ASIA-PACIFIC FORESTRY SECTOR OUTLOOK STUDY II

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LAO PEOPLE'S DEMOCRATIC REPUBLIC FORESTRY OUTLOOK STUDY

By

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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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1. INTRODUCTION

Background

This paper on the outlook for forests and forestry in Lao PDR to the year 2020 is undertaken as part of the second Asia-Pacific Forestry Sector Outlook Study. The first Asia-Pacific Forestry Sector Outlook Study was completed in 1998 and drew together studies and information from across the region to culminate in the publication of *Asia-Pacific Forestry towards 2010*. A country paper for Lao PDR prepared as part of this process drew attention to the status and trends of forestry and requirements for the sector to 2010 (available at http://www.fao.org/forestry/2393/en/).

The Lao People's Revolutionary Party (LPRP), assumed power in December 1975 and aligned itself with the Soviet bloc. For a decade, close ties were maintained with the former Soviet Union upon whom the country depended for trade and development support. Prior to and following the collapse of the Soviet Union in 1991, Lao PDR developed increasingly open relationships with countries both regionally and internationally.

Today, Lao PDR is a signatory to more than 30 multilateral environmental agreements, international treaties and international organizations (Central Intelligence Agency, 2008). The long list demonstrates the commitment of the nation to advancing and progressively developing its international status, including in relation to forests and forestry. This has, however, not always been straightforward as economic liberalization has brought problems as well as benefits. Developmental goals have often taken precedence over environmental protection, particularly in relation to revenue-generating activities such as mining, hydropower generation and logging. The direct impacts of economic development on forests include deforestation and land conversion as well forest depletion from poorly regulated legal and illegal logging. With the recent economic boom in the region it appears that unsustainable forestry activities may be on the rise.

The economy of Lao PDR is dependent on international trade and investment, with Thailand as the largest single trading partner followed by Viet Nam. China and Lao PDR normalized relations in 1989 and Chinese investment in Lao PDR increased rapidly following the Asian financial crisis in 1997/1998. China is fast becoming a major player in Lao PDR and currently ranks as the country's third largest trading partner.

Within the next decade, China seems destined to become Lao PDR's largest trading partner and an important source of external funding. The is especially likely if suggestions are true that donor fatigue is beginning to set in due to slow reform of the country's legal, financial and political systems (Storey, 2005). In contrast to other partners, China is able to provide Lao PDR with aid and investment without calls for political reforms (cited in McCartan, 2008). This diversity of interest creates a situation in which economic incentives to reform may be in competition with incentives to maintain the status quo and as such the future will be largely dependent on the preferences expressed by the government and people of Lao PDR. The future forestry situation in Lao PDR is likely to be mixed, with grounds for both optimism and pessimism in relation to economic development and sustainable natural resource management.

The Forestry Strategy 2020 (FS 2020) is an effort by the Laotian government and international donors to comprehensively assess forestry-related status, issues and policy and also matters associated with implementation as well as monitoring and evaluation in forestry. The government is promoting collaboration with domestic and international players in several focal areas including plantation development, wood processing, non-wood forest products (NWFPs), forest resource conservation and ecotourism.

FS 2020 implementation is largely planned to take place through the Ministry of Agriculture and Forestry's (MAF) 4 targets and 13 measures. Projects have been designed and implemented for goal delivery. Among them are the Sustainable Forestry and Rural Development Project (SUFORD) and other projects supported by the Japan International Cooperation Agency (JICA), the Swedish International Development Cooperation Agency (SIDA) and the Forestry and Forest Resource Development Fund (FDF).

The relationship between forestry and society in 2020 is expected to be very different from what it is today. The extent of forests and forestry is likely to undergo important changes. Understanding the broad direction of change and probable scenarios will help to articulate more effective policies and strategies to support the sector. To facilitate exchange of ideas, a Lao PDR national forestry outlook consultation was held on 30 June 2008. Around 70 participants attended from various departments as well as central and provincial forestry officers.

The paper analyses the current status of forests and the forestry sector in Lao PDR and reviews the key drivers influencing forestry in the period since the first Asia-Pacific Forestry Sector Outlook Study in 1998. On this basis, scenarios for forestry in 2020 are developed and a picture of what may be seen in 2020 is constructed. The paper is structured as follows:

- Section 2 provides an overview of trends in the Laotian forestry sector and focuses on important issues confronting forestry
- Section 3 discusses the key drivers influencing forests and forestry including societal perceptions, demographic changes and the interplay between factors such as globalization, regionalization and political and economic change
- Section 4 explores the inter-relationship between demand for land and forest resources and the policy and institutional framework and the resultant effects on sustainability of economic growth, the status of natural resources and crucial issues associated with land use and planning
- Section 5 discusses possible situations in 2020 in relation to forest resources, wood and wood products, NWFPs and other areas
- Section 6 discusses how a better future could be created

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

Trends in forest resources

Lao PDR's terrain is characterized by three distinct formations: mountains, plateaus and plains. Mountains, at an average height of 1,500 m, dominate the Northern region. The Phou Luang or Annamite Range cuts through Indochina forming a spine adjacent to the Lao-Viet Nam border and claiming a small area in northern Cambodia. The plain region consists of large and small plain areas distributed along the Mekong River. Lao PDR's climate is tropical monsoon with the rainy season extending from May to November and the dry season from December to April. The following main forest types in the country are (Clarke 2008):

- Dry evergreen forest in the northern area
- Tropical montane evergreen forest along highland areas of the Annamite Mountains and Bolovens Plateau
- Lowland semi-evergreen dipterocarp forest at the Mekong River Plain
- Tropical montane deciduous forest scattered in the Northern area
- Dry dipterocarp forest in the southern area
- Mixed deciduous forest in the southern area
- Limestone forest in the Annamite Mountains
- Pine forest in the Annamite Mountains
- Subtropical montane forest in the Northern area



Met	res above se
	-10600
	-5000
	-3000
	-100
	0
	150
	350
	1000
	2500
	8500

Figure 1. Topographic map of LAO PDR and surrounding countries Source: GLOBE, 2008.

Five forest classes have been established under the Forestry Law: protection forest, conservation forest, production forest, regeneration forest and degraded forest land/barren land; they have been reduced to three forest categories under the amended forest law. A high

rate of forest loss has seen forest cover figures fall from 70% in 1940 to 64% in the mid-1960s and 47% in 1989 (Kingsada, 1998). A recent study in 2002 showed that the current forest area¹ is equal to 9.7 million ha or 41.2%. An average of about 91,200 ha per annum of forest has been lost over the past two decades. In 2002, all forest cover areas which have more than 10% of canopy density remained at 71.6% or 16,846,000 ha of the total land area (DoF, 2005). The government identified the direct causes for deforestation as unsustainable shifting cultivation, uncontrolled logging and conversion to agriculture and other land use with the underlying causes of wide spread poverty, rapid population increase and weak law enforcement (MAF, 2005). Nevertheless, the government aims to achieve 70% forest cover by 2020.

Besides changes in current forest cover, forest quality has also deteriorated. According to DoF (2005), dense forest area² decreased from 29.0% in 1992 to 8.2% in 2005 and open forest increased from 16% to 24.5% of the total forest area. The forest area dominated by large trees, small-sized timber and pole-sized trees as a proportion of the total forest area is shown in Figure 2. Over past decades, forest fragmentation has also increased with small forest compartments (less than 10 ha) rising from 0.9% to 6.7% of the total forest area between 1992 and 2005. Large forest compartments (larger than 1,000 ha) decreased in proportion from 88% to 54%.



Figure 2. Percentage of forest area dominated by large trees (>60 cm dbh), small-sized timber (20-39 cm dbh) and pole-sized trees (<20 cm dbh) to total forest area in Lao PDR

Source: MAF, 2005.

Commercial logging activities have mostly been concentrated in central and southern areas in Lao PDR and timber harvesting is based on annual logging quotas. These quotas set the limits for volumes of timber extracted and are based on assessment by individual provinces, the MAF, the Ministry of Finance and the Office of the Prime Minister. Provincial authorities issue logging permits only after the central government provides clearance for the logging quota and areas earmarked for logging. However, timber can be extracted from planned hydropower dam sites and this does not fall within annual logging quotas.

It is expected that by the time of completion of the World Bank/Finnida supported SUFORD project, all potential production forest areas in Lao PDR – altogether 54 areas covering an estimated 3.5 million ha – will have been identified and demarcated (World Bank, 2008a). Even though two production forest areas have been certified by the Forest Stewardship Council (FSC) under the SUFORD project, credibility problems have arisen in relation to lack

¹ Natural forest or tree plantation with canopy density of 20% or more, minimum area of 0.5 ha and average tree height of 5 m or more.

² Current forest with crown density of more than 70%.

of tree marking, minimum compliance with management plans and improper documentation as revealed by Jonsson (2006).

Forest and village lands in Lao PDR are at the centre of land-use conflicts. Land has become important capital for industrial use and commercial crop production and demand for land has been increasing. Plantation concessions allocated to the State, army and foreign concessionaires have resulted in land conflicts and outbreaks of violence (Colchester and Fay, 2007). In response, the National Agriculture and Forestry Research Institute (NAFRI) and the MAF began suitability zoning for key crops at the provincial level in 2006.

Forest plantations have been increasingly promoted in government policy to reduce pressure on natural forests as well as to augment local wood availability and meet processing capacity requirements. Additionally, the plantation programme is gearing towards bio-energy plants such as *Jatropha* spp. and valuable trees like *Aquilaria* spp. Lao PDR has a low population density, high land availability and has implemented investor-friendly policies to facilitate plantation programme development. Interested stakeholders in plantation programmes include foreign and local investors as well as farmers who are converting their fallow lands to rubber (*Hevea braisiliensis*), agarwood (*Aquilaria* spp.), teak (*Tectona grandis*) and *Eucalyptus* spp. plantations. The Lao Tree Plantation and Cash Crop Business Association has been formed to promote good management practices, inform members of government laws and regulations and disseminate technical and market information (Anon, 2008).

Rubber plantations began as a modest way for upland farmers in Northern Laos to supplement their incomes and have blossomed into a fast-expanding agro-industry. Major expansion of the crop began around 2002, with substantial foreign commercial interest making inroads into Northern Laos in 2004 (Anon, 2007a). Up until May 2007 when a moratorium on large land concessions was issued, forest areas across the country were being cleared in ever-increasing amounts to make way for new plantations. The ban has, however, not been absolute and in June 2007, the governor of Vientiane Province granted 705 hectares of land to a rubber plantation project (Schuettler, 2008).

Despite the potential economic benefits derived from rich forest resources and industrial tree plantation plans, land lease and concession allocation are still an intensively discussed issue. The National Land Management Authority (NLMA) is responsible for monitoring concessions or plantation development but information on the extent of concessions is generally lacking. Schumann et al. (2006) highlighted the following issues relating to land leasing and concessions:

- The existence of multiple government ministries with the authority to grant concessions
- Secrecy and lack of standardization in contracts
- Land leases provided below commercial values or without charge

Forest and livelihood

During the process of development, natural assets including forests, minerals and water resources have been exploited for their economic value although benefits in terms of poverty alleviation have not always been achieved. The current situation has been described as one in which policies favor large-scale export agriculture (including industrial tree crops) over high-value smallholder crops, NWFPs and other more sustainable options for rural development (WWF, 2007). Foreign direct investment (FDI) and regional infrastructure connections are alone unlikely to provide significant poverty reduction, and it is suggested that complex and holistic development interventions are needed to protect village livelihoods (Hunt, 2007).

In Lao PDR, the poverty profile experienced within household livelihood systems is characterized by food insecurity (seasonal shortages of the staple food, rice), low income and insufficient savings and investment (in rural areas this is expressed as a shortage of livestock) (UNDP, 2001).

The three major features of rural livelihood systems in Lao PDR are farming, dependence on forest products and the specific role of NWFPs (UNDP, 2001). In relation, some challenges to the development of sustainable rural livelihood systems exist (UNDP, 2001 and MAF, 2005):

- Declining productivity in swidden-based upland farming systems
- Declining productivity of non-timber forest resources
- Failure of alternative income sources to transform the rural economy
- Loss of access to forest

Utilization and management of forest resources are considered important in fulfilling the policy target of poverty eradication. Sustainable forest utilization, forest protection and reforestation, with strong involvement of the local community are crucial strategies for government in forest management and poverty alleviation. There are a number of different types of community-based forest management with differences in forest ownership types, functions of the forests, arrangement of partner responsibilities and benefit sharing systems (Manivong and Sophathilath, 2007). They include participatory forest management, collaborative forest management, traditional forest management, community-based forest management for ecotourism, smallholder plantations and industrial plantations.

Community forestry is strongly focused on production forests and benefit sharing arrangements for village access to a portion of the timber wealth, with some reforestation included (Braeutigam, 2003). Community forestry could also be a potential mechanism for improving the delivery of livelihood benefits from forests since the rural poor rely on forest resources for subsistence consumption and a portion of their household income.

Village forestry was introduced in the early 1990s with the first initiative referred to as Joint Forest Management. The Forest Management and Conservation Project (FOMACOP) began in 1995, but was not viewed favorably by the government. One reason was that timber wealth should be distributed more evenly across the national population and not just to those who happened to live near to forests (Sunderlin, 2004). A new initiative based on the FOMACOP approach, known as SUFORD, began in late 2003. The SUFORD project now serves as the main basis for introducing village forestry to production forests nationwide.

Challenges in implementing community forestry include developing a benefit sharing system for poverty alleviation, improving systems of land-use planning and land allocation, possible extension to areas where NWFPs are an important source of income and government implementation capacity (Braeutigam, 2003; Sunderlin, 2004).

Traditionally, women have cultivated vegetables and cash crops and collected roots, shoots, firewood and small animals from nearby forests – mainly for subsistence purposes. Men hunt, collect timber and build and repair the houses while women are usually responsible for marketing family products including textiles and handicrafts. Men are responsible when there are large quantities of surplus rice and when large animals are sold (Thomson and Barden, 1993; GRID, 2005). It is acknowledged that women are particularly knowledgeable about forest resources and household food security issues (NAFRI and IUCN, 2005). Loss of forest cover and forest degradation have been reported to be forcing rural people to travel greater distances to collect wood and other forest products (Baker et al., 2000).

Women are the main work force in the rural economy and engage in handicraft production to supplement family income in the face of poor outside employment opportunities. Small-scale export industries including textiles and electronics favour the employment of young rural women as labour costs are lower than for men.

Wood and wood products

The wood processing industry comes under the purview of the Ministry of Industry and Commerce (MOIC) following a revision of the Forestry Law and Processing Industry Law, as endorsed by the National Assembly in 2005 (Sayakoummane and Manivong, 2007). In the 1990s, wood and wood products accounted for 40% of export earnings, almost half of which came from the export of logs (CPI, NSC and UNDP, 2006). This figure dropped to 20% in 2002/2003 (MOIC, 2008). During this period, the forestry sector grew faster than the rest of the economy, with an increase in log extraction from 300,000 m³ in 1990 to 734,869 m³ in 1998 (MAF, 2005). The annual allowable cut (AAC) and actual harvesting in cubic metres from 1998 to 2008 are shown in Figure 3. However, the AAC has never been calculated nationwide. Export subsequently increased it to 370,000 m³ in 2005/2006 as a result of additional wood supply from the Nam Theun 2 Dam (NT2) hydropower project area and limited supply from the plantation programme (Sayakoummane and Manivong, 2007).



Figure 3. AAC and actual harvesting in cubic metres from 1998 to 2008 Source: Department of Forestry, Lao PDR.

It has been reported that weak enforcement capacity contributing to illegal and/or poorly regulated logging caused government annual losses of US\$20 million (ADB, 2000). This trend is thought to be rising in relation to this group of wood and wood products from poorly regulated or illegal logging as reported in the National Human Development Report (CPI, NSC and UNDP, 2006).

Total wood processing capacity is estimated at 3-3.4 million m³. MOIC data show that there has been an increase in furniture production and a reduction in sawn wood production. The total value of wood and wood products exports reached US\$67-75 million in the financial year 2001/2002 and increased to US\$97 million in 2005/2006. The general perception of wood processing in Lao PDR is that operations are inefficient, have low recovery rates and generate low-value products.

The government strongly promotes downstream processing and export of finished or semifinished wood products, and this has led to growth of the wood processing industry. Reform has been slow to date although there are some existing secondary wood processing facilities undergoing reform (Sayakoummane and Manivong, 2007). The wood industry is still at an early stage of development and comprises mainly small- and medium-sized saw mills, plywood mills and other wood processing installations (Sayakoummane and Manivong, 2007).

The bulk of exports is either unprocessed wood or basic sawnwood and planks, with additional minor quantities further processed into strip parquet flooring, furniture and various other secondary products (UNIDO, 2003). The export of high value wood products such as furniture remains extremely low, at between 1.7-3.2% of the total value (CPI, NSC and UNDP, 2006). Issues that obstruct progress to higher value wood processing and exports are the decreasing supply of raw materials, low access to finance, poorly skilled workers and lack of technology.

The government has launched a reform plan for the wood industry which aims at either closing or merging factories to promote efficiency and also seeks to promote final product processing and export. In August 2007, out of 587 sawmills and secondary processing factories, 326 were closed, 185 were to be improved within one year and only 76 were allowed to continue operations. Out of 1,528 furniture factories, 1,188 were closed, 212 were to be improved within one year and only 128 were allowed to continue operations.

Meanwhile, the private sector is forming the Lao Wood Processing Industry Association and members include those who are processing finished products. It aims to facilitate the allocation of government timber quotas to individual factories. The association is expected to play key roles in technology upgrading and skill improvement, marketing cooperation and promotion of exclusively legal logs among members. The association is also collecting chain of custody (CoC) certification information in relation to the processing and export of certified wood.

Demand for wood products remains high in the Greater Mekong Subregion and the main importers of Laotian wood and wood products are Thailand, Viet Nam and China. China has shown a tremendous increase in the total import of timber products from Lao PDR with a jump from 14 to 45 million m³ in just 10 years (White et al., 2006).

Wood as a source of energy

Lao PDR does not yet have a comprehensive institutionally supported approach to the planning and implementation of energy programmes in general (Theuambounmy, 2007). The country does not yet have a specific policy on renewable energy although the government is interested in further reform of the legal and regulatory framework in order to clarify the role of law in the power sector (Anon, 2006a). The objectives include:

- Enhancing legislation as it relates to the power sector
- Strengthening environmental protection legislation and implementing the National Environmental Action Plan as it relates to the power sector, including the strengthening of environmental monitoring and evaluation
- Developing a legal framework that aligns with international investment practices in order to supplement laws on commerce, banking and investment and also to improve legal and commercial capacity in the government
- Developing a legal and regulatory framework directly related to off-grid production

The government currently plans to intensively develop hydropower for energy production. There are no similar plans in relation to the extraction of energy from wood. Wood will, however, remain a primary source of energy for household consumption (Table 1).

Resource	Reserves	Potential for use in power
Oil and gas	Three exploration concessions in central and southern Laos. Mapping and geophysical investigations carried out, including one deep drill hole (2,560 m). Results not yet evaluated.	Possibly in the longer term (10-15 years), if sufficient reserves are found.
Coal (lignite)	Major resources located at Hongsa in northwest Laos. About 180 million tonnes of proven reserves, of which over 530 million tonnes are deemed economically recoverable. Energy content 8-10 Mj/kg, relatively low sulphur content of 0.7-1.1%.	Sufficient reserves for about 2,000 MW installed capacity.
Coal (bituminous & anthracite)	Reserves, mainly anthracite, dispersed in various fields throughout Lao PDR. Exploration ongoing. Total proven reserves about 100 million tonnes. Energy content 23-35 Mj/kg.	Current annual production of 130,000 tonnes, used for local factories or export. Possible longer- term option for around 500 MW installed capacity, depending on results of exploration.
Solar	Annual solar radiation received in Lao PDR is about 1,800 kWh/m ² , possibly less in mountain areas.	Photovoltaic modules have already been used for small-scale off-grid applications in remote areas.
Wind	Mean wind speed at Luang Prabang and Vientiane is around 1m/s, in mountain areas likely to be somewhat higher.	Costs in areas of less than 4 m/s likely to be at upper end of the range of US\$ 0.05-0.25 per kWh, hence limited potential.
Biomass (waste)	Biomass resources dispersed throughout the country.	Current share of biomass (mainly wood fuel) in total energy consumption is about 88%. Wood- fired cogeneration (heat and power) plants could be economic for self-supply in wood processing facilities.
Hydropower	Average annual precipitation of about 2,000 mm. Total runoff around 240,000 million m ³ . Theoretical hydropower potential of 26.500 MW.	Exploitable hydropower potential, including share of mainstream Mekong, is around 18.000 MW.

 Table 1. Primary energy sources in Lao PDR

Source: Dobelmann et al., 2006.

Lao PDR has major energy reserves, principally in hydropower potential and major lignite deposits. At the same time, there are initiatives to promote renewable energy sources including solar energy and biomass (Dobelmann et al., 2006).

Current energy use is dominated by household consumption of traditional fuels, wood and charcoal. Fuelwood was recorded as the most important energy source in the country for the period 1996 to 2002 and fuel wood and charcoal together account for about 75% of the total national energy consumption. Wood fuel is mainly used for cooking and space heating and in rural areas still accounts for up to 90% of the energy consumption (Nanthavong, 2005).



Figure 4. Energy sources for cooking in Lao PDR

Source: National Statistics Center, 2005.

Total energy use has increased from 1996 to 2002 at 4.8% (Table 2). Residential use tops energy use among the sectors.

TUDIC	able 2. Energy consumption by sector for 1990, 1990, 2000 and 2002										
Year	Total	Industry		Industry A		Total Industry Agriculture Commercial		Residential		Transport	
	ktoe	ktoe	%	ktoe	%	ktoe	%	ktoe	%	ktoe	%
1996	1,729.17	184.74	11.11	14.71	0.88	9.04	0.54	798.51	48.02	655.89	39.44
1998	1,772.80	280.20	15.69	20.56	1.15	13.79	0.77	847.55	47.45	624.05	34.94
2000	1,663.20	314.86	19.15	22.75	1.34	17.78	1.04	900.45	53.10	411.20	24.25
2002	1,811.81	367.60	20.30	27.31	1.50	19.90	1.09	920.30	50.83	475.22	26.25

Table 2. Energy consumption by sector for 1996, 1998, 2000 and 2002

Source: Theuambounmy, 2007.

In relation to bio-energy, the government plans to designate more than 2 million hectares of idle land for the development of bio-fuel feedstock plantations in an effort to produce enough bio-fuels by 2020 to replace fuel imports (Sylavong, 2007). This move is a response to high oil prices during 2008 and the dependence on and complete lack of control over prices and availability of oil in the country which has no domestic oil reserves.

The Ministry of Planning and Investment signed a Memorandum of Understanding in June 2008 with private companies to construct two bio-diesel factories with a production capacity of 50,000 tonnes each by 2010 (Vientiane Times 2008c).

Non-wood forest products

Non-wood forest products (NWFPs) in Lao PDR are mostly utilized for subsistence although some go to local markets and some to international markets. NWFPs are still by far the most important forest resources for most rural poor households. They constitute a wide range of subsistence and income commodities including food, medicines, construction materials and firewood (ICEM, 2003). On average, annual income from NWFPs accounts for about 40% of total household income, but 24% in the 'richest' group (where off-farm activities and livestock provide the bulk of income) and 90% of the total income for the poorest group (UNDP, 2001).

Key NWFPs include food (game, fish, bamboo shoots, fruits, greens and honey); fibre (khem grass, used to produce brooms and paper mulberry); condiments and medicinal products (cardamom and malva nuts); inputs for chemical and perfume industries (*benzoin, peuak*

meuak, resins and leoresins, 'kisi' resin and *lamxay*); bamboo poles, rattan and fuelwood (World Bank et al., 2001).

NWFPs are an important source of subsistence to rural communities who made up 73% of the Lao population as of 2005 but have yet to generate significant government interest and commitment. A paucity of knowledge and the lack of defined management systems will create setbacks in the path towards sustainability as demonstrated in an example from Ban Nong Hin in Champasak (Table

NWFP	Status in 1989	Status in 1999
group		
Wildlife	 Plenty of wildlife: turtles, monitor lizards, deer, snakes, jungle fowl, other birds. There was no outside market, no selling. Only 9 families in the village hunted. 	 Many species had disappeared: turtles, deer, jungle fowl, birds. Villagers can walk for 48 hours and get nothing. Market demand is large, prices are increasing (1 mouse-deer costs 12,000 kip). Many outsiders hunt in the local forest. Village had increased to 57 families.
Fish	 4 to 5 kg of fish within 1 hour. No selling, no destructive methods, only traps and nets. 	 Could not get 0.5 kg in 1 hour. There is not enough to feed all 57 families. Strong outside market (2,500 kip per kg). Destructive methods used by outsiders including explosives, guns and poisons.
Rattan	• 300 stems in a day or as many as a man can carry.	• 20 to 30 stems in a day.

Table 3. Changes in off-take per unit effort for three key NWFPs between 1989and 1999 in Ban Nong Hin, Lao PDR

Source: Foppes and Ketphanh, 2000.

Another setback in the sustainability of NWFPs relates to wildlife exploitation although wildlife issues are not generally discussed in the NWFP context despite constituting a widely recognized component of NWFPs. The complexities involved may be more severe than with other NWFPs, as wildlife exploitation involves people from different groups (Lao, Chinese, Vietnamese, Thai and ethic groups nationwide), as well as itinerant traders, middlemen, larger or opportunistic traders of different affiliations (Nooren and Claridge, 2001). The present situation of uncontrolled wildlife harvesting will feed increasing demand for exotic, endangered and protected species. Protected areas remain the main source of wildlife for domestic and cross border trade (Figure 5). In the ASEAN area, cross-border illegal wildlife trade is rampant and in response ASEAN launched a Wildlife Enforcement Network (ASEAN-WEN) in 2005 to combat illegal wildlife trade.



Figure 5. Protected areas and the wildlife trade in Lao PDR Source: ICEM, 2003.

NWFP development in Lao PDR is mostly project based involving education, research and field management with some projects directly supporting sustainable management of NWFPs. According to MAF, NWFP resources, especially those with high value and low rates of reproduction are being rapidly depleted due to overharvesting, deforestation and conversion of land to large-scale plantations. Similar to the wildlife trade, the export of NWFPs is not well documented and controlled due to cross-border issues.

NWFPs provide both cash and non-cash income to the rural communities. According to Foppes and Phommasane (2005), the main trends in NWFP market development in Lao PDR are:

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

The service functions of forests

Forests in Lao PDR are important for supplying clean water, supporting conservation, preserving biodiversity and acting as buffers for natural disasters.

Water is particularly important for irrigation and hydropower in Lao PDR. Developing a competitive irrigation system is a major government objective to guarantee subsistence in rice production and food security for rural households. In recent years, public investment in the irrigation sector has equaled between 40 and 50% of total public investment in the agriculture and forestry sectors. Potential protection forests for 51 watershed areas along main Mekong tributaries and 25 existing and proposed hydropower dams have been preliminarily identified on maps.

Water supply is closely linked to forest area. Kasmo (2003) found there is a positive correlation between forest area and watershed area from a 9-year study on catchment areas in tropical forest. Lao PDR has 21 National Protected Area (NPAs) covering about 14% of the country. Maintaining these NPAs for water supply is therefore essential.

The function of NPAs in water resource management is widely appreciated and improved protection of upland catchments is a prominent feature of government policy for a variety of downstream benefits. PAs are strongly connected with the role of catchment protection because they tend to be forested and are located mainly in upper catchments. This is by no means the exclusive reason for effective management, however, as many catchments are nominally protected for other reasons spanning biodiversity conservation to border security (ICEM, 2003). PAs are experiencing a net loss in biodiversity resources as a result of external commercial interest in illegally extracting natural resources to supply distant markets for short-term benefit (Corbett, 2008). A recent development in response to existing pressures is the establishment of management plans for the country's NPAs through the use of the FDF.

The FDF was issued under Decree No. 28 in 2005 to mobilize financial resources that shall be used to support and strengthen forest management, environmental protection and sustainable development of forest resources to achieve the indicative targets of the national socio-economic plans.



Figure 6. Protected and proposed protected areas in Lao PDR Source: ICEM, 2003.

The government has made significant progress in water resource management at the policy and strategic level and has enacted the Water Law and approved the 1998 Water Sector Strategy and Action Plan (WSSAP). Water resource management is divided into national and river basin level management. At the national level a National Water Resources Plan will be prepared, followed by river basin level plans. The government is undertaking the first water basin management approach in the Nam Ngum catchment, north of Vientiane where mechanisms incorporating river basin planning into provincial and national planning processes have been designed and introduced (Anon, 2007c).

Fuelwood remains the dominant source of bio-energy for most rural households and its use is the single most important source of greenhouse gas (GHG) emissions in Lao PDR (Rana, 2008). The rural economy is affected by recurring cycles of floods and droughts. The Water Resources and Environment Agency (WREA) has been assigned as the National Authority for coordinating and implementing the UNFCCC and the Designated National Authority (DNA) for the Clean Development Mechanism. So far, Lao PDR had carried out two main projects in the area of climate change: a national GHG inventory project and a climate change enabling activity. GHG mitigation options involving the forestry sector include increasing the total forest area of the country through forest restoration and afforestation. However, several factors are delaying the attainment of results – lack of local expertise, lack of reliable data, lack of country-specific or region-specific information and lack of activity data to enable estimation of GHG emissions (Sengchandala, 2003).

Reduced emissions from deforestation and degradation (REDD) was adopted at COP 11 in 2005, in response to the inadequacy of the Kyoto Protocol to address carbon mitigation options that reduce ecosystem and species destruction. Some of the issues addressed included the role of forests (particularly tropical forests) in the global carbon cycle; definitional issues; data availability issues; data availability and quality; rates and drivers of deforestation; estimation of changes in carbon stocks and forest cover and related uncertainties; bilateral and multilateral cooperation; capacity building; and financial mechanisms and other alternatives (IISD, 2008). The world has agreed to mobilize around US\$3 billion for REDD since consensus on future action was reached in the Bali Action Plan in December 2007 (IISD, 2008). Lao PDR is in a good position to capture benefits from the REDD mechanism (Table 4).

Table 4. Top 15 tropical countries that have the potential to store carbon while also protecting globally important biodiversity

Rank by	Country	Low	High	Indicators of biodiversity importance**				
carbon		carbon	carbon	MS***	Birds	Reptiles	AS	Higher
storage		estimate*	estimate*					plants
potential								
1	Brazil	5,400	14,000	4(7)	4(4)	6(5)	1(1)	1(<5)
2	Indonesia	5,400	14,000	1(1)	1(3)	3(4)	10(6)	<5(4)
3	Democratic	1,700	2,500	18(3)	21(8)	-	9(11)	-(9)
	Republic of							
	Congo							
4	India	880	1,900	12(9)	13(9)	5(6)	9(11)	<10(<1
								5)
5	Malaysia	1,000	1,900	14(19)	-	17(14)	18(15)	15(14)
6	Mexico	460	1,700	3(2)	8(15)	2(2)	3(5)	<10(5)
7	Philippines	840	1,600	6(-)	3(-)	7(25)	16(-)	<20(25
)
8	Colombia	630	1,300	16(10)	11(1)	10(3)	6(1)	<5(2)
9	Viet Nam	620	1,300	-	-	22(-)	25(-)	<25(20
)
10	Papua	630	1,200	9(-)	7(24)	12(12)	10(11)	-(17)
	New							
	Guinea							
11	Cote	590	1,100	-	-	-	-	-
	d'Ivoire							
12	Lao PDR	530	1,000	-	-	-	-	-
13	Cameroon	520	970	-(6)	-(18)	-	14(-)	-
14	Myanmar	390	950	-(19)	-(11)	23(23)	-	-
15	Peru	600	950	10(3)	5(2)	11(10)	12(4)	<10(11
)

* Million tonnes of carbon storable through new growth and slowed deforestation (1990-2050).

** Country's worldwide ranking by species endemism (and richness).

Source: Cited in Totten et al., 2003.

*** MS = mammals; AS = amphibians.

Ecotourism comprises a substantial component within overall tourism development in Lao PDR – recognizing the strong competitive advantage conferred by the country's natural environment (Manivong and Sipaaseuth, 2007). The financial benefits of ecotourism have provided local stakeholders and land-use planners in Lao PDR with a broader perspective in

relation to the range of livelihoods possible on forest lands (Khanal and Babar, 2007). Expectations resulting from ecotourism in National Biodiversity Conservation Areas (NBCAs) include conservation advocacy; wildlife threat and resource use monitoring; a deterrent to illegal activities; conservation education and awareness raising; and potential long-term changes in resource use patterns links to ecotourism income generation (Schipani and Marris, 2002).

Policy and institutional framework

Lao PDR has a short history of implementing its 1996 Forest Law, in comparison with other countries in Southeast Asia which have longer histories in this context. The FS 2020, which is endorsed by government, is the official document guiding development of the forestry sector in line with overall national plans and strategies for socio-economic development and environmental conservation including the National Growth and Poverty Eradication Strategy (NGPES) (MAF, 2005).

Legislation and regulations governing forestry have been complex, incomplete, inconsistent and difficult to interpret and apply. Important governance concerns in Laotian forestry include: inconsistencies in the legislative framework; unsupervised and largely unaccountable state-owned enterprises that dominate logging operations; and a decentralization process that may fail to provide consistent and comprehensive protection of the national interest in forest management (World Bank et al., 2001).

Referring to the Prime Minister's Decree No. 205 on import and export management in October 2001, Notice No. 202 in February 2003 issued by the Ministry of Commerce provided furthered definition to the decree. Commodities prohibited for export, except through authorization according to Article 8 of PM Decree No. 205, include:

- Wild animals, water animals and the parts of the mentioned animals prohibited according to the local regulation and law and according to the agreements which the government of Lao PDR has signed with international organizations to preserve them
- Logs, sawn wood (transformed wood), all kinds of rattan and eagle wood which have not been processed
- Forest products such as: orchids (yellow orchid), beer lay, resin from trees (yang), chanh dai and other goods which are prohibited for export according to local regulations and laws

On 17 August 2007, the Prime Minister issued PM Order No. 30 with clearer and stricter measures to control logging and wood business than the preceding PM Decision No. 25. PM Order No. 30 calls for strong coordination between relevant central and local government agencies to: (1) Improve the effectiveness of forestry conservation for financial development, and (2) reduce dependence on revenue generated from forest exploitation in the context of financial development activities (World Bank, 2007). The MAF sent senior forestry staff to all provinces to ensure proper implementation of this Order.

The MAF has adopted the 5-year Agriculture and Forestry Development Plan 2006–2010, which has 4 targets and 13 measures. Several concrete sub-targets for forestry include:

- Increase forest cover from 9 million ha (42%) to 12 million ha (53%) by 2010
- Continue detailed forest survey and classification for management according to scientific principles, available technology and current policy and regulations
- Acceleration of ground level identification of Production Forests with an area of around 4.2 million ha
- Systematic establishment of management plans for 3.4 million ha of NBCAs

- Ground level identification of watershed protection areas and planning the use and control of around 4 million ha of watershed area
- Environmental protection for other sectors

The MAF has amended the Forestry Law with the following main changes:

- Reducing the number of forest types from five to three (Production, Protection and Conservation)
- Reducing the natural forest conversion area from 10,000 ha to 1,000 ha
- Increasing degraded forest area for allocation to plantation establishment from 3 to 10 ha for each project at the district level and from 3-100 ha to 10-500 ha at the provincial level
- Inclusions of principles concerning land concessions for plantations
- Prohibition of log and lumber export
- Prohibition of logging permit issuance at the provincial level
- Clear responsibilities and mandates for the Forest Inspection Organization

In line with the Forestry Law revision, the DoF will have new divisions of Protection Forests and Production Forests and all Provincial Agriculture and Forestry Offices will have two new sections of Planning, and Forestry Inspection.

Other efforts and initiatives taken by the MAF include passing of a Wildlife Law, The GOL-Donor Sub-working Group on Forestry (FSWG), development of a Forest Management Information System (FOMIS), participation in the Forest Carbon Partnership Facility (FCPF) of the World Bank and development of forestry sector indictors.

Forestry is cross-sectoral in nature but its management is confined by vertical divisions between sectors. MAF regulations are only delivered to the agriculture and forestry sections within provinces and districts – as applies for other ministries. Further, there are still some limitations regarding cooperation in the present management and the effectiveness of management is rather low (UNDP, 2008a). Public service reform is required:

- 1. To increase the cooperation of ministries, central sectors and localities
- 2. To review the roles and responsibilities of each ministry and central sector
- 3. To seek improvements (synergies) and minimize the duplication of responsibilities (UNDP, 2008a)

NAFRI is the leading agriculture and forestry research agency in Lao PDR. Its strategy plan and research plan are based on the need to respond to the changes taking place in Lao PDR and ensure that its activities remain relevant and demand-driven. With the new strategy, NAFRI will focus on improving efficiency in agricultural production, improving land use and land management processes and relating the impacts of rapid agrarian change back to policy makers at different levels.

Research in forestry has made progress in relation to NWFPs, fast growing tree species, tree seed protection and other areas in cooperation with international institutes and projects. The number of researchers with higher degrees has increased. Forestry research is mostly driven by international efforts according to the research fields of interest and expertise. Forestry research is currently in need of a new component in the national context – to protect intellectual property rights related to Laotian natural resources – but is constrained by a lack of funding and facilities. The government has recognized this issue and together with the international research community is seeking a longer term solution.

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

The FS 2020 is the guiding document for Laotian forests and forestry. The government realizes the current inadequacy of the forestry laws and policy implementation. The government has therefore made efforts to address outstanding issues in order to continue with its commitment to sustainable forest management. The government has adopted strategies, set targets and made ground measurements to help deliver targets contained in the FS 2020. To reflect the government's seriousness in implementing sustainable forest management, progress on implementation of the FS 2020 is reported annually through stakeholder consultation.

Despite these progressive attitudes, the FS 2020 will only be as effective as political commitment and human and financial resources allow. The FS 2020 Implementation Promotion Project, initially planned for five years, aims to develop planning and management capacity in the forestry sector through formulation and monitoring of implementation plans, stakeholder dialogue and policy-related priority actions.

As institutional and financial capacity in Lao PDR is relatively weak, international financial and technical assistance is crucial to assist the country in achieving the aims of the FS 2020. Either joint or independent implementation by different agencies may achieve sustainable development of forestry in Lao PDR although monitoring and enforcement remain a challenge. Further undermining enforcement efforts is the problem that legislated property rights are frequently at odds with traditional systems, and with the values and norms of society. They do not thus gain local support (Litz, 2007).

Forestry is expected to continue to provide a range of benefits to national economic development as well as to maintenance and improvement of rural livelihoods. However, forest resources are not sustainably managed due to limited human and financial resources to enforce laws and regulations. There is relatively weak awareness that forestry is of a social character, cutting across the geographical and legal demarcations which frame the social and economic relationships between individuals, organizations and states.

The government is renewing the course of actions to better reflect national forestry issues and to ensure that actions are in tandem with international forestry movements related to forest degradation, biodiversity conservation, sustainable forest management and trade and governance issues. The government is revising the forest law to reflect the current forestry situation and is making efforts to conserve the remaining forests by improving protected area management and promoting sustainable management of production forests. The government supports the establishment of plantations on degraded and unstocked lands with the involvement of rural communities as part of the overall poverty eradication strategy.

Current wood industry capacity exceeds the sustainable AAC, and despite heavy investment, performance has not met expectations in terms of value addition, employment creation and export earnings (ADB, 2005). Harvesting is still driven by needs to supply sawmills or traders with preferred species, log sizes and volumes. There is no evidence that wood production has alleviated rural poverty. Problems in the forest policy framework can, and must be corrected to enable forestry to make its full contribution to national development. The over-capacity of the wood industry has to be adjusted to match the AAC. In some cases, the situation is worsened by the application of province level quotas; in general, annual logging quotas are not based on the principles of sustainable forest management (Bestari et al., 2006).

Forest is deteriorating both quantitatively and qualitatively in Lao PDR. Commercial logging has increased tremendously since the 1980s. Unscrupulous logging of selected commercial

species has led to less valuable species compositions, smaller average log size and an excess of lower-value and lesser-known species (World Bank et al., 2001).

Pressure on land use and conflicts in forested areas are rising in Lao PDR as demands for land for agricultural conversion, plantation establishment and road construction increase. This often results in changes at the landscape level and leads to deforestation. Additionally, the lack of a clear legal basis for the moratorium on large land concessions is allowing continuation of land leasing through provincial levels of government in Lao PDR.

Exotic species are most often introduced under Laotian plantation programmes: *Eucalyptus* spp., *Acacia* spp., oil palm (*Elaeis guineensis*), rubber *Hevea brasiliensis* and *Jatropha* spp. It is not unusual for tropical countries in this region to introduce new species plantation development and impacts on the ecology of natural habitats have been witnessed across the region. Introduced species often become naturalized – for example, *Acacia mangium* was introduced to Malaysia under plantation programmes in the 1980s. Since then it has been able to regenerate successfully and become established on open lands.

At the same time, Lao PDR has a low level of development in relation to climate change adaptation in preparation for more extreme and less certain future weather patterns. For example, climate change is thought to be causing glacial retreat in China, the source of the Mekong and this may result in heightened water insecurity (UNDP, 2008b). Massive increases in funding and technology transfer are required to ameliorate the situation in Lao PDR (UNDP, 2008b).

Participatory forest management is considered as an important, and possibly the only, path to sustainable forest management and poverty alleviation by the government. It is hence crucial that an integrated management approach, incorporating links and enhancing understanding between food security, forestry and resource conservation is implemented.

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

An overview of the changing characteristics of the society highlighting key trends

The Lao economy is primarily based on agriculture and economic growth is likely to increase demand for food and forest products. It is possible that demands will partly be met through agricultural expansion, further forest conversion and forest resource extraction. Lao PDR is still heavily dependent on its natural capital, especially timber, hydropower and NWFPs to support national development and the livelihood of its people (Sawathvong, 2003). Wood and wood product demand from neighbouring countries has put forest at heightened risk of uncontrolled and excessive logging. Lao PDR's protected areas and surrounding lands are among the most remote and agriculturally marginal in the country. However, the once remote, inaccessible, and what were viewed as economically unproductive protected areas, now flow with increasing human use and activity (Chape, 2001). The protected areas are thus subject to threats of forest degradation, large-scale development projects, agricultural frontier expansion and illegal wildlife hunting.

In 2007, the Lao Tree Plantation and Cash Crop Business Owners, Wood Processing Industry and Biodiversity Conservation associations were formed. The establishment is recent, but their common objective is to disseminate information to their members.

Lao PDR is enjoying an influx of foreign investment as a result of stronger political and economic ties with other countries. A strong workforce is therefore in demand and more workers are exploring employment opportunities in Lao PDR. Labour migration is likely to become more important as a structural feature in the country's economy (Asia News Network, 2005). This growing number of migrant workers could be beneficial or detrimental. Those leaving the country could either constitute a brain drain or a source of overseas remittances. Those moving to work in Lao PDR may provide a substantial source of cheap labour and adhere to stringent work standards but could also prove to be irresponsible and overextended.

Between 1990 and 2000 an average of 0.40% of the Laotian workforce was employed in the forestry sector (Whiteman, 2004a). Most employment has been in the wood processing industry, together with some employment in forest-based activities. The focus of the forestry sector is still largely on roundwood, sawnwood and wood-based panel production (Whiteman, 2004a).



Figure 7. Trends in the contribution of the forestry sector to total employment in Lao PDR compared with Cambodia, Myanmar, Thailand and Viet Nam Source: Whiteman, 2004a.

China, Indonesia and the Philippines reduced poverty incidence by 70% from 1990 to 2004 through economic growth (UNESCAP, 2007a). However, during the same period, Lao PDR recorded the opposite trend of increasing poverty rates (Table 5). Agriculture provides livelihood support and employment to its rural community, which made up 73% of the population in 2005 (National Statistics Center, 2005). Poverty, in this case, is not directly linked to hunger as people still depend to a great extent on natural resources for sustenance. The poverty gap³ increased from 3% in 1992 to 6.1% in 2002 (UNESCAP, 2007a). The one dollar per day measure is another method used to compare poverty incidence across countries on the basis of fixed purchasing power or purchasing power parity. The national poverty line reflects the official standard of living based on country-specific characteristics. Level and trend assessments based on these measures of poverty do not always agree (Table 5).

Table 5. Population living in poverty in Lao PDR						
Population living on I	ess than US\$/day	Population living below the national poverty line				
Earliest	Latest	Earliest	Latest			
18.6% (1992)	27% (2002)	45% (1993)	38.6% (1998)			

Source: UNESCAP, 2007a.

Poverty level is strongly related to geographical location in Lao PDR. In the northern provinces 65% of districts are categorized among the 47 poorest and in the southern and central provinces the figures are 47% and 35% respectively (Anon, 2007b). Whilst the overall incidence of poverty has decreased, urban-rural disparities have increased and the poorest segment of the population (the ethic group in remote areas in particular) has remained at the same level or become poorer, demonstrating the uneven nature of economic growth across the

³ The difference between income at the poverty line and the median household income for those in poverty expressed as a proportion of the income at the poverty line.

country as a whole (Anon, 2007b). A poverty assessment in 2007 noted that a major cause of poverty in Lao PDR is diminishing access to cultivated land (ADB, 2008).

In the face of poverty, the rural poor in Lao PDR generally turn to forest areas for food during periods of rice deficiency. At the same time, they may over-harvest natural resources to levels beyond sustainability. The impacts of over-harvesting on NWFP sustainability have received attention in addition to growing threats to forest habitats, increasing human disturbance in many exploited forests and resource susceptibility. Rural communities are aware of dwindling natural resource availability but lack the capacity to change the situation (ADB, 2000).

Efforts since 1989 to alleviate poverty through the Land-Forest Allocation Program (LFAP), especially amongst the rural poor in the northern uplands, have not succeeded in achieving their desired results. Reasons contributing to the failure include lack of human resources, technical incompetence, inconsistent implementation and the lack of a monitoring system. The LFAP has to some extent resulted in the poor being made poorer and the programme is under review for improvement (MAF, 2005).

Demographic changes

The National Statistics Center of Lao PDR projected that the growth rate of the population will remain at 2.4% from 2005 to 2010, drop to 2.2% in 2010, 1.9% in 2015 and 1.4% in 2020. The population density increased from 15 persons per km² in 1985 to 24 persons in 2005. It ranges from 10 persons per km² in rural areas to 178 persons per km² in Vientiane.

Lao PDR's economic transition has witnessed interesting migration patterns where the urban population increased from 17% in 1995 to 27% in 2005. Over the same timeframe, the rural population dropped from 83% to 73%. Migration occurs at three levels in Lao PDR (National Statistics Center, 2005):

- a. Rural to rural migration. Migrants move to stay near roads to gain better access to infrastructure, e.g. electricity.
- b. Rural to urban migration. Migrants, mostly from mountainous northern and central areas, move to Vientiane in search of better infrastructure and a better life.
- c. Emigration to Thailand. Migrants, mostly from southern areas, move to Thailand in search of better job opportunities.

In 2005, 50% of the population was below 20 years of age (National Statistics Center, 2005). The proportion below 15 years of age declined from 44% to 39% between 1995 and 2005. The proportion of the population of working age will slowly increase as a percentage of the total population, from 57% in 2005 to 61% in 2020 (National Statistics Center, 2005). The population aged 65+ is likely to remain very low during the next few decades.

Currently, the socio-economic gap between the urban middle classes and rural poor is widening. It is unlikely that the rural poor will be able to enjoy rapid economic growth like their urban counterparts and will remain very much dependent on subsistence agriculture and forest resources in their day-to-day lives.

The political and institutional environment

Thirty-three years after the Lao People's Revolutionary Party took power in 1975 Lao PDR remains a Lesser Developed Country. Economics and politics are intrinsically related dimensions of a single social reality. Lao PDR generally maintains a low profile in the larger international arena. Currently, Lao PDR's foreign policy concentrates on its immediate neighbouring countries (U.S. Department of State, 2008).

The country scores low in terms of contract enforcement, protection of property rights, transparency and effective public service delivery. Key governance issues include corruption, the slow pace of public service reforms, the adequacy and enforceability of the rule of law and limitations imposed on civil society (ADB, 2006). While the Constitution provides for separate executive, legislative and judicial branches of the government, the Party retains authority over centralized policy-making processes. Lao PDR is still governed largely through issuance of decrees (U.S. Department of State, 2008).

The Association of Southeast Asian Nations (ASEAN) was established in 1967 and Lao PDR joined in 1997. Joining ASEAN provides impetus for the country to become more closely integrated into the regional economy.

The Greater Mekong Subregion (GMS), an initiative by the Asian Development Bank (ADB) launched in 1992, is part of a functioning subregional block and potentially another emerging regional cooperation. The GMS covers a geographical region that includes nations and territories located in the Mekong River Basin, namely Viet Nam, Cambodia, Lao PDR, Thailand, Myanmar and Yunnan Province of China. ADB has played a key role in the establishment of the GMS programme and acts as financier; secretariat and coordinator and also provides; technical and advisory support (Mekong Brief, 2006). The GMS has identified nine priority areas for cooperation: transport, energy, telecommunications, environment, human resource development, tourism, trade facilitation, agriculture and investment.

The management of most forests in Lao PDR is the responsibility of MAF. Recognizing the cross-sectoral character of environmental conservation and protection, the government has created multiple coordination bodies to facilitate interagency and provincial coordination – the National Environment Committee (NEC), the Water Resources Coordination Committee (WRCC) and the Lao National Mekong Committee (LNMC).

The Water Resources and Environmental Administration (WREA), formerly known as the Science, Technology and Environment Agency (STEA), has coordinating responsibility on environmental and forestry management and is responsible for national environment policy and implementation with relevant ministries (Table 6).

Agency	Responsibilities
WREA, Office of the Prime Minister	Overall coordination; oversight of environmental affairs; environmental management (setting policy and regulatory framework, monitoring state of the environment and compliance with policies and regulations).
Ministry of Finance	The Customs Department is responsible for protecting borders from illegal activities and collection of import and export statistics.
Ministry of Agriculture and Forestry	Forest resource use and management; biodiversity conservation and management; soil resource management; water resource management; fisheries; livestock and crop production.
Ministry of Industry and Commerce	Hydropower development; industrial development; mineral resources.
National Tourism Administration	Prepare the laws, rules and regulations on tourism and the tourism industry, strategy on tourism development, and promotion targeted in the National Socio Economics Development Plan.
National Land Management Authority	Land planning.
Ministry of Energy and Mining	Formulation of policies and regulations on monitoring mining operations, hydropower development and mineral resources.
Ministry of Public Works and Transport	Development and management of infrastructure.
Ministry of Public Health	Public health and sanitation; medicinal plants.
Ministry of Planning and Investment	National development planning; development projects and approval.

Table 6. Government agencies that will have impacts on forest sectors at policy, planning and management levels in Lao PDR

WREA's operational mandate is being expanded as it nears ministry status. It is involved in matters of implementation concerning watershed and other natural resource issues. Within the WREA an Inter-Ministerial Working Group brings together mid-level technical officials from various ministries for communication and facilitation.

More institutional change initiatives are endorsed and implemented through government partnership with local communities and international organizations. A recent list of institutional achievements includes:

- Enacting the environmental impact assessment decree
- Development of a policy to safeguard the environmental and social sustainability of the hydropower sector
- Creation of an Environment Protection Fund
- Strengthening wildlife trade regulations
- Creating a specialized agency to protect and manage the Nam Theun Watershed
- Decentralizing environmental functions to provinces
- Establishing a third party monitoring protocol to report on environmental impacts of development projects
- Natural resource management and good governance as an integral part of the NGPES

In 2000, the government began implementing its decentralization policy to transform provinces into strategic units, districts into planning and budgetary units, and villages into implementing units through Order 01/PM/2000. This represents a conscious effort to empower provincial and district authorities to achieve national goals. The MAF is making progress in devolving its authority to the provinces but is constrained by lack of human and financial resources.

Law enforcement and compliance are problematic issues. Laws are sometimes not able to be translated on the ground and clear legislation and procedures are often lacking or absent from the beginning. There is also a serious lack of resources and capacity in the face of conflicting pressures from economic growth and needs for poverty alleviation and environmental protection. Weak law enforcement and compliance have led to poorly regulated and illegal logging and procedures and systems in Lao PDR are often perceived to have little transparency or accountability (Bestari et al., 2006).

The "Support to Better Service Delivery" project, funded by international donors in alignment with the 6th Five-Year National Socio Economic Development Plan (SEDP6) 2006-2010 and Strategic Plan on Governance 2006-2010, aims to increase the efficiency, effectiveness, transparency and accountability of public administration at both central and local levels by 2010. The SEDP6 prioritizes development for agriculture, infrastructure, education and health care, and calls for accelerating reforms in key areas including governance, private sector development and natural resource management.

Economic changes

Economic transition began with the New Economic Mechanism in 1986, transforming Lao PDR from a centrally planned agriculture-based subsistence economy towards a more marketoriented industry and service-based economy. The socio-economic transition taking place is driven by greater communication with urban centres and rapid growth experienced by other countries in this region. However, the 73% of the population residing in rural areas is still dependent on agriculture and forest resources for subsistence. Furthermore, the economic fruits of reform are concentrated in urban areas because urban Laotians are best positioned to take advantage of new economic opportunities (Bruce, 2006).

In 2008, Lao PDR ranked 164 out of 178 global economies in terms of ease of doing business, a drop from 2007 when it was ranked 159 (International Bank for Reconstruction and Development and World Bank, 2007). A new enterprise law is, however, designed to expedite investment procedures.

The government's revenue and fiscal performance has exceeded targets during recent years from 2004 to 2007. Driven by resource and non-resource tax revenues, the Ministry of Finance (MoF) exceeded its revenue targets for the first time in FY2005/2006 and is expected to repeat this performance in FY2006/2007 (based on the MoF's preliminary data estimates). Budget revenue was above the original target of 11.4% at 12.1% of the GDP in FY2005/2006. In FY 2006/2007, revenue is expected to increase to about 12.4% of the GDP with the budget deficit at about 2% of the GDP. The budget deficit shrank sharply from 3.3% of the GDP in FY 2004/2005 to 1.2% in FY 2005/2006 (World Bank, 2007).

Lao PDR is endowed with abundant natural resources, including forests, minerals and hydroelectric power potential, directly contributing to the national economy. The economy has grown strongly for more than a decade. Between 1990-2000 and 2001-2005, real GDP grew by an average annual rate of 6.3% (World Bank, 2007). A sharp fall-off in growth was observed during the regional crisis of 1997-1999. The GDP grew by 8% in 2007 increasing from 7.6% in 2006. In terms of GDP per capita, figures increased from US\$665 in 2006 to US\$726 in 2007 (Lee et al., 2008).



Figure 8. Average annual GDP growth rate of Lao PDR compared with other ASEAN countries from 1990 to 2005

Source: UNESCAP, 2007a.

The GDP sectoral composition has shifted in the past few years as a result of structural transformation. Two new trends stand out: the growth in the industrial and services sectors and reduction of the agriculture sector. Before 2002, the agricultural sector accounted for about 50% of the GDP, but its share in the GDP declined to 42.3% in 2006, due mainly to the double-digit growth in the industrial sector since 2002 (ADB, 2008). In 2006, the industry sector accounted for 32% of the GDP and services for nearly 26% (World Bank, 2007). The growth of the services sector was the result of steady improvement in tourism and telecommunications (Lee et al., 2008). In 2006, tourism earned a handsome figure of US\$173.2 million, with economic performance surpassing the export earnings from garments, electricity, wood products, coffee, agricultural products and handicrafts respectively (LNTA, 2006). Tourism continues to assert it significance in Laotian economic development. Hydropower represents another major comparative advantage of Lao PDR and accounts for around 25% of total foreign exchange earnings. Hydropower will stay as a major driver of economic growth relative to all other sectors (MIH, 1998). Future economic growth strategies aim to diversify the economy further, targeting growth in the industrial and service sectors.

The forestry sector contributed 1.9% to the Laotian economy in 2000 (Figure 9) and 80% of the labour force was employed in the agricultural sector.



Figure 9. Trends in the contribution of the forestry sector to the GDP in Lao PDR, Cambodia, Myanmar, Thailand and Viet Nam from 1990 to 2000 Source: Whiteman, 2004a.

The growth of the industrial sector has been driven by gold and copper mining, and construction activities such as the Nam Theun II hydropower project, and the Sepong and Phoubia mining projects. At the Business Forum on Mining Opportunities in the GMS in 2006 the Minister of Energy and Mines of Lao PDR revealed that there were 66 companies investing in minerals, half of them foreign and half local. These companies are conducting 143 projects – 27 prospecting projects, 56 exploration projects and 60 mining projects. The value of mineral production increased from US\$674,000 in 2000 to US\$194,000,000 in 2005. The share of national revenue generated by mining increased from 0.6% in 2000 to 2% in 2005.

A number of other mega projects currently implemented by the government will continue to contribute to higher positive growth for the industrial and service sectors.

To facilitate movement of people, goods and vehicles between countries in the region, the GMS Cross-Border Transport Agreement (CBTA), a multilateral legal instrument among the GMS countries has been enunciated. The agreement calls for countries to cooperate for mutual economic benefits and to enable the subregion to become internationally competitive.

The government remains heavily dependent on international aid and foreign investment – particularly from Viet Nam, China and Thailand – for its macroeconomic transition. Due to heavy reliance on Asian markets, the Laotian economy has a high degree of vulnerability to external shocks. This vulnerability was demonstrated during the Asian economic crisis of 1997-1998 when Thailand, the biggest foreign investor, was the first to pull out of Lao PDR (USCINCPAC, 2002). As a consequence of withdrawal of investment by Japanese banks from Thailand between June and December of 1997, lending by Japanese banks fell by 8% (Kaminsky, 2005).

The government continues to introduce and implement various reforms to spur economic growth, including a new State Audit Law, the Public Financial Management Strengthening

Programme (PFMSP), reconstruction of State Owned Enterprises (SOE) and development of the banking sector, trade and private sector. Such public sector reform is felt necessary to create an inductive investment environment supportive of business development. Implementation of the reforms has advanced to different extents in different areas. In some areas implementation has progressed well while in others, implementation of reforms has lagged behind legislative actions (World Bank, 2007).

The international donors are likely to increase pressure for progress on reforms and with aid inflows accounting for more than 16% of the country's GDP a move towards greater private sector revenue generation is likely to be welcomed. Lao PDR attracts donor financial and technical assistance for public sector governance, trade development, financial sector and SOE reforms, private sector and tourism development and land reform. Overseas Development Assistance (ODA) is a key component of the government's strategy to finance the SEDP6 from 2006 to 2010, and ODA has averaged around two-thirds of the country's public investment over the last four years (World Bank, 2007).

Besides foreign aid, Lao PDR is heavily dependent upon FDI (Table 7). FDI in Lao PDR contributed 5.9% to the GDP in 1990-1995 and has since followed a rising trend to 24.8% of the GDP in 2006 (UNESCAP, 2007a). Recently, however, the government has become more cautious in approving foreign investments because there are concerns that the country is not getting a fair deal from smart operators; that the demands of different patronage networks are properly balanced, and that the right balance is struck between powerful competitors. Small-scale investment procedures have been streamlined but there are signs that mega projects are being delayed due to key leaders raising concern over the pace and direction of development.

Sector	Projects	Value (US\$)	% in grand
			lolai
Electricity generation	36	3,293,252,200	60.0
Agriculture	114	582,884,768	10.6
Mining	117	500,683,198	9.1
Industry and handicrafts	161	313,712,020	5.7
Trading	83	257,713,089	4.7
Construction	23	159,336,874	2.9
Services	131	127,251,907	2.3
Hotels and restaurants	45	102,263,695	1.9
Telecommunications	3	39,940,000	0.7
Wood industry	32	24,564,290	0.4
GRAND TOTAL	-	5,490,268,785	100.0

Table 7. Approved foreign direct investment for top 10 receiving sectors from2000 to September 2006 in Lao PDR

Source: Anon, 2006b.

Lao PDR is in the process of accession to the World Trade Organization (WTO), implementation of the ASEAN Free Trade Area (AFTA) Common Effective Preferential Tariff (CEPT) by 2008 and is involved in negotiations between ASEAN and China on a Free Trade Area (CAFTA) to be completed by 2010. With regard to CEPT under AFTA, Lao PDR will reduce tariffs on a range of products to 0-5%. This is expected to eliminate trade barriers between Lao PDR and ASEAN counterpart and thus increase trade.

The interplay between China and Lao PDR will have major, perhaps determinative effects on Laotian forestry. China started economic reform in 1978 and the country's GDP increased by more than a factor of 10 over the period 1978-2004 (He et al., 2007). By the end of 2005, China was projected to be the fourth largest economy in the world. Growth prospects for 2006 to 2020 are positive, with GDP growth projection at an average of 8% until 2020. A higher risk scenario indicates that growth will slow to an average of around 6% for 2011-2020 (He et

al., 2007). China is establishing closer ties with Lao PDR to balance Western influence in the country, as well as Lao PDR's existing strong relationship with Viet Nam. China's growing interest in Laotian energy potential and mineral resources will affect the country's natural resource allocation and there may be a policy shift favouring trade with China.

India, another emerging power, with average annual growth of 9.2% since 1998, is predicted to be another industrial powerhouse in Asia. India started giving ASEAN greater importance with the formulation of the Look-East policy in 1992. Four India-ASEAN Summits have taken place in Cambodia in 2002, Indonesia in 2003, Lao PDR in 2004 and Malaysia in 2005. The summits function as a forum for exchange of business experiences between policy makers and business leaders from ASEAN and India. India and Lao PDR have signed several agreements and MOUs in the fields of culture, cooperation in defense, cooperation in science and technology, agricultural cooperation, drugs and illicit trafficking and exemptions of visas for diplomats and officials. India has also set up Entrepreneurial Development and Information Technology Centers in Lao PDR.

Impact of globalization and regional and sub-regional integration

With increasing globalization, regional trade and economic cooperation have grown in all regions of the world. During the late 1960s to 1970s, there was a shift in industrialization strategy away from import substitution and towards export promotion in Asia. From the 1980s onward, a steady poor to middle class transformation took place in Lao PDR through better education, greater employment opportunities and better working conditions (Hirono, 2006).

Regionalization offers alluring economic benefits to Laos, which is surrounded by larger, more prosperous and powerful neighbouring countries. ADB has been a catalyzing force for Mekong regionalization amidst a host of regional processes and initiatives. As such it has found itself the object of criticism as an institution and through the specific projects it has supported that have impacted on local communities and ecosystems (Hirsch, 2001).

Regionalization is reflected in the government's strategy of transforming Lao PDR from being 'landlocked' to 'landlinked'. The significance of regional and sub-regional economies has increased dramatically for Lao PDR. This has resulted in enhanced Laotian participation in regional institutions and agreements, such as the ASEAN Free Trade Area and the GMS.

Globalization is a term coined in the early 1990s and in copious use since, despite the lack of a definition meeting the approval of the majority of scholars. The numerous studies on globalization provide contradictory analysis and conclusions of the benefits. For small developing states and landlocked developing countries, challenges abound in grasping opportunities arising from globalization processes (UNESCAP, 2006). An exercise simulating Laotian accession to the WTO shows that accession generally benefits the economy. Most households will benefit although urban households will gain more than rural households and there will be some widening of socio-economic disparities. It is suggested that access will increase employment and that this will be coupled with growth in the working age population. It is expected that more sub-urban towns will be built throughout the country especially near to better economic opportunities. The main challenge for Lao PDR is to implement its accession commitments (UNDP, 2006).

Recession pressure in the US economy inevitably affects Asian economies with close trade partnership. The boom in personal consumption expenditure in the US has driven China's growth in the past years. However, China's economy is anticipated to withstand the US and global economic recession because of its vast resources and its ability to utilize these resources through the still dominant state-owned economic structures (Gundzik, 2008). According to the Manila Times on 24 January 2008, recession in the US will result in greater

impact in Southeast Asia, especially for export-driven countries such as Thailand, Indonesia, Viet Nam and the Philippines.

There is a possibility that the Asian region may be deeply affected by the global recession stemming from the credit crunch. Lao PDR, a country substantially dependent on foreign investment and international aid, will see adverse effects through foreign investment withdrawals. At the same time, this will encourage Lao PDR to establish closer trade partnerships with the regional economic powerhouses – China and India. China's continuing economic growth will probably result in increased import of raw materials and intermediate input from the GMS, helping to propel growth in the sub-region.

Lao PDR continues to attract foreign investment inflows as a result of globalization and regionalization (Figure 10). The country has had a steep upward trend in year-on-year change in total foreign investment – 63.8% in 2004-2005 to 575.8% in 2005-2006. Myanmar was the only country with a continual decline in FDI between 2004 and 2006. Despite rocketing incremental investment growth in Lao PDR, FDI in absolute terms was lowest amongst ASEAN countries in 2004 and 2005 at US\$16.9 million and US\$27.7 million respectively (Table 8). The national ranking climbed to second from last after Myanmar in 2006 with an investment value of US\$187.4 million.



Figure 10. Year-on-year change (%) of foreign direct investment in Lao PDR in comparison with other ASEAN countries from 2004 to 2006 Source: ASEAN statistics.

Country	Total net inflow (US\$ million)				
	2004	2005	2006		
Brunei Darussalam	212.0	269.1	433.5		
Cambodia	131.4	252.0	483.2		
Indonesia	1,894.5	7,452.7	5,556.2		
Lao PDR	16.9	21.0	187.4		
Malaysia	4,623.90	3,391.9	6,059.7		
Myanmar	251.1	197.5	143.0		
Philippines	687.8	1,841.3	2,345.0		
Singapore	19,827.5	13,826.3	24,055.4		
Thailand	5,862.0	8,194.8	10,756.1		
Viet Nam	1,610.1	1,856.1	2,360.0		
Total	35,117.2	41,067.8	52,379.5		

Table 8. Foreign direct investment net inflow from 2004 to 2006 for ASEANcountries

Source: ASEAN Statistics.

Lao PDR is attempting to develop and strengthen institutions and agreements to help capture the benefits of globalization and regionalization. Progressively liberalizing trade and the FDI regime is leading to a profit-motivated regionalization of the Lao economy. China and India are increasing their commitments to these markets and, in the context of industrialization in China and India, resources are likely to be increasingly sourced in Lao PDR and other parts of the sub-region.

Increasing trade, openness and integration of Lao PDR within the regional economy and the global economy are inevitable. Increasing international trade is already affecting the Lao economy, the employment of Lao workers, the role of Lao women, the education requirements of Lao children, the consumption patterns of Lao families and even Lao culture. The impacts will increase in the future (CPI, NSC and UNDP, 2006). Under the right circumstances, Lao PDR, with its small, open economy, can benefit greatly from international trade. But benefits depend on how well people and companies respond to opportunities and competition. They also depend on the composition and pattern of trade; the quality, consistency and implementation of government policy; and the policies of trading partners (CPI, NSC and UNDP, 2006).

Technological changes within and outside the forest sector

Challenges faced by regional agro-based industries including those in Lao PDR are the inadequacy of skills at various stages of processing owing to poor education, improper training and lack of exposure to improved systems of production and the lack of cost-effective, efficient and modern technology for industries.

Lao PDR, in general, is still a low-technology country. However, the country's accession into the WTO is expected to result in higher productivity for the industry and service sectors through technology upgrades.

The financial profitability of sustainable timber management (STM)/sustainable forest management (SFM) and conventional logging (CL) is presented in Table 9. Conventional logging (CL) means management for short-term timber supply and a poorly managed forest.

Study (year)	Country	Type of forestry	IRR, NPV (DR)	Ratio profits CL to SFM	Comment
Bann (1977)	Cambodia	STM, CL	STM: US\$408 per ha CL: US\$1,697 per ha (6%)	4.1	90 years x 3 cutting cycle for STM; 30 years liquidation for CL
Boscolo & Mendelsohn (1998)	Malaysia	RIL, CL	STM:US\$2,660 per ha CL: US\$4,400 per ha	1.66	STM assumes RIL and > 60 cm dbh

Table 9. Financial	profitability	of STM/SFM and CL in Cambodia and Malays	sia
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IRR – internal rate of return

NPV – net present value

Where available, discount rates used in the studies are shown in brackets.

Source: Cited in Pearce et al., 2002.

That Lao PDR has yet to produce higher value forestry products on a significant scale is partly explained by the continuing availability of logs and the demand for unprocessed wood from the processing sectors in other countries. Moreover, most of the processing facilities in Lao PDR are sawmills and with low recovery rates and little use of waste wood, efficiencies are correspondingly low. Many mills are reported to be using old equipment and technology (Southavilay, 2002a). The Government is currently undertaking a reform of the wood processing sector and inefficient factories offering low value addition are being ordered to close down or adopt better technology to add greater value to their products (Sayakoummane and Manivong, 2007).

The government is also promoting foreign investment in the wood processing sector and provides support to the Lao wood industry directing foreign investment to ventures that source wood from plantation forests, to ensure sustainability. Foreign investment and trade liberalization are likely to create benefits including increasing efficiency in the wood industry sector and movement away from the use of old machinery and outdated technology with low recovery rates and low added value.

Lao PDR also has a policy to develop and promote the handicraft sector and strongly encourages both local and foreign investors to use locally sourced raw materials (Southavilay, 2002b). Lao woodcrafts include decorative carvings and souvenirs, household articles, toys and furniture. Woodcraft entrepreneurship in Lao PDR is, however, facing a lack of relevant knowledge, a scarcity of skilled workers, low investment and poor market access and product design and quality. Additionally, market information is poor and the woodcraft production and trade volumes for Lao PDR are unknown.

Traditional sources of energy, like wood or bamboo charcoal, biomass residues, sawdust and rice husks, are still being produced mainly for cooking or thermal applications in small industries. The production of these energy sources is still reliant on poor techniques and inefficient technologies, mainly because the products are destined for domestic consumption rather than high-end markets (Southavilay, 2002b).

Environmental issues and policies and their impact on the forest sector

The Environmental Protection Law 1999 is the principal environment legislation in the country. The law covers measures of protection, mitigation and restoration of the environment as well as guidelines for environmental management and monitoring.

Lao PDR is facing several environmental challenges; including vulnerability to natural disasters, slash and burn agriculture, uncontrolled fires, poorly regulated logging, fuelwood collection, soil erosion, declining water quality, deforestation and forest degradation. Much of the land is susceptible to soil erosion as a result of the large areas that are steeply sloping, the common soil types and the high rainfall. Around 40% of villages still practice slash and burn agriculture, and some are also involved in pioneer slash and burn activities which destroy natural forest (World Bank and STEA, 2007). As such, all environmental concerns are taking on significant economic importance.

To be effective, forest policy and law in Lao PDR require capable public institutions. Forestry cuts across sectoral boundaries and may involve many different agencies. Clearly delineating institutional arrangements is therefore crucial for effective implementation and enforcement.

Forestry is often planned by governments without integration alongside other sectors' policies, with no exception in Lao PDR. A traditional forest policy has objectives such as conservation, industrial development, afforestation and governance reform (Whiteman, 2004b). Problems arise in natural resource-based countries in relation to implementation and enforcement where existing forestry laws are not comprehensively executed at different levels. At the same time, other laws for other natural resources may be favoured and may thereby pose a threat to forest sustainability. Forestry, at present, is not planned at a broad inter-sectoral level in the national context. Further, natural resources are at the top of the list for exploitation to generate capital for investment in long-term projects including tree plantations in Lao PDR (Hodgdon, 2008).

There is a direct conflict of interest in natural resource management between forest and other highly commercial natural resources including gold, silver, copper, lead-zinc, tin, coal, sapphire and construction rocks. Mining operations have raised considerable concerns in relation to clear-cutting of forest and also in relation to the use of chemicals which may threaten Lao people, plants and wildlife.

Increased demands for land for cultivation and plantation result in conversion of natural forests and development in forest and forestry is often determined by market forces rather than by state regulations. The demand for some natural resources has doubtlessly been catalyzed by economic growth in recent years, but it is widely perceived that overexploitation and mismanagement have caused irreversible environmental damage and permanent loss of natural forest.

The Lao government has attempted to address deforestation issues with policy initiatives, and annual logging quotas among other initiatives. Lack of clarity in procedures, including those related to plantation establishment, together with limited financial resources and human capacity and weak law enforcement are major obstacles. Another contributing factor has been the award of logging concessions to State Owned Enterprises with no bidding process such that the enterprises have become relatively powerful in comparison with the generally weak forest authorities. Several studies by Angelsen and Kaimowitz (1998) and Naidoo (2004) suggest that pursuance of economic growth leads to unfavourable forest development, often linked to deforestation, across a large cross section of developing countries.

REDD has been generally viewed more favourably in relation to forestry that the CDM (Karsenty, 2008). REDD is, however, currently in a phase of methodological development (IISD, 2008). For countries, including Lao PDR, to capture REDD benefits, several issues have to be put on close watch (Conservation International, 2008):

- Incorporate a multiple benefit approach
- Need to award the countries that have been protecting forests

- Learn lessons from the CDM
- The system should be encouraging
- Non-permanence
- REDD to happen sooner than later.

Theoretical assessments praise the advantages of payments for environmental (PES) over indirect approaches, but in the tropics PES application has remained incipient (Wunder, 2007). Among other obstacles identified by Wunder (2007) are demand-side limitations and implementation and design of PES programmes. An example of PES in Costa Rican forest which has some similarities to the Lao forest situation, is cited for reference:

Hope *et al.* (2005) studied how the PES programme may contribute to poverty reduction for small-scale land owners in the upper water catchment area of a tropical montane cloud forest. Participation in the programme was limited due to weak programme dissemination, disputed land claims and inelastic commitment to compensation payment levels. Recommendations for this programme include clarification of resource claims and environmental service provision rights, and simplifying programme goals to defensible biophysical and/or socio-economic criteria.

The World Bank, with support mainly from Australia, Finland, France, Germany and Japan, has established a Forest Carbon Partnership Facility (FCPF) to establish REDD pilots so that countries can become "ready for REDD" at a national level. In July 2008, Viet Nam, Lao PDR and Nepal joined with eleven other countries selected to develop a readiness plan to take part in FCPF.

Lao PDR will continue to fulfill signed international conventions. It signed the World Heritage Convention in 1987, the Conservation of Biological Diversity in 1996, the UN Frame Convention on Climate Change in 1995, the Agreement on Cooperation for Sustainable Development of the Mekong River Basin in 1995 and CITES in 2004. However, the government has not signed some other important conventions, including the Ramsar Convention on Wetlands and the ASEAN Agreement on the Conservation of Nature and Natural Resources (adopted but not in force). National law will have to be amended accordingly to reflect the country's commitment as a signatory to the conventions.

Within the Lao economic transformation process, certain risks are threatening forest resources. Economic growth has coincided with declining environmental sustainability. Secondly, rural communities that are generally subsistence based and lack the skills necessary to become involved in the new economy will probably be left behind and thus more likely to participate in illegal activities, such as illegal logging (Mekong Brief, 2007).

Infrastructure development

The Ministry of Communication Transport Post and Construction (MCTPC) places high priority on sustainable economic growth and development through infrastructure investments that impact upon the domestic economy, assist rural producers and encourage socio-economic activities through an improved transport network (Ngonphachanh, 2006).

Road developments in Lao PDR will not only affect trade volume and routes and the movement of people but will also alter rural landscapes. The entire road network in 2002 was roughly 32,600 km (Nogales, 2004). It comprises 7,200 km of national roads (22%), 9,000 km of provincial roads (27%) and 16,500 district and local roads (51%). There is a shift in attention of road development in Lao PDR, from improving national roads only towards improving both national roads and developing a better community road network. This

inevitably causes some adverse effects on forest where roads may cut across forested areas, and clearing forest becomes necessary for associated infrastructure developments.



Figure 11. Road network map of Lao PDR Source: ADB, 2006.

Since the establishment of the GMS Economic Cooperation Program in 1992, road infrastructure projects have played a very important role in Lao PDR (Ishida, 2007). The members of the GMS signed a Memorandum of Understanding on the North-South Economic

Corridor (NSEC) during a GMS summit. Lao PDR is also traversed by an East-West Economic Corridor (EWEC) and Southern Corridors (Figure 12). The NSEC runs from Yunnan, China passing through the northern part of Lao PDR and connects to Bangkok and beyond. The EWEC starts from the deep seaport in Danang, Viet Nam, runs through the central part of Lao PDR across the Mekong River at Savannakhet (Lao side) and Mukdaharn (Thai side) passes through central Thailand and ends in the deep seaport of Mawlamyine, Myanmar – a total length of 1,600 km . The Southern Corridor stretches from Bangkok to Ho Chi Minh City.

The development of three economic corridors is intended to facilitate greater interconnection among markets within GMS member countries. Economic corridors have helped GMS countries to position themselves as important players in global markets (Guina, 2008). Each economic corridor project involves infrastructure development in not only transport but also telecommunication and energy. There are nearly 200 projects associated with these corridors (Mekong Brief, 2006).

The large-scale infrastructure development in the GMS will have implications on Lao forest and forestry in three major ways (Hirsch, 2008):

- The accessibility afforded by the expanded regional road network can be expected to increase the rate of log extraction, encourage settlement and clearance of land for cash cropping
- The hydropower projects involve forest clearance and increased access to remote forest areas
- The market development puts pressure on forest products previously used mainly for local subsistence purposes



Figure 12. Greater Mekong Subregion economic corridors Source: ADB, 2002.

The GMS approach to development has, however, been subject to criticism on a number of grounds (Mekong Brief, 2006):

- Heavy emphasis on infrastructure and rapid economic growth with the potential to undermine sustainable development objectives
- Heavy reliance on the exploitation of natural resources
- Uncritically assumes that the benefits of economic growth will be shared by all in the region, and will lead to poverty reduction
- ADB's accountability as a major programme proponent in the region
- Private sector accountability
- Lack of civil society involvement in GMS planning and implementation

Summary of key factors likely to impact forestry to the year 2020

Forests and forestry in Lao PDR are mostly influenced by national economic development decided by central and provincial governments, whereby decisions are significantly influenced by trading partner countries. The key factors directly and indirectly affecting Lao forests and forestry are active pursuit of rapid economic growth, resource accessibility and poverty; and 'foreign' factors in terms of FDI, plantation development and employment.

a. Active pursuance of rapid economic growth

Economic factors affecting forestry are determined by the industrial and services sectors which have seen significant growth over the recent years, as well as demand on resources in trading partner countries including China, Thailand and Viet Nam. In the future, India hopes that its economic growth and strategic influence will rival China's increasing importance as a key trading partner with Lao PDR.

Each of these countries will play major roles in determining Lao natural resource allocation in the medium term until Lao PDR completes its commitment to WTO accession. By then, other trading countries are expected to balance the strong influence of these countries, in the same way that China has begun to rival Viet Nam's influence in the Lao economy. Since the economy is critical for nation development, future policy may favour sectors that most significantly spur economic growth.

b. Resource accessibility and poverty

Diversifying sources of growth and employment are amongst the economic challenges facing Lao PDR. Improved roads and higher road densities provide better access to once isolated forests. Roads also are being built or upgraded along with development in other economic sectors, such as tourism and industry. Since rural communities are susceptible to land and forest degradation and are not well positioned to become involved in the new economy, an improved road network may create significant social as well as environmental risks. Combining the cumulative effects of road development, increased accessibility to forest resources and community reliance on forest resource harvesting, further forest clearing and forest degradation are likely.

Road development also provides the opportunity to expand trade and contribute to national economic growth and integration into the regional markets. Improved access is likely to spur increased forest product harvesting and trade, for example supplying to temporary settlements along the road and later through middlemen with access to markets further afield. The lack of baseline data on illicit timber and forest product trade means that no reliable estimate of how this trend will develop can be made.

c. Foreign factors in Lao forest and forestry

FDI inflows in Lao PDR are predominantly directed towards the natural resource sector, namely hydropower and mining. FDI in the hydropower sector made up 70% of the total foreign investment in 2006. In agriculture and forestry, tree planting and wood processing are the largest areas of foreign investment. Foreign investors in Lao PDR do not at present shoulder the responsibility of promising to target their investment towards sustainable development and fulfillment of corporate social responsibility.

The idea of plantation establishment was adopted by the government as a foreign investment attraction, besides being expected to substitute during potential future timber shortages and displace pressure on natural forests. The MAF, under the 'Strategic Vision for Forest Resource Management', has set a target of establishing a goal of 500,000 hectares of industrial plantations by 2020. The timber plantation industry has gone through two peaks – in the early 1990s and in 2000 – but plantations have not been successful in terms of productivity or sustainability so far. There are many cases of conversion of rich forest or village forest or land with no ensuing planting programme combined with very low concession fees (Anon, 2008).

Foreign labour introduced by investors to compensate for the low-skill base of domestic workers and movement of local labour in the forestry sector will have impacts on forestry. The advantages and disadvantages of a foreign work force are they can apply best practices and international standards in forest operations and the wood processing industry. The downside is they do not necessarily feel obliged to practice good and responsible standards.

4. PROBABLE SCENARIOS AND THEIR IMPLICATIONS

Forestry outlook scenarios are developed here on the basis of broad potential changes in society. This approach helps to envisage the sector in terms of overall national development. It also allows formulation of a range of policy recommendations based on possible situations in which the forestry sector may find itself.

Parameters used in defining scenarios

Drivers of changes were identified and discussed in the consultation workshop on 30 June 2008. The drivers were subsequently taken into account for Lao PDR's forestry scenario development. A guiding principle – that of living within ecological limits – was adopted for the scenarios analysis from Redclift (1999). Living within ecological limits means reducing the negative environmental effects of human activity, and enhancing the resilience of the environment.

Two axes were decided after studying the drivers of change based on the adopted principle. One axis is on demand for land and resources and the other axis on policy and institutional effectiveness (Table 10).

mand for land and resources	Scenario 2 • High but unsustainable economic growth • Rapid depletion of natural resources • Unsustainable land use	Scenario 4 • High economic growth • Slow depletion of natural resources • Sustainable land use						
	Scenario 1 • Low and unsustainable economic growth • Slow depletion of natural resources • No land use planning	Sustainable economic growth Sustainable natural resource management Sustainable land use						
ă	Policy and institutional effectiveness*							

Table 10. Scenario analysis for Lao PDR

*Includes management, technical and regulatory capacity.

The four scenarios that emerge are as follows:

Scenario 1

Low demand for land and resources together with low policy and institutional effectiveness is expected to result in low and unsustainable economic growth. Lao PDR would continue to have a subsistence economy with minimum external pressure and demand on its natural resources and minimal adjustment of its administrative system.

Scenario 2

High demand for land and resources but with low policy and institutional effectiveness would result in increased industrial development, increased FDI, but with high incidence of poorly regulated logging and a high rate of conversion of forested lands to non-forest use.

Scenario 3

High demand for land and natural resources together with high policy and institutional effectiveness would result in greater investment plantation development, increased FDI, increased industry sector development, and effective land use planning although with a low level of depletion of natural resources.

Scenario 4

Low demand for land and natural resources together with a high level of policy and institutional effectiveness would result in optimization of forested and non-forest land use, reduced pressure of timber and NWFP harvesting in natural forest and achievement of sustainable forest management.

The business as usual scenario

Lao PDR wants what the rest of the world wants: industrial growth, productivity and participation in global and regional markets. Increasing corporate and consumer demand may, however, increase rates of land degradation and forest conversion in Lao PDR. Some key stakeholders appear indifferent to sustainable development and business as usual, while employing the rhetoric of sustainable development without the associated reality. It is important for the country that a narrow business-government coalition does not develop and allow businesses to downplay the concept and realization of sustainable development.

The forests will be under increasing pressure from the logging industry with an excess wood processing capacity and timber demand originating from neighbouring countries which either have logging bans or round log export bans. As a consequence, rapid depletion of natural resources will continue. Forest cover and forest quality will decline.

Under a business as usual scenario, land use conflicts will intensify as competition develops for exploitation of natural resources; development of agriculture, infrastructure and plantations; and protection of forested areas. Consequently, environmental quality may deteriorate in forest and other areas with biodiversity following a similar trend.

Integration of the Laotian economy within the regional and global context is likely to lead to further socio-economic development while widening urban and rural disparity. Rural communities' consumption is likely to be based on household production or bartering. Rural communities will, however, experience greater difficulty in obtaining NWFPs for use as food or otherwise. Under the business as usual scenario increased competition for natural resources which are currently sustaining rural communities will result in a widened socio-economic gap.

Infrastructure development is important to integrate the Laotian economy into the regional context by developing market access and supporting market expansion. Road access is expected to support generation of cash income for rural communities through sale of agricultural products and livestock and more generally through increased export to neighbouring countries.

Rapid liberalization catalyses cross-border trade and FDI, but may also heighten unsustainable development where production and trade are reliant on traditional commodities such as timber and minerals and manufacturing businesses suffer from low levels of technology and managerial skills.

Probable shifts and alternative scenarios

The NLMA recognizes that Lao PDR needs a master plan to identify land suitable for specific investment purposes. To address the issue, the government is formulating a nationwide master plan to allocate land for specific uses, including agricultural projects, industrial tree plantations, production forests and protection forests (Vientiane Times, 2008a).

Acceptability of sustainable development will vary at different levels in Lao PDR. Some stakeholders might not think favourably of credible and transparent systems as a vehicle for sustainable development but rather as a threat to business as usual. Sustainable development can be understood in the Lao context as sustainable change rather than preservation or stasis.

Motivation for stakeholders' preferences for forest land use is driven by rapid economic development and demand. For example, until recently the rising oil price stimulated investment in biofuel crops as alternative fuels became an increasingly attractive investment. The more popular biofuel crops are palm oil and *Jatropha* spp. There are, however, economic and environmental sustainability concerns with biofuel crops as large scale plantation may drive further deforestation and species extinction and, in the light of the recent oil price slump, investments may not prove fruitful.

Increasing demand for biofuels, notably oil seeds, has been suggested as a contributor to food price increase. In the longer term, higher prices will have a detrimental effect on the poor who may be significant in specific locations (Renewable Fuels Agency, 2008). A slowdown in the growth of biofuels, as is likely now that oil prices have fallen, will allow assessment of the scale of the indirect effects of biofuel production and proposal of solutions (Renewable Fuels Agency, 2008).

Among other factors that might contribute to rising food prices in Lao PDR are environmental issues that may affect food production and repeated escalations of the global oil price. High fuel prices in 2008 pushed up the costs of transportation for individuals and households, construction, land clearing and agricultural farming (World Bank, 2008b). At the same time, Lao PDR was put at risk of rising inflation which is likely to put increased pressure on forest resources (World Bank, 2008b).

Shifts from the business as usual scenario could also include positive changes in forestry driving Lao PDR towards sustainable development in 2020. These may include adoption of the SUFORD forest management model at the national level, increased PES, improved awareness raising among officials and public of the values of forests and forestry and implementation of REDD to address deforestation and degradation.

5. WHAT WE MAY SEE IN 2020

Forest resources in the next two decades

Economic development has spurred demand for land and forest products in Lao PDR. Logging, exotic tree plantation, mineral exploitation and infrastructure development will be the key industrial drivers of forest cover loss and forest degradation for the next decades. Forest loss is at -0.4% per year (Laurence, 2007). Forest resources are under constant pressure from increasing commercial exploitation. Escalating pressure from logging will be focused on remaining forests, including protected forests with still reasonably good standing volume. Other factors exacerbating the problem include low land lease rates and concession fees, and possible government approval of higher timber quotas for domestic industry. It is recognized that many of these protected areas are being isolated and degraded by illegal logging, hunting and other forms of encroachment (Laurence, 2007). Effective policy and legislation implementation are needed to help ensure economic and environmental viability.

It is likely that more land will be allocated to forest conservation in a bid to protect natural resources, biodiversity and wildlife, (Vientiane Times 2008b). The fulfillment of expectations in relation to protected areas effectively being used to conserve biodiversity and produce environmental services is mixed and challenges ahead include curbing likely illegal logging, hunting and encroachment.

Natural forest is expected to face changes in stocking densities, species composition and size structure and reductions in wildlife and plant populations are also expected in the coming years. Ecological restoration and forest rehabilitation at the national scale may be possible through implementation of SUFORD.

Thousands of hectares of long-term concession land were granted to investors for establishment of industrial tree plantations and cash-crop farming. Species included in the plantation programmes include rubber, sugarcane, eucalyptus and palm oil (World Bank, 2008b). Conflicts between forest land use and agricultural extensification can, however, be reduced when land use planning is effectively implemented. There is, nonetheless, likely to be a shift in forest cover composition, with plantation cover increasing and natural forest cover decreasing.

Monoculture tree plantation practices are expected to be expanded and improved to promote greater use of native species and improved integrated systems. Large areas of degraded land are being planned for allocation to teak, rubber and *Jatropha* spp. plantations with the support of the latest Forestry Law revision which disallows land concession to plantations in natural forest areas.

Mining and construction industries are likely to have impacts on forest resources, water resources and biodiversity conservation as shown in Table 11.

Forest resources	Water resources	Biodiversity conservation	
 Flooding of large forested areas Clearing for mining operation Clearing forests for infrastructure and construction development Forest degradation Deforestation 	 Affecting natural flow (the impact is not fully studied at the moment) Pollution of water systems from mining operations Water sedimentation from industry and logging activities Loss of watershed protection 	 Declining wildlife population due to improved access to the interior Fisheries resources impacted by hydropower and mining operations Major alteration in forest landscapes caused by biodiversity loss 	

Table 11. Impacts of mining and construction industries on forest resources, water resources and biodiversity conservation in the next decades

A Land Use Planning and Land Allocation Manual is being drafted and aims to increase the ease with which villagers can operate together with businesses in Lao PDR. It is planned that land certificates will be issued to land holders to formalize ownership. Increased accountability, transparency and implementation of monitoring in relation to concession application guidelines and procedures are also planned. If efforts fall short of success, forest destruction is likely to increase in Lao PDR.

Wood and wood products

Wider acceptance and recognition of SFM at different levels should take place in Lao PDR in the coming years. Plantation woods will play an increasingly significant role in meeting timber demand from the wood processing industry. There is likely to be greater appreciation of the ecological and economic functions of forests, for timber and NWFPs, as well as biological diversity and forest services as a result of forest loss and degradation, combined with the development of a growing middle class.

Forestry and social changes in Lao PDR are influenced by internal and external pressures. Internal pressures come from the rural poor who are heavily dependent on natural resources for survival while the resources themselves are decreasing. External pressures include the growing capacity of wood industries in neighbouring countries, especially Viet Nam and China and the resulting requirement for more raw materials. The international community will assist in pursuing sustainable forestry practice in Lao PDR.

Sustainable forest management is achievable through implementation of codes of practice for harvesting, reduced impact logging and certification systems among others. SFM not only provides long term economic benefits and maintains forest quality but also provides benefits through increased carbon retention. After 30 years, the typical period after which loggers return to an area under sustainable management, carbon stocks in forests with improved forest management are predicted to be at least 30 tonnes/ha higher than those in conventionally logged forest (Putz et al., 2008). If REDD provides a strong economic incentive to improve timber harvesting, it will be cost effective to solve remaining technical difficulties and SFM will become more attractive (Putz et al., 2008).

Credible certification systems are another means of supporting sustainable forest management but such systems are challenged by indiscriminate demand in some consuming countries and active opposition from state-industry. Communities may also be daunted by the high costs and low benefits of certification (Gale, 2006). Alternative strategies may be employed to solve some of these problems and included amongst these are the WWF Global Forest Trade Network (GFTN) and The Nature Conservancy (TNC) Responsible Asia Forest and Trade (RAFT), both of which offer market access for legal or certified wood. The SUFORD project targeted production forests in two provinces for certification and successfully acquired Forest Stewardship Certification (FSC) in 2005/2006. Challenges remain, however, such as selling certified timber; improving log tracking and marketing systems, and the forest management plan not meeting the FSC requirement for high conservation value forest (Scheyvens et al., 2007).

Lao PDR's continuous commitment to improving the structure and technical standard of domestic wood processing factories in accordance with industrial modernization will see positive results. Foreign companies directly working in the wood industry will improve technology transfer to Lao PDR and help build technical and management capacity. This development is, however, conditional on the enforcement of revisions in the Forestry Law banning round log and sawn timber export, to reduce the export of low-value wood products and improve value addition to the domestic wood processing sector. Integration of the national economy into regional and global economies is expected to further catalyse wood processing reform in Lao PDR.

By 2020, it is estimated that domestic consumption of timber and plywood will increase to approximately 300,000 m^3 per annum, assuming an equivalent per capita consumption (Sayakoummane and Manivong, 2007). If the current level of sawn timber exports is maintained, total log removals of more than 1 million m^3 will be required. Plantation wood has the potential to complement the declining supply of logs from natural forests but significant investment will be required to reach high levels of production.

The National Export Strategy 2006-2008 recognizes the potential of the wood processing industry to grow and subsequently increase the export of wood products. Recent economic development research suggests that natural resources can lead to sustained economic growth when there is shift from the export of commodities to higher value products and exports are diversified over time (cited in RRI, 2008).

Legal timber has gained momentum in markets in recent years and more consuming countries have green procurement policies that demand legality as a minimum requirement. The Forest Law, Enforcement, Governance and Trade (FLEGT) Action Plan was adopted by the European Commission (EC) in May 2003. At the core of the Action Plan are Voluntary Partnership Agreements (VPAs) with timber-producing countries that wish to eliminate illegal timber from their trade with the EU. China and Viet Nam have expressed their interest in VPAs and as major trading partners with Lao PDR, timber legality issue are likely to climb the agenda in Laotian forestry through direct negotiation or impacts from Viet Nam's interest in developing a VPA with the EC.

Wood as a source of energy

Efficient use of energy and development of bio-energy and renewable energy are expected in coming years as a result of potential future fuel price spikes, inflation and urbanization. The rural community is likely to continue to depend on fuelwood as the main source of energy for cooking and lighting.

At present only 13 of the 18 provinces in Lao PDR have access to the electricity grid and 42% of the total households are electrified according to a census by National Statistics Center in 2005. The government aims to increase the electrification ratio for the whole country from the current level of about 45% in 2005 to 90% in 2020, with immediate targets from 45% in 2005 to 70% in 2010 (Table 12).

Year/desc	ription	2005	2010	2015	2020				
Number of villages	s electrified	3,574	5,584	7,024	8,906				
% of villages elect	rified	32%	50%	63%	80%				
Number of electrified	households	595,598	733,926	914,894	1,140,396				
% of households		45%	70%	79%	90%				

Table 12. Targets of electrified households until 2020 according to the Power System Development Plan (PDP) 2004-2013 in Lao PDR

Source: Adopted from Dobelmann et al., 2006.

Energy consumption in rural areas is primarily for cooking and lighting. Generally, rural communities make only a weak contribution to the GDP. Hence they will be unlikely to afford electric power without access to greater income opportunities. Substitution of current energy sources for electricity in rural areas can be expected when a range of sectors begin to increase demand such that costs per participant are lowered.

The increase of population will increase the need of energy. Major energy consumption by rural people is expected to depend on fuelwood for cooking and small industry. Other options for energy adoption will be low in rural areas due to the high cost of investment and construction material.

The collection of fuelwood is the main source of rural household energy and primarily is the responsibility of women and girls and is a burden on their time, energy and health (UNESCAP, 2007b). Informal income-generating activities by women are fuel-intensive, making them increasingly vulnerable to fuel scarcities and rising fuel prices. Lack of access to renewable and environmentally friendly rural energy has adverse ecological, health, educational and livelihood implications for rural communities (UNESCAP, 2007b).

A genuinely sustainable industry for bioenergy and renewable energy is possible provided that robust, comprehensive and mandatory sustainability standards are developed and implemented (Renewable Fuels Agency, 2008). At present, energy exploration is mainly confined to hydropower and solar power for electricity. Existing energy sources including fuelwood and charcoal will remain while other energy sources such as wind power are likely to be pursued. Climate change is likely to further stimulate efforts to develop renewable energy.

Besides biofuels, the use of wood residues and sawdust in sawmills might be increasingly used for energy production in 2020. The level of utilization of wood residues is unclear at present but residues could potentially provide materials for manufacture of sawdust briquettes charcoal or for small industries in need of cheap energy sources. Energy policy, legal frameworks, institutional capacity and energy efficiency information are among the deciding factors in the development of wood as a source of energy to 2020.

Future of non-wood forest products

There is a trend showing increased commercialization of NWFPs by rural communities living in or near to forest resources with the result that natural resources are often overexploited. Rural communities are often provided access to unspoiled areas by newly constructed logging roads. In turn, this reduces the cost of getting the products to market and so helps competitiveness (Woods and Black, 2008).

NWFPs will continue to play a significant role for rural communities, especially in periods of droughts, after floods and for subsistence. The estimated poor rural people of about 300,000 households scattered in more than 6,300 villages (National Statistics Center, 2005), are generally small farmers depending on agriculture for subsistence and NWFP harvesting.

Plants will be continued to be harvested for food, medicinal use, spices, fuelwood, construction materials and grazing and fodder.

Lao PDR is a signatory to CITES and as such has commitments to implement and strengthen CITES rules in relation to cross-border trade with neighbouring countries on plant and animal species regulated under Appendices I, II and III. Commitments have also been made to building up synergies with the ASEAN-Wildlife Enforcement Network (ASEAN-WEN). These efforts by both Lao PDR and ASEAN will strengthen enforcement on present high volume cross-border wildlife trade by strengthening customs procedures. Domestic demand for wildlife is nonetheless likely to maintain hunting and poaching practices.

NWFPs are uniquely essential for the Lao national economy, both for subsistence and trade. NWFPs are key elements as food sources, in poverty alleviation, forest and biodiversity conservation, as substitutes for shifting cultivation and in industrial development (Foppes and Ketphanh, 2000). Widespread transition to market-based systems is envisaged; domestication and intensification of marketable species would be necessary to improve the efficiency of production, allow allocations of time to more productive pursuits and generate revenue for purchase of alternatives (Broadhead, 2004). Arresting depleting resources is another focal work area.

Service function of forests

The international community is committed to exploring innovative approaches to forest conservation in Lao PDR, which would be linked to multilateral environmental agreements and international conventions and protocols (ADB, 2000). Carbon agreements are likely to be used as an instrument to conserve the remaining natural forests and to afforest or reforest degraded lands. However, strong policy is required from governments to decouple carbon emissions from economic growth, and governments must enhance frameworks for monitoring end-use energy consumption (International Energy Agency, 2008). However, adaptation capacities in Lao PDR are low and concerted efforts will be necessary for genuine advances to be made.

There are a number of climate change activities in Lao PDR and climate change efforts are being increasingly supported by the international community – both financially and technically.

In preparation for inauguration of the REDD mechanism, approaches are soon to be implemented in reducing deforestation and forest degradation. REDD is widely accepted as presenting huge potential to reconcile sustainable development with economic growth in Lao PDR and to link forestry and climate change. Since Lao PDR has been selected as one of the pilot countries for REDD, it is expected to contribute positive progress in forest and forestry, including forest zoning, cross-sector coordination on logging control, wood trade and wood processing factories (Manivong, 2008).

Another instrument with great potential for immediate delivery is eco-tourism and culturebased tourism. These demonstrate direct economic benefits from the national protected areas and can support biodiversity and landscape conservation. Ecotourism also presents an opportunity for income generation in rural areas through demand for accommodation, handicrafts, food and tour guides. In 2006, arrivals to Lao PDR reached 1.21 million and generated US\$173.2 million for the national economy. Half of all arrivals are interested in the natural environment (LNTA, 2004). By 2013, Lao PDR hopes to attract 3 million visitors with expected revenues of US\$500 million per annum.

The National Center for Environmental Health and Water Supply identified deforestation as a major cause of clean water source depletion around the country (Vientiane Times, 2008d).

Responsibility for keeping forests for watershed management is expected to be shared between local authorities and communities through integrated forest management practices. Ways to move forward include increasing awareness and appreciation of forests among local communities and authorities.

Social functions of forests

The declining share of agriculture in national income is reflected by increasing urban-rural migration, especially of young males and skilled workers, resulting in the graying and feminization of the rural sector (UNESCAP, 2007b). Continuing deprivation of women, marginal farmers, and ethic and social minorities is undermining rural human resources (UNESCAP, 2007b).

Market forces and private initiatives are driving social development in Lao PDR. A more comprehensive human resource development programme is expected to be developed inclusive of technical, leadership and research capacity. Firstly, shortages of skilled technical and managerial manpower will continue to affect the likelihood of a market economy for the wood processing industry in Lao PDR. Secondly, qualified staff in government administration will continue to be improved as more English speakers are required to lead in different forestry thematic areas. And thirdly, Lao PDR will develop research capacity to address national priorities.

Rural woman will continue as subsistence farmers, particularly, counting on forest products for their health and food, especially during bad crop years. Forest product extraction remains important and critical for poor households and for women. At the same time, rural women will move near to developed infrastructure for work opportunities, such as in the garment industry, for better family income.

Local knowledge of rural communities could be useful in mitigating the effects of drought, flooding and farming as it is an important component in sustainable development.

Decree No. 59/PM on Sustainable Management of Production Forest in 2002 provided principles and legislation for the establishment and management of production forest with the participation of local people in all aspects including zoning, planning, logging, log sales and benefit sharing according to agreements between local authorities and villages.

The Vientiane Times (2008e) reported that the government is drafting a master plan for economic and industrial development to accelerate poverty reduction in the northern provinces to 2020. Development potential lies in mining, hydropower, agricultural production and tourism.

The Vientiane Times (2008f) reported new funding of US\$20 million for the government's Poverty Reduction Fund Project. Road construction in remote areas is one activity and the fund also supports commercial crop production, livestock rearing and encourages local communities to participate in forest conservation. One main goal is to build capacity and empower poor villages to plan, manage and implement their own public investments in a transparent manner.

The social aspects of forestry, however, remain a challenge ahead for Lao PDR. Projects aiming for poverty alleviation still require refinement and previously were discontinued or amended because they did not meet objectives. Efforts have therefore been made to continue experimenting through different project approaches The long-term impacts of these projects on government policy and poverty alleviation targets are still not clear (World Bank, 2008c). In this context, it is important for the government and other stakeholders to gain a better

understanding of the types of households that tend to gain and lose in the transition process (World Bank, 2008c).

Policy and institutional framework

For sustainable economic, environmental and social development towards 2020, creating a sound policy and institutional framework is an important factor. At the top of the agenda to create a sustainable future for forestry is a credible, accountable and transparent governance system.

The FS 2020 was developed to ensure sustainable forest management, forest industry development and biodiversity conservation. The MAF formulated 4 goals and 13 measures representing agriculture and forestry sector strategies and incorporating policies, programmes and projects. A balanced, coherent and consistent policy approach will need to be adopted together with an efficient policy implementation mechanism. An integrated policy on sustainable natural resource management is also necessary to coordinate different sectors responsible for natural resource management in Lao PDR.

While guidance for the FS 2020 is clear, implementation progress and performance varies, indicating some room for improvement. At the provincial level, in spite of strong commitment to the national agenda and national agricultural policy, implementation is often compromised for logistical and budgetary reasons (World Bank, 2008c).

Institutional capacity remains a challenge for the Lao government, especially at lower levels. National capacity to implement basic planning and forest management is also still limited and most sectors are still managed vertically while the DoF has minimum support from government agencies that have impacts on forestry.

Ensured policy implementation, law compliance and enforcement of effective laws regulating the forestry sector and other sectors are necessary to achieve sustainable use of natural resources. More training and networking support to strengthen institutional enforcing capacity are essential. Indicators for enforcement and monitoring are a second focal area of work.

Overall, materialization of an integrated policy approach to sustainable development and a coordinated legislative regime can only be achieved through strategic partnership and synergy. Strategic partnerships among government agencies will facilitate long-term and significant cooperation.

Another channel to improve sustainable resource management is to explore options of building synergies through existing partnerships and networks such as the Asia Forest Partnership and ASEAN. There is a number of sub-regional and regional mechanisms that Lao PDR could optimize through its present engagement and further enhance its engagement through a proactive role. The situation of Lao forestry may be advanced through these regional and international forums.

An overview of the future of the country's forests and forestry in 2020

Faced with growing challenges in protecting biodiversity-rich tropical forests, Lao PDR's next steps are crucial. Forest and forestry will still be largely influenced by an increasingly interlinked regional resource economy and subject to external intervention in the next decades.

The FS 2020 and the 4 goals and 13 measures are the guides for forest and forestry goals in 2020. However, their implementation is inevitably determined by budget, policy effectiveness

and institutional capacity. Other development programmes such as land allocation, macroeconomic stabilization, forest product market development and poverty alleviation, will also have implications for forests and the forestry sector.

Forest resource planning and management is, however, likely to be in conflict with industrial sectors in the coming years. The hydropower, mining and construction material sectors are viewed as large 'ecological footprint' sectors and with expansion of these sectors for economic development in the coming years there are likely to be considerable impacts on forestry.

Industrial plantations of perennial tree crops, especially rubber, will become a common feature in the coming years. Such industrial plantations are likely to result in permanent landscape alterations through replacement of natural forest, but positive economic results are expected. Plantations are also seen as part of efforts to achieve the country's target of 70% forest cover by 2020. However, plantations play a limited role in biodiversity conservation and environmental service provision in comparison with natural forest. As such, protection and conservation forests are vital in ensuring species survival and controlling escalation in vulnerability to natural disasters.

These primary economic sectors although vital for national development, can lead to, detrimental and irreversible effects to forests and the environment. The government is, however, committed to an integrated approach on forests and environmental principles in its policy and regulatory framework to ensure sustainable development. The commitment of key decision makers is critical in delivering sustainable development without compromising the abundantly natural resources of Lao PDR.

Forestry is cross-sectoral in nature but in Lao PDR authority is rarely exercised in a uniform or coherent way, and underlying the various struggles are questions of agency effectiveness and legitimacy. Strengthening institutional capacity for implementation and enforcement is a key step, but institutional reforms or creation of effective partnerships to make forest governance less sectoral may also be necessary.

While there are roles for foreign intervention through civil society involvement, corporate social responsibility and various bilateral and multilateral agreements and treaties, it is important to recognize that the key impetus and motivation for achieving forestry change in Lao PDR ultimately lies with the government.

6. HOW COULD WE CREATE A BETTER FUTURE?

Sustainability must be the key thinking in planning, implementation and monitoring processes. Practicing sustainability in forest management is necessary at national, provincial and district levels.

Knowledge management is a key component and should include lessons and experiences as well as data and information. A prerequisite for good forest management is planning based on timely and high quality information. In view of the lack of comprehensive information on forest systems in general, Lao PDR should make it a priority to establish such baseline data. If not, the country will continue to face constraints in planning and implementation.

In connection, Lao PDR, in general, is still lacking comprehensive knowledge of complex forest systems and, hence, precautionary principles need to be incorporated in developing policies. For example the Prime Minister announced a moratorium on large land concessions until a more comprehensive strategy could be developed (Vientiane Times, 2007). A slower-paced, integrated and sustainable development process will allow Lao PDR to understand pertinent critical issues in managing forest resources leading to better strategic decisions.

The Nam Theun 2 (NT 2) hydroelectric power project under consideration by various developers since the late 1980s aims to generate revenues that target poverty reduction and environmental protection. The project took more than 10 years of consultation by an appointed International Advisory Group and Social Panel of Experts. The project has great potential for significantly benefiting Lao PDR if properly implemented and managed.

It is also crucial to improve awareness among relevant government agencies on sustainable natural resource management. Strengthened understanding of local people and district level forestry officers about the new forestry law is also necessary. Disseminating information or knowledge on the contribution of forests to poverty reduction and their role in producing national, regional and global goods will contribute to improved awareness and efforts are needed to promote this agenda.

Sustainability in Lao PDR requires a regional cooperation consensus and collective actions to protect valuable natural resources from being squandered. Public and private stakeholders have to express interest in contributing to sustainability in Lao PDR. Promoting and enhancing corporate social responsibility in foreign multinational companies working in Lao PDR must also be included.

7. SUMMARY AND CONCLUSIONS

Key conclusions are:

- The DoF is making a tremendous effort to fulfill its commitment to sustainable use of forest resources guided by the FS 2020
- The risk of losing forest cover and resources to increasing internal and external demands is highly relevant in Lao PDR
- To strengthen inter-institutional coordination to mainstream forestry in developmental decisions in Lao PDR is a priority
- Strong political commitments as a condition for sustainable forest management in Lao PDR are a primary need

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