crisis, production of industrial roundwood in the GMS began a gradual recovery after 2001 as shown in **Figure 2.9.** The subregion's emergence from recession combined with the stimulating effect of exchange rate

6 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.

realignments in 1997/1998 and increasing demand – primarily from China – resulted in roundwood production increasing slowly up to 2007.

Production in the Mekong countries has climbed since 1997

Production in the GMS 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 declines in production. 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).

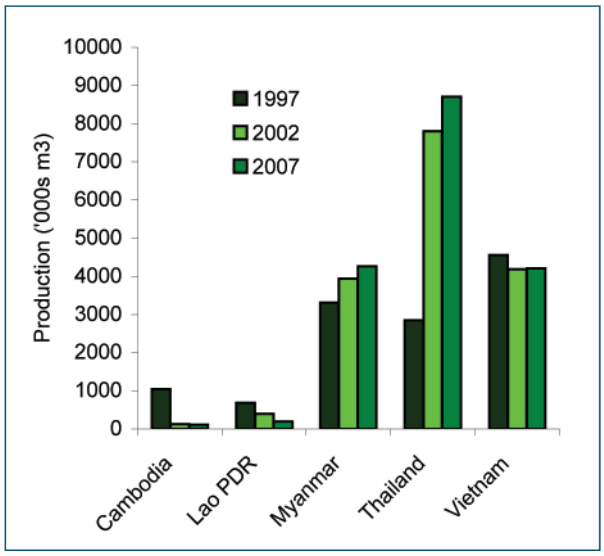


Figure 2.9. Industrial Roundwood production in GMS countries, 1997-2007[7]

Source: FAO (2009).

Sawnwood

Sawnwood production in the GMS has increased

Sawnwood production in Myanmar and Viet Nam has increased steeply over the past decade. In Myanmar, clearance of forest areas has resulted in increased production whereas in Viet Nam,

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

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

Viet Nam's sawnwood imports have increased to around half a million cubic metres over the past decade while Thailand's have averaged about 1.5 million cubic metres per year with considerable fluctuation. Imports to other countries are insignificant and Thailand is the only significant exporter in the region, but with volumes falling from 2 to 1 million cubic metres between 2003 and 2007.

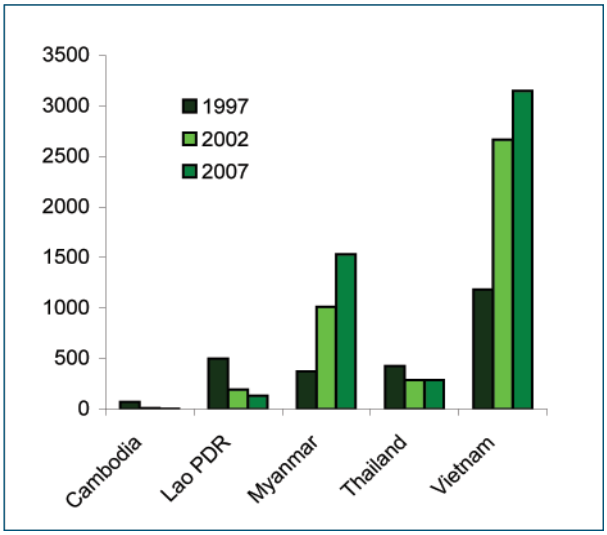


Figure 2.10. Sawnwood production in GMS countries, 1997-2007

Source: FAO (2009).

Panels

Thailand dominates GMS panel production

In volumetric terms, Thailand dominates wood-based panel production in the GMS, accounting for two thirds of subregional production in 2007. GMS production, however, only accounted for 14 percent of the Southeast Asia total. Particle board (chip board), medium density fibreboard (MDF) and plywood account for the bulk of GMS production and in Thailand, particle board and MDF dominate. Production of both panel types 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 cubic metres in 2007.

China's plywood production has soared

The Asia-Pacific trend in panel production is driven by China where output of all board types has increased rapidly since 1998. In 2007, China's production of wood-based panels reached 71 million cubic metres, dwarfing amounts manufactured in the GMS. Production

in Malaysia and Indonesia is also significant, reaching 7.7 and 4.3 million cubic metres respectively in 2007.

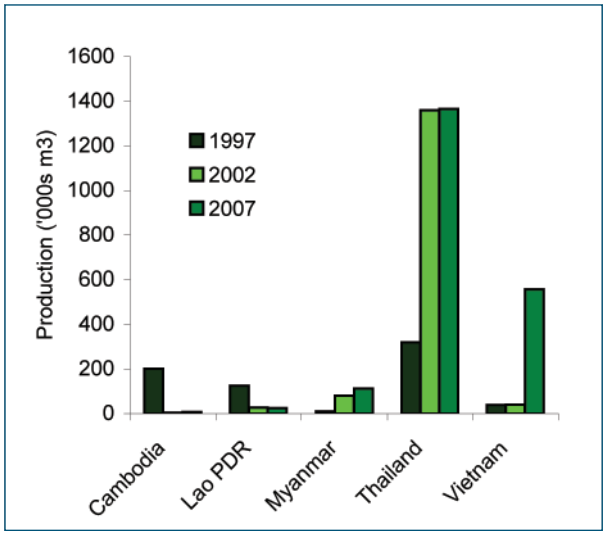


Figure 2.11. Panel production in GMS countries, 1997-2007

Source: FAO (2009).

Woodpulp

Woodpulp production is rising across the subregion

Woodpulp production in Southeast Asia is dominated by Indonesia, although within the GMS, Thailand and Viet Nam are also increasing in stature (**Figure 2.12**). 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.

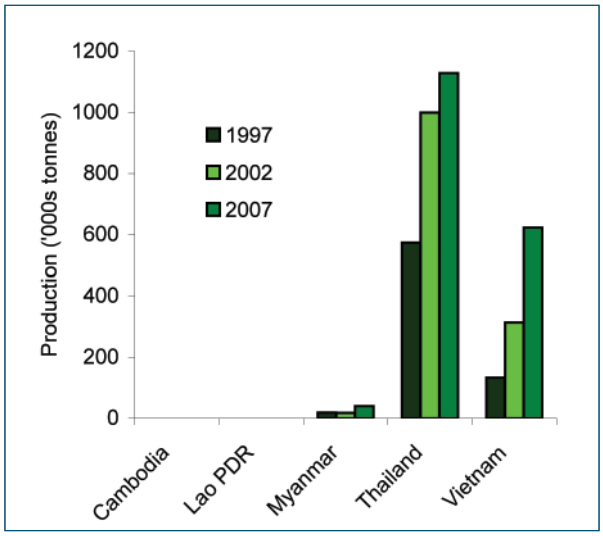


Figure 2.12. Woodpulp production in GMS countries, 1997-2007

Source: FAO (2009).

Paper and paperboard

Paper and paper board production has grown slowly

Paper and paperboard production in Southeast Asia is dominated by Indonesia, but with significant proportions also coming from Thailand and Viet Nam (**Figure 2.13**). Growth in production in Southeast Asia slowed after the turn of the millennium, whereas growth rates in China increased substantially. Expansion in Thailand and Viet Nam has also been rapid with production jumping by 80 percent and 60 percent respectively between 2002 and 2007. 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 in recent years and expansion to supply the growing domestic market looks set to continue.

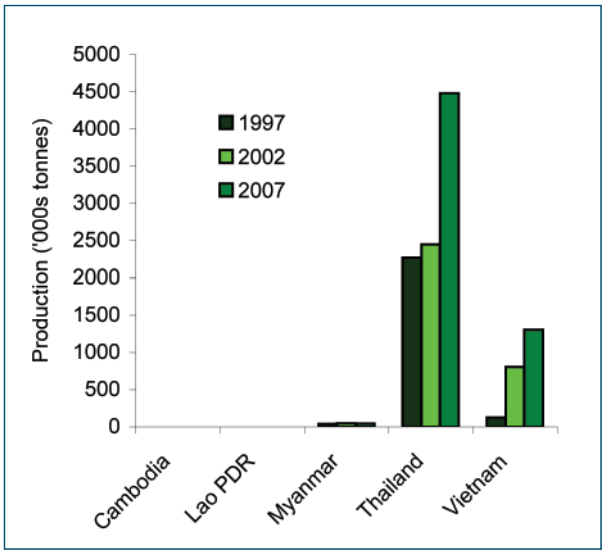


Figure 2.13. Paper and paperboard production in GMS countries, 1997-2007

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, the first Asia-Pacific Forestry Sector Outlook Study 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 products trade flows in the GMS in 2006 included exports of roundwood from Myanmar to India and China (ITTO 2007). Significant amounts of sawnwood were also exported from Thailand to China. Overall, however, trade flows involving the lower Mekong countries were relatively minor in comparison with those from Malaysia and Indonesia.

The value of the GMS forest product trade has fallen

By value, forest products trade in the GMS contracted after 1997 – partly as a result of currency adjustments related to the Asian economic crisis (**Figure 2.14**). Between 1998 and 2007, wood products import value increased by two and a half times with Thailand and Viet Nam behind the subregional trend. Export value dropped by a quarter over the same period. Export value has, however increased since 1998 in Thailand and Viet Nam despite the overall trend (**Figure 2.14**).

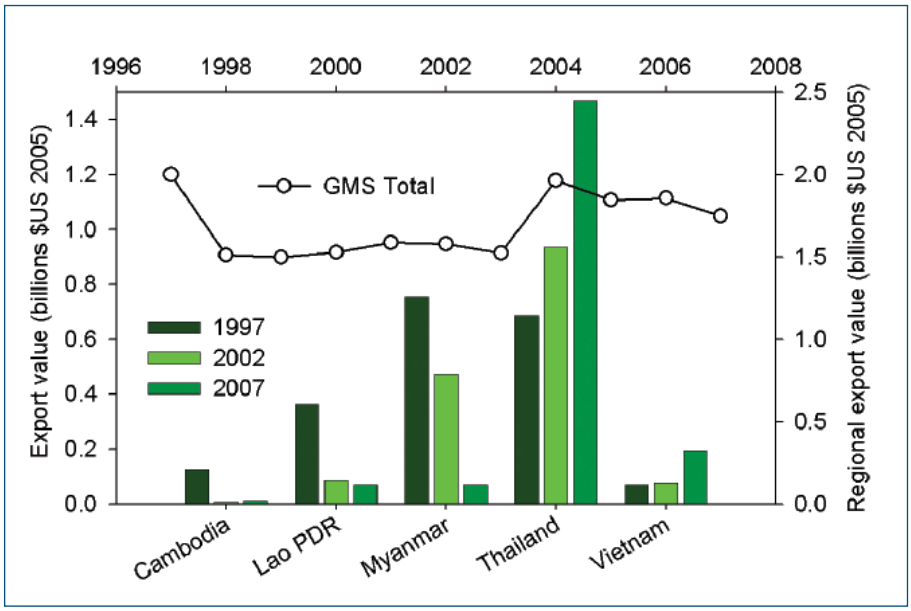


Figure 2.14. Forest products export value for GMS countries, 1997-2007

Source: FAO(2009).

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.[8] 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.

The GMS is importing more sawnwood

GMS sawnwood imports have increased over the last decade as production has fallen. 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.

GMS imports of more processed products are rising

GMS imports of panels more than quadrupled between 2002 and 2007 to 845 thousand cubic metres while exports increased 2.5 times to 2.6 million cubic metres; Thailand's export of particleboard and MDF accounting for the majority of the increase. GMS imports of paper and paperboard also more than doubled between 2002 and 2007 to 1.5 million cubic metres – Viet Nam and Thailand both having shown increases. GMS exports of paper and paperboard only increased marginally over the same period to one million cubic metres.

2.2.3. State of forest industries and wood processing technology

Forest industries have faced and are facing rapid change in the GMS

As timber supply constraints have emerged in the GMS, the importance of industrial efficiency and value addition has increased. Countries have switched progressively from export of unprocessed logs to value addition – particularly in Viet Nam and Thailand – as supply constraints have emerged and labour rates have increased. The lower income 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.

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

8 According to trade statistics reported to FAO by China.

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 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, and sawmilling of Malaysian logs in Thailand are two examples of this trend.

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 formal[9] forestry activities to GMS economies showed that employment in forestry[10] and the wood industry[11] fell over the past decade, whereas employment in the paper and furniture industries increased (**Figure 2.15**; FAO 2008c). In Thailand, Cambodia and Lao PDR fewer people are working in forestry as forest resources have become depleted or protected and other economic sectors have grown. In the wood industry, the subregional employment trend has been significantly influenced by Viet Nam where employment has 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 availability of forest resources.

Employment in wood processing has increased in Viet Nam

The rising trend in employment in the paper industry in the GMS is largely due to increases in Thailand and Viet Nam, at 7 and 14 percent per annum respectively between 2001 and 2006. 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.

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

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

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

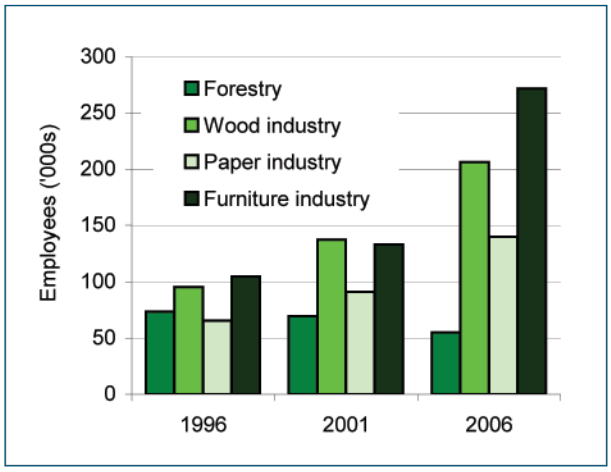


Figure 2.15. Forestry sector and furniture industry employment in the GMS, 1996-2006

Source: FAO (2008c).

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 2.16**). In comparison with primary forestry activities, the importance of value addition in Viet Nam and Thailand is evident in **Figure 2.16**. Myanmar shows the opposite trend, with greater focus on production than processing.

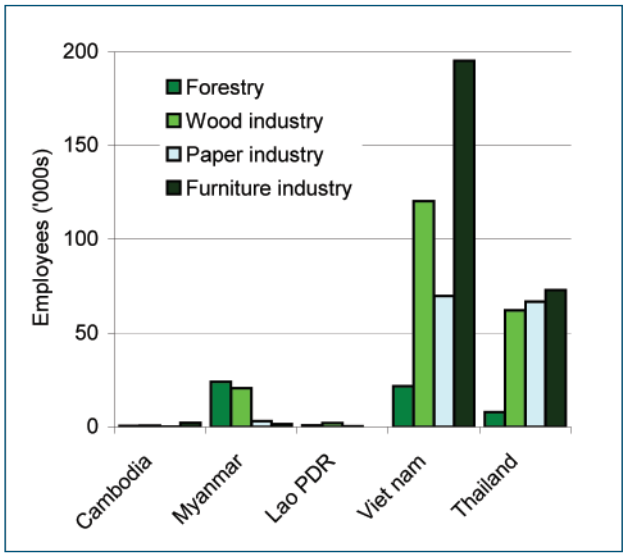


Figure 2.16. Forestry sector and furniture industry employment in GMS countries, 2006

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 GMS 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 GMS countries

Country	Main NWFPs
Cambodia	Resin, rattan and bamboo, mushrooms, medicinal plants and incense
Lao PDR	Medicinal plants, food (nuts, fern roots, fruits), fibres, exudates (damar resin, oleoresin, benzoin), incense, spices, orchids
Myanmar	Bamboo, rattan, edible bird nests, natural rubber, spices, medicinal plants, tanning barks, perfumes, exudates, honey and beeswax, bushmeat, lac and bat guano
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 production is falling and plantations are slow to take off

Rattan is the most important internationally traded NWFP. Asian rattan resources are, however, being depleted through overexploitation and forest loss. Although Lao PDR retains 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

Due to falling supply, Thailand has banned harvesting of rattan in natural forest and export in its raw form (RFD/DNP 2009). Rattan has been planted on a small scale 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). Within the GMS, China and Thailand are the main international suppliers of bamboo and Viet Nam also exports. Bamboo shoots supply a rapidly expanding export market, with China 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.

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 m hectares, of which around 73 500 hectares are plantation (FSIV 2009).

Pine and dipterocarp forests provide resins and associated employment

Countless other products, many gathered from natural forests, are commercially important in the region. Extensive pine forests provide products including resins, seeds and mushrooms. 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, is an other important product

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).

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 2.7** 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 2.7. 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 GMS 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 2.8**). 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 2.8. 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 the GMS 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). The GMS countries cover a large section of the Indo-Burma biodiversity hotspot, where biodiversity is both globally significant and under considerable threat (Myers *et al*. 2000; see **Box 2.9**).[12] A wide variety of ecosystems are represented in the region, including mixed wet evergreen, dry evergreen, deciduous, and montane forests as well as shrublands and woodlands on karst limestone outcrops and mangroves. The regional pattern of forest cover change shows that, apart from less accessible and mostly mountainous areas, most of the remaining forest cover is affected by change and that areas of change frequently overlap with protected areas and national parks. This situation indicates a severe challenge for the biodiversity of the region, and indeed the world, given the levels of species richness in the subregion (Stibig *et al*. 2007).

Box 2.9. 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.

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 the GMS

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 the GMS and

12 Conservation International defines 34 global biodiversity hotspots as regions containing at least 1500 species of endemic vascular plants (> 0.5 per cent of the world's total) having lost at least 70 per cent of the original habitat.

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, Asian elephant, 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

The 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 the GMS protected areas are designated across a broad range of categories.[13] In Lao PDR, however, all protected areas are IUCN category VI,[14] i.e., managed mainly for the sustainable use of natural ecosystems.

Forest area designated for conservation is increasing

Statistics reported to FAO show that the area of forest designated for conservation in the GMS increased by 6.7 million hectares between 1990 and 2010 to reach 20.1 million hectares – equivalent to 11 percent of the land area and 22 percent of the total forest area (**Figure 2.17**). In Myanmar and Viet Nam the area of conservation forest has almost tripled since 1990. In Cambodia, Lao PDR and Thailand increases have been between 20 and 44 percent.

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

14 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).

Primary forest areas are falling although data quality is low

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, Myanmar 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. The subregional pattern of forest cover change shows that apart from less accessible and mostly mountainous areas, most of the remaining forest cover is affected by change. Furthermore, areas of change frequently overlap with protected areas and national parks (Stibig *et al*. 2007).

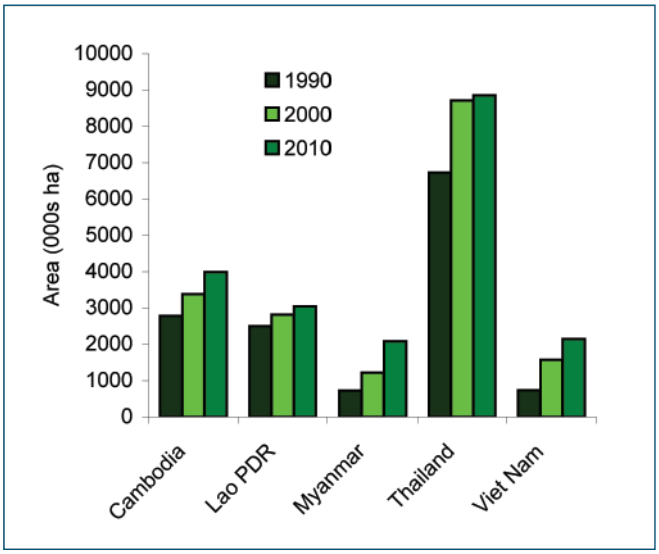


Figure 2.17. Change in the extent of forest designated for conservation in GMS countries, 1990-2010

Source: FAO (2010).

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 2.10**.

...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 2.10. 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 Myanmar, for example, 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).

The importance of local people is unresolved

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 2.11**.

Box 2.11. 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 2.18**).

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.*

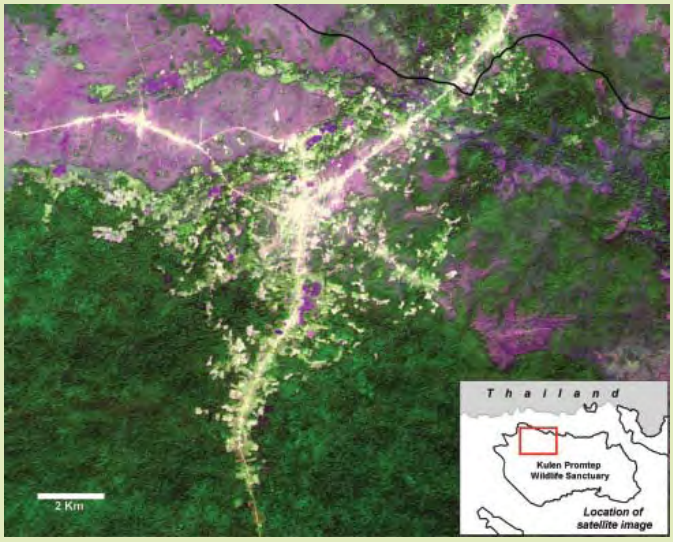


Figure 2.18. Satellite image showing forest clearing associated with a road in northwest Kulen Promtep Wildlife Sanctuary

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

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.

2.4.2. Forests and climate change

Forests are intimately involved in climate change

Forests are globally important reservoirs, sources and sinks of carbon. During the 1990s deforestation and forest degradation accounted for 20 percent of global anthropogenic greenhouse gas emissions (Gullison *et al*. 2007). Growing trees and forests absorb carbon dioxide and provide a means to mitigate climate change. When sustainably managed, forests also supply products for which life cycle emissions of greenhouse gases are considerably lower than alternatives including steel, aluminium, bricks, concrete, plastics and fossil fuels. Additionally, forests provide services, such as coastal and watershed protection, which are important in adapting to climate change effects such as increased frequency and intensity of floods, storms and droughts. Forests will also be directly affected by climate change. In particular, reduced rainfall and increased temperatures are likely to result in forest drying and increased frequency of fire, diseases and pathogens. Phenological patterns and relative competitiveness of species within habitats are also likely to change, with concomitant effects on ecosystem functioning (see Section 2.1.4).

Climate change will affect forestry and forestry could play a role in mitigation

In Southeast Asia, it is expected that climate change will result in decreased freshwater availability, increased risk of flooding in coastal and deltaic areas and increased occurrence of extreme rains and associated landslides (Cruz *et al*. 2007; **Box 2.12**). The potential impacts of climate change – and the impacts of responses to climate change – on forestry in Southeast Asia are considerable. Substantial benefits could accrue if the subregion's forestry sector can be positioned as a feasible mechanism to achieve climate change-related goals. For this to occur, however, many of the social and political issues currently constraining expansion of SFM will need to be overcome.

Box 2.12. The nature of climate change impacts in Asia

Over past decades changes have been observed in extreme events and climate anomalies in Southeast Asia (Cruz *et al*. 2007). These have included increased occurrence of extreme rains causing flash floods in Viet Nam; landslides and floods in the Philippines in 1990 and 2004; and floods in Cambodia in 2000. Droughts have normally been associated with El Ninõ years in Myanmar, Lao PDR, Philippines, Indonesia and Viet Nam. The droughts in 1997/1998 caused massive crop failures, water shortages and forest fires in various parts of the Philippines, Lao PDR and Indonesia.

In the future, climate change is expected to have a range of effects and is projected to impinge on the sustainable development of most developing countries of Asia, as it compounds the pressures on natural resources and the environment associated with rapid urbanization, industrialization and economic development. Most regional climate change studies project changes in the seasonal distribution of rainfall, with drier and/or longer dry seasons and shorter, more intense wet seasons (Johnston *et al* 2009). In Southeast Asia, little change in annual rainfall is foreseen until 2040 (Cruz *et al*. 2007). An increase in occurrence of extreme weather including heat waves and precipitation events is, however, predicted. Increases in tropical cyclone intensities by 10 to 20 percent are expected while temperature is projected to increase by 0.7-0.9°C (Cruz *et al*. 2007).

Changes in climate are expected to increase the incidence of fire, forest dieback and spread of pests, pathogens and invasive species, and are also likely to directly affect tree physiology, forest growth and biodiversity (SLU 2008; Cruz *et al*. 2007). Increases in extreme rainfall events are likely to directly increase the frequency of landslides in sloping areas (Rosenfeld 1999). At the same time, increased road development and rising levels of human activity in forest areas are likely to increase the incidence of fire and may result in increasing cycles of forest devastation (Rowell and Moore 2000). Maintenance of forest health and vitality may, therefore, become of key importance in relation to slope protection as well as other climate change-related goals (Seppälä *et al*. 2009; Dolidon *et al*. 2009).

Source: Cruz *et al.* (2007) and IPCC (2007b).

Roles of forestry in climate change mitigation

Deforestation and forest degradation account for large releases of CO_2 into the atmosphere

On a global scale, land-use change and forestry – mostly deforestation – are estimated to account for 17.4 percent of greenhouse gas emissions while transport accounts for only 13.1 percent (IPCC 2007b). Degradation of forest through logging, fire, disease and pathogen attack also increase CO_2 emissions, which may be permanent. Carbon is stored in the leaves, branches, trunks and roots of trees and also in forest soils. Old growth tropical forests store between 120 to 400 tonnes of carbon per hectare, i.e. 440-1 467 tonnes CO_2 equivalent[15] (Laurance 2007b).

15 One tonne of carbon is equivalent to 3.67 tonnes of CO_2.

Assuming a typical soil carbon density of 60 kg/m^3, forests on peat swamps contain 600 tonnes of carbon in the top one metre of soil, which also has to be taken into account. A proportion of this is released into the atmosphere following drainage, deforestation and burning. In relation, peatlands make up 12 percent of the land area in Southeast Asia and are estimated to account for 25 percent of current deforestation (Hooijer *et al*. 2006).

Deforestation constitutes a major source of global CO_2 emissions

It has been estimated that the amount of carbon presently locked up in forest ecosystems exceeds the total amount of carbon in the atmosphere (Stern 2006). **Figure 2.19** shows sources of emissions from land-use change in tropical countries, which are the source of over 98 percent of global emissions from land-use change. Deforestation is dominant although emissions associated with forest products and slash[16] from harvesting and management – potentially equivalent to forest degradation – also play an important role.

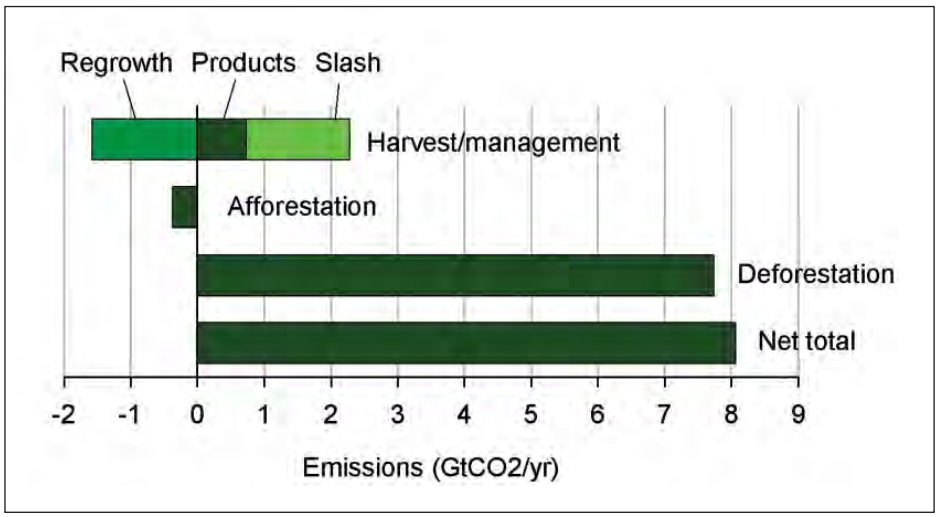


Figure 2.19. Annual emissions from land use change in tropical regions by source for the 1990s

Source: Based on data from Houghton (2003).

Southeast Asia is a huge emitter of greenhouse gases from land-use change

Figure 2.20 shows net annual transfer of carbon into the atmosphere from land-use change for global tropical regions. As a result of reductions in carbon fluxes in South and Central America in the 1990s, South and Southeast Asia became the largest source of carbon from land-use change in 2002 (Houghton 2008). Carbon flux from the United States is shown to demonstrate trend reductions that have occurred due to transitions away from agricultural expansion since the beginning of the twentieth century.

16 Branches, stumps and leaves, etc. left after harvesting or thinning.

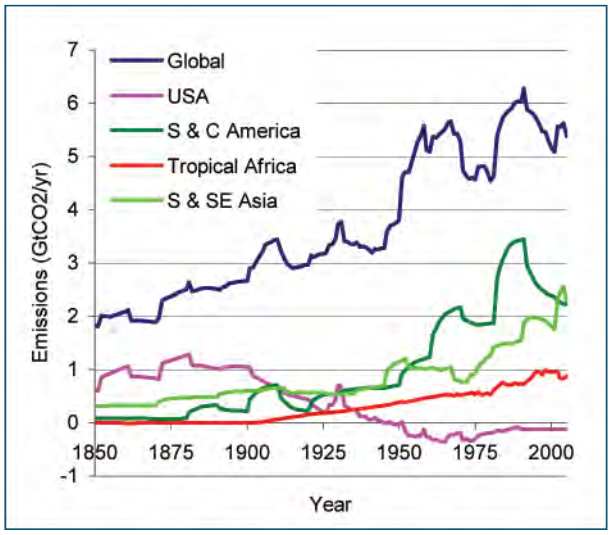


Figure 2.20. Annual net flux of carbon to the atmosphere from land use change in global regions: 1850-2005

Source: Based on data from Houghton (2003)

Global agreements have so far been unsuccessful in forest-related climate change mitigation

Because benefits associated with climate change mitigation are accrued internationally while costs are borne nationally and locally, global mechanisms to market the climate change mitigation values of forests are being further developed. The United Nations Framework Convention on Climate Change (UNFCCC) recognizes the importance of land use and land-use change (LULUCF) activities in stabilizing atmospheric greenhouse gas concentrations and the Kyoto Protocol makes provision for associated activities. At present, only afforestation and reforestation (A/R) activities qualify under the Clean Development Mechanism (CDM) of the Kyoto Protocol, which aims to reduce emissions in developing countries by funnelling payments from industrialized countries to help meet their emissions targets.[17] Only a handful of projects, have, however, successfully tapped CDM funds. More widespread implementation has been curtailed by methodological complexities related to leakage, permanence, additionality and monitoring (see **Box 2.13**). The low price of temporary credits available for A/R activities and the small proportion of revenue from CDM in relation to other revenues from A/R have also been an obstruction (Neeff and Henders 2007).

The cost of reducing emissions from deforestation and degradation appears low

Apart from A/R activities, it has been estimated that the cost of reducing emissions from deforestation and degradation will be low in comparison with current carbon credit prices (Chomitz 2007). The initial annual opportunity cost of forest protection in eight countries accounting for 70 percent of emissions from land use has been estimated at US$5 billion (Stern 2006). As well as REDD, options open for consideration in a new climate change agreement include afforestation, reforestation and enhancement of sinks

17 Emissions from deforestation were omitted from CDM projects primarily because of the risk of leakage (Stern 2006).

through forest restoration, and substitution of forest products for electricity and fuel (Robledo and Blaser 2008). Greater inclusion of forestry in a post-Kyoto agreement is greatly anticipated, although many doubts remain over the expected effectiveness of REDD mechanisms (Lang 2008). In particular, it has been suggested that addressing deforestation and its "deeply-entrenched social causes" may prove to be more expensive than alternative ways of reducing emissions of greenhouse gases (Raffensperger 2007). The failure to reach encompassing agreement on an international framework on REDD at the United Nations Climate Conference in Copenhagen in December 2009 (COP 15) suggests that there is still some way to go before forests become an integral part of international climate change mitigation regimes.

Voluntary markets have become the main vehicle for forestry-related carbon trading

Owing to the difficulty of accessing, or the present unavailability of, internationally regulated 'compliance' markets for forest-related emissions reductions, voluntary carbon markets have become the main vehicle for investment in forestry-related climate change mitigation. Markets have been growing rapidly and in 2007, A/R and avoided deforestation activities respectively accounted for 10 percent and 5 percent of over the counter transactions[18] (Hamilton *et al*. 2008). Projects in Asia generated two-fifths of credits transacted in the OTC market in 2007 and around 6 percent of these were for forestry-related activities. Prices per tonne of CO_2 equivalent were lower for avoided deforestation than A/R projects, although great variation exists (Hamilton *et al*. 2008). In March 2008, Merrill Lynch agreed to pay US$9 million over four years to protect 750 000 hectares of forest in Indonesia's Aceh Province with a proportion of funds going to communities to help prevent logging (Wall Street Journal 2008). Emissions reductions of 3.4 million tonnes of CO_2 per year are expected and associated credits are likely to climb in value if REDD is included in a post-Kyoto international agreement.

Depending on the mechanism adopted, revenues from REDD may be considerable

In anticipation of the inclusion of REDD activities in a post-2012 climate change agreement, most countries in the GMS, are beginning processes to become 'REDD ready', i.e., preparing strategies and frameworks that will meet expected requirements of global REDD markets.[19] Emissions reductions from REDD are likely to be purchased either on the basis of foregone opportunity costs or the value of carbon emissions saved (Scholz and Schmidt 2008). **Table 2.8** shows that Myanmar dominates deforestation in the GMS, and also has a high rate of loss of growing stock. Viet Nam, on the other hand has made significant gains in forest cover and growing stock since 1990. Myanmar's 32 222 thousand hectares of forest contain an estimated 3584 million tonnes of carbon in, above and below ground biomass, dead wood and leaf litter. On

18 'Over the counter' refers to voluntary transaction made other than through the Chicago Carbon Exchange, a cap and trade system which organizations join voluntarily.

19 Lao PDR, Viet Nam, Indonesia and more recently Thailand and Cambodia, have begun preparations to access post-2012 REDD markets.

average, carbon and CO_2 equivalent densities are therefore 111 and 407 tonnes per hectare. Using a price of $5 per tonne for CO_2 emissions reductions, the average value of forest per hectare would be $2039, with all forest carbon worth $65.7bn. In practice, REDD payments would be related to a baseline rate of deforestation and costs associated with establishing and administering a REDD framework would be subtracted. In countries where governance is weak, these costs are likely to be considerable.

Table 2.8. Deforestation and degradation rates in GMS countries, 2000-2010

	Forest cover change (000 ha/yr)		Growing stock change (million m³/yr)		Carbon stock in forest (tonnes)*
	2000-2005	2005-2010	2000-2005	2005-2010	2010
Cambodia	-163.0	-127.4	-16.8	-13.2	464
Lao PDR	-78.0	-78.2	-4.6	-5.6	1 074
Myanmar	-309.4	-309.6	-14.0	-13.8	1 654
Thailand	-21.2	14.8	-0.8	0.6	880
Viet Nam	270.4	144.0	12.2	3.0	992
GMS	-301.2	-356.4	-29.0	-24.0	5 064

*Includes carbon in living above and below ground biomass.
Source: FAO (2010).

REDD has many hurdles to overcome

The workability of REDD will be depend on a wide range of political, institutional and technical issues. The Stern review emphasized defining property rights to forest land and determining rights and responsibilities of landowners, communities and loggers in effective forest management (Stern 2006). Institutional capacity is likely to pose a particular challenge in countries where forest cover remains high and governance systems are relatively undeveloped. A range of technical issues will also have to be addressed as detailed in **Box 2.13.**

Box 2.13. Major technical issues facing REDD

Scope: While a national-level REDD approach addresses issues with in-country leakage and allows flexibility through aggregated management of national forest resources, projects are likely to be easier to implement and more able to accommodate within-country heterogeneity.

Monitoring: Monitoring deforestation and forest degradation and quantifying carbon flows with precision may impose significant costs and internationally agreed definitions and methodologies need to be developed.

Baselines: Setting baselines according to a country's historic rate of deforestation and degradation, and offering carbon credits for reductions below this reference

level, have been widely proposed. This method, however, neglects countries that have already lowered their deforestation rate and provides no incentive for continued conservation.

Leakage: Conservation of one forest can displace deforestation and degradation to another area and although a national-level REDD approach addresses this issue at the country level, transboundary leakage is likely to occur where adjacent countries do not participate in REDD. Markets may also turn to alternative products with greater life cycle CO_2 emissions than forest products.

Permanence: Emissions reductions from forestry can be reversed through deforestation or natural causes such as fire. Non-permanence is particularly likely where rights and responsibilities are unclear, as is common in areas with rapid deforestation. Awarding credits post-facto or holding a proportion of credits as a buffer can help to manage such risks. Reductions in the value of credits are, however, likely to result.

Source: Adapted from Davis (2008).

REDD will face longstanding barriers to SFM adoption and must avoid leakage

In the GMS, many challenges face REDD implementation. Monitoring of forest cover and carbon density to the extent and level of accuracy likely to be necessary has never been done at scale. Institutional mechanisms of the type and level of complexity needed to effectively coordinate REDD activities and distribute associated benefits do not exist in most GMS countries. Definitions also need to be agreed upon to avoid, for example, conversion of natural forest to plantation forest (Sasaki and Putz 2008). Governance issues (see Section 3.6.1) are unlikely to disappear and leakage is likely to occur across borders where countries with remaining forest resources and no REDD mechanism are found next to countries implementing REDD (see Brown *et al*. 2001). Additionally, effort will need to be made to ensure that forest product shortages resulting from REDD implementation do not increase incentives to resume unsustainable extraction or create rising demand for wood substitutes with higher life cycle carbon emissions.

Forestry and climate change adaptation

Forests have several roles to play in climate change adaptation

Climate change in the GMS is expected to result in increasing intensity of floods, storms and droughts as well as sea level rise. Forests have several potential roles in adapting to these threats, especially in relation to coastal protection and reduction of landslide risk (see Section 2.4.2). Coastal forests and mangroves in particular, provide protection for people and assets against storms and cyclones. Although cyclones infrequently make landfall on the eastern side of the Bay of Bengal, Cyclone Nargis was an exception and claimed over 84 500 lives (TCG 2008). Mangrove forests in the Ayeyarwady Delta have been almost completely cleared over

the past 60 years and the presence of habitation close to the high tide mark increased exposure to the oncoming cyclone and storm surge. Although mangrove forests cannot prevent inundation, tall dense vegetation attenuates wave action and provides structures for survivors to cling to. Coastal forests also act as a windbreak in reducing the impact of cyclones and coastal storms on local communities.

Coastal forests can protect against storms and cyclones

The east coast of Viet Nam is regularly subject to storms and typhoons from the South China Sea. Every year there are around 10 to 15 storms and typhoons which cause damage to houses, buildings and trees and also result in flooding, landslides and waterlogging. As such, storms and typhoons strongly impact on people's lives and national production (FSIV 2009). Research carried out in Orissa following the super cyclone of 1999 showed that had mangroves been present around affected villages, loss of life would have been considerably lower (SANDEE 2007). During cyclone Sidr that struck southern Bangladesh in November 2007, the Sunderbans forests also helped to mitigate the effects of the cyclone (FAO 2008a).

Forest management will need to change to protect forest values

Adaptation of forest management will also be necessary to avoid reductions in the flow of goods and services, including in relation to climate change mitigation. Climate change could result in increased incidence of fire, forest diebacks and spread of pests, pathogens and invasive species and could also have direct effects on tree physiology, forest growth and biodiversity (SLU 2008). Assessments of forest health and productivity and institutional strengthening are of central importance in managing responses to climate change impacts. Specific areas of interest are likely to include maintaining the health and vitality of natural forests, taking future climate change into consideration in planning plantation establishment, developing effective fire suppression and control systems and implementing measures to control insect and disease outbreaks.

2.4.3. Forests and water

Forests reduce erosion and help to maintain water quality

Sustainable management of upland forests and agricultural lands in Southeast Asia is hindered by the combination of steep hill slopes, high intensity rainfall, dry seasons and highly erodible soils (Sidle *et al*. 2006). The role of forests in minimizing erosion and maintaining water quality is of particular importance in hydroelectric schemes where sediment can reduce reservoir capacity and wear down turbine blades; in maintaining aquatic habitats and river navigation by preventing excessive sedimentation and sediment deposition; and in maintenance of water quality for drinking (Hamilton 2008). Because fertilizers and pesticides are seldom used in natural forest areas, forests provide preferable land cover to agriculture, habitation and industrial development, etc., where drinking water supplies are concerned (Hamilton 2008). Riparian buffer zones are particularly important

in preventing sediments and pollutants from entering rivers and in stabilizing river banks. Erosion control and entrapment of sediments is also of relevance in coastal ecosystems where removal of mangroves can lead to loss of land, saline intrusion and exposure of coastal populations and assets to increased risk from coastal hazards (FAO 2006c, Forbes and Broadhead 2007).

Forest cover can reduce landslide risk

Trees also play an important role in averting landslides under less extreme conditions, although deep landslides resulting from continuous heavy rainfall or earthquakes are unlikely to be affected (Hamilton 2008). Deep-rooted trees and shrubs strengthen shallow soil layers and improve drainage, thereby reducing the occurrence of shallow landslides. Transpiration from extensive tree canopies can also decrease soil water content and reduce landslide risk (Dolidon *et al*. 2009). Conversion of forests on sloping land reduces rooting strength for up to two decades, even with subsequent regeneration, and increases landslide risk (Sidle *et al*. 2006). Maintenance of forest cover in slip-prone areas where slopes are greater then 45-55 percent, where slopes are concave, or soils have low cohesion, or are shallow and cover bedrock, is particularly important (Megahan and King 1985).

Landslide risks are recognized but not always mitigated

Land uses that increase surface erosion and slope instability in tropical uplands include logging,[20] road and trail construction and forest conversion, while surface erosion is usually low in undisturbed forest catchments (various sources cited in Sidle *et al*. 2006). Increased occurrence of storms and increased logging and infrastructure development in sloping areas are likely to raise the incidence of erosion and landslides in the coming years. Although regulations preventing logging in riparian zones and on steep slopes are generally included in forest harvesting guidelines, in most countries they are often not strictly adhered to or enforced.

Forest-water relationships are unclear

Lack of certainty regarding the precise nature of the hydrological functions of forests, particularly in relation to flooding and droughts, has brought some uncertainty to forest protection for watershed management (Hamilton 2008; FAO 2005b; **Box 2.14**). Water-related issues have, however, been perhaps the most significant driver of forestry-related policy change in Asia. Landslides following heavy rains in southern Thailand in 1988 were linked to deforestation of steep slopes and, as most of the damage was on land cleared for cropping, a logging ban was subsequently implemented (see **Figure 2.21**). Although logging increases landslide risk, forest clearance itself and replacement with vegetation less capable of securing the soil – rubber in particular – also played an important role (Rao 1988). Although links between forestry activities and erosion, floods and droughts are sometimes imprecise, natural disasters are likely to remain a key driver of forest policy in the coming years.

20 In steep areas with wet climates, unpaved roads commonly associated with logging operations can cause a 10-300-fold increase in landslide erosion rate in forested catchments (Dolidon *et al*. 2009).

Box 2.14. The technical and political importance of forests and water

The relationship between forests and water has been variously misunderstood over the years. Forests have been believed to play roles that upon closer examination have been disproven. Importantly, it has been commonly held that firstly, trees and forests increase downstream water yields and secondly, that forest cover prevents flooding. On the basis of collected scientific evidence, however, it is clear that forests reduce the water yield of catchments rather than increase it (Hamilton 2008). Another comprehensive assessment has made a very strong argument that forest cover has limited effects on catastrophic flooding (FAO 2005b). Nonetheless, forest- and water-related issues have been at the forefront of dramatic policy shifts in the Asia-Pacific region. For example, the logging bans in Thailand, the Philippines and in China were largely the result of the understanding that landslides, floods and droughts were the result of deforestation.

Removal of tree cover does accelerate water discharge from a catchment and can therefore increase the risk of flooding and drought, although the effects are only significant in small catchments of up to 100 km^2 and with short duration, low intensity rainfall (Hamilton 2008). At larger scales and lower down in watersheds, the effect of forest cover is negligible. As such, the primary significance of forests in relation to water is in maintaining water quality through reducing sedimentation and filtering out pollutants and in erosion control and landslide prevention. In relation to these roles, forest alteration or conversion generally does not have catastrophic consequences, but high impact logging and forest removal generally increase risk. Additionally, substitution with other vegetation types may provide similar benefits but the period without vegetation has to be considered and water-related services may still fall short of those provided by healthy forests (see review by Hamilton 2008).

Figure 2.21. Landslide scars in Southern Thailand following heavy rains in 1988.

Source: M. Kashio

Protection forests cover a fifth of the subregion's land area and 10 percent of its forest area

Table 2.9 gives the area of protection forest[21] in GMS countries. Lao PDR, and Viet Nam have significant areas designated for protection. Thailand, although having banned logging in 1989 in response to landslides and flooding, has designated much of its forest for conservation purposes and a smaller area for protection. **Figure 2.22** shows that the area designated for protection fell in Lao PDR and rose in Viet Nam. In Viet Nam, forest area primarily for protection constituted 37 percent of the total forest area in 2010, having risen rapidly since 1990 in response to the implementation of national forestry programmes.

Table 2.9. Change in area of protection forest in GMS countries 2010

	Area (000 ha)			% forest area 2010
	1990	2000	2010	
Cambodia	0	6	551	5
Lao PDR	11 634	10 310	9 074	58
Myanmar	312	1 499	1 352	4
Thailand	727	1 081	1 332	7
Viet Nam	2 925	5 502	5 131	37
GMS	15 589	18 398	17 440	19.3

Source: FAO (2010).

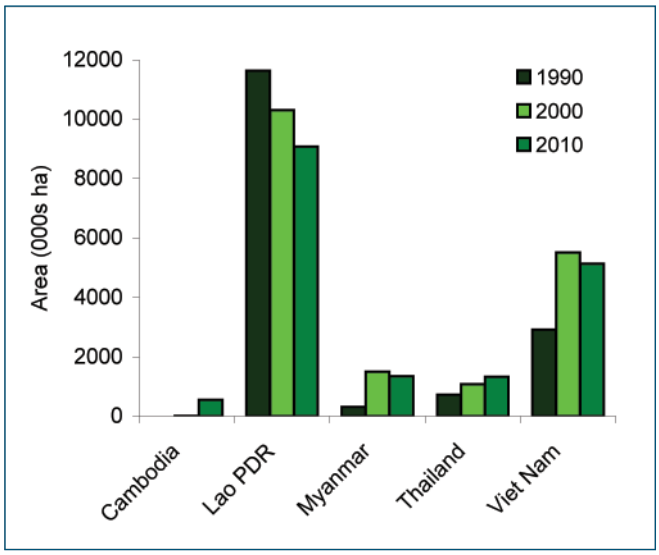


Figure 2.22. Area of forest designated for protection in GMS countries, 1990-2010

Source: FAO (2010).

21 Protective functions of forest include climate amelioration, protection from erosion and protecting coastlines and water resources.

Some of the region's major watersheds have been largely deforested

Table 2.10 shows the varying extents of forest cover and forest cover change in major watersheds in the GMS. The trans-boundary nature of the Hong, Mekong and Salween systems makes management of upper catchments for the provision of downstream services a challenging issue. The limited benefits to China of basin level management of the Mekong are a commonly cited reason for China's absence from the Mekong River Commission (MRC). The Mekong flows from China into Lao PDR, Thailand and Cambodia and reaches the sea in Viet Nam. The proportion of forest cover is low and much of the original forest cover has been lost. The effects of these losses on downstream populations and resources are, however, difficult to quantify and are likely to relate as much to the replacement land use as to the initial removal of forest.

Table 2.10. Forest cover and forest cover change in major watersheds in GMS countries

Watershed	Forest cover	Percent loss of original forest cover
Mekong	41.5	69.2
Hong (Red River)	43.2	80.0
Salween	72.3	43.4
Ayeyarwady	56.2	60.9
Chao Phraya	77.3	53.4

Source: Earthtrends - Watersheds of the world. http://earthtrends.wri.org/maps_spatial/watersheds/asiaocea.php

Mountainous Lao PDR is taking steps to reduce watershed deforestation

Lao PDR is the most mountainous country in the subregion with 87 percent of the land area classified as uplands. Watershed classes 1, 2 and 3[22] represent 74 percent of the land area, but much is highly degraded and in 1993 only 11 percent was covered by dense forest and 44 percent lacked any forest cover (MAF 2004). Over the last 50 years forest cover in Lao watersheds has fallen from 70 percent to 47 percent. In response, the Ministry of Agriculture and Forestry (MAF) has adopted a 5-year Development Plan 2006-2010, which includes targets to identify watershed protection areas and develop plans for the use and control of around 4 million hectares of watersheds (Tong 2009). Plans laid out in the Forestry Strategy 2020 include implementation of integrated watershed management, including intensification of lowland agriculture, introduction of agroforestry in sloping areas and reduction of forest conversion in steep upland areas (Pravongviengkham *et al*. 2005).

22 Watershed classes: 1. Areas with very steep slopes and rugged landforms, commonly uplands and headwater areas; 2. Areas with steep slopes, usually at higher elevation; 3. Areas with moderate to steep slopes and less erosive landforms

Payments for watershed-related environmental services are being piloted in Viet Nam

In general, schemes to establish payment mechanisms for watershed-related environmental services have not become popular in the GMS. In 2008, however, **Viet Nam** enunciated the Prime Minister's decision on The Pilot Policy for Payment for Forest Environmental Services to provide the foundation for a legal framework for PES from forests. The framework will define the responsibilities and benefits in relation to water supply for electricity production, clean water production and ecotourism. PES schemes are being piloted in several provinces to assist development of legislation, policies and mechanisms. For PES in watersheds to work, however, demonstration of costs and benefits is required to ensure buyers' involvement; government enforcement and initial funding to finance land-use change are also necessary (Ha *et al*. 2008). These issues lie at the heart of watershed management and uncertainties in the linkages between forest management and hydrological benefits (see **Box 2.15** and also **Box 2.8**).

Box 2.15. Watershed-based payments for environmental services in Southeast Asia

PES, including watershed management, have not yet taken off in Southeast Asia. Of 30 watershed-related case studies reviewed in Asia, including 13 in Indonesia, 11 in the Philippines and one in Viet Nam, all were still at the pilot level. Few of these had associated monitoring systems to determine whether the service is actually being produced.

Demand among potential environmental service buyers in Asia is limited due to lack of awareness of the concept, lack of successful cases, lack of clear scientific linkages and resistance to additional taxes or fees. Further impediments include the highly fragmented nature of land use and ownership in upland areas, the lack of sellers' bargaining power, high transaction costs, unclear land tenure and low capacity of local institutions to act as intermediaries. Additionally, countries in Asia do not have laws and policies supporting PES.

If payment schemes for watershed services are to be successful, demand from water users must increase and for this to happen, better evidence of the benefits and of watershed protection and of the effects of payments on the flow of benefits is needed.

Source: Huang and Upadhyaya (2007); Porras *et al.* (2008).

2.5. WOOD AS A SOURCE OF ENERGY

Energy demand in Asia is set to rise rapidly

With global increases in energy consumption and concerns over future oil prices, greenhouse gas emissions and energy import dependence, changes in the sources from which energy will be derived are expected in coming years. Globally, energy consumption is projected to increase most rapidly in Asia, where

population and economic growth rates are highest (EIA 2007). Wood energy has been receiving increased interest as a means to reduce fossil fuel consumption and limit greenhouse gas emissions, but has also been used for thousands of years for cooking and heating. In the GMS it remains a primary source of energy for these purposes.

2.5.1. Extent of wood energy use

Consumption of woodfuel is falling but may increase in response to high energy prices

In GMS countries, wood energy is predominantly used in the form of fuelwood for heating and cooking – primarily in rural areas – while charcoal use is less widespread. Domestic fuelwood use is often associated with low income and/or poverty and traditional modes of use are inconvenient and have negative health effects (Broadhead *et al*. 2001; Arnold *et al*. 2003). Increasing availability of alternative energy sources and fuel subsidies, as well as improvements in income and rural to urban migration, have reduced fuelwood use in recent years.

Domestic fuelwood use is falling as standards of living increase

Fuelwood is often collected from trees outside of forests and is therefore not generally associated with deforestation, but commercial collection of fuelwood and wood for charcoal has had major impacts. This is particularly common in mangrove areas due to the high quality of wood for fuel use. In the Ayeyarwady Delta, mangroves have been cleared to supply Yangon with fuelwood and charcoal although in other locations, limited areas of forest have been found capable of providing large quantities of woodfuel and meeting the demands of ever-expanding populations (Bensel 2008).

Woodfuel use in the GMS is decreasing

In 2007, woodfuel consumption in the GMS is estimated to have amounted to over five times the total industrial roundwood consumption. **Figure 2.23** shows estimates of total woodfuel[23] consumption, demonstrating an overall reduction with time associated with rising income and increasing urbanization. Estimates suggest that woodfuel consumption in the GMS will fall by 10 percent between 2010 and 2020 from 87 to 79 million m^3.[24] Although data are scarce, it is probable that fuelwood use increased after the 1998 Asian economic crisis and rose again due to high oil prices prior to the 2009 economic slowdown. A similar situation may result if a global economic slowdown results from the 2008/2009 crisis. In Myanmar, fuelwood and charcoal are still very important in domestic and industrial applications and, contrary to estimates shown above, which are based on optimistic GDP growth, total woodfuel consumption is expected to increase in the coming years (**Box 2.16**).

23 'Woodfuel' applies to the sum of wood used directly as fuel ('fuelwood') and wood for making charcoal, both for domestic and industrial purposes.

24 The models use driving variables including income, forest cover and the urban proportion of the population (Broadhead *et al*. 2001). Forecasts were revised for this publication using updated GDP purchasing power parity figures (World Bank WDI downloaded 12/07/08). Projections do not take account of the 2009 economic slowdown.

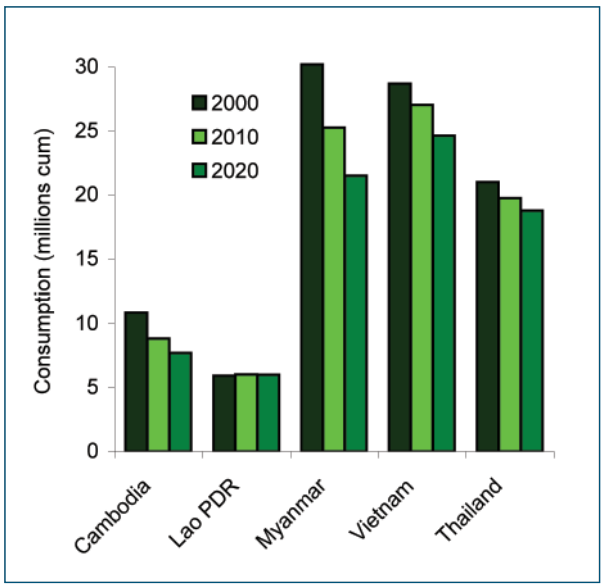


Figure 2.23. Woodfuel consumption in GMS countries, 2000-2020

Source: FAO calculations based on Broadhead *et al*. (2001).

Much of the population is still reliant on fuelwood in Viet Nam

In Viet Nam, in 2002, an estimated 80 percent of the population was reliant on biomass for cooking needs and biomass is an important energy source for local industries (FSIV 2009). Viet Nam used around 24.5 million tonnes of fuelwood, mainly for cooking and heating in rural areas, but also to bake bricks and tiles, for porcelain production and in food processing. The proportion of biomass used in total national energy consumption fell from 73 percent in 1990 to 50 percent in 2002, although overall biomass consumption increased by 13 percent. It is likely that fuelwood consumption will fall in the coming years as a result of rural electrification, rising income and falling poverty. In more rural and mountainous areas, however, dependence on fuelwood is likely to remain (FSIV 2009).

Box 2.16. Woodfuel and biofuel use in Myanmar.

Woodfuel is the most commonly used biofuel in Myanmar and is used mostly in rural households. Fuelwood consumption is dependent on availability of substitute fuels, standard of living and climate. In northern and eastern parts of the country, households often use fuelwood for heating during the cold season. With respect to charcoal, mangroves in delta areas, especially in Ayeyarwady Division, have been major sources of production for many years and are under significant threat. Charcoal production is now restricted and substitute fuels are promoted to prevent deforestation. Moreover, around 4 500 hectares of fuelwood plantations have been established annually.

Estimates of past and future energy consumption by fuel type show a falling proportion of fuelwood and charcoal, although total consumption is likely to increase by 14 percent as a result of population growth (Table 2.11).

To promote biodiesel as an alternative fuel, a large-scale campaign to plant *Jatropha curcus* was introduced in 2005. The five-year plan involves planting 202 000 hectares in each state and division, totalling 3 237 000 hectares or almost 5 percent of the total land area. The plants are grown along roadsides and around houses, schools and hospitals, as well as on land formerly producing rice and other crops. A blend of 5-20 percent *Jatropha* oil with diesel is recommended for low cost engines in rural areas.

Table 2.11. Percentage energy consumption by fuel type, 1990-2020.

Type of fuel	1990	2000	2010	2020
Crude oil	6.7	8.0	8.0	9.0
Natural gas	4.5	6.0	6.0	10.0
Coal	0.3	0.4	0.8	1.0
Hydropower	1.7	6.0	9.0	13.0
Agricultural residues	3.3	4.5	6.8	9.0
Fuelwood/charcoal	84.1	76.6	69.4	58.0

Other programmes to reduce woodfuel consumption and deforestation have been implemented including promotion of agri-waste briquettes, distribution of efficient stoves, household use of liquefied petroleum gas (LPG) and natural gas for brick kilns and reintroduction of kerosene. The 2001 National Forest Master Plan included targets of establishing 60 750 hectares of local wood supply plantations by 2010, followed by 48 600 hectares by 2020, but funding constraints and low institutional capacity have hindered implementation.

Source Tun (2009).

2.5.2. Factors affecting future wood energy use

The future of wood energy is dependent on several factors...

The extent to which energy will be derived from non-renewables, renewables, bioenergy and also from forests will depend on a number of factors (FAO 2008b):

- The future price of fossil fuels.
- The location of the energy source (in relation to national energy dependence).
- The carbon efficiency of alternatives and the nature and implementation of climate change-related policy.
- The magnitude of efforts to develop alternative energy supplies.

... energy prices and climate change mitigation efforts

Since the unexpectedly high price peaks of almost US$150/barrel in 2008, oil prices have subsided considerably and the immediacy needed to find fossil fuel alternatives has faded. The International Energy Agency (IEA) estimates that prices will fall to around US$60 (in 2006 dollars) by 2015 and remain fairly even until 2030. There may, however, be sharp increases prior to 2015 due to uncertainty in production capacity (IEA 2007).

... and energy import dependence

Dependence on energy imports is another factor likely to increase the extent to which renewables are promoted. The share of fuel in Asia's total merchandise imports reached 19.5 percent in 2006, up from 14.7 percent in 2004 (WTO 2004, 2007). In Lao PDR, fuel and energy imports rose from 10 to 16 percent of total imports between 1996 and 2006, while in Cambodia fuel as a proportion of total merchandise imports dropped from 13 percent in 2000 to 10 percent in 2004 (WDI 2010). Thailand has net energy imports that stand at around half of energy use, while Myanmar and Viet Nam, are net energy exporters (WDI 2010).

Wood residues are an untapped and potentially large source of energy

Wood energy may also be promoted in relation to carbon efficiency, although it should be noted that bioenergy is only a renewable and sustainable form of energy where harvest is sustainable, taking carbon 'expenditure' during production, transportation and processing into account. Many countries possess little information on the amount of biomass that can be collected from forest operations and have not assessed the potential of wood residues for energy generation. In natural forests, between 80 and 90 percent of total volume could be used for energy generation (FAO 2008b). Most of this material is made up of tree crowns and other rejected pieces that are left in the forest after harvesting operations.

Gasification technologies have potential for rural power generation

Gasification technology has been suggested as a way to provide small-scale power delivery for villages and small-scale industry (Knoef 2000). In Cambodia, Abe *et al*. (2007) found that biomass gasification provided cheaper power than diesel generators, although consistent supply and barriers to growing wood were potential constraints. The profitability of small-scale plants has also been found to be marginal and highly dependent on both energy prices and biomass input costs (Knoef 2000; Wu *et al*. 2002). The future of gasification technologies is therefore likely to be highly reliant on institutional backing.

Second generation biofuels are still some way off

Second generation biofuel technologies are expected to allow economically competitive production of liquid biofuels for transport from cellulosic feedstocks, including agricultural residues and wood. It is anticipated that the technology for commercially competitive production will be available within ten to 15 years (Worldwatch Institute 2007). Because of technological requirements and the limited size of the expected markets, cellulosic ethanol production is, however, likely to be limited in the GMS, particularly before 2020.

Without high energy prices woodfuel use will depend on policy intervention

High fossil fuel prices provide a direct impetus to invest in alternative fuels, whereas environmental and strategic energy issues only act as indirect drivers of change through policy intervention. In the absence of high fossil fuel prices, initiatives to switch to woodfuel are likely to be financially constrained. Under these conditions, measures by governments – which have not been seen to date – are likely to be the only way that woodfuel will be promoted.

2.6. FOREST TENURE AND OWNERSHIP

State ownership is gradually receding

As demands for land and forest products and services increase, it is becoming ever more critical for forest managers to balance interests and to integrate or separate activities according to local and national conditions. The long life cycles and non-material benefits of forests make tenure a particularly important issue. Although state ownership predominates, patterns are changing in the subregion with particular emphasis on state ownership of protected forests and private ownership of production forests.

Tenure security underpins sustainability

Economic performance in much of the subregion has been strong in recent years and poverty levels have fallen. The contribution of forestry to rural and economic development of the environment in general has, however, often fallen short of potential. This has been variously attributed to inequitable distribution of benefits, lack of reinvestment in forestry and inefficient tenure arrangements (RECOFTC 2008; Fraser 2002).

Tenure should suit management objectives

The optimum tenure and ownership for different forest types – plantations, protected areas, production forests, etc. – differ in accordance with the nature of the product/s and the markets that exist (Landell-Mills and Porras 2002). Natural forests have usually been considered state property but inefficient management, declining growing stock and forest value, and calls for greater social and economic justice are resulting in transfer of forest ownership to local levels, either as private or community property (FAO 2006b).

Stable and clear allocation of rights and responsibilities is essential

For governments, the private sector and individuals alike, clear allocation of rights and responsibilities reduces investment risk. With increasing scarcity of land and resources, formalization of rights and responsibilities has become increasingly necessary. Where tenure has remained unclear, unstable or non-exclusive, suboptimal management has resulted (FAO 2006b).

Allocation of forest and land rights has far reaching implications

Revisions of ownership and tenure can transfigure forest management, as is happening in China and Viet Nam (Zheng 2006; Nguyen 2006). Additionally, allocation of land can have considerable effects on economic efficiency and equity. Land reforms in the late 1940s and early 1950s in Taiwan and Korea, for example, are thought to have been instrumental in reducing income inequality and stimulating economic growth in comparison with later experiences in Southeast Asia (Jomo 2006).

Devolution of forest and land rights has begun but...

Natural forests in the GMS are predominantly state-owned or administered and almost all protective plantations are state-owned (Katsigiris *et al*. 2004; FAO 2006b). In several countries in the subregion, forest and forest land allocation processes have been progressing over the past decade as economic frontiers have advanced and societal demands have changed (Edmunds and Wollenberg 2003; FAO 2006b). The area of forests where secure

tenure rights for local stakeholders have been devolved remains extremely small and unclear forest tenure constrains SFM in many countries in the subregion (FAO 2006b). Only in Viet Nam have rights over significant areas of forest been devolved to individuals and families, communities, the private sector and other economic entities.

... state ownership still dominates

Figure 2.24 shows the large variation in private forest ownership between GMS countries and the rapid adjustments that have taken place in Viet Nam where private ownership increased steeply to 24 percent – largely as a result of forest land allocation programmes. In 2005, however, only 2.1 percent of forest land was privately-owned in the GMS, and in Cambodia, Lao PDR and Myanmar, there was no privately-owned forest land at all. In Thailand, large areas of rubber, pulp and sawlog plantation are also privately-owned, but no natural forest.

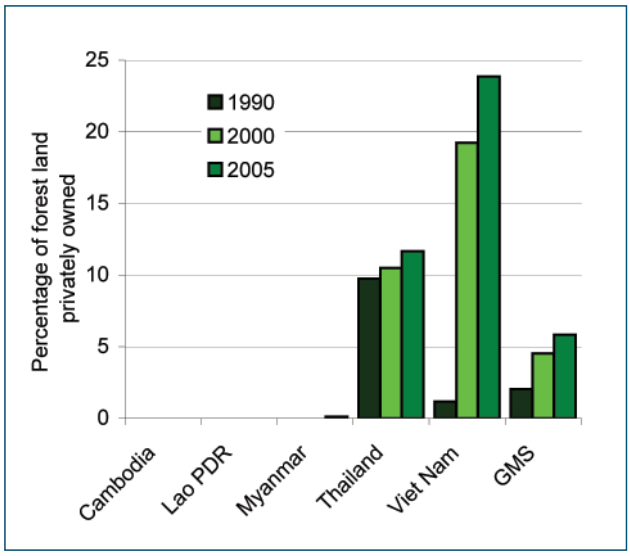


Figure 2.24. Percentage of forest land privately owned in GMS countries, 1990-2005
Source FAO (2010).

Thailand's forests have been protected but local rights and production have been curtailed

In **Thailand**, all natural forest is state-owned and protected following the logging ban of 1989. The ban and accompanying shifts in forest policy towards conservation – in state plantations as well as natural forests – had significant repercussions on the livelihoods of people living in protected areas and also on forest product production (Lakanavichian 2006). After 18 years of consultation, a bill defining the rights of forest-dependent people was passed in 2007 (RFD/DNP 2009). The bill recognizes the rights of those living within protected areas to collect NWFPs, but not to harvest trees. Those living outside do not have use rights, although a three-year opportunity to prove legitimate right of access has been granted. Resembling the situation in the Philippines, the argument that villagers' are unable to manage forests sustainably is juxtaposed with the belief that local custodianship is necessary to prevent encroachment, illegal logging and forest degradation.

In Viet Nam forest land has been allocated to households, individuals and others

In **Viet Nam**, significant areas of forest and forest land have been allocated to households, individuals, communities and the private sector (FAO 2005a). Public ownership of productive plantations fell from 48 percent in 1990 to 27 percent in 2005, while smallholder ownership rose from 46 to 64 percent (FAO 2006b). The contribution to SFM and livelihoods has generally been positive. Like the Philippines, however, benefits to local groups have often been insufficient. Regulatory constraints favouring forest protection, low forest quality/value, inequitable benefit-sharing arrangements and poor local awareness of rights have been variously implicated as detailed in **Box 2.17**.

Box 2.17. The contribution of forest land allocation in Viet Nam to SFM, livelihoods and wood production.

Land allocation has been in progress in Viet Nam since 1994 and finalization is planned for 2010 (MARD 2007). Previously, forest in Viet Nam belonged exclusively to the state and was managed by state-owned entities, but more recently forest has been allocated to households, individuals, communities and the private sector. This has had a range of effects on forest management, income generation and poverty.

Three types of forest – special-use, protection and production forest – were classified throughout Viet Nam to create a legal framework for forest management. At the end of 2006, there were 2.2 million hectares of special-use forest, 5.3 million hectares of protection forest and 5.4 million hectares of production forest. Of the total, 10.4 million hectares were natural forest and 2.5 million hectares were plantation forest (MARD 2007).

In early 2005, there were 1.2 million forest landowners; almost all were households or individuals. In 2006, 19 percent (1.9 million hectares) of the total natural forest area and 40 percent of plantation forests were owned by households, individuals and the private sector (**Figure 2.25**). By September 2007, more than 8 million hectares of forest land were reported to have been allocated.

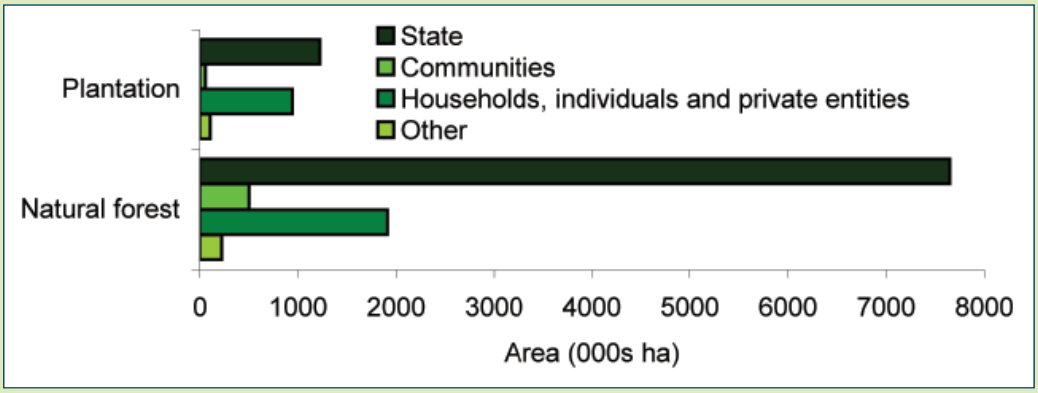


Figure 2.25. Forest allocation in Viet Nam 01/01/2006

The orientation of forest policies in Viet Nam towards protection has affected the contribution of the forest land allocation programme to poverty alleviation and

income generation. Allocated forests are also often degraded and inequitably distributed. Additionally, problems have been encountered with inadequate benefit-sharing arrangements, poor local awareness of rights, tenure overlaps and lack of monitoring (Nguyen 2006; Nguyen *et al*. 2008).

In general, private and community rights contribute more to livelihood improvement and, to a lesser extent, poverty alleviation than organizational ownership. Results from a study in Dak Lak and Hoa Binh provinces show that forest land allocation also has a positive effect on forest resources – primarily in sites with donor support (Nguyen *et al*. 2008). In areas of critical environmental importance, state management appears to be more suitable than other tenure arrangements. In less critical protection and production forests, local management may be better suited to reducing poverty and achieving SFM (Nguyen 2006).

The effects of land allocation and of increased landownership fragmentation on wood production are also receiving attention. Concerns are that wood production targets will be missed due to difficulties in establishing extensive areas of plantation and restriction of efficiencies of scale. Production of timber and sawlogs as opposed to pulp logs may also become more limited due to smallholders' preference for short rotations and quick returns. Models are being piloted to manage consolidation of land areas but a sound and successful method has yet to emerge.

Source: FSIV (2009) except where cited otherwise.

A clear land-use policy is badly needed in Myanmar

In **Myanmar**, all forest, including productive plantation, is state-owned, although communities do have long-term permission to use forests in some areas. Forests in the country remain in considerable flux, however, and a key issue contributing to poor progress in forestry is the lack of a nationwide land-use policy (Tun 2008). Formulation and implementation of a land-use policy is necessary to prevent continuing forest loss and provide a foundation for government targets, including attainment of a permanent forest estate covering 30 percent of the land area. Current government aims to increase agricultural expansion are coming into conflict with this policy because land use is not defined at the national scale and agricultural development is taking place within the permanent forest area. Unless a clear-cut land-use plan is endorsed, environmental degradation and reduction of forest product production will continue.

In Lao PDR and Cambodia land concessions are impacting upon forestry

In **Lao PDR** and **Cambodia,** all forest is state-owned and the issuance of land concessions became an important issue for forestry in 2007 and 2008 following huge increases in commodity demand from China. The situation in Lao PDR led to granting of concessions being suspended (see Box 2.4) and in Cambodia claims of widespread sale of land to foreign investors were made (Global Witness 2009). In both countries, mechanisms to introduce greater involvement of local people in forest management are warranted as a means of maintaining forest resources, reducing poverty and increasing rural income.

2.7. POLICY AND INSTITUTIONAL FRAMEWORK

Forest policy goals have shifted but implementation remains weak

During past decades the focus of forest policy in GMS countries has shifted from timber extraction to forest protection, devolution and multipurpose management. Frequently, however, forest policy has been weakly implemented because of field-level issues including high demand for forest land and forest resources, limited sources of alternative employment and low human resource capacity. Poor governance and low demand for alternative outcomes, i.e., greater production of environmental services, has also played a part. In relation, permanent forest estates have often not been demarcated, agricultural frontiers have continued to advance and uncontrolled logging has often remained widespread. In one or two instances, however, where demand for alternative outcomes has strengthened, forest policy has been more effectively implemented.

Targets have often remained unmet

Forestry strategies have been launched as guiding documents for sectoral development in Indonesia, Lao PDR, Myanmar and Viet Nam and most countries have forest cover targets as shown in **Table 2.12**. The target set by Lao PDR is high in comparison with current forest cover and the trend is in the opposing direction. In Cambodia and Myanmar the direction of change is also awry, but absolute differences are smaller, while in Viet Nam, Thailand and the Philippines forest cover is rising in the direction of the target.

Table 2.12. Forest cover targets, actual forest cover and forest cover trends in GMS countries

	Forest cover 2010 (%)[6]	Annual change 2005-2010 (%)	Forest cover target
Cambodia[1]	57.2	-1.2	Maintain 60% through 2015
Lao PDR[2]	68.2 (41.6)†	-0.5	70% by 2020
Myanmar[3]	48.3	-0.9	50% (35% closed forest, 15% open forest)
Thailand[4]	37.1	0.1	40% (25% conservation forests, 15% economic forests); not less than 33% (18% conservation area)
Viet Nam[5]	42.4	1.1	47% by 2020 (15.6 million ha)

1. Forestry Administration (2009); 2. Tong (2009a); 3. Tun (2009); 4. RFD/DNP (2009) (40% figure is from 1985 National Forest Policy, 33% figure is from 10th National Socio-economic Development Plan); 5. MARD (2007); 6. Figures from FAO (2010) – national targets may be based on different forest cover definitions to those used by FAO.

† The figure of 68% is given in the 2010 *FAO forest resources assessment,* which uses a minimum crown cover limit of 10%. The figure of 41.6% is cited in the Forestry Strategy 2020 and is based on a minimum crown cover of 20% and is the relevant figure in relation to the 2020 target (see **Box 2.18**).

SFM, value addition and forest protection have been common policy themes

In the GMS, forest policy has been directed towards SFM in almost all countries for over a decade. In more precise terms, this has meant reorientation towards reduced exploitation of natural forests, increased establishment of plantation resources and greater inclusion of community groups and the private sector in forest management and forestry. Support for the forest product industry to promote domestic value addition has been another key theme, although excessive wood-processing capacity has also led to policies promoting industrial rationalization. Logging bans have been imposed at different stages throughout the past two decades in Thailand and most recently Cambodia. Log export bans have also been implemented to reduce forest degradation and increase the availability of timber to domestic wood-processing industries.

Forest rehabilitation, and local rights have also been targeted

Forest rehabilitation has become more frequently included in policy declarations, particularly in Viet Nam where plantation development has become an important policy focus in Indonesia and Viet Nam. Community involvement has frequently been targeted and in Lao PDR poverty reduction has become a central theme. In Viet Nam, granting of land rights to individuals, families and indigenous groups has had a huge influence on the forestry sector in combination with major programmes to increase forest cover, wood product production and rural incomes through afforestation.

Forest law enforcement and climate change-related goals are more recent policy thrusts

Regional and international collaboration to tackle illegal logging and trade have been strengthened in several countries and efforts are beginning at the regional level to better enforce forest law and improve forest governance. In Thailand, separation among institutions responsible for conservation and protection has been enacted and private sector involvement in forest product production has increased. More recently, protection/conservation of forest resources has received great attention in relation to climate change mitigation and also adaptation. In the future, these issues are likely to receive greater consideration as concern grows over climate change and associated adaptation and mitigation goals.

The following sections review major changes in forestry policy in each of the GMS countries over the past decades.

2.7.1. Cambodia

Sustainability stands at the centre of Cambodian forest policy

For over a decade, sustainability has been at the centre of forestry policy in Cambodia. A log export ban has been in place since 1996 and various declarations have been made regarding illegal logging and forest encroachment (Forestry Administration 2009). Policy adopted in 1998 emphasized balancing harvesting with tree planting and forest growth while controlling illegal logging. Specific objectives included planting fast-growing trees for woodfuel production; controlling timber-processing capacity;

and encouraging modernization of wood-processing equipment and employment generation. Provision was made for reviewing the legality of forest concessions, with cancelled concessions to be classified as protected areas or classified forests (Savet and Sokhun 2003; Forestry Administration 2009).

In 2002, problems with the concession system led to policy and institutional revisions

In 2002, failures in the production forest management system resulted in the suspension of concession licences and forestry in Cambodia embarked upon a period of revision. A new law on forestry was implemented in 2002 and a National Forest Policy Statement was issued by the Prime Minister. The Department of Forest and Wildlife was reorganized into the Forest Administration in 2003 to create a single line of authority for forestry at the national level (Rotha 2009; Forestry Administration 2009). Local forest management has become increasingly important and a community forestry subdecree implemented in 2003 resulted in 274 community forest areas being identified by 2005 (Rotha 2009).

2.7.2. Lao PDR

Lao forestry has moved towards more inclusive approaches

In the early 1990s, Lao forest policy prioritized protection and conservation of forests, improvement of logging practices and forest industry efficiency and forest rehabilitation. Particular attention was given to protection against shifting cultivation and indiscriminate cutting of forests by rural people (FAO 1993). The Forestry Strategy to the Year 2020 represented a considerable step forward in guiding the Lao forestry sector towards multiple objectives with poverty reduction at the forefront (MAF 2004). Targets include:

- Improving the quality of forest resources by natural regeneration and tree planting for protection and livelihood support.
- Providing a sustainable flow of forest products for domestic consumption and household income generation.
- Preserving species and habitats.
- Conserving environmental values in relation to soil, water and climate.

Community involvement is central

Particular areas of focus include: land-use planning, village-based natural resource management, sustainable harvesting; rationalization of the wood-processing industry; tree planting; law enforcement and participation to prevent unauthorized activities; and protection of watersheds. Achieving and maintaining 70 percent forest cover has been a long-term goal that remains high on the 2020 agenda (see **Box 2.18**).

The new forestry law focuses on forest protection and regeneration

The forestry law (2007) has also been amended to include the following priorities:

- Prevention and control of forest fires, and restriction of shifting cultivation and illegal logging.
- Forest regeneration and forest plantation.

- Regulation of the allowable extent of natural forest conversion and forest land use.
- Provision for a Department of Forest Inspection.

In line with the Forestry Law revision, the Department of Forestry will have new divisions of protection forests and production forests, while provincial agriculture and forestry offices will have planning and forestry inspection sections (Tong 2009).

Box 2.18. Forest cover in Lao PDR

The Ministry of Agriculture and Forestry (MAF) has adopted the 5-year Agriculture and Forestry Development Plan 2006-2010, which includes the target of increasing forest cover from 9 million hectares (42 percent) to 12 million hectares (53 percent) by 2010 (Tong 2009). The FAO global forest resources assessment (FRA) in 2000, reported a figure of 54 percent forest cover for Lao PDR, while in FRA 2005 the figure for 2005 had jumped to 69.9 percent and a backdated figure of 71.6 percent was given for 2000. In the latest FRA a figure of 68.2 percent is reported for 2010 (FAO 2010). Forest cover determined by the Forest Inventory and Planning Division (FIPD) in 2004, and quoted in the Lao PDR Forestry Strategy 2020, was 41.5 percent. As the national forest cover target for 2020 is 70 percent, the figures are of considerable importance. Indeed, a figure of 70 percent forest cover is already being quoted by MAF.[1]

The differences in figures result from the definitions used: FRA figures for Lao PDR used 10 rather than 20 percent canopy cover, 5 rather that 10 metre height minimum and bamboo as well as unstocked forest; shifting cultivation areas that will be restocked are included. Currently, the FS2020 target is based on FIPD criteria, but there is discussion of revision to coincide with the FAO definition. Additionally, the recent inclusion of rubber as a forest species under the FAO definition will further inflate forest cover in Lao PDR given the decision that rubber is to be used to reach the 70 percent forest cover target (Mekong Maps 2009).

[1] "Minister explains logging regulations" Vientiane Times, 11 July 2008.

2.7.3. Myanmar

As pressures have increased multirole forest policy has been introduced

For most of the last century a system of sustainable forest production, the Myanmar Selection System (MSS), was in operation in Myanmar and environmental impacts were not severe. The 1894 Indian Forest Policy, which focused mainly on sustainable timber production, provided guidance until the Myanmar Forest Policy of 1995, which has six priority areas (Tun 2009):

1. Protection of soil, water, wildlife, biodiversity and environment.
2. Sustainability of forest resource use.
3. Basic needs of the people for fuel, shelter, food and recreation.
4. Efficient use, in a socially and environmentally friendly manner, of the full economic potential of forest resources.
5. Participation of people in the conservation and use of forests.
6. Public awareness of the vital role of forests in the well-being and socio-economic development of the nation.

The Forest Master Plan emphasizes economic and environmental aspects of forestry

The National Forest Master Plan (NFMP) was developed in 2001 for the period up to 2030. It covers nature conservation, sustainable harvesting of teak, forest protection, environmental conservation and export of value-added wood and NWFPs. Also included are protection and extension of forests, forest regeneration and rehabilitation, watershed management, law enforcement, and promotion of fuelwood substitutes (Tun 2009). A Community Forestry Instruction, issued in 1995, has provided a foundation for about 600 community forest management agreements (Thaung 2008).

Forestry institutions are becoming increasingly militarized

Recently, an increasing number of military personnel have been appointed to Forest Department posts. There has also been increasing centralization despite a statement in forest policy to encourage public participation (Thaung 2008). There is, however, evidence of the emergence of pluralistic institutional arrangements. For example, the Forest Products Joint Venture Corporation was established to expand manufacturing and distribution of forest products (Thaung 2008).

2.7.4. Thailand

Thai forest policy emphasizes environmental protection

Thailand's first comprehensive National Forest Policy was established in 1985 (RFD/DNP 2009). The policy is based around the principles of SFM and emphasizes environmental protection. The 40 percent national forest cover target was originally divided into 15 percent for protection and conservation and 25 percent for production. After catastrophic flooding in Southern Thailand in 1998, however, a logging ban was imposed and the ratio of conservation to production was reversed (Ongprasert 2008).

Local participation in forest management continues to divide opinion

In 1991, the Royal Forest Department began developing a community forestry bill to allow involvement of local communities in managing forests in and around national reserves. The bill made little progress despite being redrafted several times. Conflict has arisen between 'the people's movement' which emphasizes communal rights and the 'dark green movement' which objects to community forest establishment in protected areas (Ongprasert 2008). A decision was made that community forestry would be allowed where communities could prove that they settled before 1993 and could demonstrate ability to protect forests. The bill was approved by Parliament in 2007 and is awaiting royal approval before enactment.

People-centred development is gaining national level importance

Thailand's forest-related policy, legislation and institutional framework distinguished between protection and production roles of forests. In 2002, the Royal Forest Department was divided into three departments: the Royal Forest Department (responsible for forests outside protected areas), the National Park, Wildlife and Plant Conservation Department and the Department of Marine and Coastal Resources. Decentralization and public participation in policy, planning and management of natural resources in Thailand

is still rather limited. After the coup d'etat in 2006, however, a new constitution was drafted containing provisions for the promotion of public participation in environmental conservation and sustainable natural resource use (Ongprasert 2008).

2.7.5. Viet Nam

The basis for forest management in Viet Nam has shifted and major programmes have been implemented

Since nationwide introduction of free market principles in 1986, substantial changes have taken place in the forestry sector in Viet Nam, including the reorganization of state forest enterprises, changes in forest ownership and growth in wood product exports. Forests have been classified into three types – special-use,[25] protection and production and state forest enterprises are being dissolved or rearranged into companies and forest management boards. Legislation was issued during the past decade to allocate land to households and individuals for sustainable forest production, conservation of flora and fauna and forest protection (Coi 2009). Several major programmes have been implemented including the Five Million Hectare Reforestation Program, which has contributed greatly to national forest restoration since 1998.

Forestry has been granted an enlarged national role

Forestry has moved towards greater participation, improved forest protection, increased plantation establishment and increased timber processing, both for domestic demand and export. Protection of existing natural forest, greening areas of bare land, planting of production forest and sustainable use of forest resources are expected to increase the importance of forestry as an economic sector while contributing to income, livelihood improvement and poverty reduction (FSIV 2009).

The vision for forestry is broad in scope

In 2007, the government approved the Viet Nam Forestry Development Strategy 2006-2020. The strategy comprises five programmes (MARD 2007):

1. *Sustainable forest management and development programme*
2. *Programme on forest protection, biodiversity conservation and environmental service development*
3. *Forest product processing and trade programme*
4. *Programme on research, education, training and forestry extension*
5. *Programme on renovating forest sector institutions, policy, planning and monitoring*

Viet Nam, although retaining only small areas of natural forests, has also become a leader in developing REDD readiness and significant revenues could be secured by the forestry sector if international agreement and associated funding are realized. The fact that only one forestry-related CDM project exists in Viet Nam despite national focus on afforestation and reforestation does, however, suggest that expectations should remain conservative.

25 Conservation forests.

2.8. PROGRESS TOWARDS SUSTAINABLE FOREST MANAGEMENT

Progress towards SFM may be measured according to seven elements

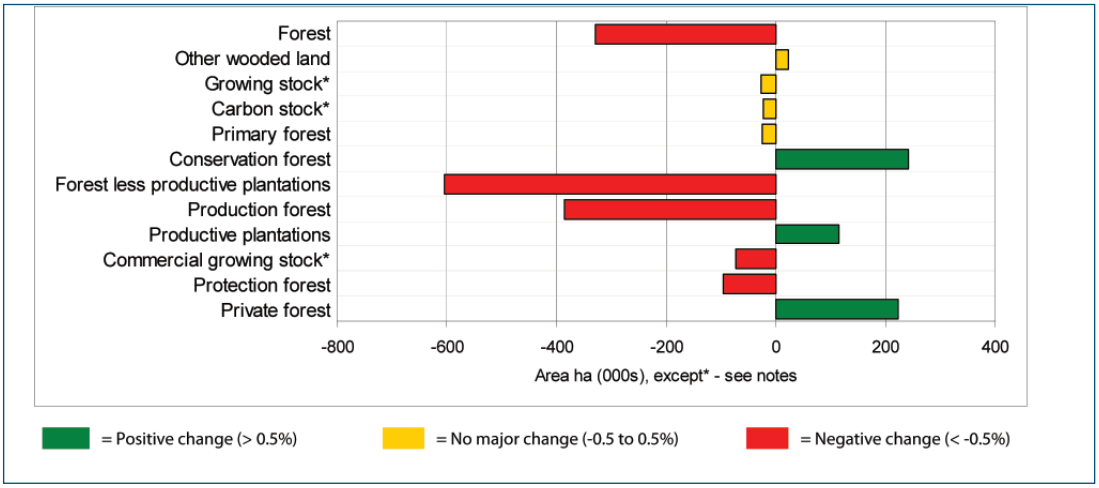
Forest resources, the products and services they provide and the social, institutional and business structures that surround them are transforming at varying rates across Southeast Asia. Demands from different groups across society are impacting forests and forestry in various ways and are also influencing the capability of the forestry sector to meet future demands. To measure progress towards SFM[26] seven thematic elements derived from regional and international processes on criteria and indicators for SFM have been suggested by FAO (2005a):

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

Trends are predominantly negative in the subregion as a whole

In the GMS, key shifts between 2000 and 2010 included a decrease in total forest area of 329 000 hectares/year and a reduction of 24 000 hectares/year in the area of primary forest (**Figure 2.26**). These trends were partly countered by an increase in planted forest area of 274 000 hectares/year. Forest area designated for conservation increased by 241 000 hectares/year between 2000 and 2010, while forest designated for protection fell by 96 000 hectares/year. The area of forest designated for production fell by 385 000 hectares/year. These trends indicate a gradual shift from production of forest products to production of services together with a reduction in the area of forest, and natural forest in particular. The area of other wooded land increased by 23 000 hectares between 2000 and 2010, although this has been at the expense of total forest area.

26 "Sustainable forest management aims to ensure that the goods and services derived from the forest meet present-day needs while at the same time securing their continued availability and contribution to long-term development." (http://www.fao.org/forestry/sfm/en/)



Notes: Growing stock in million m^3, carbon stock in million tonnes; also see **Table 2.13** notes.
Sources: FAO (2005a); FAO (2010).

Figure 2.26. Trends towards sustainable forest management in the GMS - changes in forest resources 1990-2005

Balance between elements is essential for sustainability

Comparative analysis of trends in social, environmental and economic aspects of forestry provides an indication of balance – and degree of sustainability – in sector development. Negative and unbalanced trends show a lack of SFM whereas, predominantly positive trends, together with some negative responses, indicate shifting sector structure. Trends for individual countries between 2000 and 2010 are given in **Table 2.13**. Clearly positive trends, shown in green, include Viet Nam's performance against a number of variables, although areas of primary and protection forest are falling. Thailand's positive performance also stands out while in Cambodia there are few positive trends.

Forest resources have declined in most countries

Changes in the extent of forest resources, defined by forest area, area of other wooded land, growing stock and carbon stock, have been predominantly negative in all countries except Viet Nam. Elements related to biological diversity, including area of primary forest and total forest area, excluding the area of planted forests, show mixed trends in all countries. Additionally, it should be recognized that although the area designated as conservation forest has been increasing, the management of conservation forests has often been poor as detailed in Section 2.4.1.

Productive functions of forests are falling

Trends in the productive functions of forest resources have to be carefully considered given the tendency towards forest clearance in the subregion and the low rate of implementation of forest management for sustained yield, or of SFM. In Myanmar, the area of productive plantations and total removals has increased, although the area of forest designated for production has also fallen. In Lao PDR and Viet Nam, the area of production forest and of productive plantations has increased but removals have apparently fallen. In other countries, trends are predominantly negative with removals in particular falling steeply.

Protective functions and private ownership trends are mixed

The area of forest designated for protection increased in Cambodia and Thailand, although in both countries protection forests constitute a small proportion of the total forest area. In all other countries the area of forests designated for protection is falling. Surprisingly, given trends towards devolution of forest management, areas of forest under private ownership have only increased in Viet Nam and Thailand, while in other countries there is either no private forest land or the area is falling.

Table 2.13. Trends towards SFM in Southeast Asia 2000-2010

	Cambodia		Lao PDR		Myanmar		Thailand		Viet Nam		GMS[2]		
	Annual change		Annual change		Annual change		Annual change		Annual change		Annual change		
	%	Absolute	%	Absolute	%	Absolute	%	Absolute	%	Absolute	%	Absolute	UNIT
EXTENT OF FOREST RESOURCES													
Area of forest	-1.3	-145	-0.5	-78	-0.9	-310	0.0	-3	0.6	207	-0.4	-329	1 000 ha
Area of other wooded land	-7.8	-17	0.5	68	0.2	41	-	-	-4.7	-69	0.1	23	1 000 ha
Growing stock of forests	-1.4	-15	-0.5	-5	-0.9	-14	0.0	0	0.7	8	-0.5	-27	M m³
Carbon stock in forest biomass*	-1.5	-7	-0.5	-6	-0.9	-16	0.0	0	0.7	7	-0.4	-23	MT
BIOLOGICAL DIVERSITY													
Area of primary forest	-3.4	-13	0.0	0	0.0	0	0.0	0	-8.1	-11	-0.2	-24	1 000 ha
Area of forest designated for conservation of biodiversity	1.7	60	0.9	23	3.2	86	0.2	15	2.1	57	0.9	241	1 000 ha
Total forest area excluding area of planted forests	-1.3	-144	-0.8	-91	-1.0	-339	-0.6	-91	0.6	61	-0.7	-603	1 000 ha
PRODUCTIVE FUNCTIONS OF FOREST RESOURCES													
Area of forest designated for production	-3.7	-155	0.9	22	-2.2	-501	0.3	62	0.8	187	-1.0	-385	1 000 ha
Area of productive forest plantations**	0.8	-1	13.3	15	1.1	25	0.1	1	4.0	75	0.3	115	1 000 ha
Total wood removals	28.6	-41	3.2	-12	0.9	32	-16.9	-11	-1.6	-50	-1.1	-0.1	M m³
PROTECTIVE FUNCTIONS OF FORESTS													
Area of forest designated for protection	0.8	55	-1.3	-124	-1.0	-15	0.1	25	-0.7	-37	-0.5	-96	1 000 ha
Area of protective forest plantations**	-	-	0.0	0	0.3	5	0.1	29	0.4	40	0.3	74.9	1 000 ha
SOCIO-ECONOMIC FUNCTIONS OF FOREST RESOURCES													
Area of forest under private ownership**	0.0[1]	0[1]	0.0[1]	0[1]	na[1]	3	1.0	20	0.1	201	0.2	223	1 000 ha

* Forest carbon in living (above- and belowground) biomass
** Trend between 1990-2005
1 No private forest in Cambodia and Lao PDR; none in Myanmar before 2005
2 Countries with no data available excluded from estimation of trends for GMS
- (dash) – no data available
0 or 0.0 – no change

= Positive change (greater than 0.5%) = No major change (between -0.5 and 0.5%) = Negative change (less than -0.5%)

Sources: FAO (2005a); FAO (2010).

The proportion of natural forest under SFM remains low

The International Tropical Timber Organization's Status of tropical forest management 2005 (ITTO 2006) also assessed progress towards SFM in tropical timber-producing countries and concluded that significant progress has been made since 1988, particularly in relation to designation of permanent forest estate, issuance of related policy and coverage by management plans. The proportion of natural production forest under SFM, however, remains very low and unevenly distributed. In Asia, for example, only about 12 percent of the natural permanent forest estate is estimated to be under SFM and only 5 percent of the natural production permanent forest estate is certified as being sustainably managed. In the GMS, forest management certification has been very slow to progress and only 99 000 hectares had been certified under the FSC scheme as detailed in **Box 2.19**.

Several factors constrain expansion of SFM

The contribution that has been made towards SFM by designation of permanent forest estate and other measures should be viewed in the light of ITTO's lessons learned. In this respect ITTO found that:

- SFM for the production of timber is less profitable to the various parties involved than other possible ways of using the land.
- External financial and technical support is often required to establish SFM and an adequate and reliable global system for funding the additional costs involved in putting SFM into practice is lacking.
- Long-term government resolve and credible arrangements for tenure are necessary.
- Discussing illegal logging and trade is not enough and improved laws and vigorous law enforcement are needed.
- Efforts are needed to confront the almost universal lack of resources needed to manage tropical forest properly – staff, equipment, vehicles, facilities, etc.
- Information on the extent of resources and state of management needs to be improved.

These points outline the general picture in which continued forest loss is explained in terms of the surrounding economic, policy and institutional conditions. As such, designation of forest to one class or another is unlikely to be sufficient where political resolve, resources, law enforcement and other prerequisites are lacking.

Transitions may yet occur, however, and are beginning in some countries

National- and global-scale statistics are, however, limiting and past trends should perhaps not be considered of central importance in predicting the future. In this sense, the general picture must be seen as one of a system in transition. In many countries, forest management is transforming alongside society through increased migration and infrastructural developments, shifting sectoral commitments and changing levels of demand, interwoven with evolving policy processes – both within forestry and outside. In some countries – Viet Nam in particular – vigorous programmatic approaches are helping to rejuvenate the sector and there are also

isolated pockets of change, in Thailand for example (Leblond 2008). More general advances are likely to depend on a host of factors including political will, financing, institutional capacity and policy implementation, tenure security and attenuation of demands on forests and forest land.

Box 2.19. Certification of forest management in the GMS

Forest management certification, although not fully identified with SFM, provides a means of assessing progress in forest management and the scheme run by the Forest Stewardship Council is of global prominence. FSC certification has grown rapidly in the Asia-Pacific region over the last decade although corresponding expansion in the GMS region has been minimal (**Table 2.14**). Although only 10,000 hectares of forest are currently certified by FSC in Viet Nam, the national forestry strategy announces plans to extend certification to at least 30 percent of production forest areas 2020 (~1.5 m ha; MARD 2007).

Table 2.14. FSC-certified forest area in the GMS by forest type (000 ha)

	Natural	Semi-natural and mixed plantation & natural forest	Plantation	TOTAL	Number of certificates (2008)
Lao PDR	57	0	0	57	2
Viet Nam	0	0	10	10	1
Thailand	0	0	6	6	4
TOTAL	1 116	21	51	1 188	25

Source: FSC data received December 2008.

N.B. As of June 2010, the total area in the GMS had risen to 99 thousand hectares as follows: Lao PDR (81 618 ha), Viet Nam (9 782 ha), Thailand (7 643 ha) (FSC 2010).

Barriers to forest management certification and to the implementation of SFM in the Asia-Pacific region in general have been ascribed to a suite of issues operating at the firm, national and regional level (Gale 2006). Key issues include:

- Costs of implementation – auditing costs are high due to the lack of a regional certification industry and need for international expertise.
- Human resource requirements – implementation of complex criteria requires professional management and well-trained staff who are often not locally available.
- A premium for certified wood does not generally exist – within the Asia-Pacific region especially, consumers are indifferent to legality and sustainability.
- Governments have sometimes mobilized against forest certification as a potential threat to business as usual.

Gale (2006) also draws attention to the impediment to sustainable development imposed by "an Asian model of development dominated by narrow business-government coalitions that are actively hostile to [...] sustainable forest management".