

ASIA-PACIFIC FORESTRY SECTOR OUTLOOK STUDY II

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VIETNAM FORESTRY OUTLOOK STUDY

by

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**FOOD AND AGRICULTURE ORGANIZATION OF THE UNITED NATIONS
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INFORMATION NOTE ON THE ASIA-PACIFIC FORESTRY SECTOR OUTLOOK STUDY

The Asia-Pacific Forestry Sector Outlook Study (APFSOS) is a wide-ranging initiative to gather information on, and examine, the evolution of key forestry issues as well as to review important trends in forests and forestry. The main purpose of the study is to provide a better understanding of the changing relationships between society and forests and thus to facilitate timely policy reviews and reforms in national forest sectors. The specific objectives are to:

1. Identify emerging socio-economic changes impacting on forest and forestry
2. Analyze probable scenarios for forestry developments to 2020
3. Identify priorities and strategies to address emerging opportunities and challenges

The first APFSOS was completed in 1998, with an outlook horizon to 2010. During its twenty-first session, held in Dehradun, India, in April 2006, the Asia-Pacific Forestry Commission (APFC) resolved to update the outlook extending the horizon to 2020. The study commenced in October 2006 and is expected to be completed by September 2009.

The study has been coordinated by the Food and Agriculture Organization of the United Nations (FAO), through its regional office in Bangkok and its headquarters in Rome, and implemented in close partnership with APFC member countries with support from a number of international and regional agencies. The Asian Development Bank (ADB), the International Tropical Timber Organization (ITTO), and the United Kingdom's Department for International Development (DFID) provided substantial financial support to implement the study. Partnerships with the Asia-Pacific Association of Forest Research Institutes (APAFRI) and the Secretariat of the Pacific Community (SPC) supported the organizing and implementing of national focal points' workshops and other activities, which have been crucial to the success of this initiative. The contributions of many other individuals and institutions are gratefully acknowledged in the main APFSOS report.

Working papers have been contributed or commissioned on a wide range of topics. These fall under the following categories: country profiles, sub-regional studies and thematic studies. Working papers have been prepared by individual authors or groups of authors and represent their personal views and perspectives; therefore, opinions expressed do not necessarily reflect the views of their employers, the governments of the APFC member countries or of FAO. Material from these working papers has been extracted and combined with information from a wide range of additional sources to produce the main regional outlook report.

Working papers are moderately edited for style and clarity and are formatted to provide a measure of uniformity, but otherwise remain the work of the authors. Copies of these working papers, as well as more information on the Asia-Pacific Forestry Sector Study, can be obtained from:

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EXECUTIVE SUMMARY

Key factors impacting forests and forestry

Forestry is an economic sector that is greatly influenced by socio-economic change in Vietnam. Socio-economic indicators may therefore be used to help estimate the scale of impacts on future sector development. The average increase in GDP in the five years between 2006 and 2010 is estimated at 7.5-8% per year. The GDP growth target in the ensuing years will be greater than 8% per year and GDP in 2010 is forecast to be 2.1 times that in 2000. At current prices, GDP per capita will be between US\$1,050 and US\$1,100. The agriculture sector is expected to account for 15-16% of GDP in 2010 with industries and construction accounting for 43%-44% and services 40-41%. Total export value is expected to increase at 16%/year and the domestic harvested timber volume by 2020 is estimated at around 22-24 million m³/year (MARD 2007).

By 2020 Vietnam will become a modern industrial country. In 2007 the population in Vietnam was over 84 million with about three quarters of the population living in rural areas and about 24 million people living in mountainous rural areas. With a population growth rate of about 1.5% between 2001 and 2010 and 1.3% between 2011 and 2020, the national population in 2020 is estimated to reach 100 million. The proportion of employment in agriculture is expected to drop to below 50% by 2010 and the unemployment rate in urban areas will fall to below 5% by 2010. The number of poor households, according to the new poverty line, will fall to 10-11% by 2010 from 22% in 2005.

In terms of the environment, the requirement for forest protection and landscape and biodiversity conservation is increasing; the target is to increase forest cover to 42-43% in 2010 and 47% in 2020.

Globalization is an objective trend and economic integration is inevitable. These trends will affect all sectors creating opportunities for development as well as the potential for increasing and creating challenges for the country. Increased levels of peace, cooperation and development are general trends characterising both the region and the world.

Past trends and current state of forests and forestry

In 1943, Vietnam had 14.3 million ha of natural forests, covering 43% of the total land area of the country. However, forest area has fallen rapidly and by 1990 was just 9.18 million ha or 27.2% of the total land area. For the period 1980-1990, Vietnam lost an average of 100,000 ha of forest per year. In addition to the reduction in forest area, forest quality has also fallen — the area with rich and medium levels of stocking has declined while the area of poor and regenerating forest has rapidly increased. In 1990, the area of these types of forest was about 7 million ha, but by 2005 this had increased to 10.2 million, accounting for 80% of the total forest area in Vietnam.

Since 1995, forest area has increased as a result of forest rehabilitation and plantation programs. By the end of 2006, forest area in Vietnam was 12.874 million ha (38% forest cover), of which 10.41 million ha were natural forest and 2.464 million ha were plantation forest. According to the alternative classification into 3 forest types, the area of special use forest amounted to 2,202,888 ha (17.1%), protection forest 5,268,789 ha (40.9%) and production forest 5,402,172 ha (42.0%). However, the forests are not evenly distributed throughout the country. In the Central Highlands, Central North and Northeast areas forest cover is high at over 40%, in the Southeast forest cover is nearly 20%. In the Red River Delta and Mekong River Delta, most of the area is used for agriculture and forest cover is below 10%. In 2006, bare land area amounted to 5.608 million ha or 17% of the total area of the

country. This area presents both challenges as well as potentials for production forest development in coming years as most of the area is steep and infertile.

In general, forest stocking density is not high in Vietnam. Total volume in December 2005 was estimated at 811.678 million m³, of which natural forest accounted for 93.4% and plantation forest the remaining 6.6%. The total stock of bamboo was about 8.5 billion stems — mainly in natural forest but also partly in plantation forest. Wood stocks are mainly concentrated in 3 areas: the Central Highlands (33.8%), Central North (23%) and Central South (17.4%). The Red River Delta, Southeast and Southwest areas have the lowest forest cover and wood volumes. These figures identify Vietnam as having the lowest per capita forest area and wood stocks in the world. On average, Vietnam has 0.15 ha of forest per capita and 9.16 m³ of wood per capita; meanwhile, the world averages are 0.97 ha and 75 m³ respectively.

Technological developments in relation to high yielding clone species, cutting and tissue culture and intensive plantation establishment have led to increased plantation growth rates. Eucalyptus plantations using cutting and tissue culture have increased productivity from 8-10 m³/ha/year to 15 m³/ha/year while Acacia plantations (*Acacia mangium* and Acacia hybrid) reach productivity levels of 20-25 m³/ha/year and more. Plantation forests are mainly situated in the Northeast (894,070 ha), Central North (534,585 ha) and Central South Coast (330,914 ha) areas. Areas with fewer plantation resources include the Red River Delta (48,520 ha), Northwest (109,573 ha), Central Highlands (152,114 ha) and Southeast (144,943 ha). The reasons for limited forest plantation areas are small forest land area (Red River Delta), poor accessibility (Northwest) and low competitiveness of industrial trees with natural forest species (Central Highlands, Southeast).

In 1995 MARD launched the forestry development strategy with 4 objectives:

1. Realign forestry from focusing on harvest of forest resources to forest resource establishment and sustainable development;
2. Restructure forestry from state and public management to multi-sector economic management involving households, individuals, communities, the private sector and others;
3. Alter the focus of forestry from timber harvest in natural forests to an economic sector with a variety of products and exports;
4. Develop from investment in extensive plantation with limited application of science and technology to intensive plantation with greater scientific and technical application.

According to statistics, forestry economic productivity includes contributions from plantation, harvest and a number of services, and accounted for 1.2% GDP in 2005. However, forestry also has significant contributions provided by the forest product processing industry, exports and environment values that are not included in the forestry sector's contribution to GDP.

State of forest resources in 2020

Vietnam's Forestry Development Strategy (2006-2020) outlines key points in the development of the sector:

- Synchronous forestry development in terms of management, protection, development, proper use of forest resources, plantation improvement, forest product processing, environmental services and eco-tourism
- Forestry development is to make significant contributions to economic growth, poverty reduction and environmental protection

- Sustainable management, utilization and development of forests are the foundation for forestry development
- Forestry development is to be based on speeding up and deepening policy related to socialization of forestry activities, and attracting investment for forest protection and development

The forest and forestry objectives for 2020 given in the Vietnam Forestry Development Strategy to 2020 are as follows:

- Establish, manage, protect, develop and use 16.24 million ha of land planned for forestry to increase forested cover to 42-43% by 2010 and 47% by 2020
- Growth in the value of forest production (including forest product processing and environment services) is targeted at between 3.5% and 4% per year; GDP from forestry is targeted to reach about 2-3% of GDP
- Manage, protect, develop and sustainably use 8.4 million ha of production forest — including 4.15 million ha of plantation forest, 3.63 million ha of natural production forest and 0.62 million ha of rehabilitating natural forest for agro-forestry — 5.68 million ha of protection forest and 2.16 million ha of special use forest
- Afforest 1 million ha by 2010 and 1.5 million ha for the period of 2010-2020. Conduct reforestation after harvest of 0.3 million ha per year, plant 200 million scattered tree per year
- Harvest around 20-24 million m³/year (of which 10 million m³ are big timber), to meet the material demands from the forest product processing and pulp industry, and exports
- Fuelwood harvest for the rural area to amount to 25-26 million m³/year. This report, however, forecasts fuelwood demand to reach 17.82 million tonnes by 2010 and 10.24 million tonnes by 2020 (1 m³ is equivalent to 0.7-0.8 tonne depending on timber species)
- Export of forest products is expected to reach US\$7.8 billion (US\$7 billion of timber products and US\$0.8 billion of NWFPS). With the current growth rate of forest product exports at around 20%/year, the target will be attained in 4-5 years
- Increase in income from forest environmental values through the Clean Development Mechanism (CDM), eco-tourism and water resource protection will reach US\$2 billion by 2020
- By 2020, at least 30% of production forest areas will be certified as being sustainably managed

Demand and supply of forest products to the year 2020

With the current high economic growth rates, domestic and export demand for timber and forest products is increasing. In the early 1990s, the total annual timber harvest from both natural and plantation forests was 4-4.5 million m³. Currently, timber harvest from plantation forests for pulp, woodchips for export, artificial board and forest products for export and domestic use is about 2-3 million m³/year. Given consumption trends in recent years, timber harvest from natural forest, scattered trees and plantation must reach 9.7 million m³/year by 2010 and 20-24 million m³/year by 2020 (of which 10 million m³ should be “big” timber). Supply of small wood for pulp by 2010 should be 3.4 million m³ and 8.3 million m³ by 2020.

To achieve adequate supply, it will be necessary to improve forest plantation productivity to average more than 15 m³/ha/year, to improve forest quality and to increase timber utilization to greater than 80%. By 2020, it will be necessary to reduce timber export and gradually increase domestic timber supply. Domestically sourced timber, primarily from plantation forest, will account for 65% of industrial material and 80% of timber for furniture manufacture. Natural forest growth will be 2-5 m³/ha/year depending on forest status. To meet

demand, however, assisted natural regeneration and enrichment planting of high value species will be necessary as will post-harvest rehabilitation of natural forest.

The future of the forest industry

Forest product processing will gradually rise to meet domestic demand and will increasingly contribute to the value of exports. The years 2002-2006 were considered a breakthrough period for Vietnam timber and forest product export. Vietnam timber product export value was US\$ 219 million in 2002 and US\$1.1 billion by 2004. After 2004, Vietnam maintained high growth rates in timber and achieved timber product export of 35% in 2005 and 24% in 2006. In 2006, the export value of timber and timber product export reached almost US\$2 billion and US\$2.5 billion in 2007. After only 6 years, export of Vietnamese timber products increased ten times. The value of Vietnamese timber exports is now greater even than Malaysia, Indonesia and Thailand and Vietnam has become the biggest furniture exporter in Southeast Asia.

Markets for timber and timber products export are large, and the timber industry is not too dependent on any particular market. In the last five years, Vietnamese timber products have been exported to 120 markets world-wide. Vietnam aims to export US\$3.7 billion worth of forest products by 2010 (US\$3.4 billion of timber products and US\$0.3 billion of NWFPs) and over US\$7.8 billion worth by 2020 (US\$7 billion of timber products and US\$0.8 billion of NWFPs). With the current export growth rate of around 20% per year, Vietnam should meet the 2010 target by 2009.

Forest as a source of energy — current situation and anticipated changes

Inventory and assessment show that about 20% of firewood is traded with the rest comprising branches remaining after harvest or wood collected by users. Firewood is used for fuel in brick and ceramic kilns, noodle, cake and tofu manufacture, sweet processing and cooking. About 24.5 million tonnes of firewood are consumed annually, equivalent to 8.805 million TOE (Tonnes of Oil Equivalent). About 75% of Vietnam's population lives in rural areas and is reliant on traditional fuels including wood and other biomass. About 80% of the population still relies on biomass for cooking needs and biomass is remains an important energy source for local industries.

Total biomass energy used in Vietnam in 2002 amounted to 14 million TOE, of which 76% is used by households. The main areas in which biomass energy is used include the mountainous and hilly areas of the North, the Red River Delta, the Central North and the Mekong Delta. Only about 30% of biomass derived from by-products or waste is used for energy production, the rest is not utilized or is used for other purposes. The proportion of biomass used in total national energy consumption fell from 73% in 1990 to 50% in 2002; however, the quantity of biomass used has increased from 12.39 million TOE to 14 million TOE.

With greater levels of development, more modern energy sources are used. In Vietnam's case, firewood will be replaced by other energy sources such as electricity and gas. By 2020, total firewood consumption will fall and more efficient modes of firewood utilisation will become widespread; however, firewood will still be an important energy source in rural and mountainous areas.

Establishment of plantations for the production of biofuels is a realistic option and it is likely that biofuels will be economically competitive with fossil fuels in the future.

Forest environmental services

Forests play an important role in watershed protection including protection against soil erosion and sedimentation and in controlling water flow, floods and water quality. The loss of forest cover due to unplanned harvesting or land use conversion will result in serious consequences for the watershed-related functions of forests. Forests are very important in reducing surface water flow and increasing infiltration. Watershed forests, especially natural forests with a multilayered canopy are very important in maintaining water flow rates during rainy seasons and in supplying water during dry seasons for local use, hydro-power generation and irrigation. Over the past few years, floods have occurred in many provinces in the central and the northern areas of the country. One of the main causes has been forest destruction.

Studies are currently being conducted to evaluate the environmental services of forest and to establish mechanisms to market forest environmental services such as protection against soil erosion and sedimentation, CO₂ absorption and aesthetic values. By 2020, the forestry sector can meet the needs for environmental services and improve income from environmental value through CDM, eco-tourism and protection of water resources to US\$2 billion.

The urban proportion of the population has increased from 17% in 1990 to 23.45% in 1999, 24% in 2002 and to nearly 26% in 2006. However, urbanization with limited control and poor planning has had negative impacts on the environment, natural resources and the ecological balance as well as human health. The proportion of urban area with tree cover in Vietnam is lower than the world average. In general, trees are mainly distributed in medium and large cities. The area of trees in Vietnamese urban areas amounts to just 0.5 m²/person, only 1/40th of the average of modern cities around the world. In Hanoi and Ho Chi Minh City, the area of trees is 2 m²/capita, but in Da Nang it is only 0.5 m²/capita. Urban planning should therefore pay more attention to the balance between construction and green areas.

Vietnam has established 128 special use forest areas covering 2,228,149 ha and accounting for 11.7% of the total forestry area or 6.7% of the total land area. There are 30 national parks, 60 nature reserves and 38 landscape protection areas in the special use forest system. To protect the environment and biodiversity, the Government of Vietnam has promulgated many related legal documents, including the Law on Environment Protection (2005), the Law on Forest Protection and Development (1991, 2004) and the ordinance on seeds, tree and animal species (2004). Vietnam also participates in most related international conventions including the Convention on Biodiversity (1994), RAMSAR (1989) and CITES (1994). The Government has also issued many important documents such as: Strategic Orientations for Sustainable Development (2004); Strategy for National Environment Protection to 2010 and Orientations to 2020; National Action Plan for Biodiversity (1995, 2007); National Action Plan to Strengthen Control of the Wildlife Trade to 2010; and the National Action Plan for Wetland Conservation and Sustainable Development. The Law on Biodiversity is also being prepared for submission to the National Assembly in the near future.

Social functions of forests

Forestry has contributed to the use of bare land, job creation and improvement of livelihoods for 25% of Vietnam's population living in or near forests and in mountainous areas. By September 2007, there were 8 million ha of forest land allocated to 1.1 million organizations, households and individuals for forestry production. In addition, there were more than 20,000 people working in state forest enterprises and about 90,000 households and individuals received land contracts for forest protection, natural regeneration and plantation establishment in production forest, protection forest and special use forest. The sector also attracts thousands of workers from mountainous communities to participate in forest protection, management

and sharing of benefits from forest allocated to communities for long-term use and management (MONRE, 2007).

With regard to forest product processing and trade, there are 1200 enterprises with about 520,000 workers. In addition, many employees work in forest product processing at the household or craft village level. A study in some mountainous provinces showed that income from forestry accounts for up to 15-20% of total household income and in areas with high forest cover, income from forestry may even account for 30-40% of total household income.

The social objectives of the Forestry Development Strategy to 2020 are to increase income, contribute to hunger elimination and poverty reduction of 70% of poor households in focal forestry areas; to complete forest allocation and lease to organizations, enterprises, individuals, households and communities by 2010; and to improve levels of training in forestry.

Role of forests in the provision of global public goods

Global warming has led to the melting of ice caps and glaciers and resultant sea level rise. It has been forecast that by 2100, sea level rise of more than 1 metre may be expected. If this materialises, Vietnam will suffer annual losses of US\$17 billion with 17 million people directly affected and 12.2% of the most fertile land lost. The Red River Delta and the Mekong Delta will be most affected by predicted flooding, typhoons and increased salinity.

With growing awareness of the considerable impacts likely to result from climate change, Vietnam has joined several international conventions including UNFCCC and the Kyoto Protocol. Vietnam is also establishing and implementing a number of programs to protect forests and increase both the quantity and quality of forests throughout the country. Several large programs have been implemented including The Greening of Bare Land Program (Project 327, 1993-1998), the Five Million Hectare Reforestation Program (1998-2010), the Forestry Extension Program, the National Action Plan for Biodiversity (1995, 2007) and the National Action Plan to combat desertification, 2006-2010. Many people are, however, still unaware of the substantial value of forests to the environment and the global climate, and still think in terms of forest product supply. Studies on the value of environmental services have been limited, and have not been used systematically to advocate environmental value to managers and the public. In coming years, it will be necessary to facilitate studies on forest valuation and better advocate the importance of environmental services. At the national level, preparation of socio-economic development plans (SEDP) should integrate activities necessary to adapt to and mitigate climate change. Vietnam also needs to identify priorities in relation to water resources and coastal management, forest protection and development of forestry and fishery. Access to information and capacity building are both very important factors in the process.

Emerging opportunities and threats in a globalised environment

As socio-economic development progresses many opportunities are presenting themselves to forestry as follows:

- Demands for forest products in international and domestic markets have increased; the Vietnamese economy is developing at a high rate and international integration will create opportunities for expansion of forest product production, processing and trading for farmer households, communities and state and private enterprises
- International economic integration creates opportunities to improve the national investment environment, penetrate world markets, acquire advanced technology and foreign investment — especially in relation to timber and NWFP processing for

export — facilitates sustainable forest management and creates opportunities for establishment of forest plantations

- The state, the public and the international community are becoming increasingly concerned about forest protection and development
- Forestry sector socialization has become a management orientation through multi-sector economic development, implementation of land and forest allocation and leasing to mobilize social resources for forest protection and development
- The private sector plays a major role in forest product processing and this trend will continue in coming years
- In places with stable market demand, plantation forest has been profitable to farmers and has encouraged investment in afforestation

However, the challenges are numerous, including:

- The growth rate of the forestry sector is still low (1.9% in 2001, 1.6% in 2002, 1.1% in 2003, 1.1% in 2004, and 1.2% in 2005). Profits from forestry, especially from silviculture are low and the potential of forest resources has not been fully utilized, especially in relation to NWFPs and forest environmental services
- The population is increasing and there is free movement of populations and shifting cultivation continues; the use of agricultural land has not been efficient and this has resulted in expansion into forest areas for cultivation, creating continuous pressure on forests.
- Demand for forest products has created pressure on forest resources, especially natural forest. Plantation and natural forests have low productivity and quality and have not met the demand occasioned by rapid socio-economic development, especially in relation to timber for processing and export. The area of high yielding forest plantations is limited and scattered
- The forest product processing industry has developed quickly but not in a stable manner — lacking both planning and a strategic vision. Competitiveness is not high and linkages and labour allocation are not yet good; brand names have not become popular in world markets; investment in technology development and modernization is insufficient; raw material supply are not stable and there is heavy reliance on imports
- The competitiveness of forest products is low and international integration could therefore be a challenge for the forest product sub-sector; in future competition will strengthen in both international and domestic markets
- There are several constraint to fast, comprehensive and sustainable development in the face of limited resources including in relation to human resources, infrastructure and management skills

Creating a more appropriate society-forest relationship: What needs to be done?

Orientation towards development planning: Planning the national forest estate and classifying forest land are the first and the most important measures for the forestry sector to take. All 16.24 million ha of forests and forest land should be managed in a uniform manner on the basis of blocks, compartments and other units plotted on maps and fields. With regard to protection forest, it is necessary to review and reclassify the national area not to exceed 5.68 million ha. With regard to special use forest, it is necessary to review and strengthen the national system to set the total area at no more than 2.16 million ha and to improve forest quality and bio-diversity value. With regard to the expected national production forest area of 8.4 million ha in 2020, 7.78 million ha will be permanent production forests under sustainable management and use.

Cross-sectoral participation in forest development and protection: By 2010, all forest area (natural forest, plantation forest) and forest land will be allocated with priority given to communities, households and the private sector. State organizations will manage around 85% of special use forest, about 70% of nationally important protection forest and about 25% of centralized natural and plantation production forest. The remaining areas of production, special use and protection forest will be managed by private enterprise, communities, households and individuals according to current regulations.

Forest development orientation: Efforts will be needed to develop special use forest through conservation, improvement of forest quality and biodiversity and improvement of eco-tourism activities. Similarly protection forests need to be developed to ensure an appropriate level of protection. Efforts are necessary to increase production and quality of forest products using intensive plantations developed on the basis of market demand, competitive advantage and appropriate species as well as development of rural industries, especially small and medium scale forest product processing industries, to improve income for poor households and reduce poverty.

Forest utilization and forest product processing industry development: Efforts are necessary to harvest and utilize natural forests in a sustainable manner according to forest management plans and to realise benefits from forest services including watershed and coastal protection, eco-tourism and carbon capture in order to create income for reinvestment into forest protection and development. It will also be important to facilitate forest plantation establishment and use of NWFPs with a focus on advantageous species, and to focus on developing competitive and advanced products including indoor and outdoor furniture and bamboo and rattan products. Promotion of artificial board and pulp production as well and reduction of woodchip export will be other priorities.

Prioritized programs

To improve forestry sector development, effective implementation of the Five Million Hectare Reforestation Program and the three development programs and two support programs contained in the Forestry Development Strategy will be necessary:

- (1) Program for sustainable forest management and development
- (2) Program for forest protection, bio-diversity conservation and development of forest services
- (3) Program for forest product processing and trade
- (4) Program for research, education, training and forestry extension, and
- (5) Program for reform on forestry institution, policies, planning and monitoring

1. INTRODUCTION

The Vietnamese forestry sector has long been associated with national development. Directly following the establishment of the Democratic Republic of Vietnam in 1945, the Ministry of Agriculture was established. In February 1955, the Ministry of Agriculture became the Ministry of Agriculture and Forestry including the Department of Forestry. In April 1960, the General Department of Forestry was established and by July 1976, the Ministry of Forestry was established. In November 1995, three ministries: the Ministry of Agriculture and Food Industries, the Ministry of Forestry, and the Ministry of Hydrology were merged under the Ministry of Agriculture and Rural Development (MARD). In 2007, the Ministry of Fisheries was merged with MARD and the forestry sector is currently managed by MARD.

Forestry in Vietnam has undergone many changes especially since 1986 when the Reform Policy was implemented. With increasing levels of development, forestry has changed from a traditional mode based on harvest of natural forest to more a more social footing with greater participation, improved forest protection and increased plantation establishment and timber processing 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 is, under the policy, expected to increase the importance of forestry as an economic sector while contributing to income, livelihood improvement and poverty reduction.

For the past 20 years, Vietnam has improved the legal documents that relate to forest management including the Law on Forest Protection and Development 1991 (replaced in 2004), the Law on Land 1993 (replaced in 2003) and the Strategy for Forestry Development 2006-2020, which was approved by the Prime Minister in 2007. Vietnam signed the CITES Convention in 1973, RAMSAR in 1989, the Conservation of Bio-diversity in 1994; the United Nations Framework Convention on Climate Change in 1994 and the United Nations Convention to Combat Desertification in 1998. The Government of Vietnam has also issued Strategic Orientations on Sustainable Development for Vietnam (2004), a National Strategy on Environment Protection to 2010 and orientation towards 2020, and a National Action Plan on Biodiversity (1995, 2007). In 2006, the Prime Minister approved the National Action Plan to combat desertification for 2006-2010 and orientation to 2020. Regarding forestry sector development, MARD has issued Strategies on Forest Seeds 2006-2020, a Plan for Conservation and Development of Non-wood Forest Products (NWFPs), and a Plan for Development of Scattered Tree Planting 2006-2020.

With the support of international organizations, Vietnam has invested in many national programs and projects including Program 327 and the Five Million Hectare Reforestation Program, which help to improve forest area and quality. In 1990, the forest area of Vietnam was 9.1 million ha, by 2000 it was 10.9 million ha and by 2006 it was 12.9 million ha, covering 38% of the total land area of the country. Annually, 200 000 ha are planted and harvest from plantation forest equals about 3 million m³/year. Timber and forest product processing has developed significantly to meet domestic demand and contribute to export value. The export value of timber products has increased from US\$61 million in 1996 to US\$1,035 million in 2004 and US\$2,500 million in 2007.

In this context, the Vietnam forestry sector outlook provides a valuable framework to view the current and future situation in the national forestry sector. The importance is heightened by the increasing levels of regionalisation and globalisation as evidenced by Vietnam's membership of ASEAN and accession to the WTO.

Background to the study

Asia-Pacific forestry has been undergoing significant and rapid changes resulting from fast economic growth and increased demand for timber and other forest products as well as forest environmental services. The changes have had a clear impact on the socio-economic situation within and outside the region, reducing the stability and long-term sustainability of the forestry sector. In the 16th meeting of the Asia-Pacific Forestry Committee (APFC) it was therefore agreed to implement a comprehensive study on the outlook for Asia-Pacific forestry. The Committee emphasized the importance of analysing the forestry sector in the context of wider perspectives taking into account macro-economic developments and social and environmental issues while also assessing relationships with other sectors like agriculture and energy. The Committee also called for sharing of experience between regional countries, especially in relation to successes in sustainable forest management, and the relationship between regional and global development.

The Committee assigned FAO, and particularly the FAO Regional Office for Asia and the Pacific to conduct the first Asia-Pacific Forestry Sector Outlook Study (APFSOS). The study was completed in 1998 and since then, significant changes have taken place in the region. The success of plans and policies in forestry will depend on our understanding of forestry sector development in the next two decades. At the 21st APFC meeting in Dehra Dun, India in March 2006, the Committee requested FAO to launch the second Asia-Pacific Forestry Sector Outlook Study (APFSOS II) to assess likely changes in forestry to the year 2020.

Study objectives

The objectives of this study are to:

1. Collect and systemize information and data of current situations and trends of major issues of Vietnamese forestry;
2. Identify dominant changes affecting forest and forestry;
3. Analyze possible scenarios in the development of the forestry sector to 2020;
4. Project the future development of the forestry sector in Vietnam to 2020;
5. Propose priorities and strategies based on opportunities and challenges.

Scope and coverage

The report focuses on some basic issues in Vietnam forestry:

- Forest resources: mainly focus on area, forest cover, stock volume, management, function for environmental services
- Policies and institutions: present some major institutions involved in forest and forestry management
- Factors affecting forest and forestry: consider some factors including population, economic growth, needs for firewood, technology and environment
- Outlook and scenario to 2020

Key questions/issues addressed

The report will present a comprehensive picture of the current forestry sector situation in Vietnam, recent trends and achievements in the national forestry sector and scenarios for the future development of the sector to 2020. To achieve its objective, this study focuses on the following questions:

- How have Vietnam's forest resources (include also NWFPs and firewood) changed over the past years?
- What achievements have timber and forest product processing industries attained especially in terms of timber product export?
- How important are environmental services and conservation for Vietnam?
- How have forestry management policies and institutions changed over past years?
- How do internal and external factors affect the Vietnamese forestry sector?
- What are the major factors affecting Vietnamese forestry and relations between people and forests as well as the social issues that arise from these relations?
- What is the role of forestry in livelihood improvement for forest dwellers through forest product processing and trade?

The process

To implement this study, the Forest Science Institute of Vietnam (FSIV) was assigned by the Ministry of Agriculture and Rural Development (MARD) as the focal point with the responsibility of establishing a national working group to collect data and prepare reports according to FAO requirements.

To initiate the Outlook Study, a meeting was held in Chiang Mai, Thailand from January 31 to February 2, 2007 to assemble national outlook study focal points from around the Asia-Pacific Region. The objectives, methodology and Outlook Study process were discussed during this meeting. Following the guidelines disseminated at the meeting, FSIV implemented relevant activities as follows:

- Establishing a 12 member National Working Group including managers, policy makers and scientists representing various fields and organizations related to forestry such as FSIV, Forestry University of Vietnam, Forest Inventory and Planning Institute, Department of Forestry, Department of Legislation, Department of Science and Technology, Vietnam Forestry Techniques and Science Association, Vietnam Timber and Forest Products Association, Strategy Research Institute (Ministry of Investment and Planning)
- Holding meetings of the National Working Group to discuss and develop the report structure and study methodology to implement the study
- Establishing a drafting team and assigning tasks to its members
- Collecting data and information and drafting sections of the report (drafting team)
- Holding drafting team meetings to discuss and comment on the contents and progress of the report
- Holding meetings of the National Working Group to discuss and comment on the report and plan the national consultation workshop
- Holding the national consultation workshop in Hanoi
- Revising the report according to comments given at the National Workshop
- Translating the report from Vietnamese into English

Structure of the report

This report was developed on the basis of both the general structure suggested by FAO and adjustments made according to the situation in Vietnam. The structure of the report is therefore as follows:

- *The current status of forests and forestry in Vietnam* including status and trends in forest resources and management, wood and forest products, wood energy, NWFPs, service functions of forests and the political and institutional framework

- *Influences on the future state of forests and forestry* including a discussion of the main changes in society that will impact on forests and forestry, such demographic and economic changes, developments in the political and institutional environment, globalization and regional and sub-regional integration, technological changes within and outside the forest sector and the impact of environmental issues and policies on the forestry sector
- *Probable scenarios and their implications* including a discussion of the probable scenarios encompassing society, the economy, and the political and institutional environment likely to develop in the coming decade
- *What we may see in 2020* including a prediction for 2020 of the state of forest resources, wood and forest product production, wood energy, NWFPs and the service and societal functions of forests
- *How a better future could be created* including a discussion of forest sector development planning, forest protection and management, promotion of investment and human resources and solutions to implement the Forestry Development Strategy
- Summary and conclusions

2. WHERE ARE WE NOW? CURRENT STATE OF FORESTS AND FORESTRY IN THE COUNTRY

Trends in forest resources

Key characteristics regarding forest area, growing stock, increment and within country differences

According to the findings of various studies in 1943, Vietnam had 14.3 million ha of natural forest amounting to 43% forest cover. However, by 1990, forest cover had decreased sharply to 9.18 million ha, accounting for 27.2% of the national land area. Between 1980 and 1990, Vietnam lost an average area of 100,000 ha of forest annually. Since 1995, forest area has increased continuously thanks to forest plantation establishment and natural forest rehabilitation. By the end of 2006, forest area reached 12.9 million ha, or 38% land cover, including 10.41 million ha of natural forest and 2.464 million ha of plantation forest (Table 1).

Table 1. Trends in forest area and cover 1943-2006

Year	Area ('000 ha)			Forest cover (%)
	Natural forest	Plantation	Total area	
1943	14,300	-	14,300	43.0
1976	11,077	92	11,169	33.0
1980	10,486	422	10,608	32.1
1985	9,308	584	9,892	30.0
1990	8,430	745	9,175	27.0
1995	8,252	1,050	9,305	28.0
1999	9,444	1,471	10,916	33.2
2002	9,865	1,919	11,785	35.0
2003	10,005	2,090	12,095	36.1
2004	10,088	2,218	12,306	36.7
2005	10,283	2,333	12,616	37.0
2006	10,410	2,464	12,874	38.0

Source: Prime Minister, 2001; MARD 2001; 2004; 2005; 2006, 2007.

Due to a range of socio-economic causes and unsustainable management and use, the quality and quantity of forests in Vietnam has decreased over the decades. Forests are not equally distributed throughout the country (Table 2). In the Central Highlands, North Central and Northeast regions, forest cover is high, at over 40%. In the Southeast region, a large area has been used for industrial plantations including tea, coffee, rubber and pepper, etc. According to the results, forest cover is less than 20%. In the northern and southern delta where cultivation is dominant, forest cover is very low — less than 10% (MARD, 2007).

Table 2. Forest area and cover by regions in 2006

Region	Forested area (ha)	Natural forest (ha)	Plantation forest (ha)	Forest cover (%)
Northwest	1,508,740	1,399,167	109,573	40.3
Northeast	3,164,873	2,270,803	894,070	47.9
Red River Delta	95,819	47,299	48,520	7.6
North Central	2,611,525	2,076,940	534,585	50.7
Central Coastal	1,775,770	1,444,856	330,914	40.6
Central Highlands	2,976,951	2,824,837	152,114	54.6
Southeast	431,135	286,192	144,943	18.2
Southwest	309,037	60,045	248,991	7.7
Total	12,873,851	10,410,141	2,463,710	38.0

The total forest area of Vietnam in December 2006 was 12,873,850 ha of which natural forest accounted for 10,410,141 ha and plantation forest 2,463,709 ha. According to forest use classification, the area of special-use forest was 2,202,888 ha, protection forest 5,268,789 ha, and production forest 5,402,172 ha (MARD 2007). Timber forest constituted the largest proportion of current natural forest with 8,192,053 ha followed by bamboo with 695,979 ha, mixed forest with 729,104 ha, swamp mangrove with 64,042 ha, and mountain forest with 728,963 ha. Of the total area of plantation forest, stocked forest constituted 1,059,083 ha, non-stocked forest (young forest) 1,104,984 ha, bamboo 81,307 ha and NWFPs 218,336 ha. Bare lands and bare hills amounted to 5,608,763 ha (MARD 2007). According to the Vietnamese swamp mangrove protection and development plan to 2015 (Do, et al 2006) swamp mangrove area in 1943 amounted to 400,000 ha. This fell to 185,000 ha by 1982 and 156,608 ha by 2002. The 2002 estimate is 2.5 times higher than the figure given by MARD, 2007.

The quality of forest has also fallen. The average volume of natural forest is around 76.5 m³/ha and the total area of rich and average quality forest has declined continuously. The area of poor forest and secondary forest increased rapidly from 7 million ha in 1990 to 10.2 million ha in 2005, constituting over 80 percent of total forest area in Vietnam.

The total standing volume of wood in the country in late 2005 amounted to 811.678 million m³ of which natural forest accounted for 93.4% and plantation forest the remaining 6.6%. The average volume of the growing stock of intensive plantation forest in which advanced varieties and silvicultural methodologies are applied was 40.6 m³/ha. Stocks of bamboo and rattan were high at around 8.5 billion stems distributed in natural forest and some areas of plantation forest.

The bulk of the country's wood volume is mainly located in 3 regions: the Central Highlands (33.8%), North Central region (23%) and South Central region (17.4%). The lowest percentages of forest cover and wood volume are in the northern, southeast and southwest regions (MARD, 2007).

With respect to plantation forests, the Northeast, North Central and South Central coastal regions have the largest plantation timber volume. These 3 regions are seen as the main material suppliers to the paper, artificial board and chip production industry. The Central Highlands, Northwest, Southeast, Red River Delta and Mekong Delta have only small areas of plantation forest as forest plantation is not their priority.

In the context of total area and volume, Vietnam has low per capita forest area and wood volume in comparison with other countries. On average, Vietnam has 0.15 ha of forest per capita and 9.16 m³ of standing stock per capita while the world average figures are 0.97 ha and 75 m³ respectively (MARD, 2007).

With respect to plantation forests, seedling development and intensive plantation techniques have resulted in increasing forest growth rates. The average productivity of tissue culture-based Eucalyptus plantations increased from 8-10 m³/ha/year to 15 m³/ha/year and acacia plantations (*Acacia* hybrid, *Acacia mangium*) attained 20-25 m³/ha/year and above.

Forest ownership — changes in recent years and their implications

For a long time, forest in Vietnam belonged to state-owned entities for management and utilization. These entities included state forest enterprises, the special use forest management board, the protection forest management board and cooperatives. Recently, ownership has shifted towards households, individuals, village communities and the private sector as they are increasingly being allocated both forest and forest land.

Vietnam has two laws that govern forest resource ownership and use. The land law covers issues related to land and the law on forest protection and development covers forest related areas. The land laws of 1993 and 2003 stipulate that land is under public ownership with the State acting as the representative. The State hands over land use rights to different groups through land allocation and lease and recognition of land use rights for those using land in a stable manner. The State also hands over forest use rights to forest owners through forest allocation and lease, recognition of forest use rights, and rights or ownership rights over planted production forests. The State uniformly manages and disposes of natural forests and forests developed with State capital including: forests being planted for which ownership has been transferred to the State; forest wild animals; forest micro-organisms; and forest landscape and environment.

As all land is under public ownership, the State only hands over forest land use rights (50 years with possible extension) in the form of land allocation and lease, and recognition of land use rights without private ownership. Natural forest is under public ownership but organizations, households and individuals may be allocated or leased natural forest (50 years with possible extension) for stable long-term forestry use but with entitlement to utilization rather than ownership. For natural production forests, households and individuals are awarded sureties or can contribute capital in return for forest use rights, which are in effect brought about by the forest owners' investment. For plantation forest, households and individuals are awarded sureties or can contribute capital in return for resulting benefits from the planted production forest and with ownership rights remaining with the forest owners.

Between the end of the 1980s and the beginning of the 21st century, Vietnam has implemented policy on land, forest allocation and has gradually shifted from state ownership of forest resources to public or social forestry. After promulgation of the Law on Forest Protection and Development (1991, 2004) and the Land Law (1993, 1999, 2003), land and forest allocation legislation has been strengthened with the establishment of three main types of forest ownership:

Firstly: State ownership is recognized for any forest or forest land area allocated to the State's economic entities, special use forest management board, protection forest management board, people's armed forces, agencies involved in the study and development of technology, training and forest vocational training in addition to forest and forest land area that has not yet been allocated to any entity for management and is under the management of commune people's committees.

Secondly: Forest under the ownership/utilization of households, individuals, the private sector or joint-venture companies is recognized for long term and stable use for forestry purposes.

Thirdly: forest under community ownership/utilization is recognized as forest or forest land area traditionally managed by the local community or allocated by the State for stable long-term management for forestry purposes.

Structure of forest and forest land ownership and utilization rights: By 1/1/2006, State owned forest and forest land amounted to 10,940,379 ha and covered 76% of the total forest and forest land area (including area that had not yet been allocated to any entities and was under the management of commune people's committee as stated in the existing regulations). Forest area owned by households, individuals and the private sector totalled 4,787,762 ha, accounting for nearly 24% of the total land area. The remaining area belonged to community, cooperative and joint-venture enterprises. In the coming years, Vietnam will further enhance forest and forest land allocation to households, individuals, communities and the private sector.

Natural forest ownership/utilization rights: Out of a total of 10,283,173 ha of natural forest in 2005, the state's owned area amounted to 74% (7,649,578 ha) while other economic entities owned 26%. Of this, 5% (501,038 ha) belonged to communities and 19% (1,910,198 ha) was owned by households, individuals and private entities while the remaining area constituted natural forest for lease in accordance with the law on forest protection and development. In coming years, natural forest area owned by the non-state sector will increase in line with current plans.

Structure of plantation forest ownership/utilization: Out of the total 2,333,526 ha of plantation forest in 2005, State owned plantations accounted for 52% (1,223,646 ha) with the remaining 48% belonging to other economic entities. Plantation forests owned by households, individuals and private entities accounted for 40% (944,685 ha) while only 3% (58,432 ha) belonged to communities and cooperatives. In the coming years, plantation forest area owned by the non-state sector will increase as the State has guidance to further allocate plantation forest to households, individuals and communities.

The application of incentives in addition to the implementation of the policy on forest lease should also encourage private sector investment in forests. As a result of these moves there have been recent changes in the structure of forest ownership and utilization. Nevertheless, the majority of natural forest still belongs to the State although there is a tendency for more and more households, individuals and private entities to own plantation forest.

Changes in forest ownership and utilization have not only been reflected in changes in the structure of forest and land ownership/utilization but have also resulted in the establishment of a nationwide forest owners system. Nowadays, households, individuals and village communities who are allocated forest and forest land also become integrated into the forest owners system. Joint ownership schemes are also being established and these include both joint-ventures and ownership by stock-holding companies.

According to the data from the Ministry of Natural Resources & Environment, as of 1 January 2005, there were 1,180,465 forest land owners, including 1,173,829 households and individuals; 1,245 commune people's committees; 1,365 economic organizations; 3,105 other entities in addition to a number of enterprises involved in joint-ventures with foreign partners and enterprises with foreign investment.

Extent of production forests and changes over time

Before 1960, natural forest was the dominant source of forest product production. In 1962, the first national park (Cuc Phuong national park) was set up and marked a break for the establishment of the special use forest system. Subsequently, a protection forest system aimed at watershed protection, erosion prevention and river mouth protection was also established. However, there still existed a large natural production forest area used for forest product supply. By the 1990s degradation and loss of natural production forest had become serious and in 1997 the Government therefore began limiting natural forest exploitation.

During the early 1990s, the total annual wood volume exploited (natural and plantation forest) was around 4-4.5 million m³. Today, natural forest exploitation is around 150 000-300 000 m³/year in addition to 2.5-3 million m³/year from plantation forest (MARD 2007). Placing limits on natural forest exploitation was necessary to prevent further destruction. However, once natural forest is rehabilitated, exploitation, while ensuring sustainable forest management, should be seen as a crucial task of the forestry sector in order to meet increasing demand from the processing and exporting industry.

Following limitations on natural forest exploitation the area of plantation forest and particularly the area of plantation production forest, increased sharply — from a total of 872,275 ha of plantation production forest in 1999 to nearly 1.7 million ha in 2006. Similarly,

the total production forest area in 2006 rose to 13% above that in 1999 — plantation production forest area increased by 92%. By the end of 2006 the national production forest area equalled 5.4 million ha and accounted for 42% of the total existing forest area. Management attention has been focused on the establishment of intensive industrial material zones, sustainable management and use of production forest with emphasis on multi-purpose use and integration of rehabilitated natural forest into the exploitable forest area.

Table 3. Production forest development in recent years

Forest type	Area (ha)		
	1999	2005	2006
Natural forest	3,168,781	3,105,674	3,723,305
Timber forest	2,579,391	2,467,063	2,937,305
Bamboo, rattan forest	321,580	358,278	408,820
Mixed forest	257,643	251,133	323,968
Mangrove forest	8,973	11,795	10,441
Limestone forest	194	17,405	42,410
Plantation forest	872,275	1,382,040	1,678,867
With timber	420,411	477,964	680,952
Without timber	342,794	692,298	766,852
Bamboo, rattan	60,482	75,543	74,763
Specialty species	48,588	136,235	156,300
Total	4,040,056	4,487,714	5,402,172

Source: Government of Vietnam 2001, MARD 2006, 2007.

Status of forest management in the country

Table 4. Forest management status in Vietnam, 2005

	Unit	World ¹	Vietnam ²
1. Forest resources			
Total forest area	million ha	3,952	12.616
Forest cover	%	31	37
Forest area/person	ha/person	0.62	0,15
Changes in total forest area	%/year	-0.21	+1.9
Total volume	billion m ³	434	0.691
Average volume	m ³ /ha	110	76.5 (natural forest) 40.6 (plantation forest)
Average volume/person	m ³ /person	70	8.4
2. Biodiversity			
Primary forest area	million ha	1,422.7	-
Special use forest area	million ha	442.62	1.93
% special use forest	%	11.20	15.20
Changes of special use forest area	%/year	+1.87	-
3. Production function			
Total production forest area	million ha	1,348.40	4.48
- Natural forest	million ha	1,188.60	3.106
- Plantation forest	million ha	159.80	1.382
Change in natural production forest area	%/year	-0.35	-0.33
Change in plantation production forest area	%/year	+0.24	+9.74
4. Protection function			
Protection forest	million ha	367.53 (9.3%)	6.20 (49%)
- Natural forest		335.91	5.33
- Plantation forest		31.62	0.87
% protection forest	%	8.60	12.65
Change in natural protection forest area	%/year	+1.06	-
Change in plantation protection forest area	%/year	+1.41	-
5. Socio-economic function			
Timber exploitation	million m ³ /year	~ 3,000	2.70 (natural forest timber ~ 7.4%)
- Industrial timber		1,800	-

- Fire wood		1,200	-
Changes in wood exploitation volume	%/year	-0.11	-
Wood exploitation volume	billion US\$/ year	64.00	-
Changes in wood exploitation value	%/ year	+0.67	-
NWFP exploitation	billion US\$/ year	4.70	-
Changes in NWFP exploitation value	%/year	+0.80	-
Number of forest labourers	million/year	10.00	-
Changes in forest labourers	%/year	-0.97	-
Private forest ownership	%	16.00	10% (1.2 million ha)
Change in private forest ownership	%	+0.76	-

Source: FAO 2005 (average data for period 1990-2005), GoV 2001, MARD 2006, 2007 (average data for period 1999-2005).

By 2005, Vietnam's 4.48 million ha of production forest accounted for 35.8% of the total forest area. However, the wood volume generated was just ~ 2.7 million m³, mainly from plantation and scattered forest. This situation resulted from enforcement of national policy at the end of the 1990s to limit natural forest exploitation to 150,000-300,000 m³/year. Forest loss, however, still takes place in Vietnam. For instance, in 2005 around 2,744 ha were destroyed and 7,552 ha were devastated by fire (Department of Statistics 2006). Nevertheless, thanks to the presence of policies that strengthen forest protection and management, particularly implementation of national programs 327 and 661, forest area has been constantly increasing. According to MARD (2007), forest area in Vietnam increased at an average rate of 240,000 ha/year between 2000 and 2005. An increasing forest area is seen as one of the crucial indicators of sustainable forest management. According to plans, natural forest exploitation will increase significantly in the future once secondary forest areas have had the chance to regrow.

Protection forest in Vietnam has increased considerably over the last years. In 1993, Vietnam had 2.80 million ha of protection forest covering 32% of the total forest area, and by 2003 this figure had increased to 5.61 million ha, including 4.90 million ha of natural forest and 0.71 million ha of plantation forest (Forest Sector Manual, 2004). The existing protection forest management system is threatened by the fact that state financing, on which it is currently dependent, may not be available in perpetuity. A sustainable solution could be for the protected forests to generate their own benefits. This could be achieved by allowing limited production from protection forest while still taking into account the service functions of the forest.

Over the last 10 years, the government in general and the forestry sector in particular have paid special attention to sustainable forest management. A number of legal documents have been issued, comprising provisions on sustainable forest management and protection as follows: the Law on Forest Protection and Development (2004); the Law on Environmental Protection (2004), the Land Law and others. The State also has large scale implementation programs, such as the 5 Million Hectare Reforestation Program, and policy to reduce natural forest exploitation. In pursuit of State decisions and instructions, the forestry sector has promulgated various policies and regulations that provide guidance on sustainable forest management and in 2007, the Government issued the Vietnam Forest Development Strategy by 2020, which focuses on sustainable forest management and development.

As a reflection of the importance of forest certification in allowing access of Vietnamese timber and NWFPs to world forest product markets, the national working group on sustainable forest management and certification was established in 1998. The working group developed national principles on sustainable forest management based on the international

principles of the Forest Stewardship Council (FSC). By 2007, the national principles were completed and tested in Vietnam.

Currently, there are several forest certification schemes world-wide. However, there are only two globally operational schemes, the FSC and the PEFC (Programme for the Endorsement of Forest Certification Schemes). By the end of 2007, the FSC had certified 913 forest management entities in 78 countries with a total area of 93,898.717 ha. In 2006, the FSC certified the New O.J forest plantation joint-venture company in Quy Nhon (Bình Định) with an area of 9,904 ha. Additionally, other organizations such as SGS Vietnam and Smartwood have granted 145 CoC (chain of custody) certificates to Vietnamese furniture exporting enterprises and timber importing agencies.

Overall state of forest (especially health and vitality) including key problems that undermine sustainable forest management

A central problem confronting sustainable forest management in Vietnam is the lack of unity between central and local authorities. Forest management systems should have transparent and logical policies and institutional structures. The most important issues in creating a supportive policy environment are the relationships between property and land use rights and management responsibilities at different levels and in different sectors. Management mechanisms must provide rights both to enterprises and to forest owners and management systems must be developed in the context of regional and global as well as national issues.

At present, awareness of forestry among individuals and organisations in Vietnam is generally only in relation to direct economic values. There is little concern over the value of forests in terms of environmental protection, recreation, tourism or biodiversity conservation. Non-material benefits of forest, however, provide considerable value for communities and society but as yet have not been commercialized. As a result, enterprises and organizations assigned to manage well stocked forest will reap economic benefits whereas those assigned to manage degraded forest or bare land may have to invest money and wait for long periods to see returns on their investments. This situation also means that protection and special use forest management boards have to operate on limited financing which causes the efficiency of forest management and protection to be similarly limited. Connected major problems include illegal exploitation of timber and forest products and hunting and smuggling of wild animals.

In recent years, the area of plantation forests in Vietnam has increased rapidly although quality is generally low and the average timber volume of mature plantation is only 80 to 90 m³/ha. In relation, if investment is not made in increasing production from plantation forests and natural regeneration the target of increasing forest cover to 43 percent by 2010 as stated in the forestry development strategy may not be attained. Decision No, 147/2007/QĐ-TTg of September 10 2007 on production forest development during 2007 to 2015 that sets the target of planting 2 million ha of production forest will, however, provide some of the support necessary to reach the target. The predominance of pure and even age stands in the national forest plantation stock presents further problems, however, and has resulted in appearance of epiphytotic diseases, affecting both eucalyptus and pine, that may cause great damage to the nation's plantation forest.

Currently Vietnam has more than 6 million ha of 'easy-to-burn forest', consisting of pine forest, supratidal forest, bamboo forest, eucalyptus forest, dry open dipterocarp forest and regenerating forest. During past decades, there has been an average of 16,000 ha of forest burned annually. According to data from the Department of Forest Protection, in the last 40 years (1963-2002) there have been over 47,000 forest fires which damaged over 633,000 ha of mainly young forest, of which 262,325 ha were plantation forests and 376,160 ha were natural forests.

Mangrove forests were rapidly destroyed and converted to aquaculture in the 1980s and 1990s and during the last 20 years, over 200,000 ha of mangrove have been logged and cleared for shrimp pond establishment (Phan Nguyen Hong, 2003). Converting forest land for the establishment of industrial crop plantation such as rubber, coffee, pepper and cashew has also had considerable effects.

Wood and wood products

Production and consumption of wood products

Wood consumption in 1993 was estimated as follows: Sawmills used more than 2 million m³ of roundwood; MDF producers used 70,000 m³, and particle board manufacturers used 140,000 m³. National demand for wood was mainly satisfied through natural forest exploitation and imported wood while plantation forests (consisting of rubber) played only a limited role due to the small amount of saw logs produced by plantations.

The wood processing industry in Vietnam plays an important role in increasing the value of products produced by the forestry sector. Forestry products in Vietnam are diverse and include many classes, from products having undergone minimal processing such as sawn timber, flooring, plywood and chipboard to more processed products for direct consumption such as tea chests, beds, wardrobes, sofas and other furniture.

Table 5 shows wood industry capacity and production in Vietnam for the period 2001-2005. Sawn timber remains the most important product by volume although the production of woodchips is also considerable. Since 2005 there has been significant growth in the production of wood furniture in Vietnam and this is likely to increase as long as supply remains. For most products, however, installed capacity exceeds production due to a shortfall in supply resulting from diminishing timber extraction in Vietnam over the past decade.

Table 5. Average annual wood industry capacity and production in Vietnam 2001-2005

Product	Capacity	Production
Sawn timber	4,000,000 m ³	2,165,000 m ³
MDF	144,000 m ³	84,000 m ³
Plywood	150,000 m ³	60,000 m ³
Paper	970,000 m ³	30,000 m ³
Pulp	682,000 tonnes	642,000 tonnes
Wood furniture	-	1,042,000 m ³ of products
Wood chips	-	1,800,000 bone dry tonnes
Mine pole, scaffold	-	80,000 m ³

Source: Vietnam Association of Timber and Forest Products, 2005.

Table 6 shows that national consumption in 2005 exceeded that in 2003 for almost all wood products and that the value of exports increased at a much higher rate reflecting the focus on value addition and increase in the export of furniture.

Table 6. Volume of wood consumption in 2003 and 2005

Consumption	2003	2005
Consumption of domestic wood and export ('000m³)	7,420	10,063
Large size timber in the industrial sector and civil construction	4,561	5,373
Small timber for panels and wood chips for export	1,649	2,032
Small timber for producing wood pulp	1,150	2,568
Mine poles	60	90
Value of exported forestry products (million US\$)	721	1,700
Wood products	567	1,500
NWFPS	154	200
Fuelwood consumption (million m³)	25	25

The state of the forest product industry and timber processing technology

Currently there are 1,200 timber processing enterprises in Vietnam of which 24% are state owned, 10.4% are joint ventures and 65.6% are non-state owned enterprises. The technology used in Vietnam's wood processing industry has progressed in recent years although there is still a big gap in comparison with the most advanced countries. In the future, if there is no renewal of equipment or update in technology, it will be hard for wood products from Vietnam to compete in international markets.

The total capacity of the saw milling industry is estimated to be 3 to 4 million m³ per year. In 2003, MDF production capacity was 54,000 m³ although recently, a factory with 60,000 m³ capacity was established. Particle board production capacity was estimated at 80,000 m³ in 2003 and in 2001, 6 plywood factories were in operation. Most of the country's sawmills are small and produce only 1000 to 2000 m³/per year. In general, investment in capital is low and the mills can only meet limited demand for products that are of insufficient quality for higher paying markets. The mills do, however, employ many labourers and take advantage of people's available time outside of harvesting periods.

Timber processing technology includes many different areas covering the full spectrum of forest product production from harvesting to finishing of highly processed products. The production of sawn wood in the past was commonly done using crosscut saws and band saws. Both types of saw are, however, slow, have low capacity and are inefficient in terms of wood loss. During recent years, vertical electrically controlled hole saws have been increasingly used and many countries have applied digital technology to design a cutting map before sawing. This technology has, however, not been applied in Vietnam.

With respect to timber drying, there are four methods that are generally available (1) Freeze drying, (2) heat drying, (3) steam drying and (4) air drying. Steam drying is the most commonly used method in Vietnam.

In general, investments in wood and forest product processing equipment have been insufficient in Vietnam and innovation has fallen behind, especially in the Northern region. Proportions of consumption accounted for by different processes and products are as follows:

- Saw milling and wood preliminary treatments account for approximately 40% of the total processing capacity, including domestically manufactured band saws and disk saws as well as one-sided planers, moulding machines and drills, the majority of which are imported from Taiwan, Province of China, People's Republic of China, Czechoslovakia and Japan

- Equipment for refining and finishing timber to produce furniture accounts for about 50% of the total processing capacity and includes three and four side-planers, one or two-axis milling machines, tenon milling machines, multi-bullet drillers, polishing machines, lathes and drying-rooms. In recent years, most establishments have imported comprehensive assemblies and high-tech equipment from Japan, France, Taiwan, P.O.C. and Republic of Korea
- Lines for producing panels account for 10% of the total processing capacity. Some lines are synchronous but many use dated technology and only lines installed since 1995 utilise modern technology and equipment
- Total processing capacity is around 4 million m³ of round timber per year, but only 2 million m³ per year are actually processed

Increasing investments have been made in the pulp and paper industry. However, in general, Vietnam's paper manufacturing facilities are small scale and use dated technology. These factories also cause a lot of pollution, especially those producing non-wood pulp and paper produced in Vietnam is of low quality and cannot compete with imported paper either for quality or price. Recently, new investments have enabled purchase of new technology but product quality has not met the export requirements and other factors also need to be dealt with.

Currently there are nearly 300 paper production facilities in Vietnam but the total capacity is under 20,000 tonnes. The scale of a company necessary to be competitive is about 10 times higher than the current average capacity. For example, new facilities in Thailand, China and Indonesia have capacities of over 500,000 tonnes.

In 2003, Vietnam produced nearly 640,000 tonnes of pulp and consumed approximately 2.6 million m³ of wood. Major raw materials for these companies are woodpulp, waste paper and bamboo and in 2003 the estimated proportions consumed were: 80% woodpulp and 20% non-wooden pulp and waste paper. Demand for woodpulp imports has been gradually increased due to increased requirements for higher quality inputs.

Trade in forest products

Import of raw materials

Vietnam imports a diverse range of raw materials for production of wooden products including roundwood, sawn timber and artificial board types. Import turnover reached US\$250 million in 2002, rising to US\$800 million in 2006 as shown in Table 7.

Table 7. Forest product imports 2002-2006

Year	2002	2003	2004	2005	2006
Value (million US\$)	245.8	250	522	680	800
Quantity (million m³)			2.6		4.5

Wood is imported from Laos, Malaysia, Myanmar, Indonesia, New Zealand, New Guinea, Australia, Guyana, South Africa, Mozambique, Brazil, Sweden, and Russia. Types of wood imported into Vietnam mainly comprise dipterocarps, eucalyptus, followed by Parashorea and Michelia.

Export of timber and forest products

The period 2002-2006 was considered prosperous for the timber industry and timber export business in Vietnam. In 2002 national export turnover of wood products reached US\$219 million; in 2003 it rose to US\$567 million and, with a growth rate of 88%, reached US\$1.1 billion in 2004. In the following years, growth rate remained high at 35% in 2005 and 24% in 2006 to reach nearly US\$2 billion. Within 6 years, export turnover of wood products in Vietnam increased 10 times and in surpassing Malaysia, Indonesia and Thailand, Vietnam became the biggest exporter of wood products in Southeast Asia.

Table 8. Value of export turnover from wood and forest products 1996-2007

	1996	1998	2000	2001	2002	2003	2004	2005	2006	2007
Value current US\$ (million)	60.5	108.1	219.3	334	435	567	1054	1570	1970	2500

Vietnam's export market for wood and wood products is rather diverse and there is no strong dependence on any particular country. In the past 5 years, Vietnam's wood products have been exported to ~120 countries all over the world. Major export markets include the USA, EU, Japan and others. In 2005 25.8% of Vietnamese wood products were exported to the USA; 16% to Japan; 11% to the UK; 6.1% to Taiwan, P.O.C.; 4.6% to France; 4.3% to Germany; 3.5% to Australia; 3.2% to the Netherlands; 3% to Republic of Korea; 2.8% to China; 2% to Belgium; 1.7% to Spain; 1.6% to Denmark; 1.4% to Malaysia; and 17.8% to other countries.

Table 9. Value of wood export markets for Vietnam (unit: million US\$)

	2003	2004	2005	2006
EU	160.74	379.10	457.63	500.23
US	115.46	318.80	566.97	744.10
Japan	137.91	180.00	240.87	286.80
Other countries	271.45	172.00	297.79	470.00
Total	685.56	1049.90	1563.26	2001.13

Source: Vietnam Association of Timber and Forest Products.

In 2005 wood product exports composed: outdoor furniture, 17%; indoor furniture (living room, dining-room), 31.4%; bedroom furniture, 13.4%; office furniture, 4.1%; kitchen furniture, 3.2%; other wooden furniture, 16.8%; wooden furniture combined with other materials, 5.1%; and wooden handicrafts, 8%.

Recently, the growth rate of wood product exports has increased greatly and, in particular, the growth rate of indoor furniture exports has increased rapidly. Export turnover of indoor furniture in 2006 reached US\$501 million, an increase of 46% over 2005. Indoor furniture exports to the US market have especially high growth rates. The export turnover of chairs in 2006 was US\$386 million, an increase of 23% in comparison with 2005. The USA, the EU and Japan are the three largest importers of chairs from Vietnam.

Although export turnover of wooden office furniture is not currently as high as that for indoor furniture, there is considerable potential to increase exportation as wooden office furniture is becoming more and more popular in world markets.

Table 10 shows the volumes and relative profitabilities for a range of wooden products in Vietnam emphasising the reason for the recent growth in furniture exports.

Table 10. Profitability of typical indoor furniture and woodchip factories in 2006

	Indoor furniture	Outdoor furniture (Cam Ha Co.)	Artificial board		
			MDF (An Khe Factory)	Particle board (Thai Nguyen factory)	Woodchips
Product volume (m ³ /per year)	10,000	15,000	54,000	16,500	140,000
Investment (dong/m ³)	6,000,000	7,000,000	9,600,000	9,000,000	535,700
Net profits (%)	12	11	4	3	17

Source: Program on wood processing and forest product business – forestry strategy.

Wood as a source of energy

Extent of wood energy use

Around 20% of fuelwood consumed in Vietnam is marketed while the majority is collected by the user for home consumption. Fuelwood is used mainly for cooking in rural households but is also used for baking bricks, tiles, porcelain and cakes, as well as for processing soft noodles, tofu and candies. Total national consumption of fuelwood is 24.5 million tonnes, equal to 8.805 million Tonnes of Oil equivalent (TOE) as shown in Table 11.

Table 11. Biomass consumption by type and final output (unit: KTOE)

		Type of biomass					Total
		Fuel wood	Rice husk	Straw	Bagasse	Other biomass	
Heat	House stove	6997	665	1950	165	890	10667
	Kiln (construction material)	663	140	-	-	100	903
	Improved stove (agriculture and foodstuff processing)	1145	110	-	100	698	2053
Electricity	Cogeneration of energy	-	-	-	377	-	377
Total		8805	915	1950	642	1688	14000

Source: Institute of Energy 2002.

It has been reported that wood waste has become difficult to sell to households as gas is a preferred fuel. Brick manufacturers and owners of lime kilns do, however, still use wood waste. Large wood processing installations also often use wood waste for heat and power generation but this is not generally practiced at smaller installations.

With nearly 75% of the population living in rural areas, large volumes of biomass including wood, straw, rice husks and leaves are used for energy production. It is estimated that 80% of the population is dependent on biomass for cooking. Moreover, biomass is also an important source of energy for local industries producing bricks, tiles, lime, glazed terra-cotta, porcelain, food and foodstuffs for domestic and export markets.

Total biomass consumption in Vietnam in 2002 was 14 million TOE in which households accounted for 76% of the total consumption. Biomass is utilised at the household level for domestic cooking, cooking pig bran and providing heat for drying, warming and processing.

The total consumption of biomass energy at the household level was 10.6 million TOE, accounting for 76% of total national consumption of biomass energy. Biomass energy is also used for industrial processing and small scale manufacturing, e.g. processing of construction material, sugar and food stuffs. Total consumption of biomass for these applications was 3.33 million TOE, accounting for 24% of the total biomass consumed nationwide.

Areas consuming large quantities of biomass include the Northern mountainous region and the Red River Delta region. Nearly 30% by volume of the biomass consumed for energy production is either industrial by-products or from waste. Although the proportion of biomass in national energy consumption declined from 73% in 1990 to 50% in 2002, the absolute volume of biomass consumed increased from 12.39 million TOE to 14 million TOE.

To 2020, total consumption of fuelwood is likely to fall and methods for using fuelwood are likely to be more efficient. Fuelwood will, however, remain a major source of energy in rural and mountainous areas.

Table 12. Bioenergy consumption by type and area (unit: KTOE)

Areas	Type of biomass					Total consumption	Proportion (%)
	Fuel wood	Rice husk	Straw	Bagasse	Other products		
Household	6997	665	1950	165	890	10667	76
Mountainous & hilly areas	1875	30	150	15	20	2090	
Red River Delta	685	200	1220	20	40	2165	
North Central	1085	140	500	30	120	1875	
South Central	710	130	80	29	240	1189	
Central Highlands	605	-	-	-	32	637	
Southeast	625	60	-	18	140	843	
Cuu Long Delta	1412	105	-	53	298	1868	
Industry — small handicrafts	1808	250	-	447	798	3333	24
Sugar production	-	-	-	377	-	377	
Construction material	663	140	-	-	100	903	
Other	1145	110	-	100	698	2053	
Total	8805	915	1950	642	1688	14000	100

Source: Institute of Energy 2002.

Current status of energy conversion technologies

In Vietnam, direct combustion is still the most popular technology for energy production from biomass. Conditional on the use, purpose and scale, either heat or electrical power is produced.

About three quarters of Vietnamese households use biomass in traditional stoves (for instance three-legged stoves) for daily cooking with low conversion efficiency (8-15%). Ways of increasing the efficiency of biomass conversion and thermal transmission are being investigated and many improved stoves have been introduced, demonstrated and disseminated at the local level.

Manual stoves are used with rice husks for making bricks, with fuelwood for ceramics production and there are also smaller stoves used for processing food (rice noodles, rice cakes, etc.); depending on the type of biomass used, the conversion efficiency of these stoves ranges from 15-35%.

Steam stoves/kilns, the majority of which are foreign-designed, are imported and used for burning sugarcane dregs. Their advantage is in terms of conversion efficiency which may equal 50% or even 80% and they are likely to offer a good opportunity to expand power production capacity in sugarcane factories if incentives and small power service contracts become more favourable.

Large-scale biomass use

The potential of biomass for large scale energy production is considerable although there are some constraints: i) low capacity of installations; ii) high investment rate per unit output; iii) existing habits of using grid based electricity and diesel engines. However, it is likely that exploitation and use of biomass will become more promising in the future, for the following reasons:

- Technological advancement will reduce investment per unit output
- Fossil energy sources will gradually become depleted and prices may increase
- Tendencies are developing towards greater use of clean energy and reduced greenhouse gas emissions
- Support is growing for alternative energy development policies based on requirements for equal energy access, poverty reduction and environmental protection, especially in the areas outside the national grid

Policies and regulations impacting wood energy use

Renewable energy development in Vietnam is in its infancy with only about 1% of national energy supplies coming from renewable sources. In recent decades, Vietnam has attained significant poverty reduction and hunger elimination. However, Vietnam is still a poor country with 75% of the population living in rural areas. Poverty reduction in these areas is a Government priority for the coming years and provision of electricity is an important means of improving villagers' lives and promoting economic development.

Currently, over 80% of villagers use the national electricity grid and this will rise to 95% by 2010. This increase is likely to result in the replacement of other fuels and particularly fuelwood as households begin to use electric cookers and electric lamps as well as electricity in agricultural drying, processing of foodstuffs and manufacture of small handicrafts.

Economics of wood energy use

Major factors affect the production of wood for energy including the soil and aerial environment and the species cultivated. In some countries, short-rotation biomass production is competitive at a price level of US\$2/GJ. This estimation is based on experience with fast growing eucalyptus plantation in Brazil from which energy is produced at an average price of US\$1.7/GJ. Research in the USA showed that with continuous research and development effort, the price of biomass energy could be reduced to US\$1.5/GJ or less by 2020. Other research showed that with increased land prices and increased biomass production, the price of biomass energy in 2020 may be around US\$1.8/GJ while the price of coal in the USA is predicted to be US\$1.3/GJ.

At US\$2/GJ, biomass is competitive with oil at US\$20/barrel. Planting trees for biomass production is an increasing trend around the world and the possibility of biomass becoming fully commercialised as an energy source in the coming years is made much more likely by oil prices of over US\$100/barrel.

Potentials for increased wood energy use

Wood which is used for fuel in Vietnam may come from natural forests, plantations, scattered trees, household land and from waste produced by the timber processing industry. The following estimates relate to each of the sources:

- The sustainable supply of fuelwood from **natural forests** is around 0.5-1 tonnes/ha/yr and the total volume of fuelwood extracted from natural forests is therefore estimated at 6.8421 million tonnes/year (Institute of Energy 2001)
- The total area of **plantations** in 2002 was estimated at 1.8 million ha. If it is assumed that average forest growth is 6 m³/ha, it may be assumed that 50% of the harvested volume may be used for fuel and that the specific volume of wood is 0.7 tonnes/m³; the total potential volume of fuelwood from plantations is 3.781 million tonnes/year
- On **non-forested land** where trees are well protected and regeneration takes place, a fuelwood yield of 0.4-0.5 tonnes/ha/year may be expected. The total volume of fuelwood extracted from non-forest areas (hilly land) in 2002 was 3.85 million tonnes
- If the average growth of different tree species is estimated at 5 m³/ha and 60% of wood harvested is used for fuel, **dispersed plantings** of 3 billion trees (equivalent to 3 million ha) are estimated to be able to supply 6.05 million tonnes per year

Fuelwood may also be harvested from cash crop and fruit trees including rubber, cashew, coconut and other fruit trees such as orange, pomelo and rambutan:

- **Rubber:** From now until 2010, it will be necessary to re-plant an average of 5,000 ha/year of rubber. The volume of timber extracted will be 100 m³/ha. The percentage potentially used as fuelwood is 50%, equivalent to 35 tonnes/ha. Thus a total of 175,000 tonnes per year will potentially be available. In addition, in the area not yet replaced, the exploitable fuelwood volume is 0.5 tonnes/ha on average
- **Tea:** A volume of approximately 0.5 tonne/ha/year is collected from annual thinnings of tea plantations that could be used for fuelwood
- **Cashew and coffee** potentially yield between 0.5 and 1 tonne/ha/year
- **Coconut:** each of the 150-160 coconut trees per hectare has 13 new leaves annually and each dry peduncle weighs around 1 kg. Apart from the leaf peduncle, bark and coconut husks are also major fuel materials. On average, each hectare of coconut trees may provide 6.5-7 tonnes fuelwood/year. The total annual volume of fuelwood from this source is more than 2.39 million tonnes

Wastes from the timber-processing industry may also be used as fuel and these include sawdust, wood chips, off cuts and odds and ends. The volume of timber waste comprises some 60% of the round timber input. The annual volume of sawlogs consumed is 800,000 m³, producing around 800,000 tonnes of timber waste. Apart from this timber waste, fuelwood may be derived from reclamation of construction timber, fences, houses etc. According to overall calculations the amount of waste which can be used as fuelwood is 1.65 million tonnes.

According to recent calculations, the total of sustainable biomass production in Vietnam is about 77,869,800 tonnes, including 25,360,800 tonnes of fuelwood. Other material may also be derived from agricultural by-products and wastes as shown in Table 13.

Table 13. Summary of potential agricultural wastes for energy production

Biomass type	Potential (million tonnes)	Harvest coefficient (%)	Actual capacity (million tonnes)	Capacity of electricity (MW)
1. Rice husk	6,504	23	1,5	75-100
2. Straw	32,500	-	-	-
3. Sugarcane dregs & sugarcane leaves and tops	4,500	63	2,80	150-200
	2, 000	80	1,60	70-100
4. Coffee cover	0,075	-	-	-
5. Timber waste	0,8	10	0,08	5
6. Energy trees	To be clarified			
Total	-	-	-	300-405

The potential for utilisation of biomass for energy production in Vietnam is huge — agricultural by-products alone account for an annual production of over 50 million tonnes and this is in addition to 25,360,800 tonnes of wood potentially available for energy production. The total potential electricity generation capacity from biomass is around 450 MW (Nguyen Duc Cuong 2001).

Non-wood forest products (NWFPs)

Main NWFPs and their economic significance

NWFPs in Vietnam are classified into 6 groups:

- (1) Fiber products such as bamboo, rattan, and leaves;
- (2) Food stuffs including bamboo shoots, vegetation, leaves, fruits, grains, spices; honey, wildlife, swallow nests and edible insects;
- (3) Medicinal plants and aromatic substances;
- (4) Extracted products such resins and oils, essential oils and stains;
- (5) Forest animals and products of forest animals, birds and insects, and
- (6) Other products such as decorative plants, leaves for packing food and goods.

Vietnam has a tropical monsoon climate and complex topography resulting in a diverse and plentiful flora including many NWFPs. Vietnam also has a large area of bamboo forest of nearly 1,489,000 ha of which 1,415,500 ha are natural forest and 73,500 ha are plantation. Vietnam also has over 3800 herbal species (Nguyen Tap, 2006); over 1000 tree species that can provide oil, resin and tannin; 200 species of bamboo (Nguyen Hoang Nghia, 2005) and 40 species of rattan.

Areas most important for NWFP production include bamboo forests (mostly within natural forests), rattan stocks within natural forests (381,936 ha), resin trees covering an area of 255,718 ha and cinnamon trees covering 80,991 ha. Other NWFPs are generally of less significance at the national level (MARD, 2006).

Table 14. Major NWFPs and their export value (unit: 1000 US\$)

NWFP	1999	2000	2001	2002	2003	2004	2005 ¹
Honey	2,054	3,609	5,669	16,541	18,692	17,930	8,038
Pole, branch	231	276	423	398	305	854	626
Cinnamon, anise	8,309	9,134	10,329	11,022	11,715	11,912	5,108
Medicine	5,703	5,746	6,164	6,467	6,747	6,575	2,371
Resin and flora extraction	4,089	4,335	4,700	4,172	4,939	5,651	2,110

Bamboo and rattan material	6,523	5,068	4,626	7,621	8,830	9,911	4,071
Chemical products from nature	1	141	46	40	29	863	488
Essential oil from flora	3,157	3,680	2,922	3,433	3,595	6,044	1,180
Products from rattan, bamboo, rush	48,216	65,932	73,216	88,747	99,737	138,218	63,860
Total	78,283	97,921	108,905	138,592	154,589	197,958	87,852

¹ for the first 5 months in 2005
Source: Customs Office 2005.

As shown in Table 14, rattan, bamboo and rush products are the most economically important NWFPs in Vietnam and account for 60-70% of the total export value. Other products such as cinnamon, anise, honey, medicinal plants, resin and essential oil also play a significant role and are of great importance for the livelihoods of local people. In 2004 the total export turnover of NWFPs was US\$200 million, 2.5 times that in 1999. In general, growth rates for NWFP export are high at an average of 15-25%/per year. Bamboo and rattan are, however, increasing at over 30% per year. NWFPs from Vietnam have been exported to around 90 countries and regions over the world (MARD, 2006).

There is great demand for NWFPs and forest products for village level handicraft production. Handicraft production is a pastime that attracts many villagers after harvest periods and which serves to increase villagers' income. Processing of NWFPs creates jobs and income in rural areas and is an important part of the local economy. NWFPs account for 15% to 25% of household income in some forested regions. Products and handicrafts manufactured include: statues, objects of worship, interior furniture, bookshelves, small boxes and souvenirs. These products are usually made from hardwood from natural forests. Currently, there are 432 villages making wood products, mainly in Ha Tay, Thai Binh, Ninh Binh (northern area), Thanh Hoa (central region) and Can Tho (southern region). These villages create jobs for nearly 100,000 villagers, of which women account for 20%. Export of wooden products from villages had increased from US\$7.5 million in 1996 to US\$40 million in 2005.

Status of management of NWFP resources

Currently, neither MARD nor the provinces have established departments in charge of NWFP management. State management of NWFPs concentrates on creating a legal framework for NWFP conservation and development and includes contents detailed in the following paragraphs (MARD, 2006).

Since 1992, the Government has promulgated policy to encourage investment and development of forests. Accordingly, forest owners may borrow capital with preferential interest rates if they include NWFP management. Additionally, the Government has tax reduction policies related to activities such as forest plantation establishment and tree planting on bare land and denuded hills, which includes planting of NWFPs.

The Government also has policies on the inheritance of benefits from land and forests allocated or contracted to households and individuals. Recently, the Government has promulgated the following initiatives:

- An action plan for 2007-2010 on NWFP protection and development
- A MARD approved project on NWFP preservation and development 2006-2020 (Decision No, 2366-QĐ/BNN-LN dated August 17 2006).
- Documents relating to trade in rare flora and fauna according to the CITES Convention

At the provincial level, the Department of Agriculture and Rural Development approves documents and grants licenses to organizations for the exploitation of bamboo in production and protection forests. District People's Committees grant exploitation licenses to forest owners including households, individuals and communities. They also issue regulations to allow forest owners to exploit and transfer NWFPs (except where harvest of species is forbidden).

The service functions of forest

Significance of forest-based recreation

Forests play an important role in recreation through the system of national parks, nature reserves, cultural and historic areas and the wide range of natural beauty spots in the country.

Ecological tourism is booming in Vietnam with a high and stable economic value. Especially in national parks, nature reserves and beauty spots, ecological tourism has brought benefits for many local regions. The tourism and landscape value of Thac Ba Lake has been estimated at up to VND530 million/year, the National Park of Ba Be at VND1.5 billion/year and the average value of each hectare of forest is estimated at VND209,000-278,000.

Urban forestry

The urban population has increased in Vietnam from 17% of the national population in 1990 to 23.45% in 1999, more than 24% in 2002 and nearly 26% in 2006. By 2004 there were 708 towns classified into: two special cities, two cities (level I), 14 (level II), 20 (level III), 52 (level IV) and 618 (level V). Among them, there are five central cities, 82 provincial towns and 621 small towns. However, badly-controlled and poorly planned urbanization has had impacts on health, the environment, natural resources and ecological balance. Urban planning also pays little heed to the ratio of land area for construction and for tree planting or open spaces. Moreover, some areas, once planted, have subsequently been developed.

The proportion of planted land in urban areas of Vietnam is below world average. Generally, trees have been planted mainly in big and medium size cities. Small towns have not been significantly planted and contain only very small areas of parks and trees. Many towns are lacking trees altogether and face associated challenges. The planting target in towns averages 0.5 m²/person, which is equal to only one fortieth the figure for modern cities of 20 m²/person (Thanh Ha 2006). Moreover, the average land area available for planting in towns is small and trees and parks are unevenly distributed. For example, in Hanoi and Ho Chi Minh City the average area of land for trees is 2 m² person whereas in Da Nang it is only 0.5 m²/person.

These problems have resulted from the lack of suitable mechanisms and policies to involve economic sectors and people in the development of trees in urban areas. The management of trees in urban areas is unclear and inadequate and the limitation in land area has resulted in changes to plans for tree planting. The tree species selected for parks and streets are not suitable in many cases and therefore the extent of green cover and the function of urban trees is not fully realised.

To increase the coverage of trees in urban areas according to construction plans and sustainable development principles, the Ministry of Construction has completed procedures for tree planting in urban areas. The Circulation No 20/TT-BXD on management of trees in urban areas made by the Ministry of Construction is based on the general regulation that trees in urban areas must be owned and managed by individuals or organizations. Planting must be carried out according to plans for urban construction and guidelines detailing appropriate species. The selection of trees must be done based on local characteristics, climate and soil

conditions, as well as utility requirements, landscape considerations, traffic safety and the environment without causing harm to infrastructures.

Forests and water

Forests play an important role in the protection of watershed areas in Vietnam. They help to retain soil, control erosion and prevent sedimentation and the accumulation of mud and sand from runoff; they help regulate flows of water, reduce flooding and improve the quality of water. The disappearance of forest through unplanned exploitation or change in land-use can bring serious consequences in relation to changes in the level of protection for the watershed area.

Forests play important roles in reducing surface flow and increasing the absorption of water into soil. Research has shown that surface flow beneath forests is 2.5 to 2.7 times lower than in agricultural areas (Thai Phien and Toan 1998). Surface flow in natural forests may be 3.5 to 7 times less than in plantation forests (Bui Nganh et al, 1984, Vo Dai Hai, 1996). In natural forests, the velocity of absorption of water into the soil is 16.8 mm/minute compared to 10.2 mm/minute in plantation forests and 2.1 mm/minute in grass-plots or shrub covered areas (Hoang Niem 1994, Vu Van Tuan 2003).

Evergreen broad-leaved forests with cover of 70-80% can prevent 9.5-11.7% of rain water from falling to the ground and vegetation cover of 30-40% can prevent 5.7% in this context. If vegetation cover is reduced from 70-80% to 30-40%, soil erosion will increase by 42.2% and flow on the ground will increase by 30.4%. Similarly, if the cover of *Pseudoxylanthera* sp. is reduced from 70-80% to 40-50% erosion will increase by 27.1% and surface flows will increase by 33.8% (Nguyen Ngoc Lung and Vo Dai Hai, 1997). Forests and especially those with multi-layered canopies are very useful and efficient in retaining water in the wet season and supplying water in the dry season (FSIV & IIED 2002). In recent years, floods have had serious impacts in some Central and Northern provinces, and some of this has resulted from deforestation.

The important roles of the national protection forest system are included in forest management regulations under the 2004 Law on Protection and Development of Forest and in Prime Minister’s Decision No. 186/2006/QĐ-TTg. A range of measures to restore and develop protection forests are included in the Forestry Development Strategy.

Conservation of biodiversity

By 2003, Vietnam had established 128 special-use forests (Protected Areas) covering 2,228,149 ha or 11.7% of the total forest land and 6.7% of the total natural land area. The system of special-use forests includes 30 national parks, 60 nature reserves and 38 landscape reserves (Table 15).

Table 15. The system of protected areas in Vietnam

Grades	Number
I, National parks	30
II, Nature reserves	60
a) nature reserves	48
b) species/habitat reserves	12
III, Landscapes protection areas	38
Total	128

Vietnam has also developed programs and plans for the protection and restoration of rare and valuable species that are at risk of extinction. This includes development of parks, botanical gardens and centres for animal rescue (Table 16).

Table 16. National parks and constituent vegetation diversity

National parks	Number of species	Genera	Families	Herbal plants	Timber trees
Ba Be	369	272	98		
Ba Vi	812	472	99	250	
Bach Ma	1406	635	170	108	200
Ben En	597	412	134	177	
Cat Ba	745	495	149	350	265
Cat Tien	1362	638	151	310	440
Con Dao	882	562	161	165	371
Cuc Phuong	1983	915	229		
Hoang Lien	2024	771	200	428	123
Pu Mat	1165	-	-	-	-
Tam Dao	904	478	213	-	-
Yordon	566	290	108	227	116
Total in Vietnam	11,373* 11,000**	2524 2342	378 318	-	-

* Nguyen Nghia Thin (1997).

** Tran Dinh Ly (1993).

To protect bio-diversity, the Vietnamese government has promulgated a series of legislative instruments including the Law on Environment Protection (2004), the Law on Protection and Development of Forest (1991, 2004) and the Ordinance on Crops and Domestic Animals (2004). Vietnam is also signatory to several international conventions including: the Convention of Biodiversity (1994), RAMSAR (1989) and CITES (1973). The Government has also issued some important biodiversity-related documents including the Strategy for Sustainable Development in Vietnam (2004); the Strategy for National Environment Protection by 2010 and Orientation for 2020; the Plan for National Action on Biodiversity (1995, 2007); the Plan for National Action on Reinforcement of Control over Trade in Wild Animals and Plants by 2010; and the Plan for National Action on the Protection and Sustainable Development of Tidal Land. The Government is also drawing up a Law on Biodiversity to submit to Congress.

Forests and climate change

The rapid increase in fuel consumption for transport, everyday activities, manufacturing, and farming and its association with waste and the degradation and loss of forest areas has resulted in projected increases in global temperatures as a result of greenhouse gas emissions. Vietnam, with its long coast and many rivers, is one of the countries expected to be most severely and most directly impacted by climate change. More than one third of its population and around 16% of the land area will be impacted by sea-level rise and hundreds of animal and plant species will be under threat of extinction.

As global temperature increases, polar ice caps will melt and break up with resulting sea-level rise. By 2100, the sea-level is predicted to rise by between 0.69 and 1 metre. If this materialises, Vietnam will face damage amounting to an annual cost of US\$17 billion; 17 million inhabitants will be directly impacted; 12.2% of the country's most fertile farming areas may disappear; and coastal regions and provinces in the Red River and Mekong Deltas may become prone to flooding.

Each year, Vietnam is hit by between five and eight large storms and tidal surges that result in economic, social and environmental damage. In the past, people and their property were well protected from natural disasters by the system of dykes, the natural mangrove areas and coastal plantation forests. In recent years, inland deforestation has increased to contribute to flooding and inundation in coastal riverine areas and many other regions. Moreover, the

removal of mangroves for aquaculture, tourism development and urbanization has increasingly impacted the lives of coastal communities. The restoration and development of mangroves is therefore very important and necessary for coastal protection.

The very important roles of forests in climate regulation, especially in sequestering and storing carbon, have been made clear in recent years. The value of carbon stored in natural forests is VND35-77 million/ha and the value of CO₂ absorption is VND5-13 million/ha/year. With respect to plantation forests, the value of CO₂ absorption is estimated at VND1 to 7 million/ha/year (Vu Tan Phuong, 2007).

To contribute to efforts to combat the effects of climate change on the country and on the world, Vietnam is signatory to the United Nations Framework Convention on Climate Change (UNFCCC, 1994) and the Kyoto Protocol. It has also developed and implemented a number of programs to protect and develop forests across the country in relation to climate change threats. Major programs have been implemented such as programme 327 (1993-1998), the Five Million Hectare Reforestation Programme (1998-2010), the Program of Forestry Promotion, the National Action Plan for Biodiversity (1995, 2007) and the National Action Plan for Protection against Desertification (2006-2010).

Protective roles of trees and forests

The East Coast of Vietnam is regularly subject to storms and typhoons from the South China Sea. Every year there are around 10-15 storms and typhoons which cause damage to houses, buildings and trees and also result in flooding, landslides and water logging. As such, storms and typhoons strongly impact on people's lives and national production.

Landslides usually happen in mountainous regions in the wet climatic zones of Vietnam, especially in places without forest cover. Every year, Vietnam has thousands of landslides that result in loss of life and damage to infrastructure including damage to dykes, burial of dwellings and fields, drainage of reservoirs, lowering of water tables causing localised water shortage, exposure of hazardous substances and pollution of water courses.

Around the world, floods have been continuously reported in recent years and are a frequent threat to inhabitants living in mountainous areas especially areas without forest. Flash floods occur over a period of hours or a day and the interval between peak rainfall and flood peak may be around 2-3 hours. The damage to infrastructure may, however, be considerable. Reduction in forest area in recent years has made flash floods more frequent in many places throughout the country, especially in the northern mountainous areas (for example Ha Giang, Lao Cai, Yen Bai, Son La, Cao Bang, Bac Can) and the Central Highlands.

Three quarters of Vietnam's terrain comprises hills and mountains and within this area more than 20 million people live. The Government has promulgated laws to manage, use and develop forest resources and improve the living standards of local inhabitants in these areas including the Land Law (1993, 2003), Forest Protection and Development Law (1991, 2004), Environmental Protection Law (2004) and Vietnam's Forestry Development Strategy for the period 2006-2020 (2007).

Wildlife management

The biodiversity of Vietnam is threatened by excessive consumption of animals and associated products and from habitat destruction. Many of the species which are threatened are forest dependent. According to WWF, Vietnam presently has around 700 species of flora and fauna which are endangered at the national level and 300 which are threatened worldwide. Forty-nine species are highly endangered. Surveys have shown that many local people do not understand basic laws on endangered species conservation and habitat

protection. Therefore, raising awareness and responsibility in relation to biodiversity conservation is both necessary and urgent.

Vietnam has formulated a legal framework and made considerable efforts to fight the illegal wildlife trade as well as having joined CITES some time ago. In 2007, Vietnam elaborated and implemented a national biodiversity work plan for 2010 and vision towards 2020 and implemented the Biodiversity Convention and Cartagena Biodiversity Safety Protocol.

Policy and institutional framework

To enable appropriate forest management and use and in accordance with the law on forest protection and development 1991; 2004, forest in Vietnam is divided into three main categories: protection, special use and production forest. The State uniformly manages and disposes of natural forests and forests developed with the State's capital; planted forest where the ownership right has been transferred to the State; wild forest animals; forest micro-organisms; and the forest landscape and environment. The State hands over forest use rights through forest allocation and lease; recognition of forest use rights, and rights or ownership rights over planted production forests; and regulates rights and obligations of forest owners. MARD is responsible to the Government for nationwide forest management, protection and development. The Government regulates organizational structure, tasks and authorities of professional forestry agencies from the central to district level and forestry officers working in communes, towns and in large forest areas.

The Forestry Development Strategy introduced a new concept of the forestry sector as follows:

Forestry is a specific technical economic sector, including all activities connected with commodity production and services from the forest, such as reforestation/afforestation, harvesting, transportation, production and processing of forest products, and providing environmental services related to forests; the forestry sector plays very important role in the protection of the environment, biodiversity conservation, and poverty reduction, particularly for the people in the mountainous areas, and contributes to social stability and to national defence security.

Recently, the Government has promoted socialization of forestry by issuing the Land Law (1993, 2003), the Forest Protection and Development Law (1991, 2004) and the Forestry Development Strategy to 2020 (2007). Promotion of land and forest allocation and lease of forest to individuals, farmers, communities and non-state owned economic sectors is evidence of the Government's effort to socialise forestry. These efforts will provide significant livelihood support to about 24 million people living in mountainous areas and will contribute greatly to sustainable forest management. The Government is improving the legal framework to foreigners and foreign companies that want to invest in forest and forest land or do business in forestry.

General trends as regards forest policies and legislation

The Forestry sector has made some significant strategic changes in accordance with renovation as shown in Figure 1.

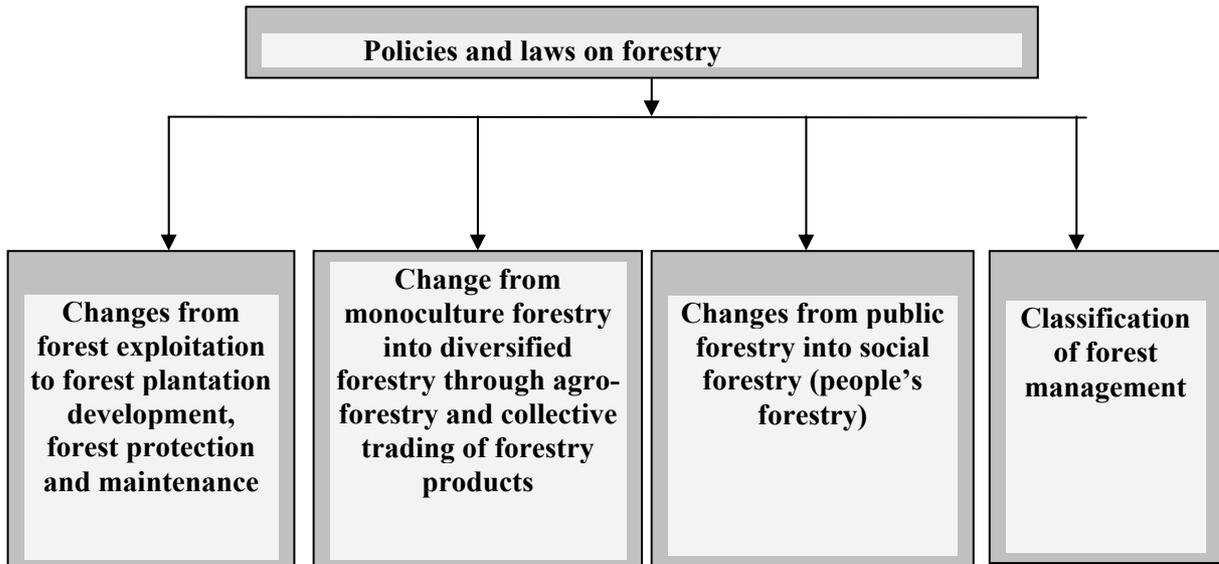


Figure 1. Trends in forestry laws and policies

As shown in Figure 1 there are four trends underway in forestry as follows:

First trend: Changing from exploitation and use-based forestry into plantation development, protection, enrichment and maintenance of forest through classification according to purpose (special-use, protection or production), limitation of exploitation and closure of natural forest and expansion of plantation forests.

Second trend: Changing from extensive production and monoculture forestry to intensive and diversified forestry including agro-forestry and collective trading of forest products. This trend is made clear in the implementation of economic forest plantation development in support of the forest product processing industry and increases in investment for economic forest plantation according to forest and tree types. Forestry not only encompasses timber trees but also the development of NWFPs, long-rotation industrial trees and fruit trees.

Third trend: A gradual shift from public forestry to people's or social forestry with the participation of various economic sectors. Social forestry development is identified in the following ways:

- Gradual restructuring of state forest enterprises throughout the country. All state forests must be rearranged in two ways: (1) They must be maintained, strengthened and transformed into forestry companies, they must implement accounting mechanisms, be given the right of control and be self-financing while taking responsibility for production and trading efficiency; (2) some state forest enterprises must be transformed into forest management boards acting as non-productive organizations; (3) some state-owned forests must be transformed into other types of trading enterprise
- Promoting private forestry: all economic sectors should be encouraged to take part in forestry through forest and land allocation, lease and contracts for organizations, households and individuals; preferential investment and credit policies; policies on benefits from forests; policies for promoting farmstead economies and tax exemption

Fourth trend: Classifying the level of state management of forestry and forest product production and trading. The classification of state level management of forestry must be carried out according to the regulation that more power must be given to local bodies. Similarly the Government should not be deeply involved in forestry related trading activities and production.

The classification of production and trading management is based on two systems of forest owners. Forest owners involved in production and trading enterprises such as forestry based companies, joint venture enterprises, joint stocks companies and those involved in non-productive management organizations such as management boards for protection and special-use forests.

Recent policy changes that have impacted forests and forestry

With the reforms in forestry since 1986, the Government has issued some important laws relating to forestry policies resulting in important projects/programs as follows:

- Planning of three types of forests and policies for land and forest allocation
- Program of tree planting on bare land and denuded hills (program 327)
- Five Million Hectare Reforestation Program (program 661)
- Program for exploiting, processing and trading forest products
- Program for reform of state forest enterprises

The impacts of each program are detailed in the following sections.

a. The impacts of the planning of three types of forests and forest and land allocation

The classification of the three types of forests (special-use, protection and production) has been implemented throughout the country, creating a legal framework for the management, development and promotion of protection and exploitation of other benefits of forest. The total forest land area is 16.24 million ha, of which 2.16 million ha are special-use forest; 5.68 million ha are protection forest and 8.40 million ha are production forest.

Forest and land have been allocated to organizations, households, individuals and communities to promote a system of forest owners throughout the country and assure that each parcel of land and forest is clearly owned and managed. According to the Ministry of Natural Resources and Environment (2007), by September 2007, more than 8 million ha of forest land had been allocated to more than 1.1 million organizations, households and individuals. Additionally more than 20,000 labourers working in state forest enterprises and nearly 90,000 households and individuals have received contracts to protect, plant or to regenerate natural forests or plant trees in state forest enterprise areas or in special-use or protection forest areas. The policy has involved thousands of workers in mountainous communities in sustainably managing, protecting and using benefits from forests (Ministry of Natural Resources and Environment 2007). According to available statistics, in 2002, there were 368 state forest enterprises; more than 100 special-use and protection forest management boards; 1.1 million households had been allocated forest land and communities in 1,203 communes and 146 districts in 24 provinces were taking part in the management and sharing of benefits from forests.

A survey carried out in some mountainous provinces showed forestry had contributed some 15-20% of the total income of households and in provinces with greater forest cover, the income from forestry contributed 30-40% of total household income.

b. Impacts of Program 327

Program 327 has established new protection and special-use forests, providing improved conditions for benefiting from forest services such as biodiversity protection, the protective and ecological functions of forests, reducing the impacts of natural disasters and protecting water resources. According to statistics from the Ministry of Planning and Investment,

between 1993 and 1997 the Government invested VND2,314,58 billion in program 327, 58% of which was in forestry, 15% in agriculture, 19% in infrastructure development and 8% in non-productive organizations.

Under program 327, forests have been well protected and deforestation from slash and burn cultivation and illegal and uncontrolled logging has been limited. Through contracts, investment and lending to households, the program has enabled production of forest products and advantages including establishment of mixed forests, large native tree species and fruit trees which function to provide economic, environmental and poverty alleviation needs.

Program 327 attracted many workers from minority groups, created jobs, improved incomes and social welfare for thousands of households, contributed to the construction of infrastructure and has improved the livelihoods of people living in mountainous and hilly areas. Results have also included adjusting labour demands between regions, encouraging new models of commodity production, intensifying farming through new technology to increase yields and improve household economic conditions.

c. Impacts of the Five Million Hectare Reforestation Program (Project 661)

Project 661 is a national program that began in 1998 replacing the 327 program. The program has contributed greatly to restoration of forests throughout the country, especially in some Northern and North Central mountainous areas (Table 17). The program increased national forest cover from 33% in 1999 to 39% in 2006 with average annual growth of 1% and has made the following achievements:

- In the period 1998-2005, the program allocated 2,261,966 ha/year of protection and special-use forests and established 1,267,126 ha of new protection and special-use forest — equal to 63% of the project's 2010 target. Investment for special-use and protection forests has come from the Government and from international organizations
- In the same period, 770,350 ha of production forests were planted equalling 26% of the 2010 target. Of this area, 683,396 ha were for industrial roundwood and 86,954 ha were fruit trees
- Bare ground has been planted in many places to control erosion, floods and natural disasters and to help regulate climate, while natural forests have been restored and increased in areas for watershed protection
- The quality of plantation forests has been improved and in protection forests, many multi-purpose trees have been planted to improve farmers' income and provide protection, including bamboo, *Rhamnoneuron* sp, *Camellia oleifera*, *Canarium* sp, *Litsea* sp and *Camelia sinensis* var *assamica*). The success rate has reached 80-90%
- The program has built and upgraded establishments for research, tree breeding and forest plantation and production related activities. The program has also produced high productivity trees through cross-breeding and has improved multi-purpose trees through selection; it has developed seed production, cutting and tissue culture technologies
- The program has brought benefits to mountainous communities, creating jobs and income for households and reducing poverty
- The program has been implemented in 60 provinces and cities, involving more than two million labourers in protection, production and regeneration of forests. It has increased the income of households, especially where the contribution of forestry to household income was high
- Many nurseries, forest roads, guard stations and fire fighting stations have been built through the program

- Through the program, many international organizations have supported and invested in the protection and development of forests. In the period 1998-2005, 45 projects supported by the United Nations, bilateral donors, NGOs, the World Bank and the Asian Development Bank have been implemented. Twenty-four donors have also pledged to support and invest in the program

Table 17. Results of Project 661 (period 1998-2005)

TT	Targets	Targets by 2010	Implemented 1998-2005	Percentages of target by 2010
I	Quantity (ha)			
1	Allocated forest through contract for protection		2,261,966	
2	Plantation forests	5,000,000	2,037,496	41
2.1	Protection and special-use forests	2,000,000	1,267,126	63
-	New plantation forest	1,000,000	631,318	63
-	Regenerated and maintained forests	1,000,000	635,808	64
2.2	Production forests	3,000,000	770,350	26
-	Forests for industrial materials	2,000,000	683,396	34
-	Fruits and industrial plantation	1,000,000	86,954	9
II	Invested capital (VND million)	33,000,000	5,916,248	
1	Central budget	8,500,000	3,317,848	39
2	Local budget		246,717	
3	Loans from credit		1,552,995	
-	Foreign capital		371,077	
-	Equity of forestry enterprises		301,283	
-	Capital from resources tax		126,328	

Source: Ministry of Agricultural and Rural Development (2005).

d. The program of exploitation, processing and trading of forest products

The targets of the program are to limit the exploitation of timber from natural forests, to increase processing and value addition, to gradually switch from using materials from natural forests to plantation forests and to develop the forestry industry on the basis of market demand. Achievements of the program include the following:

- The program has limited the volume of timber extracted from natural forests. In the early 1990s, the volume of wood consumed was about 4-4.5 million m³/year of which about 1.5-2 million m³/year were harvested from natural forests. Recently, the figure has fallen to about 2.2 or 2.5 million m³, of which 400,000-500,000 m³ were from natural forests (including 100,000-200,000 m³ from forest conversion), and 1.5 to 2.5 million m³ were derived from plantation forests. The quantity of imported wood was 3 to 4 million m³ per year
- In the early 1990s, nearly 30 provinces were given rights to exploit timber in the natural forests but now only 14 have rights that are based on principles of sustainable harvest. Natural forests in provinces where exploitation rights are not given have been closed for restoration and maintenance for 10 to 15 years. Efforts to limit exploitation of natural forests have been successful and resumption of natural forest exploitation should now be considered
- State forest product enterprises have been rearranged according to the policy of privatization. Inefficient enterprises have been combined and a national processing industry network has been formed

There are about 300 enterprises specializing in wood processing for export. There are 88 enterprises processing bamboo, 40 processing rattan, 713 cooperatives and villages processing and weaving rattan and bamboo and more than 342,000 labourers amounting to 25.4% of employment in handicraft manufacture. There are 115 state enterprises, 10 joint stock companies, 36 limited companies and 170 privately owned enterprises producing medicine from herbal plants. There are also companies importing and exporting pharmaceutical products. There are also five plants processing pine resin with the capacity of 15,000 tonnes/year and a number of enterprises extracting chemical products from raw materials.

Paper and wood processing industries have increased capacity and production and have significantly increased the importance of the sector. Increased value addition has also been a focus. For example, in 2005, sawn timber accounted for only 14% of the total value of the processing sector whereas construction and civil woodwork, boats and transportation accounted for 60%, woodwork (fine arts) 13%, man-made boards 8.4% and rattan and bamboo 4.2%:

- The processing industries have supplied jobs for thousands of people. This sector has attracted nearly 520,000 labourers of whom 115,200 people work in saw mills, 1,750 in board processing factories, 830 in MDF plants, 5,900 in pulp mills, 85,700 in paper mills and 310,600 in forest product manufacturing. The actual number of workers in the forest product processing sector is larger than officially estimated since there is no formal estimation of small-scale processing establishments such as households
- The private sector plays an important role in forest product processing activities clearly shown in the structure of percentages of processed industrial product production of main forestry goods in the future

e. Program for renovation of state enterprises

The targets of the program for renovation of state enterprises are to rearrange the structure and management of state forest enterprises (LTQD) to improve production efficiently and for trade, to contribute to the protection and development of forests and to advance socio-economic development. Impacts have been as follows:

a) Restructuring and renovation of state forest enterprises have reinforced and improved the management of forests, solved problems of land shortage, and provided local people with cultivated land. According to a report issued by the Ministry of Forestry (currently the Ministry of Agricultural and Rural Development), there were 412 state forest enterprises after re-registration under Decree No 388/CP dated January 20 1991. By 2002, this number had fallen to 368 enterprises, a reduction of 10.7% compared to 1991. In 2002, there were 5,000,794 ha allocated to these enterprises, equalling 15.2% of national natural land and 81.2% of the area allocated in 1991. By 2006, the land area managed by state forest enterprises was nearly 4 million ha.

From 1991 to 2002, the Government reclaimed land from 222 of 358 state forest enterprises and in 38 out of 41 provinces and cities which had state forest enterprises. The total reclaimed land area amounted to 1,204,800 ha. This land was re-allocated to households under the control of local authority for long-term stable use. From 2002-2006, 300,000 ha of state forest enterprise land were transferred to local authorities. This has been a continuous process with priority given to households, individuals and communities.

b) The program has led to better protection, plantation forests have been enlarged and raw material supply sources have been geographically consolidated. By 2002, 534,580 ha of forest had been planted. Of this 320,281 ha were production forests equalling 59.9% of the total plantation forest area. The areas managed by 316 state-forest enterprises have been re-planted and this has helped to form concentrated regions for industrial timber supply in combination

with associated processing industries. Different regions specialise in different products including a region supplying paper materials (Phu Tho, Vinh Phuc, Tuyen Quang, Yen Bai, Ha Giang, Dong Nai) and a region supplying wooden posts for mines (Quang Ninh, Lang Son, Thai Nguyen, Bac Giang). By 2006, state-forest enterprises (forestry-based companies) had planted 600,000 ha.

c) Some state forest enterprises have applied agro-forestry and forestry-agriculture models and reduced monoculture. Forest structure and silviculture have also been addressed. Different forestry models have been implemented including mixed forest plantation, planting fruit trees with forest trees, raising animals under forest canopies, planting pine trees with acacia trees on poor land, planting cinnamon trees for natural regeneration-oriented protection, selecting trees according to site to shorten production cycles and implementing aquaculture in mangroves and tidal forests.

Some state-forest enterprises have invested in intensive methods, used improved seeds, implemented guidelines on land suitability for different species, adopted tissue culture and cuttings using high productivity trees to replace former methods; as such productivity and production have increased from 70 m³/ha/year to more than 100 m³/ha/year with a rotation of 6 to 8 years.

Some state forest enterprises have implemented natural regeneration as a low cost and rapid means of forest rehabilitation. Thousands of hectares of natural forests have been re-established with this method and more forests have been formed, contributing to protection forest area in the country.

Some small-scale forest product processing establishments have been formed by state-forest enterprises to optimise use of raw materials, supply services for local inhabitants and improve the economic efficiency of forests as well as the efficiency of production and trade of forest products.

In addition to these major programs, the Forestry Development Strategy includes a number of programs to be implemented to 2020 as shown in Box 1.

Box 1. Forestry Development Strategy Programs

I. Sustainable forest management and development program

Objectives

To manage, develop and use forest sustainably and effectively to meet the basic demands for forest products for domestic consumption and export; to contribute to national economic growth and stabilization of society, particularly for mountainous ethnic minority areas, while ensuring protection functions, biodiversity conservation and providing environmental services that contribute to sustainable national development. Key aims of the program include:

- Managing and sustainably utilising forest areas planned for production, including 3.63 million ha of natural forests, 4.15 million ha of plantation forests, and 0.62 million ha of forest planned for agro-forestry activities
- Allocating or leasing all forests and forest land to forest owners by 2020
- Improving the quality of 0.5 million ha of poor natural forests by enrichment and planting 200 million scattered trees annually to meet fuelwood demand in rural areas
- Establishing 1 million ha of plantation forest by 2010 (including 0.75 million ha of production forests, and 0.25 million ha of protection forests)
- Carrying out inventory of forest resources and strengthening forest resource data.
- Forestry enterprises to develop, implement and monitor forest management plans
- Certifying at least 30% of production forests for sustainable management by 2020
- Investing in modern equipment for forest product processing

II. Program on forest protection, biodiversity conservation and environmental service development

Objectives

To protect forests and conserve biodiversity in an effective manner with the active participation of local communities and enhance the contribution of environmental services from forests.

III. Forest product processing and trade program

Objectives

To produce internationally competitive products mainly on the basis of sustainable domestic sources for wood and NWFPS; apply advanced and environmentally friendly technologies to meet the basic demands for domestic consumption and for export; and to develop the forest product processing industry to become a key economic factor of the forestry sector.

IV. Program on Research, Education, Training and Forestry Extension (RETE)

Objectives

To improve the quality and effectiveness of RETE activities to develop high-quality human resources for the forestry sector. Science and technology are the basis for sectoral development. Research and training are linked with production and markets to increase the contribution to economic growth of the forestry sector, to protect the environment and to improve the livelihoods of people working in forestry activities.

V. Program on renovating the forest sector institutions, policy, planning and monitoring

Objectives

To create a favourable legal environment for forestry activities according to market orientation and international integration, with the broad participation of households, communities and the private sector. To strengthen the organizational system while planning work and monitoring in the forestry sector are enhanced.

Institutional arrangements for forest management — the role of the public and private sectors

Under MARD, the Department of Forestry has rights to manage, develop and exploit products from plantation forests. The Department is also responsible for protecting natural forest resources, managing forest products and implementing the law to protect forests.

The system of forestry management from the central to the local level is not comprehensive or united. There are no forestry branches in some provincial Offices of Agricultural and Rural Development and the difference between the number of forestry officers and forest rangers in provinces, districts and communes is considerable. According to statistics from the Department of Forestry, in 2005 there were 559 officers in forestry branches or in departments of forestry under the control of Offices of Agricultural and Rural Development where there are no branches of forestry. Three hundred and twenty eight officers are stationed in the Northern provinces and 231 in the Southern provinces. In 2005, there were 9,500 forest rangers — 8,200 of them were personnel and the rest contract labourers.

State-forest enterprises were once considered to be the main agents of forestry production but are now being rearranged in three main ways: (1) Becoming accountable companies authorized to self-finance and being responsible for efficiency and productivity; (2) In certain cases, becoming Boards of Forest Management and acting as non-productive organizations; (3) Moving some state-forest enterprises into other business or dissolving them.

Many promotional policies have been launched by the Government to encourage all economic sectors to take part in agro-forestry through land and forest allocation, lease or contracts to organizations, households and individuals. Many preferential policies have also been issued including favourable investment, credit and tax rates, policies related to benefits from forests and to promote farmstead economies.

State of research and education in the forestry sector

In the forestry sector, a network of education and research organisations exists including research institutes, universities, schools of forestry, local forestry related organizations and forestry related non-government organizations.

The Forest Science Institute of Vietnam is the main forestry research institute. The institute was formed in 1961 with six departments specializing in silviculture, forestry economics, forest product processing, forest restoration, forest resources and vegetation and forest protection. There are also four centres for the study of seeds, bio-technology, ecology and forest environment, and special forest products, and two centres for the study and transfer of forest technologies and application of silviculture. Nine regional centres are located in Sonla, Vinh Phuc, Phu Tho, Quang Tri, Gia Lai, Lam Dong, Dong Nai, Ca Mau and Ho Chi Minh city.

The University for Forestry in Xuân Mai specializes in forestry education. It was formed in 1964 and remains one of the most important centre for study in the sector. There are other similar establishments including the University of Agriculture and Forestry in Thu Duc, Ho Chi Minh city, the Highland University, the University of Agriculture and Forestry in Thai Nguyen, University for Agriculture and Forestry in Hue and the high school for Agriculture and Forestry in Quang Ninh.

The forestry sector has focused on tree breeding and development of propagation technologies by cuttings and tissue culture. By 2006 pine, acacia, eucalyptus, melaleuca, casuarina, and chukrasia were affirmed as having advanced stocks from 30 sources. Many high productivity

varieties (20-25 m³/ha/year for eucalyptus, 15-20 m³/ha/year for *Acacia auriculiformis*, and more than 30 m³/ha/year for hybrid acacia) have been put into production and this has greatly increased the productivity and effectiveness of forest plantations.

Basic studies have been completed including species classification, growth and yield studies, land and forest classification, and forest monitoring to supply basic statistics for planning forest development. Some studies on bio-diversity have also been carried out and many rare animals and plants have been found and protected.

Studies have been conducted on natural forest restoration, forest enrichment, classification of protection forests and establishment of fig tree, wattle, pine, acacia and eucalyptus plantations. Causes of forest diseases have been discovered as have treatments both biological and otherwise. Software for fire forecast using satellite photographs has also been developed.

In the process of studying the forestry industry, advances in equipment and tools have been made including timber cutting machines — disk saws, planers, veneer peeling lathes and small sawing machines; wood drying technology — production of boards, synthetic lining agents; using timber from plantation forests and using post-consumer wood products. Models of community forestry and agro-forestry and silvo-fisheries have also been developed to improve the incomes of local and mountain communities.

Key issues and an overview of the overall state of forests and forestry

Key forest and forestry issues in Vietnam

- (1) Pressure on land and forest products is increasing, especially in mountainous areas which are short of agricultural land and where there is free population movement.
- (2) Natural forests have not been managed sustainably.
- (3) In many areas, the quality and bio-diversity of natural forests is falling.
- (4) Plantation forest rotations are long, profits are low, investment is risky and plantation is mostly located in mountainous areas where levels of development are low and the competitiveness of plantation forests is limited due to the quantity of natural forest in the area and the returns available from other crops.
- (5) The growth of forestry and its contribution to GDP is very small (about 1.2%) because forest protective functions and environmental services have generally not been identified and the contribution of forest product processing and export is not taken into account.
- (6) The forest product processing industry has made great achievements in recent years but without stability, plans or strategic vision. Competitiveness has not been high enough, no brand has been developed in world markets, there is lack of capital for modernization and wood availability has been unstable and dependent on foreign sources.
- (7) Forestry has not efficiently reduced poverty or brought jobs to people who work in the field. Incomes are low and unstable, most forestry workers are from mountainous areas and cannot live on forest work alone and the lives of forest officers are difficult.
- (8) Although the system of forest policies is comprehensive, it is asynchronous in that some policies do not support the socialization of forestry and introduction of market mechanisms. Some new policies and mechanisms for forest development and forest product processing have not been implemented in time to stimulate other economic players such as households, communities and individuals to become involved in forestry.
- (9) The socialization of forestry should make considerable changes but there are still disadvantages in managing forest and forest land and the progress of forest and land allocation or allocation of forestland use rights is slow. Some local authorities hesitate to allocate land and natural forests to people, especially to households and

communities and some private economic actors do not consider the situation in the field.

- (10) Forest management is not united and remains dispersed. The quantity, quality and ability of forest officers working in management, science or technical areas, does not meet the requirements laid down by market requirements and economic integration. The management of forests is classified according to locality but the system is inefficient as a foundation for policies and mechanisms or as a material, technical or financial base.
- (11) Technology transfer does not meet requirements for production and demand; there is a lack of available methods to use millions of hectares of poor natural forests and bring income to local mountain communities. The network of organizations promoting forestry is thin and weak.

Overview of the status of forests and forestry in Vietnam

Status of forest resource and forest land of Vietnam

- (1) Vietnamese forests have high levels of biodiversity with about 15,000 species of plants, 310 vertebrate species, 840 bird species, 286 reptile and 162 batrachian species. The forestry sector has actively contributed to ecosystem conservation and preservation of valuable and rare animal and plant genetic resources.
- (2) Forest cover has increased with the establishment of plantations, special use forests and protection forest throughout the country. In 1990 the forest area was 9.1 million hectares covering 27.8% of the national land area, in 2003 it was 12 million hectares covering 36.1%, and in 2006 it increased to 12.61 million hectares, covering 37%.
- (3) The area of plantation forest has increased, but the harvestable forest area is small as the majority is immature or is not production forest and the yield of plantation forest is not high. Timber species currently account for only a small area of plantation forests.
- (4) Average timber stocking in natural forests is low (70-80 m³/hectares) and the area of rich forest (> 150 m³/hectares) accounts for only 20% of the existing natural forest area. Timber resources are concentrated primarily in three areas: Central Highlands, Northern Central region and Southern Central region. These areas account for about 70% of total reserves.
- (5) In Vietnam there is only 0.15 hectare of forest per person and 9.16 m³ timber per person, in comparison with the world average of 0.97 hectares of forest per person and 75 m³ timber per person.
- (6) Unused forestland in the country amounts to 6.76 million hectares, of which most is bare land and denuded hills. These areas will pose challenges to the future development of forestry production since they comprise mostly sloping and degraded land.
- (7) Forestry product processing has developed rapidly to meet domestic demand and contribute to export turnover. Between 1990 and 1995, export turnover of timber and forestry products remained at around US\$200 million per year compared to US\$2.5 billion in 2007.
- (8) Forestry has contributed jobs and improvement in living standard for about 25% of the Vietnamese population living in or near forests.
- (9) Forestry sector operations are moving from state-ownership with a centrally planned structure to socialized forestry with multi-component economic institutions operating under market conditions to produce commodities. Statistics show that the private sector is the main force behind forest product processing in the country.

3. WHAT WILL INFLUENCE THE FUTURE STATE OF FORESTS AND FORESTRY?

Overview of the changing characteristics of society

Until 2007, the Vietnamese population was more than 84 million people, three quarters of whom lived in rural areas (Statistical Office 2007). About 24 million people have settled in rural areas. Most highland farmers make a living from forest and relevant forestry activities, so forest and forest land play an important role for their livelihoods. People living in mountainous and rural areas are often poor due to a suboptimal market approach, weak infrastructure, poor land, backward farming, and people have low cultivation standards. The poor in remote areas often depend on forests, NWFPs and forest land to cultivate crops. In addition, the growth of population in these areas is high, creating pressure on forest and forest land.

The Government has promulgated policies for forestry socialization, raising the living and educational standards of rural people, and gradually decreasing the gap between urban and rural areas. Since 1994, forest land allocation to organizations, individuals, and households to use in the long term for forestry purposes has been conducted extensively nationwide. Especially in 2003, the Government introduced the Land Law and then the Forest Protection and Development Law (in 2004). According to these laws, households or individuals are allocated areas to use that are smaller than 30 hectares within 50 years. Besides, households or individuals can carry out various transactions according to land use rights.

Socially, Vietnam has made notable achievements. People's living standards have been improved. Human resources have been enhanced, particularly in rural and mountainous areas. However destitution is still high and the risk of returning to poverty is present, especially among ethnic minority groups in remote areas.

Policies and laws have been issued or amended in accordance with market mechanisms and international integration, step-wise to create a full, safe and convenient legal environment for production and business. However, the economic law system is incomplete and needs to be addressed (MARD, 2007).

International and domestic context

International context

Integration into regional and global economies is indispensable for all countries and Vietnam in particular. The country should adjust towards an open-door policy, reducing and removing tariff and non-tariff barriers and liberalising exchange of commodities, services, capital and technology among countries. Vietnam should develop industries and fields that have competitive advantages, establish an independent, self-regulated economy and efficiently take part in the international division of labour. The Asia-Pacific region continues to be a dynamic developing region. China is playing an increasingly important role and following the financial crisis in 1997, ASEAN countries are restoring the momentum of development and improving competitiveness.

Domestic context

By 2020, Vietnam's population will reach about 100 million, with the population growth rate falling from 1.5% between 2001 and 2010 to 1.3% between 2011 and 2020. Vietnam's GDP growth rate was 8.17% in 2006 and 8.5% in 2007. Average per capita income in Vietnam in 2007 was US\$835 and in 2008 it is expected to reach US\$960. If GDP average growth rate stays at an estimated 7.2% per year, per capita GDP will reach US\$1,050-1,100 in 2010

although the figure may be higher as the present GDP growth rate is 8.5% per year. Recent achievements in Vietnam's national situation include the following:

- The fast pace of economic growth
- The economy continues to modernise and industrialise
- Social capital is increasing rapidly
- A socialist-oriented market economy is established and the macro economic situation is stable
- Integration internationally has resulted in important advances
- Education and training have been well developed
- The political situation and society are stable

Some weaknesses are evident:

- The quality of socio-economic development and the competitiveness of the economy are weak
- The national economic structure is changing slowly
- The socio-economic infrastructure does not meet development requirements
- The socialist oriented market economy has many restrictions and there is lack of balance at the macro level
- Integration into international and external economies has many restrictions
- A number of problems related to culture and society are urgent but are resolved only slowly, especially with respect to training and human resource development, which are falling behind the pace set by rapid economic development.

Demographic changes

Vietnam's population has increased rapidly over the last century. At the beginning of the last century, Vietnam had about 15 million people. By 1940, this figure had increased to 25 million. By 2006 Vietnam's population was more than 84 million with an average density of 254 people/km² — five times greater than the world average. The Red River Delta has the highest population density at about 1,225 people/km² as shown in Table 18. The Northeast area and the Western Highlands have the lowest population densities and are hilly and mountainous with most inhabitants belonging to minority groups.

Table 18. Population density in different areas of Vietnam in 2006

Region	Population ('000s)	Area (km ²)	Population density (people/km ²)
Red River Delta area	18,207,9	14,862,5	1,225
Northeast area	9,458,5	64,025,2	148
Northwestern area	2,606,9	37,533,8	69
Northern Central region	10,668,3	51,552	207
Southern Central littoral area	7,131,4	33,166,1	215
Western Highlands	4,868,9	54,659,6	89
East Nam Bo	13,798,4	34,807,7	396
Cuu Long Delta River	17,415,5	40,604,7	429
Vietnam	84,155,8	331,211,6	254

Source: Statistical Office 2007 (<http://www.gso.gov> accessed 12/2007).

Vietnam's birth rate is likely to decrease in the long term although in 2003 there was a slight increase (Table 19). The birth rate in Vietnam in 2003 at 2.23 children per female is approximately the rate necessary for replacement and is below the regional average (Statistical Office 2005).

Table 19. Vietnam's crude birth rate, crude death rate and natural increase rate

Year	Crude birth rate (births per 1000 people)	Crude death rate (deaths per 1000 people)	Natural increase rate
1998	21.1	5.6	15.5
2000	18.6	5.6	13.0
2001	19.0	5.8	13.2
2002	17.5	5.8	11.7
2003	19.2	5.4	13.8

In recent years, economic development and processes of industrialization, modernization and urbanization have taken place with rapidity and have attracted many domestic and overseas investors as well as a huge number of labourers from rural areas. From April 2004 to March 2005, there were 278 000 emigrants — equivalent to 3.36 persons per 1000 people. Among the eight geographic/economic zones in the country, the Southeast only experienced immigration from other areas (7210 people), while the Southern Central Littoral region experienced the highest rate of emigration (2770 people), followed by the Northern Central region (2380 people). The area with the lowest rate of net emigration was the Western Highlands (180 people), followed by the Red River Delta area (590 people) (Central Statistical Office 2007).

The political and institutional environment

MARD manages and directs the forest sector and the Prime Minister approves guidelines, important policies and the sector's organization. Other policies relating directly to the sector are issued by MARD. The government's role in forestry and forestry sector management is being strengthened but is increasingly being distanced from production and business management by increasing the role of households and the private sector, especially in forest product processing and trade.

Decentralization of forestry management has been a concern of the Vietnamese government for a long time. This has been especially so since 1998 when the Government issued decisions to assign responsibility for forest management to authorities at provincial, district and commune levels. For example, in the past national parks were under the direct management of MARD. At present, all except eight national parks are under the direct management of MARD. The eight remaining parks, and national nature reserves, are managed by local government. Province level government has responsibility for local forest resource management according to the plan approved by MARD.

Economic changes

Growth rates of income including changes in its distribution

There is diversity of economic sectors in Vietnam but key sectors of the economy are still under state management. After 1986, Vietnam's economy developed rapidly and achieved an average growth rate of around 9% from 1993 to 1997 before falling to 8.5% in 1997 and to 4% in 1998 <http://vi.wikipedia.org/wiki/1998> due to the Asian financial crisis. Subsequently it increased to 4.8% in 1999 and from 6 to 7% between 2000 and 2002. After that, GDP increased continuously from 7.3% in 2003 to 8.17% in 2006 as shown in Table 20.

Table 20. GDP and GDP growth rates 1986-2006

Year	GDP (US\$)	Annual GDP growth (%)	Year	GDP (US\$)	Annual GDP growth (%)
1986	109.2	2.8	1996	213.8	9.3
1987	113.1	3.6	1997	231.3	8.2
1988	120	6	1998	244.7	5.8
1989	125.6	4.7	1999	256.2	4.8
1990	132	5.1	2000	273.6	6.8
1991	139.6	5.8	2001	292.5	6.9
1992	151.8	8.7	2002	313.2	7.1
1993	164.1	8.1	2003	336.2	7.3
1994	178.5	8.8	2004	362.4	7.8
1995	195.6	9.5	2005	393	8.4
			2006	425.1	8.2

Source: Statistical Office 2007 (accessed from Wikipedia 2007).

The contribution of the forestry sector to GDP varies according to the economic situation of the country, the region and the world. Export of Vietnamese agricultural products such as rice, pepper, coffee, tea, rubber, joinery and NWFPs has increased consistently but the percentage contribution to GDP fell from 42% in 1989 to 16% in 1999. In 2006, the contributions of different sectors to GDP were as follows: agriculture 16.0%, forestry 1.2%, industry and construction 41% and services 38% (Wikipedia, 2007).

The contribution of agriculture, fisheries and forestry to GDP fell from 24.5% in 2000 to about 21% in 2005. The contribution of the forestry sector to GDP has remained low at 1.3% in 2000 and 1.2% in 2005. The contribution of agriculture fell from 19.8% in 2000 to 15.9% in 2005. Comparison of the relative contributions of the two sectors shows that although forestry makes a smaller contribution, it has been better maintained.

It should be noted that the contribution of the forestry sector to GDP would be considerably greater if the forest product processing industry were included. Present statistics only include the value of planned main operations and not the value of forest products extracted, processed and marketed. Forest services such as watershed and coastal protection and urban environmental amelioration, and values associated with biodiversity conservation, genetic resource conservation and ecotourism are also not accounted for in calculations of the contribution of forestry to GDP.

Changes in the employment situation and its implications on forestry and the forest industry

Forest management, protection and development employ a huge labour force. According to the Ministry of Natural Resources and Environment (MONRE), as of September 2007, more than 1.1 million households together with hundreds of communities and collectives had land and forest allocated and became forest owners. Therefore, the implementation of land and forest allocation policies attracted more than 2 million rural labourers in mountainous areas. Within the framework of the 5 Million Ha Reforestation Program 2.261 million ha were allocated for forest protection and regeneration for the period 1998-2005 with a total investment of almost 100 billion dong. Planting operations also create job opportunities through activities such as nursery management, planting, tending, harvesting and processing.

The forestry sector and especially the timber industry play an important role in employment creation and income provision for many Vietnamese, especially in rural and mountainous

areas. According to the MONRE (2007), up to September 2007 there were more than 8 million hectares of forest land allocated to more than 1.1 million organizations, households and individuals. Additionally, there were more than 20,000 labourers working in state owned forest plantations and about 90,000 households and individuals were allocated land for protection and assisted natural regeneration and for afforestation in state owned forest plantations, protection forests and special use forests. Measures taken also attracted thousands of workers from communities in rural and mountainous areas to take part in forest management and protection for which they received benefits (MONRE 2007).

The timber and export forest product processing industry has developed strongly in recent years and has made an important contribution to increased employment. The forestry sector has played an important role in increasing incomes for Vietnamese people, especially for farmers in mountainous areas.

Forests in the context of improving rural economies

Forests play an important socio-economic and environmental role and are linked to the livelihoods of nearly 24 million people living in and adjacent to forests — most of them belonging to ethnic minorities. Forests are one of the major sources of income in farmer households in mountainous areas. The relationship between forests and rural livelihood improvement includes the following links:

- Some forest land is converted into agricultural land for rubber, coffee, and cashew and for cattle grazing
- Timber and NWFPs contribute significantly to the income of the rural population. According to research findings, income from forests accounts for 10-20% of the total income of rural households. Especially in industrial forest zones, income from timber and NWFPs represents up to 50-60% of the total income of rural households

Social objectives included in the National Forest Strategy (NFS) to 2020 are to increase income and eliminate poverty and reduce by 70% the total number of poor households in key forest areas; to complete forest and forest land allocation and lease to organizations, enterprises, households, individuals and communities before 2010; and to increase the number of well-trained forest workers by 50% (MARD, 2007).

Future energy demand and its implications on forests

Vietnam's economy is largely agriculture based with about 75% of the population living in rural areas. As such, energy from fuelwood plays a very important role. The annual demand for fuelwood in Vietnam is about 22-23 million tonnes. According to Vietnam's Forestry Development Strategy (MARD, 2007), demand for fuelwood will rise from 25 million m³ per year in 2003-2005 to 25.7 million m³ in 2010 and will level off at 26 million m³ to 2020.

The Government has implemented programs to plant forest not only for industries and environmental purposes but also to meet the huge demand for fuelwood. Besides formal programs, there are about 200 million scattered trees planted in the country each year. These trees could provide about 5 million m³ of small wood and fuelwood and 15 million m³ of firewood for construction and energy needs in rural areas and reduce pressure on natural forest (Handbook of Forestry Sector, 2004).

Emerging trends in the production of fuel and potential implications for the forestry sector

Vietnam is exploiting energy resources such as coal, gas and crude oil but these resources have gradually been exhausted. Supply of anthracite resources extracted in Quang Ninh will

be sustained for an estimated 100 years while other types of coal such as peat coal, flame coal and pitch coal will only meet demand for 20-50 years. Vietnam has 10 defined oil and gas reservoirs and has assessed their potentiality. However, because the reserves are not great and are far from the coast, exploitation is likely to be difficult. With existing reserves, Vietnam could extract 30-40 million tonnes up to the year 2020 but according to forecasts gas and oil reserves will be exhausted by 2040. Vietnam also has the potential for mining uranium ore for nuclear power development. However, to exploit this resource, Vietnam needs to apply new technology and improve its human resources.

According to inventory data, the total hydropower reserves of the 10 main rivers in Vietnam are 17,000 MW with a power production potential of 82 billion kWh/year. Due to a range of factors, economically exploitable potential is not more than 50 billion kWh/year — 30 billion kWh/year in the north, >10 billion kWh/year in the Central area and more than 8 billion kWh/year in the South. It is important to note that hydropower sources are dependent on water resources and that the role of forests in soil protection and water level regulation is very important.

Vietnam has enormous potential for fuelwood development and scientists have estimated that natural forests are likely to provide about 41 million tonnes of fuelwood/year, shrub and other vegetation 25-26 million tonnes/year, forest plantations 1-2 million tonnes/year and scattered trees 8-10 million tonnes/year with a total of 70-80 million tonnes per year (26-28 million tonnes of oil equivalent). Planting trees such as *Jatropha curcas* on denuded hills and bare land to produce biofuel also holds huge potential. Other important forestry sector functions are to develop and protect watershed forests in order to maintain water sources for hydroelectricity generation.

Impact of globalization and regional and sub-regional integration

Vietnam is a member of ASEAN and the WTO. The development of the world and the region will strongly impact upon the domestic situation. There are chances to advance economic and social development in general and in relation to the forestry sector in particular.

Globalization creates many chances for development but can also create inequality and other great challenges for each country. Competition within markets and over natural resources, energy, capital and technology may all cause undesirable effects. Science and technology and especially information technology have also developed rapidly and have led to deep change in society across the country.

Peace, cooperation and development are the era's tendencies not only in the region but also in the world. Global problems related to population, the environment, financial and economic matters, food security and disease are, however, posing difficulties. Requirements for cooperation and development are becoming increasingly important as economic sectors have become increasingly interrelated, with the forestry sector being no exception. Developments such as the regional economic corridor connecting Vietnam's North with Southwest China will create many chances for economic development as well as development in agricultural and forestry production.

Foreign investment in Vietnam is changing significantly and in general, Overseas Development Assistance (ODA) is falling while Foreign Direct Investment (FDI) is increasing. Investments tend towards zones with convenient investment environments and productive sectors with high economic returns.

The trends currently experienced will impact strongly on the country's economic situation and more generally on national politics and society. They are chances for advancing socio-economic development in general and the forestry sector in particular. Besides opportunities,

Vietnam also faces challenges. The most pressing challenges are the state of the economy, the gap in development level between Vietnam and other countries, the risk of lagging behind economically and the threats posed by bureaucracy and corruption which still exist in complicated forms.

4. PROBABLE SCENARIOS AND THEIR IMPLICATIONS

Vietnam's socio-economic development to 2010 and beyond

The main socio-economic development orientation of Vietnam to 2010 and scenarios to 2020 will be based on the following criteria:

Economy

- GDP growth between 2006 and 2010 will reach 7.5-8% per year and GDP in 2010 will be more than 2.1 times that in 2000, per capita GDP will reach US\$1,050-1,100
- By 2010, agriculture will account for 15-16% of GDP, industry and construction for 43-44% and services for 40-41%
- Total export turnover will increase by 16% per year
- By 2010, total national investment capital will reach 40% of GDP
- Telephone use will rise to 35 telephones per 100 people and internet use to 12.6 subscribers per 100 people
- By 2020, Vietnam will have become an industrialised country

Society

- In 2010, the population growth rate will be 1.14% and by 2020 population will reach 100 million people
- The proportion of the labour force occupied in agriculture in 2010 will fall below 50% of the total labour force
- According to the new standard, the proportion of poor households will fall to 10-11% by 2010 from 22% in 2005
- By 2010 universal secondary education will be available and 200 people per 10,000 will study to university and college level. Trained labour will constitute 40% of the total social labour
- Average life expectancy in Vietnam will reach 72 years by 2010

Environment

- By 2010 forest cover will increase to 42-43%
- By 2010 95% of urban inhabitants and 75% of rural inhabitants will have access to clean water
- Newly constructed production facilities will apply low-waste technology or be equipped with pollution abatement and waste disposal devices; over half the country's cities and all industrial and export processing zones will have sewage disposal systems and 90% of common solid waste, 80% of hazardous waste and 100% of medical waste will be collected and treated

Strengths, weaknesses, opportunities and threats

Future scenarios for national development and for forestry sector development will depend to a great extent on the interplay between the drivers of change outlined in section 3. While some of the drivers of change may be conservative in their probable trajectories, others may fluctuate or change direction leading to widely divergent situations. In determining probable future scenarios it is useful to review strengths and weaknesses, opportunities and threats in relation to national socio-economic development:

Strengths and opportunities

- Dramatically higher national and international demand for forest products; Vietnam's high rate of economic development and international integration is likely to create a major opportunity to expand forest production and forest product processing, trade and business activities and increase income for rural households and communities as well as state-owned and private enterprises
- International integration has created opportunities to improve the national investment environment, to enter global forest product markets, to make use of advanced technologies and financial investments, especially in the development of the timber and NWFP export processing industries, to speed up implementation of sustainable forest management and to create opportunities to develop plantations for industrial raw material supply
- The State, society and the international community have paid more and more attention to forest protection and development
- Socialization of the forestry sector has become institutionalised through implementation of the multi-sector economic development policy and forest land allocation and lease, facilitating mobilisation of social resources for forest protection and development
- Plantations have provided profits for foresters and encouraged local people to invest in planting in areas with sustainable demand

Weaknesses and threats

- High rates of population growth, free immigration and ineffective use of agroforestry results in pressure on forests and expansion of agricultural land
- Higher demand for forest products puts pressure on forest resources and especially natural forests. At present, the demand for forest products exceeds sustainable supply and the area of high yield forest plantations remains limited and fragmented
- The competitiveness of forest product production remains low and international integration is creating both opportunities and challenges for forest product processing and trade. Vietnam will face fierce competition in international and national markets
- The area of depleted natural forest is huge and to improve the quality of this area large, long-term investments are required. However, financial efficiency is generally low and the attractiveness to households and investors is accordingly limited; therefore State support is required
- The need for fast, comprehensive and sustainable growth in the forestry sector to match resource requirements is limited by human resource, infrastructure, capital and management related constraints

Scenarios up to 2020

Key factors affecting forestry and society in Vietnam include GDP and demand for forest products and services, international markets and trade, climate change and environmental policy and implementation of the land allocation program. Of these, the most volatile driver of change is likely to be GDP and the associated demand for forest products. At present, the economies in the USA and Europe are nearing recession and inflation rates are running high in Vietnam. Demand in the region remains strong and the economic powerhouses in the region — China and India — have shown little sign of slowing.

Two possible scenarios are envisaged for economic development as shown in Table 21. Scenario 1 follows a business as usual path where the contribution of agriculture to the economy decreases, that of industry and construction rises and the contribution of services remains relatively constant. In scenario 2, higher rates of growth are realised, the contribution

of the agriculture sector falls more dramatically while industry and construction grow more strongly. The contribution of services again remains relatively constant.

Table 21. Economic development scenarios to 2020

	Scenario 1			Scenario 2		
	2006-2010	2011-2015	2016-2020	2006-2010	2011-2015	2016-2020
GDP growth rate (%)	7.17	7.36	7.42	8.00	7.36	7.66
- Agriculture	3.54	3.16	2.88	2.65	2.43	2.13
- Industry and construction	8.70	8.81	8.68	9.87	9.21	9.33
- Services	7.30	7.41	7.36	8.52	7.00	7.11
	2006	2015	2020	2006	2015	2020
Total GDP (VND billion, current prices)	872,688	1,643,780	2,350,574	-	-	3,200,000
- Agriculture	173,356	232,198	267,554	-	-	-
- Industry and construction	362,883	773,413	1,172,790	-	-	-
- Services	336,449	638,196	910,230	-	-	-
Sectoral contribution (%)	2005	2015	2020	2005	2015	2020
- Agriculture	20,50	14,13	11,38	20.50	12.57	9.66
- Industry and construction	41,00	47,5	49,89	41.00	48.66	52.55
- Service	38,5	38,82	38,72	38.50	38.77	37.97

With greater economic growth and an increased focus on industry and construction, it is probable that agricultural livelihoods will become less attractive and that greater urbanisation and rural to urban migration will occur. This may have a number of opposing effects on forestry depending on the specific area concerned and the nature of markets for forest derived goods and services. Possible effects include increasing costs of forest management and scarcity of labour, increased investment in trees and other perennial crops by absentee landlords, increased demand for forest products for construction and growing demand for environmental services by increasingly wealthy urban populations. The way in which these opposing effects play out will be closely linked to the policy environment and the strength of policy implementation. Current efforts to allocate land to individuals, families and enterprises should, however, increase the responsiveness of production to demand for different products. Production of environmental services is likely to be much more dependent on centrally implemented policy given the difficulties associated with establishing markets for environmental services.

The effectiveness of the Vietnamese forestry sector in capturing opportunities and responding to threats will largely depend on reforms that are currently underway and the depths to which they are implemented. As such, the land allocation program is a key determinant of the future of the forestry sector in Vietnam. Currently, land allocation is approximately 50% complete in the country and is progressing more slowly than expected due to difficulties associated with conflicting land claims and boundary disputes. This is especially the case in forest areas where inventories often have to be conducted before allocation takes place due to the value of the established forest.

Although land allocation has resulted in increased forest productivity, there are impediments to large scale production occasioned by implementation of the program. As such, investors cannot secure large areas of land for plantation establishment without negotiating and forming agreements with many farmers/land owners. This has the desirable effect of increasing equity but may impede rapid increases in production and may also lead to lack of uniformity in production as many small scale producers cultivate different products at different times.

Transferring forest rights to individuals and families has also had the undesirable effect of reducing plantation rotation length and decreasing the potential availability of sawlogs in

comparison with pulp logs. Efforts have been made to lengthen rotations and increase production of sawlogs by encouraging farmers to sell thinnings for pulp production to gain interim income. There is, however, some reluctance to comply due to the long wait involved, increased risk and lack of experience in tree growing.

Figure 2 outlines four different scenarios that may develop depending on levels of economic growth and the effectiveness of implementation of the land allocation program.

Fast economic growth ↑ Slow economic growth	<p>2. Unsustainable growth</p> <ul style="list-style-type: none"> - High demand for forest products but low incentive for reinvestment resulting in forest degradation - Greater allocation of land to large enterprises for plantation development resulting in increased but inequitable production - Contribution of agriculture to GDP falls rapidly while industry and construction grow strongly 	<p>4. Sustainable development</p> <ul style="list-style-type: none"> - Increased long-term forest product production and increased equitability of benefit sharing resulting from land allocation and associated division of assets and increase in investment security - Impediments to large scale plantation development result from land fragmentation - Decreased uniformity and greater diversity of products due to land fragmentation. - Contribution of agriculture to GDP falls while industry and construction grow strongly
	<p>1. Socio-economic development slows</p> <ul style="list-style-type: none"> - Poor economic development and slow land allocation see the economy and forestry sector stagnate - Lack of land allocation compounds effects of slowing economy by providing less incentive to invest - Contribution of agriculture to GDP falls slowly while industry and construction grow slowly 	<p>3. Low-growth development</p> <ul style="list-style-type: none"> - Stable demand and an improved investment and production environment resulting from land allocation lead to sustainable development under low growth conditions - Greater reliance on production in the agriculture sector due to lower growth in industrial and services sectors - Contribution of agriculture to GDP falls while industry and construction grow slowly
<p>Land allocation incomplete /poorly implemented →</p>		<p>Effective land allocation</p>

Figure 2. Four different scenarios depending on level of economic growth and effective implementation of the land allocation program

5. WHAT WE MAY SEE IN 2020

Forest resources in the next two decades

Forest cover

Sector targets are to manage, protect and develop 16.24 million hectares of forest and forest land, increasing the forest cover to 42-43% in 2010 and to 47% in 2020 as shown in Table 22 (MARD, 2007). If the investment for afforestation is not sufficient or increases in population and wealth result in other demands for land, the targets will be difficult to reach.

Table 22. Forecasted area of different forest types (million ha)

	Status in 2005	Forecast in 2010	Forecast in 2020
Protection forest	9.47	5.68	5.68
- Forested land	6.19	5.67	5.67
- Unused land	3.38	-	-
- Open land in forest	-	0.01	0.01
Special use forest	2.32	2.16	2.16
- Forested land	1.92	2.12	2.12
- Unused land	0.4	-	-
- Open land in forest	-	0.04	0.04
Production forest	7.10	8.40	8.40
- Forested land	4.48	6.28	7.78
+ Natural forest	3.10	3.63	3.63
+ Plantation forest	1.38	2.65	4.15
- Unused land	2.62	-	-
- Land for reforestation	-	0.30	0
- Land for forest restoration and agroforestry	-	1.82	0.62
Forest cover (%)	37	42.6	47

Source: MARD 2007.

Growing stock, increment and annual timber harvest

Wood production from natural forests, plantation forests, and scattered trees will reach 9.7 million m³/year in 2010 and 20-24 million m³/year in 2020, of which 10 million m³ will be large timber. The forest sector will provide 3.4 million m³ of pulp wood in 2010 rising to 8.3 million m³ in 2020 and the productivity and quality of plantation forests will be improved. The average growth rate of plantation forests will increase to over 15 m³/ha/year. The growth rate of *Acacia mangium* and hybrid acacia plantations will exceed 20-25 m³/ha/year as a result of tree breeding and tissue culture programs. Large areas of rehabilitated natural forests will also be re-harvested.

Wood and wood products

Wood product production

Ensuring forest product production meets domestic demand by 2020 will pose challenges. To meet requirements, major investment will be necessary each year. Infrastructure for forest plantation development will also require significant investment and it may therefore prove difficult to achieve sufficient supply to meet domestic demand in 2020. Providing 70% of domestic wood requirements will require around 22 million m³/year as shown in Table 23. This scenario corresponds to total export turnover increasing at 16% per year while meeting wood material demands for production and reducing wood imports. Requirements for

investment in forest sector development are not excessive and the contribution of forestry to GDP should increase.

Table 23. Forecasted wood demand for 2005-2020 (cubic metres)

	2005	2010	2015	2020
Large timber for industry and civil engineering	5,373,281	8,030,909	10,266,667	12,000,000
Small timber for particle board, MDF and woodchips	2,031,985	2,464,804	2,922,369	1,682,509
Pulpwood	2,568,000	3,388,856	5,271,554	8,200,000
Pit props	90,000	120,000	160,000	200,000
Total	10,063,266	14,004,569	18,620,590	22,000,000

Imports of timber are expected to decrease gradually up to 2020 as greater use is made of domestic timber sources. By 2020 65% of industrial timber and 80% of wood used for furniture is expected to be derived from domestic sources as a result of increasing plantation resources and improved conversion ratios.

By 2020 the forest product processing industry is expected to be the key economic driving force in the forestry sector as timber processing installations are established in industrial zones linked to material supply zones. By 2020, NWFPs will represent 20% of total forest product production and export turnover of NWFPs is also expected to increase by 15-20%.

Wood product demand

At present, Vietnam meets domestic demand for saw logs. However, import of timber has contributed to the production of furniture for export and the value of imported timber is expected to increase from US\$246 million in 2000 to about US\$900 million by 2010 (equivalent to 4.7 million m³ round timber). Forest product exports have increased tenfold over the past 6 years. Europe, the USA and Japan are the main destinations. The wooden furniture industry is striving to attain annual exports of US\$8 billion compared to US\$1 billion in 2004. The achievement of this objective is largely dependent on the price and supply of imported timber. Vietnam's competitiveness is enhanced by abundant cheap labour and good marine transport links. The European Union is expected to be an increasingly important importer and is likely to begin importing furniture made of legally sourced or certified wood in the future. With respect to individual wood products, the following forecasts and comparisons are made:

- Domestic sawlog demand is anticipated to increase annually by 7-8% from 2.2 million m³ in 2003 to approximately 7 million m³ in 2020
- Wood fibre demand is estimated to increase from 40,000 m³ in 2003 to 165,000 m³ in 2020. The annual average increase is anticipated to be 7-10%/year mainly due to increased demand for MDF. The annual consumption of wood fibre is presently 0.5 m³/1000 persons in Vietnam. This compares to 2003 figures of 8 m³ in China, 10 m³ in Malaysia, 40 m³ in Republic of Korea and 31 m³ in the United States
- Particle board demand is estimated to increase by 8-10%/year from the current 80,000 m³ to 312,000 m³ by 2020. Current consumption is equivalent to 1 m³/1000 persons/year. In 2003 equivalent figures were 4 m³ in China, 0.4 m³ in the Philippines, 33 m³ in Republic of Korea, and 97 m³ in the USA
- Plywood demand is foreseen to rise by 7-9%/year reaching 37,000 tonnes by 2020 from 11,000 tonnes in 2003. At 0.1 m³/1000 people, the current annual consumption rate of plywood in Vietnam is very low in comparison with 10 m³ in China; 41 m³ in Malaysia; 68 m³ in Republic of Korea and 64 m³ in the USA
- Hard cover paper demand is forecast to increase rapidly creating many opportunities for producers. Self-sufficiency in paper is dependent on the type of paper. In 2003,

about 50% of newspaper was imported compared to 11% of printing and writing paper and 56% of hard cover paper. Imports of woodpulp and paper are increasing and the trend is expected to become clearer if import taxes are reduced/exempted within the AFTA framework in the context of Vietnam's WTO membership

- Newspaper and printing paper demand is anticipated to increase by 8-10%/year from 55,000 tonnes in 2003 to 190,000 tonnes in 2020. In 2003 annual consumption of newspaper and printing paper in Vietnam was estimated at 0.7 kg/1000 people. Comparable figures were 2.3 kg in China; 3.2 kg in Thailand; 16 kg in Malaysia; 29.2 kg in Republic of Korea and 36.6 kg in Australia
- The annual increase in demand for writing and printing paper is estimated to rise from 9% to 13% per year. In 2003, the consumption was about 160,000 tonnes, equivalent to 2 kg/person. Per capita average consumption figures in 2003 were 7.5 kg in China; 12.6 kg in Malaysia; 33.5 kg in Republic of Korea and 90 kg in the USA
- Demand for hard cover paper and other paper is estimated to increase by approximately 60,000 tonnes/year, from 680,000 tonnes in 2003 to 1.7 million tonnes in 2020. Although consumption has increased dramatically in Vietnam in recent years, per capita consumption is only 8.4 kg, considerably lower than Republic of Korea (17.4 kg), Malaysia (73.1 kg) or Thailand (30.9 kg)

Wood as a source of energy

Emerging energy scenarios

The Long-term Energy Alternative Planning study (LEAP) developed a number of scenarios based on economic development forecasts, national development objectives, population growth, forecasted timber consumption and prospects for commercial energy demand and supply. Different assumptions were made for the different scenarios as follows:

- **Baseline scenario:** Sectors using wood energy included in future calculations are households, industry, agriculture and services
- **Scenario 1:** Baseline scenario + replacing fuelwood with other alternative fuel at different levels, conditional on the sectors using fuel wood as energy
- **Scenario 2:** Scenario 1 + using advanced kitchens (by 2020, 5% of urban households, 15% of rural households are using advanced kitchens for cooking)
- **Scenario 3:** Scenario 2 + industrial tree planting and a scattered tree planting program

Table 24 shows projected demand and supply and the gap or shortfall between these two figures under the four scenarios outlined above. The greatest shortfall is under the baseline scenario where no efforts are implemented to reduce demand or increase fuelwood supply. The lowest shortfall occurs when other alternative fuels are used, improved technology is adopted and tree planting measures are implemented under scenario 3.

Table 24. Fuelwood demand, supply and shortfall under different scenarios (million tonnes)

Scenario		1995	2000	2010	2020
Baseline scenario	Demand	23.77	24.50	25.28	23.93
	Supply	23.77	17.02	13.15	12.49
	Shortfall	0.00	7.47	12.13	11.44
Scenario 1	Demand	23.77	22.87	19.19	12.83
	Supply	23.77	15.83	10.01	6.72
	Shortfall	0.00	7.04	9.18	6.11
Scenario 2	Demand	23.77	22.79	18.10	10.76
	Supply	23.77	15.77	9.43	5.64
	Shortfall	0.00	7.02	8.66	5.12

Scenario 3	Demand	23.77	22.79	17.82	10.24
	Supply	23.77	15.98	12.00	9.78
	Shortfall	0.00	6.81	5.82	0.46

Source: Long-term Energy Alternative Planning.

Non-wood forest products

By 2010, NWFP production growth is expected to reach 10%/year and export turnover is estimated to reach 10-15% (about US\$300-400 million per year by 2010). About 1 million people are expected to be employed in NWFP production and processing and this is estimated to be linked with 10-15% increase in income in households in mountainous areas. This income will also contribute to poverty reduction in remote areas as well as NWFP conservation and development in some National Parks, Nature Reserves and will help to control overexploitation and illegal trade of NWFPs (MARD, 2006). By 2010, major NWFPs and respective levels of production are expected to be:

- Rattan and bamboo products 120,000 tonnes/year
- Pine latex 50,000 tonnes/year
- Essential oils 700 tonnes products/year

By 2020, NWFP production is expected to become a major sub-sector of the forestry sector. If, however, the land allocation program stalls, and GDP and demand increase, management of NWFPs and production of greater volumes may be undermined by poor tenure arrangements and depletion of stocks may result. With low GDP and demand growth, on the other hand, there may be little incentive to invest. The following characteristics of the NWFP sub-sector are forecast as follows (MARD, 2006):

- The value of NWFP production will reach around 20% of total production in the forestry sector
- NWFP export turnover will increase by 10-15% per year obtaining US\$700-800 million/year by 2020 (30-34% of the total timber export turnover)
- 1.5 million mountainous rural labourers will be mobilised to collect, process and trade NWFPs, accounting for 50% of the total forestry sector labor force by 2020
- 15-20% of income in rural households will be from NWFPs
- People's and community capacity and awareness of NWFP conservation and development will be raised
- Economic and scientific values of NWFPs will thus be conserved and overexploitation reduced

Service functions of forests

Long-term shift in demand for service functions of forests

Forest protection and natural resource conservation aim to provide environmental services, including watershed protection, coastal protection, urban environmental protection, disaster mitigation, habitat protection and soil, water and biodiversity conservation. At the same time the potential for revenue generation from activities associated with these services such park visits, CO₂ sequestration, ecotourism, cultural tourism, recreation, etc. is increasing and could make a contribution to national economic development.

The Forest Protection and Development Fund was established in 2007; by 2020, the forest sector is expected to meet the demands for environmental services and increased revenue through payments for environmental services and in particular through the Clean

Development Mechanism (CDM), eco-tourism, forest protection and water conservation etc. Associated revenues are expected to reach US\$2 billion in 2020 as shown in Table 25.

Table 25. Forecasted revenue from environmental service payments to 2020

	2003	2005	2010	2015	2020
CDM	-	-	-	400	800
Coastal and urban watershed protection	-	-	200	300	800
Ecotourism	-	-	50	200	400
Total environment service value (million US\$)	-	-	250	900	2,000

Managing forests for biodiversity — the likely future situation

As well as the plan for sustainable forest eco-system establishment, management and use, a national biodiversity conservation plan has been elaborated and implemented. By 2010 the following achievements are expected:

- A special-use forest system including 128 nature reserves covering a total area of 2.16 million ha will be fully implemented
- 50% of the total depleted watershed forest area will be rehabilitated and rare and endangered fauna and flora will be effectively protected
- Nature reserves which are considered World Heritage Sites (e.g. Ha Long Bay, Phong Nha Ke Bang National Park) or world biosphere reserve (Can Gio, Cat Tien, Cat Ba and the Red River Delta) will be established
- Efforts will be made to establish and expand nationally and internationally important wetland reserves to reach 1.2 million ha
- 200,000 ha of mangrove forests will be rehabilitated and 5 wetland areas of international standard will be established
- Efforts will also be made to restrict import of alien biological material and to build capacity in relation to biodiversity conservation and biological safety

By 2020, the country will have developed considerably in the direction of sustainable biodiversity conservation, development and use, efficient implementation of biological safety measures, human health protection, environmental protection and biodiversity conservation. Vietnam will also make active contributions to biodiversity conservation and development both regionally and globally. By 2020, Vietnam will have established organizational structures, mechanisms, policies and legal instruments related to biodiversity and biological safety management. The country will adopt the National Action Plan for Biodiversity by 2010 and Vision 2020, implement the Convention on Biodiversity and promulgate the Biodiversity Law.

Forests as a carbon sink — potentials and constraints

To control CO₂ emissions and global climate change, 180 countries including Vietnam signed the Kyoto Protocol in 1997. Agencies and units are concentrating on CDM projects. However, the Kyoto Protocol and the value of greenhouse gas reduction are not yet fully understood by the majority of the population. Regulations stipulating that institutions which emit CO₂ should pay environmental taxes for sustainable ecosystem management are still not strictly enforced. In the coming years, law makers will be required to focus on related fields and formulate policies on sustainable forest ecosystem development and management.

There is a considerable lack of understanding of the importance of forests to the environment and climate among the population and forests are still known primarily as a source of forest products. There is insufficient research on the value of environmental services. It is very

important and necessary not only to raise awareness of the environmental services provided by forests but also to promote research programs on the value and quality of forests.

Vietnam must pay more attention to climate change adaptation and mitigation and combine suitable activities with its socio-economic development plans. Programs to manage water, coastal regions and forests and promotion and development of agriculture and aquatic products should be considered. In relation it is very important for Vietnam to improve related skills and improve access to information so that goals related to climate change can be achieved.

Social functions of forests

Forest resources provide income for minority groups, particularly in mountainous areas; they also contribute to poverty reduction in other rural areas as well as income generation through the wood processing industry.

By 2010 and 2020, implementation of forest and land allocation and lease policies targeted at households, communities and individuals is forecast to create 2 million new jobs in the forest sector and provide additional jobs in mountainous communities through tree planting, tending, protecting, and harvesting and forest product processing activities.

6. HOW COULD WE CREATE A BETTER FUTURE?

Forest development planning

Priorities for the forestry sector concern planning a stable national forest estate according to the three designated types of forest and forest land. The national protection forest system should be reviewed and re-arranged, with its area not to exceed 5.68 million hectares. The special-use forest area, which should cover 2.16 million hectares, also needs to be reviewed and activities should be strengthened to improve forest quality and biodiversity values. The planned protection forest system should cover 8.4 million hectares, of which 7.78 million hectares should be stable production forest. With respect to production forests, attention should be paid to creating concentrated raw material supply zones where forest products are sustainably produced and processed by a growing forest product industry.

Management, protection, development and use of forest

A total of 16.24 million hectares of forests and forest land will be uniformly managed within the national permanent forest estate with the block, compartment and plot system delineated on maps and demarcated in the field. Up to 2010, almost all natural and plantation forests, and forest land, will have to be allocated and leased to forest owners belonging to various economic entities, with priority given to communities and families. State organizations will manage most of the special-use forests (around 85%), large-scale and nationally important protection forests (70%) and some concentrated natural and planted forest areas (around 25%). The remaining special-use forests (15%), protection forests (30%) and production forests (70%) will mainly be managed and used by private enterprises, communities, cooperatives, households, and individuals as stipulated in the laws of the country.

Forest protection and conservation must be based on the development principle, which creates conditions for forest owners and local people to be engaged in forest protection and development activities in order to provide them with legitimate and essential income. The State will support communities, households and individuals involved in forest protection activities, when their direct forest-based income is not available. Forest conservation should combine in-situ and ex-situ conservation including the domestication and rearing of wildlife under legal regulations.

Development of special-use forests will be mainly based on the preservation of current status to create suitable habitats and ecosystems for endemic flora and fauna species and to improve forest quality and biodiversity values. Ecotourism and outdoor recreation activities should be strengthened. A renovation of management approaches for special-use forest should be considered and should be in line with new international perception on natural resource conservation.

Natural production forests should be managed with appropriate silvicultural techniques to reach maximum productivity and efficiency. Enhancement of rehabilitation and development of natural forest through application of silvicultural measures with multi-purpose species and NWFPs aim to improve the quality of forests and the income of forest dependent people. Plantation forests for production should be prioritized according to the requirements of the processing industry, e.g. planting fast-growing species and also longer rotation timber trees, while also cultivating multi-purpose species and NWFPs. Development of production forests will be based on market demand and concentrated in areas with competitive advantage, stable production and high economic efficiency. Focus also should be directed towards species for which Vietnam has a comparative advantage.

Farmers' income sources should be diversified through the development of tree crops, promotion of short-rotation trees and animal husbandry to generate immediate income, while establishing small-scale plantation forests and taking part in natural forest enrichment, management and protection. Income should also be generated through the development of local occupations, particularly in small and medium-scale forest product processing, to increase income for the poor and help households to avoid falling into poverty.

Forest harvest and use, forest product processing and trade

Sustainable harvesting and utilization of natural forests should be based on an appropriate forest management plan. The key principle is that the harvest should depend upon the mean annual increment of the forest. Planting and utilisation of NWFPs should be strengthened, focusing on advantageous products, such as bamboo, rattan, latex, medicinal herbs and foodstuffs. The legal mechanism should allow forest owners to manage, harvest and use NWFPs in accordance with the principles of sustainability.

The forest product processing industry and associated trade should be a key factor in forestry sector development. Focus should be directed towards products in which the country has high competitive advantage such as indoor and outdoor furniture, wooden art handicrafts and other products made from bamboo and rattan. The processing of wood-based panels and pulp should be enhanced and processing of woodchips for export should be gradually reduced. Manufacture of products made from wood-based panel and timber from plantation forest should be encouraged.

Key export products should include indoor, outdoor furniture, wooden art handicrafts and NWFP-based processed products. Attention should be paid to major markets, such as the USA, the European Union and Japan. Diversification and continuous improvement of the quality and design of processed products is necessary to meet the interests of national and international customers. Special attention should also be paid to develop brand names and to achieve forest certification for export items.

Priority program

Up until 2020, attention will be paid on effective implementation of the Five Million Hectare Reforestation Program and five priority programs including three development programs and two support programs:

1. *Sustainable forest management and development program*

- Establish the national permanent forest estate for 3 forest types, mapping and boundary demarcation in the field; 100% of forests and forest land will be allocated and leased to forest management entities before 2020 and capacity building for forest owners will be enhanced
- Implement sustainable forest management in accordance with the forest strategy, sustainable principles and plans from forest owners
- Stabilize wood production from natural forests, plantation forests and scattered planted trees and develop NWFPs to meet the major demands for domestic consumption and export
- A forest inventory will periodically be undertaken
- A database of forest resources and related socio-economic aspects will be consolidated and updated
- By 2020, at least 30% of production forests will be issued with certification for sustainable forest management

2. Program on forest protection, biodiversity conservation and environmental services development

- 16.24 million ha of forests and forest land area will effectively be protected with a reduction of 80% of cases violating the forest protection and development laws
- The State will continue to allocate 1.5 million ha of special-use and protection forests under protection contracts by 2010
- The system of protection forests (watershed, coastal and urban environment) and special-use forests will be developed and consolidated
- All protection and special-use forests will have a management owner (state agencies, private owners, or communities), and medium and long term forest protection and development plans
- Continue to pilot and scale-up the community-based forest management modality and other modalities
- Studies on the valuation of forest environmental services such as water source protection, erosion control, sedimentation protection, CO₂ sequestration, and ecotourism will be implemented, and mechanisms for payment of environmental services during the period of 2006-2010 will be developed
- The Forest Protection and Development Fund should be established and implemented

3. Forest product processing and trade program

- Reorganize the wood processing industry and NWFPs in order to match production capacity with sustainable raw material supply sources
- By 2020, NWFPs will become one of the main production commodities, accounting for more than 20% of the total value of forest production
- The average exported NWFP value will increase 15-20%, attracting 1.5 million labourers and the incomes from NWFPs will comprise about 15-20% of the rural household economy

4. Program on research, education, training and forestry extension

- **Research:** Research is focused on several key areas, such as bio-technology, refining technology for NWFPs, high yielding plantation, agroforestry and rehabilitation of degraded natural forests. Technologies and equipment for the forest product processing industry are improved in order to enhance its competitive capacity and to meet the requirements of international economic integration. A scientific and practical basis will be studied to develop break-through policies within the forestry sector
- **Education and training:** An average of 5000 students will annually be trained at the education and training institutions of MARD in which attention will be paid on training key staff for capacity improvement. Vocational training will be conducted for 50% of farmers working on forestry activities and those from craft villages with forest product processing capacity
- **Forestry extension:** The professional level for forest management and protection is improved to 80% of farmers. Around 50% of forestry-related private sector entities and mass organization is attracted and involved in forest extension activities. The linkages between the forest extension and training system with forest owners and forest product processing enterprises will be developed and consolidated.

5. Program on renovating forest sector institutions, policy, planning and monitoring

- Policy, law and forestry institutional systems will be developed and updated, and decentralized to local levels; they will be developed sustainably according to market orientation and socialization of forestry activities. Mechanisms and policies will be

developed to create momentum to encourage the participation of various economic entities in forest protection and development, and to stimulate development of the forestry economy among domestic and international economic entities

- The state management system in forestry will be reorganized and improved in the direction of unified forest management, protection, utilization and development. The functions and tasks of forestry organizations at all levels will be clarified and, and the modalities of forestry services will be diversified. Several state forestry companies will be reorganized and operated according to the market mechanism in key forestry areas, and move towards harmonization of inefficient forestry production and forest product processing enterprises

7. CONCLUSIONS

From 1995 onwards, the forest area of Vietnam has continuously increased due to forest rehabilitation and plantation programs. By the end of 2006, the forests of Vietnam were estimated at 12.874 million ha (covering 38% of the country), of which 10.41 million ha were natural forests, and 2.464 million ha were plantation forests. However, Vietnam has one of the lowest rates of forest cover and wood volume per capita in the world. The bare land area is still large so both potentials and challenges exist for the development of national forest production in the coming years.

In order to sustainably manage, protect and use 16.24 million ha of forests and forest land allocated to forest sector; to increase the rate of forested land to 42-43% in 2010 and 47% in 2020; to increase the sector contribution to around 2-3% GDP; to reach the annual harvest of 20-24 million m³, of which around 10 million m³ are sawlogs; to meet the main material demands for forest processing industries, pulp and export; to maintain fuelwood harvest at 25-26 million m³/year; and to reach the annual forest product export value of more than US\$7.8 billion (including US\$7 billion from wood products and US\$0.8 billion from NWFP products), the Forest Sector needs to make a great effort to effectively enhance and implement the appropriate policy and benefit sharing mechanisms, to implement forest and forest land allocation and lease, plant high productivity clones, establish intensive forest plantations, and sustainably manage natural forests.

The forest product processing industry and the associated trade should become the economic centre of the Forestry Sector. It will be necessary to develop forest products with high competitive advantage and the production of integrated processing of plantation wood and NWFPs will also be desirable. Production of wood-based panels and pulp should be strengthened while production of woodchips for export should be reduced. Use of wood-based panels and timber from forest plantations should also be encouraged to reduce pressure on natural forest.

By 2020, fuelwood consumption will be reduced, but the modes of using fuelwood should be more effective as it will still be an important energy source in rural and mountainous areas. Production of bioenergy materials will become more realistic and bioenergy sources are likely to be competitive with fossil energy.

Forests play an essential role in watershed protection and in the environment more generally including in relation to land maintenance, erosion control, river flow control, flood reduction and water quality control. The Forestry Sector should strive to meet the requirements for environmental services with the help of income incentives through the CDM, ecotourism, and watershed and water source protection which could reach around US\$2 billion per year by 2020. By this time, sustainable forest management certificates will cover at least 30% of the production forest area in Vietnam.

The forestry sector has contributed greatly to production, bare land utilization, job creation, and improvement of living standards for nearly 25% of Vietnam's population living in hilly and mountainous areas. By 2020, the target is to increase income of local people so that poverty will be alleviated in 70% of the poor households in the main forestry areas. Forest and forest land allocation and lease to organizations, enterprises, households, individuals, and communities will be completed before 2010 to help achieve this goal.

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