

Transitions to Sustainable Forest Management and Rehabilitation in Laos

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ABBREVIATIONS

DAFO	District Agriculture and Forestry Office
PAFO	Provincial Agriculture and Forestry Office
NTFPs	Non-timber forest products
FOF	Faculty of Forestry
NUOL	National University of Laos
NPA	National Protected Area
NAPA	National Adaptation Programme of Action
UNDP	United Nations Development Program
SNV	Netherlands Development Organization
RRA	Rapid Rural Appraisal
PRA	Participatory Rural Appraisal
Lao PDR	Lao People's Democratic Republic
REDD+	Reduction of Emission of Deforestation and Degrade Forest
SE-Asia	South-East Asia
WWF	World Wildlife Fund
MAF	Ministry of Agriculture and Forestry
MONRE	Ministry of Natural Resources and Environment
MOU	Memorandum of Understand
FIP	Forest Investment Programme
FDI	Foreign Direct Investment
FAO	Food and Agriculture Organization
GDP	Gross Domestic Product
HDI	Human Development Index
LDC	Least Developed Country
WTO	World Trade Organization

EXECUTIVE SUMMARY

Laos is a developing country locating in the central heart of South East Asia with population of 6,385,057 people. The current gross domestic product (GDP) of Laos is USD1069 in 2010. This figure has been gradually increased from only USD340 in 1995 and about USD491 in 2006. The current main drivers increasing Laos GDP are industry sectors (hydropower and mining) and services (tourism). Previously, agriculture and forestry sectors are a chief employer in Laos, employing over 80% of Lao citizens while generating about 53% of the national GDP. Economic growth has reduced the official poverty rates in the country from 46% in 1992 to 26% in 2010. The Lao government projects that by 2020 Laos will no longer be classified among the least developed countries.

Laos has ranked as the top range of rich countries in terms of natural resources: forest, water and minerals compared to other Asian Countries. These natural resources are the main factors contributing to Lao social-cultural and economic developments, as well as environment protection. The percentage of forest cover in Laos has been decreased dramatically from 70% in 1940 to 49% in 1982 and only around 40% or 9.5 mil ha in 2010. However, this figure is the highest forest cover rate compared to other Southeast Asian countries. There are several factors driving to forest degradation in Laos, such as shifting cultivation, agricultural expansion, unsustainable logging, and industry tree plantation, mining and infrastructural development projects (dam and road constructions).

There are two main national organizations respond for forest management in Laos: Ministry of Agriculture and Forestry (MAF) controls the forest and agriculture sector focusing on production forests. The Ministry of Natural Resources and Environment (MONRE) is recently established responding on conservation, protection forests as well as other activities relating to environmental issues. These organizations are the main coordinators with other related sectors such as the National Land Management Authority, the Ministry of Industry and Commerce, the Ministry of Energy and Mining and Water Resources.

There are 757 plants and 150 animals have been identified as Non-Timber Forest Products (NTFPs) in Laos, but it would probably 4–5 times higher. NTFPs are most being daily used by local people and some of these are nationally important for their commercial values. There is over 80% of the total Laos population still highly depend on NTFP products for constructing their shelters, herbal medicines, and food and cash incomes in Laos.

There are several potential factors contributing to transition forest in sustainable management and rehabilitation in the future in Laos. One of the main important key is the Lao government strategy to increase forest cover up to 70% by 2020. In order to achieve this target, the Ministry of Agriculture and Forestry has to encourage all governmental forest organizations from national to local levels. The relevant agencies and donors also need to plan their work relating to forest development both in natural forest and plantation management. Another important key achievement for the government goals is forest plantation. The state has encouraged more incentive for forest plantation by supporting free seedling, especially on the Lao national forest plantation day (1 June every year). In addition, the government also reforms forestry law and regulation by extension a longer period time of land concession for industrial tree plantation investment in the country. The government has also strengthened forestry law and regulation in terms of natural forest participatory management and uses through national to local levels. Forest management has been more involved by local people in terms of sharing their right ownership and benefits from forest management. Finally, forest transition to sustainable management and rehabilitation in the future would be affected by gradually increasing for local people incomes, particularly for the rural people who highly depend on forest and forest resources for their livelihoods. These groups would reduce for the rate of shifting cultivation (slash and burning forest) and cutting forest for fuel, which are mainly previous keys deforestation in Laos.

1 LAOS – GENERAL INFORMATION

This chapter discusses the general information of Laos, which are including climate, geography and general social-economical issues. It also briefly describes Lao forestry governance.

1.1 Topography

Lao People's Democratic Republic (Lao PDR) or (hereafter Laos) is a landlocked country, located in the central heart of the Southeast Asia, latitude 14 to 23°N and longitude 100 to 108° E. The total country area is 236 800 sq km, stretching from north to south is 1 700 km length and 100–400 km width, with a lowest altitude of the country is 200 m and highest is 2 880 m (Ministry of Natural Resources and Environment Department 2011). Laos is divided into three regions: northern, central and southern. It is a mountainous country with flat land covering up about 15% of the total land area.

The lowland plains are mostly appeared along at the main river basins, such as Mekong and Nguen Rivers. Mountains are mainly found in the Northern and central parts, which are highly potential for hydro-power development in the country. Laos shares borders with five nations including, China and Myanmar to the northwest, Vietnam to the north and east, Cambodia to the south and Thailand to the west.



Figure 1. Map of Laos.

Laos has no direct access to the sea, which is one of the main constraints to transportation of products to other nations and participation in international markets. The Mekong River is the largest river in Laos, flowing north to south for about 1900 km, serving an important role in transportation and provides valuable fisheries resources for Lao residents.

1.2 Population and Urbanization

According to the statistic of population in 2011, the total population of Laos is 6 385 057; with a density of 27 people per sq km (Ministry of Planning and Investment: Department of Statistics 2011). The female ratio as compared to male population is a little bit higher as figure shows here 3 196 392 and 3 188 665 of female and male respectively. It is nearly 50% of the total Laos population is under 20 years old and only 5.6% is elderly or over 60 years old. The population growth rate is increasing by about 2.5–2.8% per year and the crude birth rate is 28 per thousand people. According to the population growth rate, the number of Lao people projected will be about 7.3 millions for 2020 and the population density in Vientiane Capital will be reached 150 people per sq km (Ministry of planning and investment (MPI) and Department of national statistic 2005) (Figure 2). The death rate of young children (infant mortality rate is 54.1. The life expectancy for adult is 65.4 years in average both male and female. Laos is a multi-ethnic country with 45 ethnic groups. Over 73% of the total population live in the rural areas and heavily depend on natural forest resources, especially for non-timber forest products (NTFPs) for a variety of living conditions, for example, food, cloths, home, medicine and incomes (Department of Ethnic 2005).

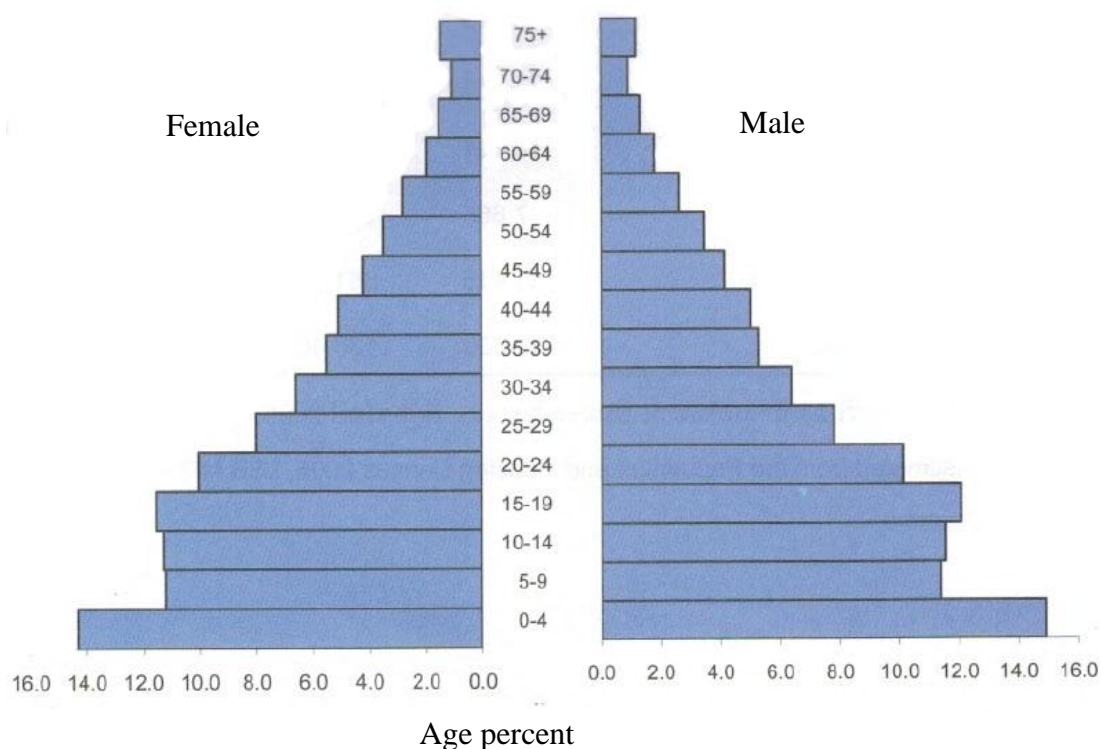


Figure 2. Lao population pyramid, 2011.
Source: Department of Statistics 2011

1.3 Climate

Laos has a tropical monsoonal climate with two main seasons: wet and dry. The wet, hot season starts from May to November with an average of rainfall of 1 300–3 000 mm with highly humidity. The dry, cool season is from November to April (MAF 2009). Lao altitude is divided into three regions with different climatic parts: Northern mountainous region, which located above 1 000 m, has a lower range of temperature. This region has rainfall between 1 500 to 2 000 mm. The middle part of the country altitude ranged approximately from 500–1000 m. This part has a tropical monsoonal climate with a higher temperature and higher rainfall in average with about 2,500–3,500 mm compared with the northern part. The lowland is mostly laying along rivers basins locating at the southern part of Laos. This region includes several provinces, for example, Vientiane, Borikhamxay, Khammouan and Attapeu. This part of climate is hotter and more humidity compared to other regions. However, the average rainfall in the region is similar to the northern part with 1 500 and 2 000 mm.

The average temperature of the three main regions (north, central and south) is 26.31°C (Ministry of Planning and Investment: Department of Statistics 2011).

1.4 Economical Condition

Laos PDR is one of the poorest countries in the world, ranking 140 of 174 countries in 1999 (UNDP 2006). However, the information recorded that the Gross Domestic Product (GDP) of Laos has been increasing steadily. In 1995 it was USD340, increasing to USD370 in 1997 and USD491 in 2006. This figure has raised up to USD1,077 in 2010 (Ministry of Planning and Investment: Department of Statistics 2011). The growth rate of Laos GDP is 8.1% (Oliver Schonweger *et al.* 2012) (Figure 3). The main drivers for Laos GDP increasing are included several sectors: Agriculture and forestry sector is 28.8%, industry (mining, manufacturing, electricity and construction) sector is 28% and services sector (hotel and tourism) is 37.2% and another small sharing sector is import and exportation taxes cover only 5.9% (Ministry of Planning and Investment: Department of Statistics 2011). The Lao government projects that by 2020 Laos will no longer be classified among the least developed countries.

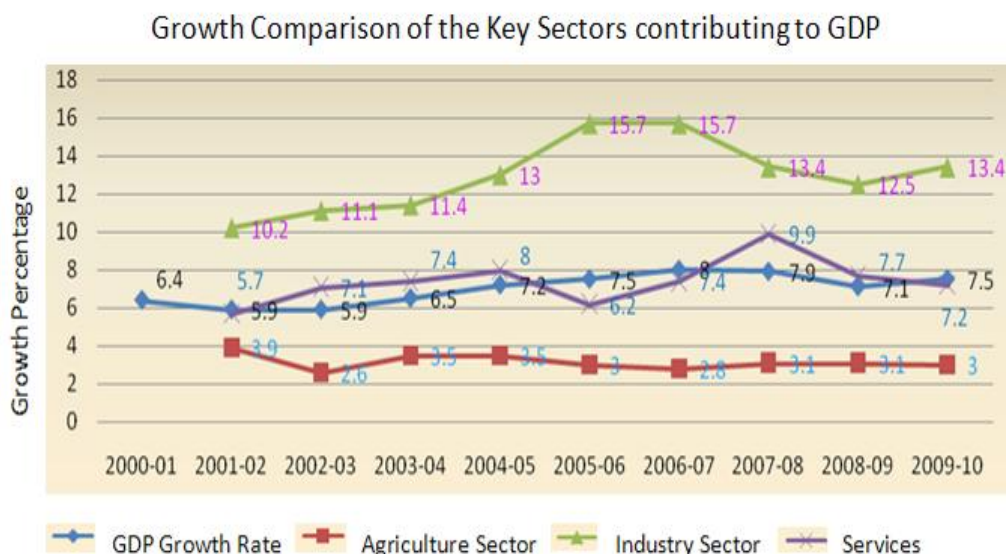


Figure 3. GDP growth by sectors, Lao PDR, 2000–2010 (MAF 2011)

Laos has been officially accepted to be a member of the World Trade Organization (WTO) on 2 February 2013, which listed on the number of 158 countries. WTO member has been tried by the Laos government for over 16 years and finally Laos has been accepted. The government believes that it would be a great point changing of Lao economics in the future. Because, Laos can upgrade its products and export to the international markets (Lanxang Media Co. Ltd 2013). In addition, it would be a great factor encouraging more international investment in the country.

1.5 Forestry governance

There are several forest organizations in Laos from the national to local levels. The institutional framework for natural resources management and nature conservation is on this moment very complex and affected by uncertainty. The responsibility for the Forestry Sector used to be mainly assigned to the Ministry of Agriculture and Forestry (MAF) and its line agencies especially the Department of Forestry (DOF) and the Department of Forest Inspection (DOFI). The mandate of the MAF is to govern the management of national Production Forests in terms of timber commodity and supply chains, the MAF's jurisdiction over natural forest timber ends where and when harvested trees are transferred to the second landing, after which the Ministry of Industry and Commerce assumes legal control.

Since 2011, there was a decree issued by the Prime Minister, on the establishment and operation of the Ministry of Natural Resources (MONRE) changed the existing management responsibilities enormously. The MONRE, which has been recently established, responds on conservation and protection forests (Figure 4). They are two main coordinators of other related sectors such as the National Land Management Authority, the Ministry of Industry and Commerce, the Ministry of Energy and Mining and the Water Resources. There are four main organizations which directly involve in forest activities including both the Ministry of Agriculture and Forestry (MAF) and Ministry of Natural Resources and Environment (MONRE) with the Department of Forestry performing the secretariat role, the Provincial and Vientiane Capital Agriculture and Forestry Offices, the District Agriculture and Forestry Office and the Village Forestry Units (National Assembly 2005).

The organisational development process between MAF and MONRE has just started and there are still a number of unclear functional attributions and distribution of responsibilities. In addition cross sector and multi-level consistency of the regulatory framework and responsibilities are very weak. The implications of the reorganisation at national level on relevant institutions on the province and district level are also not clear yet. Staffs of MAF and MONRE are both uncertain in respect to who is exactly in charge of what. No final decision on the responsible institution for forest inspection for example the partner institution for the REDD+ programs and projects could be identified. On this moment it is unclear as well what the detailed implications of this reorganisation for the provincial and district levels are.

Relevant Departments in MAF are Department of Forestry (DOF), along with NAFES, through their line offices at provincial and district levels, is responsible for implementation of land use planning and land allocation under the previous Land and Forest Allocation System. The current framework of Participatory Land Use Planning (PLUP) is being implemented through the provincial and district levels. DOF, through its provincial and district lines, manages the key jurisdictional state forests. DOF is the lead agency in FSC certification through PSFM forest management and houses the World Bank SUFORD project. Department of Forest Inspection (DoFI): The DoFI has been given wide-ranging powers to inspect all aspects of the timber trade, including logging, wood processing, and wood export operations. The separation of inspection from management responsibilities in the timber trade is a key policy move by the Government to address embedded corruption and rent-seeking in the Lao forestry sector. In general, however, DoFI is underfunded, and is still organizing and training their staff. Relevant departments in MONRE are: Department of Forest Resources Management, Department of Inspection, Department of Land Use Planning and Development and Department of Land Management, including national land management authority.

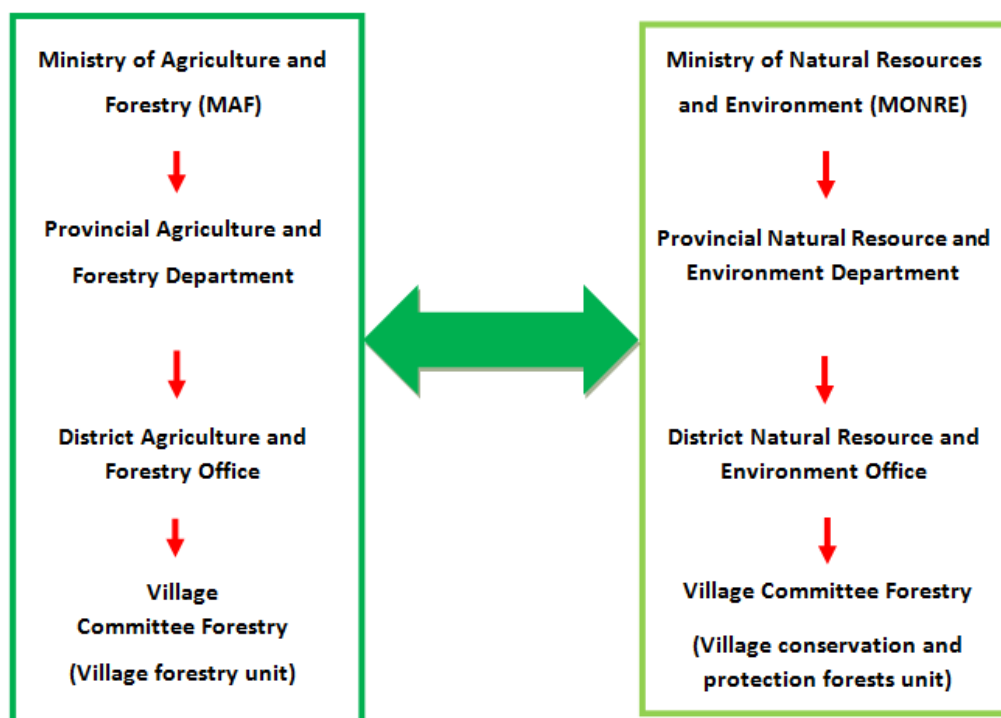


Figure 4. Organization structure of MAF and MONRE in Laos.
(According to the agreement of MAF and MONRE, 2012)

1.6 Environmental concern in Laos

Major environmental issue in Laos is the climate change affecting to natural disasters such as flooding, drought, rainfall, temperature and land slicing. In Laos these kinds of disasters are the main factors affecting to the agriculture productivity and community livelihoods. Climate change appears mainly in Laos four sectors: (1) drought, (2) flooding disaster, (3) temperature and (4) air humidity.

The data also shows that the annual mean temperature has gradually increased with a rate up to 0.05 °C/year, especially in the southern part of the country. In Vientiane (central part of Laos), the trend of temperature shows gradually increase in average for period of 1970 and 2010 with approximately 30.8 °C in 1970 and increased to 2010 with about 31.5°C (Ministry of Natural Resources and Environment Department 2011).

The trend of climate change affecting to a particular region flooding in Laos gradually increases compared time by time from 1992 to 2009. The figure significantly showed that in 2000, the areas flooding in Laos was only around 1000–2000 sq km, but in 2008 the flooding areas sharply increased over 20 000 sq km (Ministry of Natural Resources and Environment Department 2011) (Figure 5).

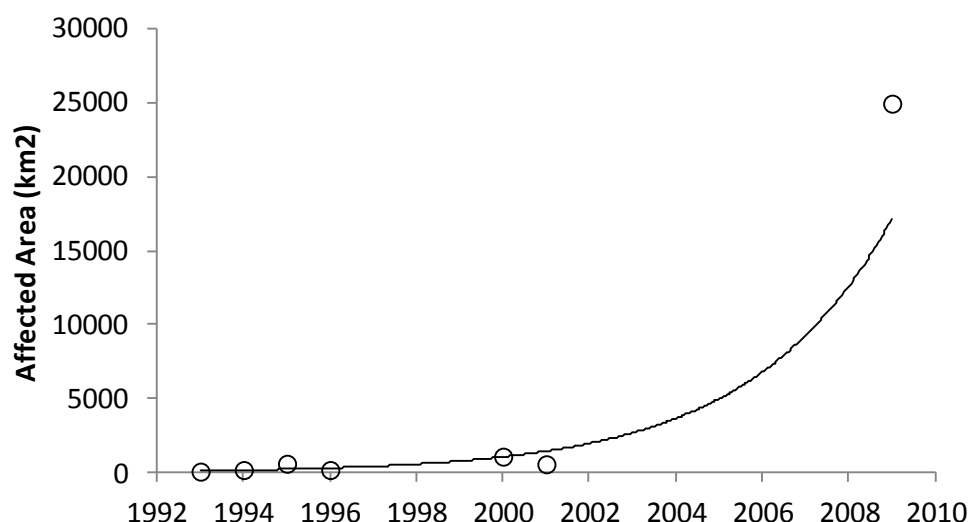


Figure 5. Total area affected by flood hazards in the Lao PDR, 1992 – 2009.
(Ministry of Natural Resources and Environment Department 2011)

The main extreme climate change occurring in Laos, especially for flood, drought and temperature have significant impacts on many sectors, for example, agriculture, forestry, water resources, health and economic growth (Ministry of Natural Resources and Environment Department 2011). Over 80% of Lao people still depend mainly on agriculture and natural forest resources for their house construction, income, food and medicine. Therefore, climate change, especially drought and flood have extremely affected to economics, food security and infrastructures (Figure 6).

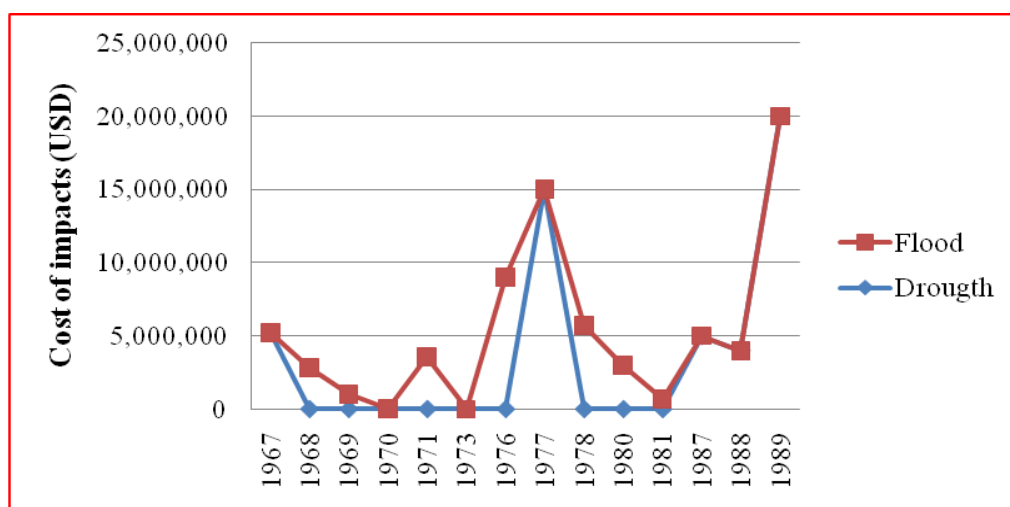


Figure 6. Impacts of floods and drought in Lao PDR from 1967 to 1989. (Revised from UNDP 2009)

1.7 Carbon emission and stock in Laos

Carbon stock is the main issue affecting to global warming greenhouse gas. CO₂ is annually increasing, which will be an important factor for climate change in the future. Even though, Laos has currently small amount CO₂ is from industrial processing sectors, however, it will be impacted from others neighbouring countries' industrial activities. Assessment by UNDP (2009) using the tools of the atmospheric CO₂ confirmed that CO₂ concentration of 360 PPM as the baseline for represent day levels. The report concluded that this figure will be increased at two more levels to 540 PPM and 720 PPM in the future. However, the report has no explain in detail for the period of year. An increase in CO₂ will cause global warmer under the CO₂ of 720 PPM with a range of an increase of temperature from 1–2 °C (NAPA 2009). Furthermore, daily temperature also will change. It estimates that the hot days will have a maximum temperature over 33°C; the period of time will increase by 2–3 weeks. The

cool days will change with a minimum temperature of 15°C under CO₂ 720 PPM and the period of times will increase by 2–3 weeks per year (UNDP 2009).

The study of UNDP (2009) also confirmed that amount of CO₂ emission is about 42 855.3 compared to the CO₂ removal only 2 049.14 in the atmosphere. The report also records that land use change and forest sector are the sectors that released highest amount of CO₂ in Laos with 42 758.48 compared to agriculture and industrial process sectors with equally only 48.41 (Table 1).

Table 1. Greenhouse gas emissions in Laos. (UNDP 2009)

Sectors/Emission sources		CO ₂ Emission	CO ₂ Removal	CH ₄	N ₂ O	NO _x	CO	NMVOCs	SO _x
1	Agriculture sector	-	-	251.41	7.73	0.32	8.39	-	-
2	Industrial process	48.41	-	-	0.00	0.00	17.86	0.05	48.41
3	Energy sector	48.41	-	-	0.00	0.00	17.86	0.05	48.41
4	Land use change and forestry	42 758.48	2 046.73	52.21	0.36	12.97	456.84	-	-
5	Waste sector	-	2.41	0.27	-	-	-	-	-
Total:		42 855.3	2 049.14	303.89	8.09	13.29	500.95	0.1	96.82

2 FORESTS AND FORESTRY

This chapter aims to provide a general overview of forestry sector. It provides definition of each forest types based on forestry law. The chapter also summarizes the history of forest development and cover change in Laos, including driver factors to deforestation. It overviews the importance of Lao forest strategy and wood industry processing as well as plantation forest in Laos. The chapter discusses forest products marketing and processing in Laos. Finally, this chapter also overviews forest utilization and ownership as well as non-timber forest products in the country.

2.1 Forestry definition and clarification in Laos

There are several forestry-terms such as, forest type and classes, which depends on different forest situations and a variety of forest development terms. According to the Lao forestry law updated 2007 have definite some forestry terms in order to be referencing to forest development, management and plantation in the country:

Protection forest: is forest and forestland classified for the purposes of protecting water sources, preventing soil erosion, protecting soil quality, strategic areas for national defence, protection from natural disasters, environment protection and so on.

Production forest: is natural forest, planted forest and forestland classified as area for production, wood business and forest products to satisfy the requirements of national socio-economic development and people's living. Logging and harvesting of forest products must be conducted in accordance with laws and regulations and without causing any serious impacts on water sources, biodiversity and environment.

Preservation: is forest and forestland classified for the purposes of conserving the nature, preserving plant and animal species, forest ecosystem and other valuable sites of natural, historical, cultural, tourism, environmental, educational, and scientific importance. Conservation forest consists of National conservation forest, Provincial conservation forest and District conservation forest.

Forest: is a precious resource of the nation and its ecology consists of biodiversity, water resources and forestland with a variety of tree species and non-timber forest products (NTFPs). It also can be called forest; even it is natural forest or planted forest growing at the area of protection, conservation and production forests.

Forest resources: are various forest resources both living and non-living resources consisting of soil, water, plants, wildlife and all other things exist in forestland area.

Forestlands: are all land with or without forest cover, which are determined by the government are all forestlands.

Regeneration forest: is the forest or forestland that is in degraded conditions such as young fallow and secondary forests or grass land that are allocated for forest generation site by the State for a main purpose of transforming natural forest cover in the area.

Degradation forest: is the forest that has been heavily damaged by logging, shifting cultivation or other activities in the past. This kind of forest area is allocated by the government for multiple purposes, such as tree plantation, animals rising and as well as other development activities.

Secondary forest: is the middle aged class of forest that has been regrown after damaging.

Fallow forest: is the forest area or forest that is very young trees, has just finished from the activity of shifting cultivation or other various encroachments for many years. However, this kind of forest has possibility to become rich natural forest in the future. Normally, the age of fallow forest is about 1-3 years after shifting cultivation.

Village forest: is the forest area locating within the village area and managed under the village community according to the land-forest allocation plan.

2.2 History of forest use and development

Natural forest resources have played an important role in the Lao economy for over three decades. It provides food, building materials, herbal medicine and income as well as creating jobs to rural people involving in log harvesting activities. Forest development and use have classified mainly for four phases: Traditional forest use, exploitative colonization of forest use and war, forest resource-based economy, transitional phase of forest policy and globalization forestry (Phimavong *et al.* 2009).

2.2.1 Traditional natural forest resources use in Laos before 1893

Natural forest resources use by 1893 in Laos is considered as traditional forest use. During this time, non-timber forest products (NTFPs) played a major important in the society. They used for food, herbal medicine, building materials, and income. Non-timber forest products were also commonly traded locally among the country as well as with some neighbouring countries (China, Vietnam and Thailand), for example resins, cardamom, bee wax and variety of parts of wildlife, such as horns, born and skins. Sometimes, NTFPs were not used only for sale and home consumption, but in some cases NTFPs were also traded by exchanging products between the highland and lowland people in the Country. For example, the highland (rural people) used NTFPs to exchange for cooking salt, oil, and cloths of the lowland people (urban people). For forest use was majorly practised for basic human needs, and there was only minor trade in the local market (S. Phimavong *et al.* 2009). Another important issue for forest resources degrading in the past was shifting cultivation, opium growing, especially at the northern parts of Laos. Fire wood and forest burning for hunting were also important factors affecting to deforestation. Some of these activities have also been continued at the present time; however, the numbers are decreased compared to the past. The government projected to complete stopping for shifting cultivation by 2020.

In the seventeenth century, the Lao people were only about 1.5 million (Phimavong *et al.* 2009). Low population and limited high technology for timber harvesting, were the main reasons remaining high forest cover in the country over 70%.

2.2.2 Exploitive colonization of the Laos forest (1893–1975)

There were two main colonial periods in Laos: the early French colonial period (1893–1945) and the Indochina war period when the United States was also involved (1945–1975). During these periods, the forest and forestland in Laos were directly controlled by French Indochina. The forest resources were harvested about 12 000–15 000 logs both natural forest and plantation teak. These timbers were floated down the Mekong River to Saigon (Phimavong *et al.* 2009). Another negative impact to forest resources during the French colonization was slash and burn practices and poppy plantation.

During the Indochina war, the Laos forest cover faced a tremendous decrease, losing about one-fifth of the total forest area. Two main factors contributed to this loss. First, there were more than two million tonnes of bombs were dropped on Laos by the secret US and Vietnam War between 1964 and 1969. The forest resources in Laos were destroyed by bomb fire and chemical substances. Furthermore, many forest areas were used as army camps and military roads (Phimavong *et al.* 2009).

2.2.3 Forest resource-based economy (1975–1989)

Over 30 years, the Lao People's revolutionary party was officially declared for a freedom country in 1975. The Lao government planned to form and develop its government organization and administration depending on the potential of natural forest resources in the country. The government maimed to generate national revenue by harvesting timber. The government established nine state-owned log harvesting enterprises in the country covering northern, central and southern parts (Kaisone Phengsopha 2011). After implementing forest harvesting for 15 years (from 1975 to 1989), it was realized that the Lao forest cover rate was rapidly decreased by about 13%. The figure dropped from 60% of the total forest land cover in 1975 to 47% in 1990. The experience found that the logging activities, which were poor business and forest harvesting managements, were also inefficient.

2.2.4 Forest transition policy and global intervention (1989–1999)

After realizing that the forest cover rapidly decreased from timber harvesting, the Lao government called for first national forest conference to review and rethink for the forest policy by promoting sustainable forest management and reforming forest law at the year of 1996. The Lao government has declared the 1st June for Lao national forest plantation day. This is in order to rehabilitation forest in the country. Forest policy in the period were involved both national and international participation for example, United Nation Development Programme, World Bank and Asian Development Bank and etc. During the phrase, the government also agreed to set up 20 national protection forests, which covering over 12% of the total country area (Kaisone Phengsopha 2011). The government has also agreed forward to achieve the return forest cover to 70% in 2020.

2.3 Forest status and trend

Formerly, Laos was one of the richest forest heritages and biodiversity in both Southeast Asia and the world. However, the rate natural resources have rapidly decreased in a period of times. In the 1940's forest covered over 70% of the total area with the area of about 16.6 mil ha. This figure has decreased steadily to 47% in 1992 with an area of 11.2 mil ha, and 41.5% (9.7 mil ha) in 2006 (MAF 2006). Recently forest cover assessment in 2010 showed that the Lao forest cover rate remains only 40.3% with about 9.5 mil ha (MAF 2010), see Figure 7. Studies show that in average, the Lao forest cover loses around 1.4% annually. The losing rate would be about 134 000 ha in the total forest area in Laos. However, figure forest cover change calculating here includes on the forest canopy of 20% up only, if it includes the forest canopy less than 20%, the figure would be much higher (Figure 7). If the calculation includes forest canopy cover higher 10%, the figure of forest cover rate in Laos will up to 55.1% (Figure 8). Furthermore, forest areas including agriculture, urban forests, and etc also cover 25% with about 5.9 million ha in the country is not included in the current forest cover rate (Figure 8).

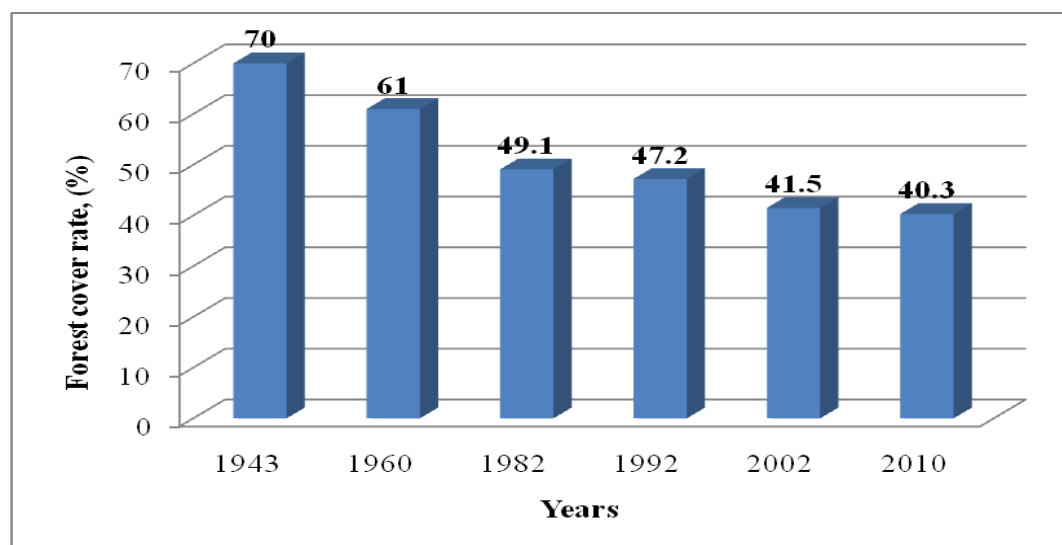


Figure 7. Trend of forest cover in Laos (1943–2010), of forest canopy cover higher than 20%.
Source MAF 2010

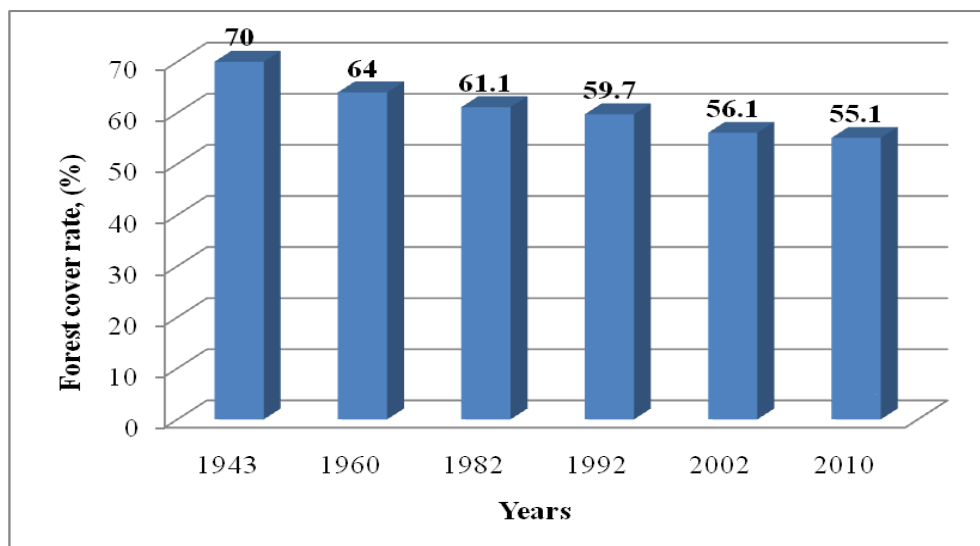


Figure 8. Forest cover change (1943–2010) of FAO forest cover definition with forest canopy cover higher 10%. (Revised from MAF 2010)

2.4 Forest quality and timber stock

Even though forest resources were destroyed heavily in the past, there is highly potential for forest regeneration in the future. Laos has good condition for plant natural growing, such as soil and humid climate. It would say that it is not necessary to plant tree, if the government do a better job for natural forest protection, forest management and clearer land and forest zones management, the natural forest will regenerates itself. The data surveyed by the Department of Forestry (2010) showed that currently the canopy of natural forest cover rate of 20% up is 40%, forest canopy lower than 20% is 35% and other forest areas such as urban and city forests is approximately 25% in the country (MAF 2011).

Currently, the total forest growing stock in the country is 964 mil cu m. Bole volume of forest is 719 mil cu m. The total bole volume classified in different sizes of tree diameter showed that tree diameter sizes between 20–29 cm covers for the highest volume with over 140 mil cu m and the lowest volume of stand tree is in the tree diameter class 60–69 cm (Figure 9).

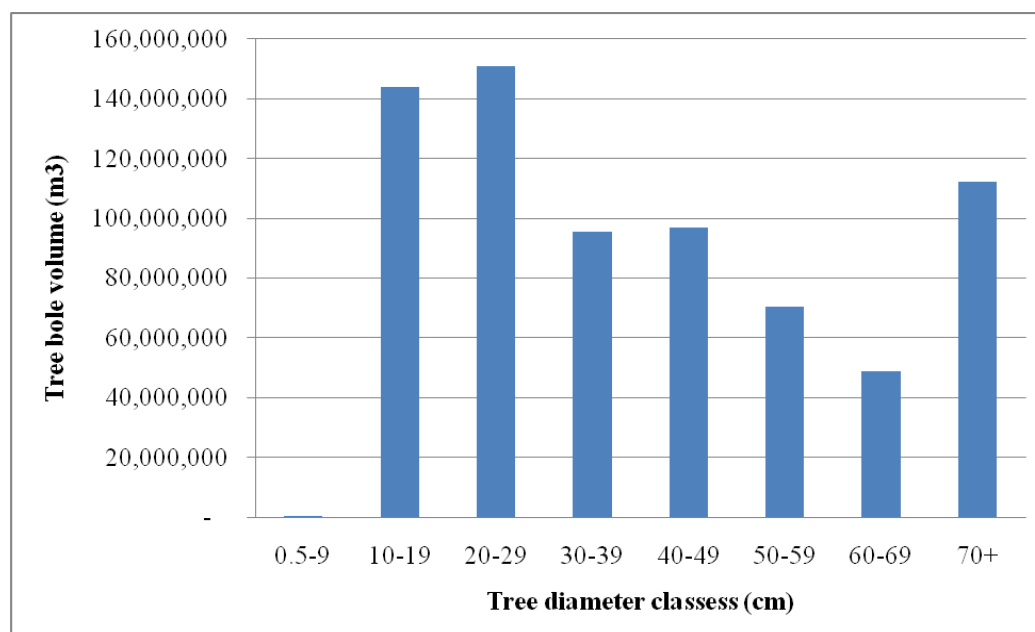


Figure 9. Tree bole volume. (Revised from MAF 2010)

2.5 Forest products, marketing and processing

2.5.1 Forest products supply in the country

Generally, Lao wood products for exporting are still mainly raw materials and semi wood products, which mainly processed from primary wood factories. There are some finished products processing in the country such as furniture, flooring, parquet, window and plywood, however, these products are mainly used in the country. According to the projection of Kaisone Phengsopha (2011), Lao timber products would increase by 35% in 2020 from the 2007 level. The log supply would increase from approximately 1.2 mil cu m in 2007 to 1.67 mil cu m (Figure 10). The Lao government has expanded more production forests in the country with a total area of 3 207 000 ha. This is in order to ensure future log supply in the country. The Ministry of Agriculture and Forestry (MAF) also estimates that the total annual timber supply from forests under management plan was about 600 000 cu m (MAF 2005).

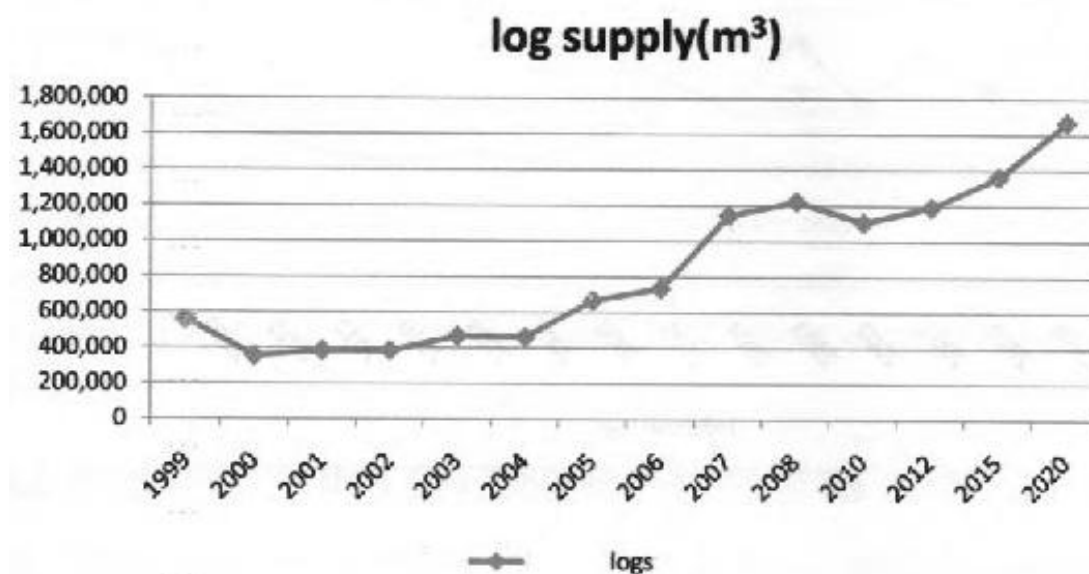


Figure 10. Log supply projection from 1999 to 2020. (Kaisone Phengsopha 2011)

2.5.2 Forest products markets

Lao timber products have played an important role distributing to Lao economy. The products are supplied to both domestic and international markets. Timber products both national and international trades in Laos represents about 6% of the country GDP and covering about 30% of the all industrial production in Laos (Phongxiong Wanneng 2012). However, mainly products exporting to international markets are still raw material and semi products, which produce from the primary wood factories, are low price. Lao wood products exporting faces many constraints and difficulties compared to other neighbouring countries, especially for the country geography with no sea access to the country. This causes difficulties and a higher cost of timber products exporting the international markets because the neighbour countries double charge for fees and taxes when Lao products pass through these countries. While pulp logs of *Eucalyptus* and *Acacia* species are exported because there is no processing factory in Laos, other logs, such as poles and posts, are mainly supplied to domestic markets. Currently, sawn veneer woods are still commonly exported, even though the government encourages supplying to domestic processing firms and exporting only finished products in order to adding more value to the products.

Since early 20 the century, Laos timber products were mainly exported to neighbouring countries, which accounted for about 40% of the total Lao exporting products or about 30% of the national foreign currency earning (Kaisone Phengsopha 2011). Countries that Lao timber products are mainly export to is including China, Thailand and Vietnam. Some semi-finished timber products are exported to the American and European countries; however the amount exporting is much smaller compared to exports to neighbouring countries: China, Thailand and Vietnam (Table 2).

Table 2. Timber products export ranking in 2007.

Ranking	Country	Value (USD)	Percent (%)
1	Thailand	34 713 080	47.82
2	Vietnam	33 478 479	46.12
3	China	2 155 855	2.97
4	Japan	1 174 278	1.62
5	Korea	398 124	0.55
6	Australia	202 259	0.28
7	Taiwan	191 918	0.26
8	America	124 002	0.17
9	France	49 697	0.07
10	Malaysia	40 710	0.06
11	Cambodia	26 820	0.04
12	Singapore	18 036	0.02
13	Germany	8 205	0.01
14	Russia	4 702	0.01
15	Canada	3 176	0.00
Total:		72 589 341	100.00

Source from (Kaisone Phengsopha 2011)

2.5.3 Forest products processing

There are 160 wood factories and two plywood producers in Laos, which employ over 2000 workers (MAF 2005). Minister of the Industry and Commerce reported that there were 2 090 wood factories in 2007, increased from only 78 in 1974. However, when checking throughout all of the factories, there were only around 128 factories met the quality standard for business-level in terms of administrating, marketing and wood products standard compared to the other countries' factories. Therefore, there were over 800 factories have to improve and another 1 181 factories had been closed down because of lacking products quality processing (Phonpachith 2007). Timber products are currently being processed locally for furniture (mainly for local use), with limited exportation compared to other neighbouring countries. The products do not meet the quality criteria of international market due to the use of old machinery, lack of skilled labour for wood processing and products designing. Wood processing in Laos consists of primary and secondary wood processing. The industry focuses on primary processing, mainly the production of sawn wood. The practice of primary wood processing in Laos does not meet international standards. There is a low recovery rate of product from the raw materials utilized. The United Nations Industrial Development Organization (UNIDO 2002) stated that wood wastage is over 30% from the process of Lao wood processing and up to 90% of all sawn wood exported is in the form of flitch at a low price. The existing machinery however is generally second hand, imported from neighbouring countries such as Thailand, Vietnam and China. There has been little new primary machinery investment. The operational quality of machinery is low resulting in low wood recovery rate (UNIDO 2002). The sawdust and other wood waste caused by inaccurate cutting are not utilized. They are dumped and burned without any value adding. The sawn wood grading is lower than the international standard requirements, without wood certification and with limited wood quality information. These are the major obstacles to Lao's access to the international timber market.

2.5.4 Forest ownership

According to Lao forestry law, article 4 states that forest ownership consists of both state and private ownership for the forest and forestland in Laos. The total forest area covering in Laos is 16.14 million ha, comprising mostly modified natural forest (14.43 mil ha) and 223 000 ha of plantation (FAO 2006). All the natural forests are owned by the national government, which plays a key role in their management. Plantation forests are owned by a variety of domestic and foreign owners through direct investment by forest industry companies, farmers, and private individuals. The timber products (logs) harvesting from the plantation forests are all belong to plantation or investment owners and they can

have the right to use, trade and export to both domestic and international markets. The government owns all natural forest areas in Laos, conservation, protection and production forests. The government can sell these resources, example logs and NTFPs, by giving quota and auctioning prices to companies (Updated Forestry Law 2007). Other sub-minor types of forest areas, such as village and individual land property forests, belong to local organization and land owner.

2.6 Major drivers of deforestation and degradation

Reviewing has been found that there are several factors contributing to forest degradation, which can be identified for four main factors; shifting cultivation, agricultural expansion relating to the population growth rate, unsustainable logging, industry tree plantation, mining and infrastructural development projects such as dam and road constructions (Phiathap 2002, MAF 2011).

2.6.1 Shifting cultivation and agricultural expansion

Shifting cultivation is an activity of cut and burn forest for a purpose of upland rice growing (Figure 11). The activity is considered as one of the main factor causing of deforestation in Laos. It seems reasonable, as over 80% of the Lao population still live in the rural area of the country. These people depend heavily upon agriculture practice and forest resources for their income, food security and medicine (Midgley *et al.* 2007). Shifting cultivation has caused to degradation mainly. This activity has practised traditionally by the rural people, especially for ethnic groups who are generally living in the high and steep mountains in the country, which are lack of flat land for irrigation rice growing. In average, the total annual forest area affecting from shifting cultivation is about 57,300 ha in the country (MAF 2011). In contrast the number of shifting cultivation in average annually was about 187,000 ha in year 2000. The figure starts decreasing because of the government has formed a stricter law enforcement in order to reduce and come to end of shifting cultivation activity by 2020. The government has also supported local people with other activities such as village resettlement by moving the high land village to lower lands, which are more available flatlands for irrigation rice growing, and promotion the local people for rotational shifting cultivation as well as cash crops planting promotion to the rural people. This is in order to reduce and come to stop slash and burn forest in the future.



Figure 11. Shifting cultivation (upland rice), after harvesting.

2.6.2 Logging contributing to deforestation

Logging is an important factor affecting to forest degrading in Laos. **Legally there are 3 main sources for timber supply in Laos: production forest, development area and plantation forest.** In addition, illegal logging sources include both places mentioned above and also implemented at the protection and conversation forests (Figures 12 and 13), especially in Xepain protection forest, southern part of Laos.

Because of the high demand of timber products for both domestic and international markets, especially from neighbouring countries, such as China, Thailand and Vietnam are the main timber markets for Laos. In addition, the price of timbers is getting increase, which encouraging more timber harvesting in the country. The available data shows that in average annual timber cutting in Laos is about 3,103,286 cu m between years 1999–2007 (Kaisone Phengsopha 2011) including timber supply from both production, plantation and development areas, including exporting and domestic consumption in the country (Table 3). This figure is not included illegal logging. Logging process in Laos still lack of insufficient capacity of the authorities in terms log controlling and management in sustainable harvesting.

Table 3. Total log supply in the country (cu m).

Year	Exports (cu m)	Domestic consumption (cu m)	Total log (cu m)
1999	1 206 463	3 377 282	4 583 745
2000	1 290 409	1 561 828	2 852 237
2001	1 086 982	2 322 696	3 409 678
2002	551 571	2 187 819	2 739 390
2003	374 445	3 284 256	3 658 701
2004	386 355	2 386 747	2 773 102
2005	687 003	2 571 395	3 258 398
2006	638 054	1 787 846	2 425 900
2007	756 209	1 472 216	2 228 425

Source: Kaisone Phengsopha 2011



Figure 12. Legal and illegal logging in the southern part of Laos.
(Johannes 2012)



Figure 13. Log pulling by Elephant inside Xepian protected area, southern part of Laos.
(Johannes 2012)

2.6.3 Industry tree plantation contributing to deforestation

In reality industry tree plantation contributes both deforestation and rehabilitation in Laos. Negative and positive affecting to the forest cover change highly depends on the quality of controlling for forest plantation. Example, if the industry tree is grown at the right place of degraded forest area; it will be affected in the positive way (rehabilitation forest). On the other hand, if the tree is planted at a wrong place, which still highly covers of natural forest, it will be contributing to forest degradation. Industry tree plantation has become a priority development since the government realized that the total forest area had decreased dramatically from 70% to 41.5% (MAF 2006). **The Lao government has a target to rehabilitate forest cover of 70% by 2020.** Tree planting has therefore been strongly supported by the government (in 1980 the government set up a national tree planting day on 1 June and each year several tree seedlings are provided to provincial and district offices, farmers and private sectors to grow trees nationwide). However, it seems that Lao still lack clear definition and clarification forest types and canopy cover situations, such as degrade forest and other primary, secondary, fallow forests, etc. Therefore, previous industry tree plantation in the country, especially rubber and *Eucalyptus* plantation got more negative impact than positive impact for the idea of reforest station in the country. The plantation implementing is not good involving detail of environmental issues and biodiversity assessment at the site. Therefore, plantation would be damaged diversity of plants. There are mainly four industry tree species growing in Laos: Rubber tree (*Heven brasiliensis*), teak (*Tectona grandis*), Eucalyptus, eagle wood (*Aquilaria crassna* Pierre ex Lec) and *Acacia mangium* (Phongxiong Wanneng 2012).

The total estimate of plantation forest in Laos is over 146 600 ha, mainly grown in the middle part of the country (MAF 2006). However, the figure of Lao industry tree plantation areas was updated by FAO (2010) that total 223 000 ha including private, small holder and urban industry tree plantation in the country. Table 4 shows the main industry plantation tree species in Laos.

Table 4. Industrial plantation species of Laos. (Midgley *et al.* 2007)

No	Tree species	Area (ha)	Main site
1	Teak (<i>Tectona grandis</i>)	15 000	Mainly in Luangprabang Province (98% belongs to farmers and small private entrepreneurs)
2	Rubber (<i>Hevea brasiliensis</i>)	12 000	Every part of the country (farmers, private sector and Chinese investors)
3	Eagle wood (<i>Aquilaria</i>)	-	Mainly grown in the middle part (Vientiane, Bolikhamxay Provinces) involving farmers and private sector.
4	<i>Eucalyptus globulus</i> (blue gum) and <i>Eucalyptus cladocalyx</i> (sugar gum)	100 000 (expected to 2012)	Central and southern parts, involving mostly foreign investors.

2.6.4 Deforestation from development areas

There are two main development sectors that seriously affect to deforestation in Laos: Hydropower construction and mining. Hydropower development is considered as the priority sector of the government that should go one step forward from the other sectors, because this sector is the central factor contributing and supporting to other sectors development in the country. Since 1990s, natural forests have been seriously damaged from the activity of dam construction such as flooding and log harvesting at the sites. Investigation records that between 1997 and 1998; timbers have been supplied alone with the dam projects sites with over 50% of the total timber harvesting in the country with 600 000 cu m (Kaisone Phengsopha 2011). Department of Energy Promotion and Development states that the Lao government, who is planning to be Asian battery, signed MOUs to supply 7 000 MW of energy to Thailand after year 2015, 3 000 MW to Vietnam after year 2020, and 5 MW to Cambodia by the end of year 2009. For this strategy, the government investigates possible sites for hydropower constructions. Up to 2012, the government has signed contract to both domestic and international investors for hydropower construction projects in Laos with about 88 projects with estimating for power products of 100 000 GWH per year (Laxang Media Co. Ltd 2013). Between 2002 and 2010, there are four main dams were constructed; Nam Ngum 2, Xe Kaman 3, Nam Theun 2, and Xeset 2. These dam construction projects clear forest areas totally about 54 222 ha, and also being a main forest timbers of the country's informal supply from these sites. The total projected area which will be flooded in the country by dam construction projects to 2020 is about 183 037 ha (Kaisone Phengsopha 2011).

In addition, gold and mine exploration are also the hot issue in Laos. These products exporting represent 40% of the total export earnings in the country. In 2007, 100 foreign companies invested in 158 mining sites with over 427 184 ha under exploration and 1 395 016 under prospecting in the country. A detailed investigating of the forest loss in the sites has not been conducted yet. However, most mining sites are dense forest cover. Therefore, if average stand volume in Lao forests is 60 cu m/ha, the areas would be supply approximately 109 332 000 cu m of logs (Kaisone Phengsopha 2011).

2.7 Forest management

According to the forestry law updated (2007), forest management, which is based on the main purposes of forest diversity conservation, is clarified into three main forest types based on forest management term: Protection, conservation and production forests. Community forestry is another extra forest management type, which is belonging to local authority's responsibility, such village, district and provincial levels. In the past, forest types were classified for five categories for a better forest management purposes, such as production forest, protection forest, preservation forest, regeneration forest and degradation forest (Forestry Law 1996). However, the updated Forestry law, 2007 has reclassified forest types for only three main types: production, protection and conservation forests. Conservation forest, which covers about 33% of the total of the state forest area in the country, is allocated for the main purpose of biodiversity conservation, research and education,

ecotourism and special site of Lao history. Protection is established for mainly environmental issues protection, such as soil, water, natural disasters and as well as for national security, covers over 44% of the total state forest areas. The remaining state forest type is production forest, which covers about 22% of the total state area. The production forest is allocated in the country mainly for supplying timber products for both domestic consumption and international markets. Village forest (community forest) and plantation forest areas are also clarified to be forest types in Laos, but these kinds of forests are belong to local and private owners.

Forest management activities include forest area and its natural resources inventory, zoning, and management planning, as well as some special plant species conservation (rare species). The activities also include forest logging, grading and transporting to the sawmill factories. As previous mentioned, there are two main national organizations, which work closely together, and coordinate with other relating sectors in the country in terms of forest activities. Ministry of Agriculture and Forestry (MAF) responds for production forest, and the Ministry of Natural Resources and Environment (MONRE), which is a recently established, responds for conservation and protection forests (Prime Minister decree issued 2011).

2.8 Forest fire management

Forest fire issue in Laos is mainly caused from shifting cultivation (slash and burn) and forest/grass burning for wildlife hunting. Forest fire happens mainly during the dry season, which normally starts from the end of November to May. Therefore, the government make some regulations, and also normally make annual announcement from national to the local level, especially for the related forest organizations, such as; provincial agricultural and forestry department (PAFO), district agricultural and forest office (DAFO) and village chiefs to be aware and control for forest fires where are located in its boundary and zones in case of forest fire happening. According the forestry law 2007, people who damage forest or forest resources value less than 1 million Kip shall be subjected to a warning and educating. But in the case of damaging value higher more than 1 million Kip shall be liable to a fine of the value of damaged forest and forest resources. In addition, the case of second habitual violation shall be fined double of the total damaged value and sometimes can be penalty in jail (National Assembly 2007). Furthermore, another ways of forest fire management in the country are also building local awareness, especially for ethnic groups who usually burn forest. This is in order make local people understand and know for the fire damaging to environmental issues and forest biodiversity resources. The government also encourages integrating cash crops growing with some industry tree species (rubber tree) to the village in order to reduce shifting cultivation. Furthermore, some villages that located in the high mountains with high sensitive to forests have to move to lower land (flat lands) where is more available irrigation rice growing. The government is planning to stop the activity of shifting cultivation in year 2020. In addition, as mention before, hunting activity not only harms to wildlife animals, but it also makes forest fire (burning grass for hunting). Therefore in order to control fire and other more issues, the government has banned using guns or even holding gun at home since around 1996.

2.9 Non-timber forest products (NTFPs)

In Lao PDR 757 plants and 150 animals have been identified as NTFPs, but this is probably 4–5 times higher, most being daily used by local people and some of these are nationally important for their commercial value (Greijmans *et al.* 2006). NTFP products are important for Lao people for food security and poverty alleviation forest and environment management. NTFPs provide incentive for community forestry management. It seems reason able because the local people do better for their forest management in order to have more NTFP products. Probably over 70% of Lao people still highly depend on natural forest resources for their livelihoods, such as food, shelter, medicine and income. The data recorded by the National Agriculture and Forest Research Institution (NAFRI), 2008 showed that about 20% in average family's cash-income in the country is from NTFPs. This figure is just next to income-value from agriculture sector (NAFRI 2008). For rural people, NTFPs provides 45% of cash income in the family, and about 50% of non-cash income. Total value of NTFP products in Laos USD128 million per year and export value USD50 million in 2005.



Figure 14. Sample NTFPs products in Laos. (Sources from Phongxiong Wanneng)

3 FORESTRY POLICY AND LAW

This chapter briefly discusses for the forestry law and regulation, which are relating to forest and forest resources utilization and business in Laos.

3.1 Forest utilization based on forestry law

According to the Forestry Law 2007 (Article 37), forest utilization in Laos has been classified in to four 4 main categories: forest utilization for public benefits, utilization for household, customary forest utilization and forest utilization for business purpose. However, the forestry law states that all categories forest utilizations must make sure avoiding any negative impacts on forest resources and natural environment or society.

3.1.1 Forest utilization for public benefits

Forest timber and resources can be legally used for any public benefits in the society in terms of construction activities and infrastructure development in the local levels (village, district and province), such as village office, school, village meeting hall and village dispensary service building. These kind of forest use can be practice both production forest and community forest types. However, it must be getting permission from the village level and passing by the local authorization of the district or municipal administration office through the application form the district or municipal agriculture and forestry office in accordance with the provincial or Vientiane capital annual logging plan endorsed by the government. Utilization of forest products, that are not for business purpose, are for medicinal use, decorative activities, research, exhibition and other relative activities are allowed in a particular forest type and area that are already conducted for land use planning and land allocation in the country, such as production forest (National Assembly 2007).

3.1.2 Forest utilization for household

The Lao government allows local people use non-protected timber species for house construction and repair in the village, particularly for those households that are in necessarily for example, the households or new couples that have no house yet in the village or very old and damaged houses by disaster with the certification from village chief and approving by the head of agriculture and forestry office (DAFO). However, the timber volume is under limitation 5 cubic meter of logs per household. In addition, this timber is prohibited for selling, buying and transporting to other areas (National Assembly 2007).

3.1.3 Customary forest utilization

Customary forest utilization is the way that local people have used forest and forest products for a long time in the society or ethnic groups that are in accordance with forestry law and regulations. The state allows to use trees for making fences, firewood, harvest non-protected trees species and non-timber forest products for household consumption and so on with the condition that shall not cause any negative impacts on forest, forest resources, environment as well as inflicting on rights and benefits of other individuals or organizations. In addition, customary forest and forest products utilization must be carried out in accordance with the village land and forest use planning and allocation as well as village regulation relating to forestry law and regulation of the government (National Assembly 2007).

3.1.4 Forest utilization for business purpose

Forest utilization for business purpose means for use the natural forest for tourism activities, recreation sites, logging for commercial purpose including construction poles, firewood and etc. Tourism and recreation sites can be undertaken all type of forest types: protection forest, conservation forest and production forest areas. However, logging and harvesting forest products for commercial purposes are permitted only at the infrastructure construction and development areas. This activity is also allowed to carry out in the production forest which is under permission of relative authority of the government. For small construction poles and firewood harvesting are also allowed only in the infrastructure construction areas, such as mining and dam construction sites. In addition, the state allows local people to collect firewood and small tree poles for building in the agricultural zones. The government prohibits any individual or organization to rent or get concession for forest land and natural forest

areas for undertaken logging or even any activity of non-timber forest products (NTFPs) harvesting (National Assembly 2007).

3.2 Logging and forest resources harvesting

The government allows logging in natural forests only in the production forest areas of which are inventory surveyed for sustainable management. And forest logging also can be conducted in the forest areas where have been completed approving by the government for infrastructure constructing such as mining, damming and other agricultural developing in the country. The annual logging plan must be endorsed by the National Assembly based on the proposal by the government.

Logging in the Production forest must follow the main principles as below: (1). Assigning forestry staff to be posted at logging sites for managing, monitoring and controlling the logging so that it correctly follows laws and regulations; (2). Using logging units that are officially established; (3). Logging must be carried out in the so designated areas and in accordance with the plans approved by the government; (4). Harvesting only the species and trees marked and stamped to be cut by the Forest Management Organization; (5). Felling of trees must be carried out in accordance with technical prescriptions and in the right season as well as collecting all harvested timber for maximum utilization; (6). Applying selective cutting system, ensuring natural regeneration, minimizing impacts on natural environment and society and limiting destruction of surrounding trees; (7). Hauling, transport and landing of logs must be undertaken through the roads and at the log landings or log yards set by the State; (8). After logging, forest cleaning operations and enrichment planting must be undertaken, (9). After completing the logging according to the plan, the logging area must be declared closed and plan measures for management, regeneration and maintenance to ensure logging in the next cycles.

In addition, forest logging and forest products harvesting in the infrastructure construction areas, the state considers based on the situation case by case to find specific management plan and relevant regulations (Figure 15).



Figure 15. Logging at the production forest. (Source: Somsack 2013)

4 LAND USE PLANNING AND LAND TENURE

This chapter briefly discusses land use planning and land use change in the country. It also focuses on what main factors drivers to land use change and affecting to forest cover change. This chapter also discusses the failures and successes as lessons learned for land use planning in Laos. Finally, the chapter will also include the practice of land concession and tenure in the country.

4.1 Land tenure policy and arrangement in Laos

According to the first national land conference of the Lao government holding in 2007, the conference was discussed turning land into capital in the country (Schonweger *et al.* 2012). This policy is the main key encouraging more both domestic and foreign investment in the country in several sectors, such as mining and agriculture and forestry sectors. For agriculture and forestry sectors, especially for forest plantation the local people have also been involved for the land investment of 2+3 and 1+4 systems. It means that local people share investment for agriculture and forest plantation by land and labor, for the investors share the investment by capital, technical support and market. Currently, the number for land concession and lease in Laos is up to 2.1 mil ha, which have been granted to both domestic and international investors, covered about 9% of the total land area of Laos (Table 5).

Table 5. Overview the total investments in Laos by sectors.

Investment sectors	Deals	Total area (ha)	Average area/deal (ha)	Total area (%)
Agriculture	360	140 015	453	12.73
Forestry	367	306 234	885	27.85
Mining (exploitation)	564	548 756	1 155	49.91
Construction	392	358	1	0.03
Electricity	10	3 730	533	0.34
Manufacturing/processing	427	22 878	63	2.08
Communications	69	37	1	0.00
Services/utilities	144	1 956	17	0.18
Tourism	156	75 182	519	6.84
Transport	20	275	14	0.03
Wholesale/trade	121	107	1	0.01
Education	2	5	2	0.00
Total:	2632	1 099 533		100

Source revised from (Schonweger *et al.* 2012)

According to the decree of the Prime Minister on state land lease or concession (Article 10) 2009, the National Land Management Authority has the right to grant concessions for the degraded forest land over areas from 150 ha to 15 000 ha for each project. An area more than 15 000 ha must be approved by the National Assembly; this is mainly for land lease or concession for industrial plant plantation and industrial farm business. The maximum lease period is from 30 to 50 years with the possibility to extend on a case-by-case basis, approval by the Government.

The Land Management Authority at the provincial or city level can authorize the lease of state land covering an area of not over 50 ha per one business unit. It must take into consideration the characteristics, size, and condition of the factory business, the maximum lease period of 30 years with the possibility to extend on a case-by-case basis, based on the consent of the Department of Industry and Trade, and line agencies within the province, city and with the approval of the provincial/city administrative authority. For the industrial farm for which the state land lease is granted the area must be less than 150 ha per one business unit, and must take into consideration the characteristics, size and condition of the industrial farm business. The maximum lease period is 40 years with the possibility to extend on a case-by-case basis, based on the consent of the Department of Industry and Trade, and line agencies within the province, city and with the approval of the provincial/city administrative authority. The investor countries relating to the largest amount of land concession and lease investment in Laos (including Laos), are three main countries: Vietnam is the highest in terms of land concession area in Laos with 28%, following by China with a number of 18% and Laos (domestic investment) with 17% of the total percent of land concession area in the country (Figure 16).

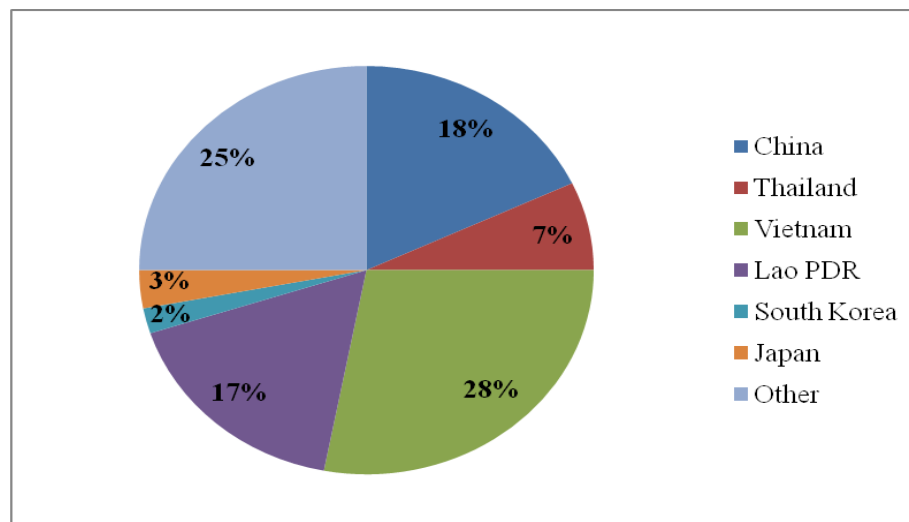


Figure 16. Overview of neighboring countries investment relating to land concession in Laos.
(Revised from Schonweger *et al.* 2012)

4.2 Land use and land use change

Land use in Laos has been followed land use planning activities which has been practised since 1990s. Land and forest areas have been zoning in differently land categories depending on the size and situation of land and forest areas. However, there are often happened for five main land zoning types in the village: Village protection forest, preservation forest, production forest, cemetery and sacred forests, agricultural and village zones.

Study observed that previously, land use planning has just located for villages' boundaries as well as forest and land use types in the villages. However, it seems that the villagers have insufficient land for their agricultural production or it would be lacking of law enforcement. Therefore, land use planning in some villages can't be implemented in sustainable way. It means that, after ending projects, villagers break the land use planning rule by expanding agricultural area to another land and forest and land categories. Example, growing rubber and teak to production and community forestry forest areas.

In addition, there are lacking of technical support from the government to the local people in terms of forest management, cash crop growing and accessing market to the local people in order to increase more agricultural productivity and income. These are the main reasons failure for land use planning and land allocation in Laos. However, land use planning is a good tool to reduce village boundary conflict, deforestation and as well as access right and ownership to local people in terms of land and forest management and use (Moore *et al.* 2011).

Land use change has been caused mainly for deforestation and degradation. Some available data were recorded from 1982 to 2010 (Table 10). This represents an annual deforestation rate of 0.4% (46 000 ha) between 1982 and 1992 and of 1.2% (134 000 ha) between 1992 and 2002. The FCMP data show a different picture with 39% forest cover in 1993 and 38% in 1997 and a lower average annual deforestation rate of 0.5% (46,000 ha) between 1993 and 1997. However, according to preliminary findings, in 2010 the overall forest cover had further decreased to 40% or 9.5 mil ha (MAF 2010)

Table 6. National forest cover rate in Laos (MAF 2010)

	1982	1992	2002	2010
Actual forest cover (% of national territory)	49%	45%	41.5%	40%
Actual forest cover (ha)	11 637 000	11 168 000	9 825 000	9 500 000

As mentioned above based on the geographical landscape, Laos has been divided in to three main regions (northern, central and southern parts). Between 1992 and 2002, the average annual deforestation rate in these parts is 1.1% in the northern and 1.5% in the southern parts. In the central part of the country the rate is 2.2%.

4.3 Major driver Land use change in Laos

Expansion of agricultural areas for cash crops and long term industry plantation in the country are the main sectors driving to land use change in Laos. However, there is only limited actual figure available supporting. Cosh crops plantation mainly includes maize, variety roots, coffees and rice and fruits. For long term industry tree plantation mostly grown in Laos are rubber, eagle wood, teak and eucalyptus, as mentioned above. The main encouraging to growth those plants are because of high both domestic and international markets demand in neighbouring countries.

Study showed that the number of agricultural area for cash crop plantation increased from 17 700 ha in 1992 to around 320 000 ha in 2006 (Thomas *et al.* 2010). Another data estimating by UNDP (2010) indicated that approximately 3.5 million ha or 14.7% of the land area of Lao PDR is under various agri-business concession agreements and contracts. Between 2002 and 2009, agricultural expansion has been a major driver of deforestation in Lao PDR as the number of large and small agricultural concessions as well as household-based agricultural expansion increased substantially (Thomas *et al.* 2010, MAF 2010). Land lease and tenure by conversion from forest to cash crop plantation includes rubber plantation is the most important cause of forest losing forest cover and land use change in Laos.

5 MAJOR DRIVERS TO FOREST TRANSITION IN THE FUTURE

This chapter summarizes the potential factors contributing to increase of forest cover rate in Laos. These factors are included forest plantation, long term Lao forestry strategy to 2020, reforming forestry regulation and policies as well as other natural forest sustainable management and mission reduction for green house gas emission in Laos.

5.1 Forest plantation

As mentioned above, forest plantation can be contributed to both deforestation and rehabilitation forest in Laos. Negative and positive affecting to the forest cover change highly depends on the quality of controlling for forest plantation. Example, if the industry tree is grown at the right place “degraded forest area”; it will be affected in the positive way (rehabilitation forest). On the other hand, if the tree is planted at a wrong place “natural forest area”, which still highly covers of natural forest, it could be considered much more contributing to forest degradation than rehabilitation forest. However, industry tree plantation has become a priority development from the government (MAF 2006). The Lao government has a target to rehabilitate forest cover of 70% by 2020. Tree planting has therefore been strongly supported by the government (in 1980 the government set up a national tree planting day on June 1 and each year several tree seedlings are provided to provincial and district offices, farmers and private sectors to grow trees nationwide). Currently, the government has learned more experiences on forest plantation and stricter on law enforcement. This is in order to use the area for forest plantation in the future.

Forest plantation in Laos has been developed in the late 1950s. There are mainly four species that have grown in Laos: Rubber tree (*Heven brasiliensis*), teak (*Tectona grandis*), Eucalyptus, eagle wood (*Aquilaria crassna* Pierre ex Lec.) and Acacia mangium. Rubber and teak were introduced by French colonialists in the early 1890s. Eucalyptus species were brought to Laos in the late 1960s (Phimmavong 2012). Eucalyptus plantations were introduced through the Lao-Australia Reforestation project in the early 1970s. Teak planting originated in Luangprabang Province, in the northern part of Laos in the late 1950's. Teak was planted on a small scale in home gardens. By 1996, more than 80% of villagers in Luangprabang had planted teak (Figure 17). Firstly, teak plantation in Laos was the policy instruments by the District Agriculture and Forestry Office and Provincial Agriculture and Forestry Office, which were funded by United Nations Development Program and Food and Agriculture Organization projects. These policies also included incentives such as the food for work programs in which villages were given food in return for planting teak. Another incentive was the provision of free seedlings by the project and the Lao government to increase forest cover in the country (Xayvongsa 2001).

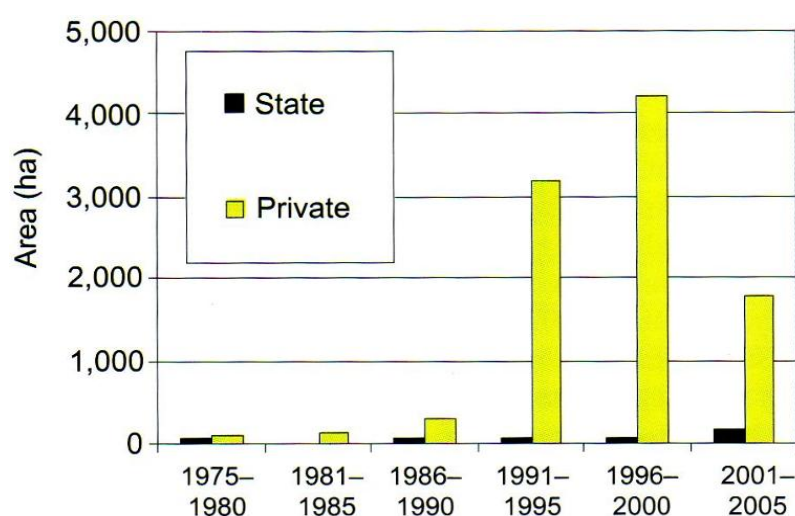


Figure 17. Teak plantation in Laos. (Midgley *et al.* 2007)

In the present years, investment of forest plantation in Laos has been increasing. Since 1990, over 140 000 ha of rubber plantations have been grown, with a projected increase to 300 000 ha by 2020 (Phimmavong 2012). Rubber and teak plantations have been extensively increased by smallholders in

the northern part of Laos, while the Eucalyptus and Acacia plantations have decrease planted by several sectors both central and southern parts. However, generally the figure areas under tree plantations have been risen rapidly since 1990s (Figure 18). According to the data recorded, the largest area of tree plantation was in 2008 in the country with 40 000 ha.

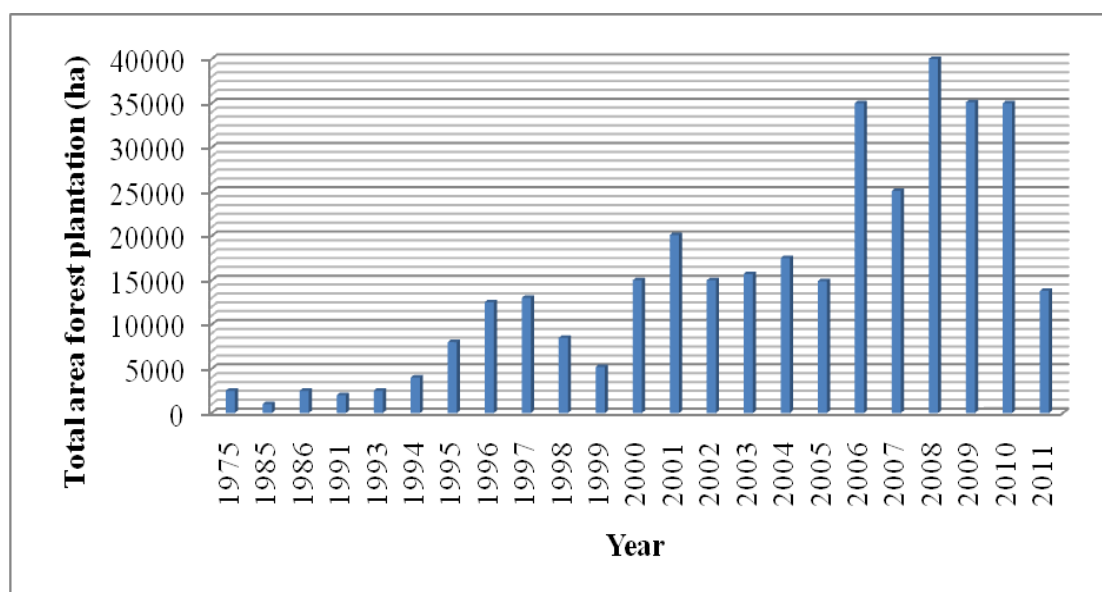


Figure 18. Forest plantation in Laos. (Revised from Phimmavong 2012)

5.2 Forestry strategy to 2020

The Lao government is planning a strategy for the forestry sector to rehabilitate forest coverage up to 70% by 2020. In order to achieve this target, the Ministry of Agriculture and Forestry has to oversee all governmental forest organizations from national to local levels. The relevant agencies and donors also need to plan their work relating to forest development both in natural forest and plantation management (MAF 2006).

The government encourages forest rehabilitation by increasing participation of villagers in sustainable forestry management, based upon technical advice from the local government. Encouraging more incentive of forest plantation in the country by supporting free tree seedling plantation, especially on the Lao national forest plantation day (1 June every year). In addition, the government has reformed the forestry law and regulation by considering extension a longer time period for industrial forest plantation in the country up to 50 years (According to the decree of the Prime Minister on state land lease or concession, 2009). The government has banned exporting log and timber in raw materials to neighbouring countries and promoting wood processing in the country. This is in order to reduce amount of forest harvesting in the country, but the timber income still maintains the same amount.

Another key addresses increasing forest cover in the future are encouraging natural regeneration of up to 6 million ha and planting of up to 50 000 ha in degraded forest area by 2020. Furthermore, the achievement target is also to increase local people income by improving integrating tree plantation with other cash crops, accessing market to the villages and supporting wood industry development. This is in order to generate household income through sale and export, thus contributing to livelihood improvement, and the local people reduce depending on forest resources utilization. The final key strategy of the Lao government to 2020 is to preserve species and habitats and further increase research of new species, building a stronger legal framework and develop human resources. The final key forest strategy is also to conserve the environment including soil protection, conservation of the watershed and curtailing further spread of shifting cultivation (MAF 2006).

5.3 Strengthening forestry law and Regulatory

In order to support the achievement goal of the forestry strategy to 2020 to recover forest back to 70%, there has been tremendous development on the regulatory framework in the Lao forestry sector since the mid-1990s that include the passage of the revised Forest Law in 2008 followed by various

regulations on sustainable management of forest areas, promoting the participation of villages, and enforcement of regulations on timber harvesting and marketing.

Concerning land and forest allocation, Prime minister Decree 186/1994 on Delineation and Allocation of Land and Forest for Tree Planting and Protection provides a basic legal framework for incentives and promotion of tree planting, including exemption of land tax on tree plantations containing more than 1,100 trees/ha, ownership of planted trees (use, harvest, sale, transfer, and inheritance).

The reforming forestry law and regulation has to encourage participatory forest management in the country. The Lao government has accessed more forest ownership based on sustainable forest use and management to local levels. As a result of the Decree and its implementing program, land and forest allocation was carried out from 1995–2004 in 6 830 villages (>50% of national total) with a total allocated area of more than 9.1 million ha of the allocated area 8.2 mil ha (90%) was allocated as village forest (1 200 ha/village; or roughly 19 ha/household) in average. The Forestry Law is comprehensive and gives relatively clear directions in many aspects of forestry. Under the Forest Law, three categories of state forests are recognized: production, conservation, and protection. These forests types are covered of 10–20 mil ha in the country, which is covered approximately 79% of the total forest areas in the country (MAF 2006).

5.4 Forest management

Forest management is another main key driver to forest transition in sustainable management in Laos. The government has strongly encouraged of forest participatory management in the country, which includes by several sectors, such as private sectors, domestic and international forest investors, as well as the international agencies (NGOs development projects). This is in order to increase the rate of forest cover in the country to 70% in 2020. Natural forest management, particularly in Laos are mainly included four main forest types: Protection forest, conservation forest, production forest and community (village) forest (Table 7). The models of natural forest management include a variety of forestry methods, such as land and forest uses zoning, setting regulations of forest resources utilization in the local levels, involving more local people in forest resources management and sustainable right use and ownership. The local people share more benefits for forest resources and management. The government focuses for three main strategies to increase forest cover to 2020: 1) Regenerate natural forest by its self; 2) Assisted natural forest regeneration by local people and 3) Encourage forest plantation in the country.

Table 7. Forest management in Laos.

Forest categories	Area (Million ha)	Plan adding to 2020 (million ha)
Production forest area	3.15	1.48
Conservation forest area	2.64	3.13
Protection forest area	4.41	2.64
Village forests area	1.56	6
Industrial tree plantation area	0.50	0.05
Smallholders woodlots area	< 0.50	-

Source revised from (MAF 2006, DOF 2012).

5.5 Income distribution to forest transition

Poverty reduction is a priority development in the Laos. The government has agreed both short and long-terms social-economic development goals. The data records that the major poverty in Laos is rural people, which the figure covers 4.2 million rural people in Laos are still living in poverty condition considering in the Human Development Index (HDI): life expectancy at birth, adult literacy rate, combined primary, secondary and tertiary gross enrolment ratio and as well as income (GDP per capital).

Economic growth has reduced the official poverty rates in the country from 46% in 1992 to 26% in 2010 (MAF 2011). The government has planned to reduce poverty rate to less than 28.7 percent and completely eradicating poppy plantation by 2005; raise income per capita to USD1,800 by 2015; and remove the Lao PDR from the Least Development Country (LDC) status by 2020 (Ministry of Planning and Investment, 2010). It has been also realized that majority poverty rate in the country is the ethnic

groups as well as rural people who live in remote places. These groups are also mainly contributing to deforestation, especially shifting cultivation (slash and burning forest) and cutting forest for fuel. Therefore, the government has implemented some activities of village resettlement in the country by moving the villages that are located in remote area where lack agriculture land and limited market access to the village to resettle in the new places, where have better potential for social-economic development (Schonweger *et al.* 2012). This also can be reduced deforestation rate in the country.

It has been seen that the strategy development of socio-economic in Laos during the first half of 2010s is slightly lower than the targeted plan (Figure 19). However, generally the total country income per capital is gradually increased from 2000 to 2010 with result income per capital approximately USD 1,069. And the inflation rate is in good control.

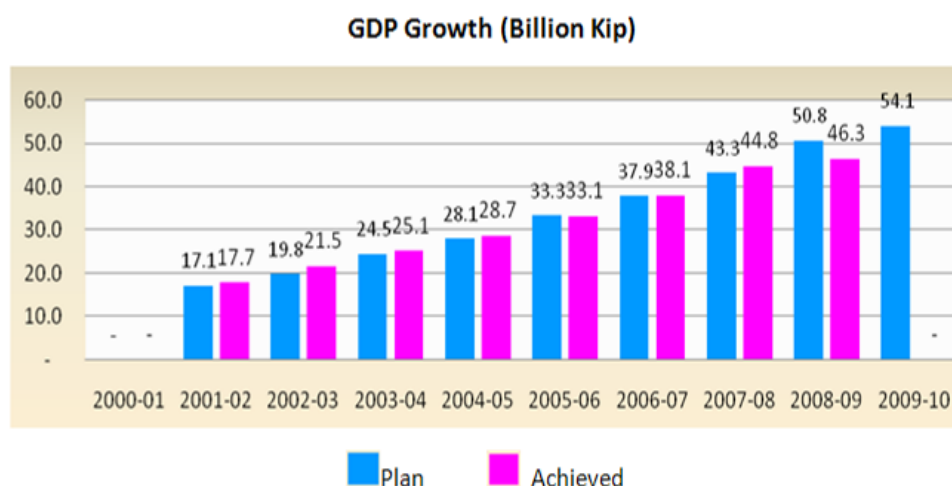


Figure 19. Plan and achievement for social-economic development in Laos (2000–2010).
Sources from (Ministry of Planning and Investment 2010)

5.6 Mission reducing for greenhouse gas emission in Laos

Laos is developing country with actively participation for climate change issue. The government has set up a clear strategy to 2020 to increase forest cover in the country to 70%. The strategy has been setup for a multiple purposes, such as conserving forest biodiversity and reducing greenhouse gas emission (CO₂) in the country, especially in the future. In the action plan for the strategy, the government encourages all state authorities (national and local), private sectors and as well as nongovernment organizations (international agencies) in Laos to involve for a variety of forestry activities for both tree plantation, assisted natural forest regeneration and natural forest rehabilitation. The government has located over 22 protection forest areas in the country, which over 12% of the total country area. In addition, the Lao government has also joined with other international development agencies in Laos implementing for forestry activities, such as participatory village forestry, sustainable state forest management, smallholder woodlots, plantation and strengthening enabling forestry law and regulation framework (MAF 2011).

The estimates of emission reductions are based on study of the MAF (2011), assumes that there will be significantly reduced emission in Laos by the government supporting variety of forestry development and also supporting alternative livelihoods such as agro-forestry and home gardens with fruit and vegetables, especially for the local people and ethnic groups. This is will be gradually reducing the area used for shifting cultivation. This will bring emission reductions from the area cleared and burnt annually as well as sequestration in the secondary forest from regrowth for a better management (Table 8).

Table 8. Estimate change in CO₂ emissions resulting from forest protection and alternative livelihoods supporting for local communities (2012–2020).

Year	Shifting cultivation		Natural forest				Total (tCO ₂)
	Emissions		Emissions avoided		CO ₂ sequestered		
	Avoided	Sequestered	Deforestation	Degradation	Growth	Restoration plantations	
Base year	83,076		31,703	275,322			390,101
2012	8,308	2,342	34,873	15,971	58,709	313	120,516
2013	16,615	3,712	38,044	17,423	58,709	1,428	135,931
2014	24,923	4,684	41,214	18,874	58,709	3,896	152,300
2015	33,230	5,438	44,384	20,326	58,709	8,279	170,367
2016	41,538	6,054	47,555	21,778	58,709	18,072	193,706
2017	49,845	6,575	50,725	23,230	58,709	34,908	223,992
2018	58,153	7,026	53,895	24,682	58,709	70,660	273,125
2019	66,460	7,424	57,066	26,134	58,709	147,480	363,273
2020	74,768	5,760	60,236	27,586	58,709	291,101	518,160

Source: MAF 2011

6 CONCLUSION AND LIMITATION OF THE STUDY

This chapter briefly summarizes all the results of reviewed data relating to forest transitions in sustainable forest management and rehabilitation in Laos. The chapter also identifies the limitations of the literature review and provides recommendations for future studies to fill in the gaps of the existing knowledge with in this study.

6.1 Conclusion

In conclusion, the results of this review paper shows that Laos is a developing country locating in the central heart of South East Asia with the population of 6 385 057 people. The current gross domestic product (GDP) of Laos is USD1069 in 2010. This figure has been gradually increased from only USD340 in 1995 and about USD491 in 2006. The main drivers for Laos GDP increase currently are industry (hydropower and mining) and services (tourism). Previously, agriculture and forestry sectors are a chief employer in Laos, employing over 80% of Lao citizens while generating about 53% of the national GDP. Economic growth has reduced the official poverty rates in the country from 46% in 1992 to 26% in 2010. The Lao government projects that by 2020 Laos will no longer be classified among the least developed countries.

Laos has ranked as the top range of rich countries in terms of natural resources: forest, water and minerals compared to other Asian Countries. These natural resources are the main factors contributing to Lao social-cultural and economic developments, as well as environment protection. The percentage of forest cover in Laos has been decreased dramatically from 70% in 1940 to 49% in 1982 and only around 40% or about 9.5 million ha in 2010. However, this figure is the highest forest cover rate compared to other Southeast Asian countries. There are several factors driving to forest degradation in Laos, such as shifting cultivation, agricultural expansion, unsustainable logging, and industry tree plantation, mining and infrastructural development projects (dam and road constructions). There are two main national organizations respond for forest management in Laos: Ministry of Agriculture and Forestry controls the forest and agriculture sector focusing on production forests. The Ministry of Natural Resources and Environment (MONRE) is recently established responding on conservation, protection forests as well as other activities relating to environmental issues. These organizations are the main coordinators with other related sectors such as the National Land Management Authority, the Ministry of Industry and Commerce, the Ministry of Energy and Mining and Water Resources.

There are 757 plants and 150 animals have been identified as Non-Timber Forest Products (NTFPs) in Laos, but it would probably 4–5 times higher. NTFPs are most being daily used by local people and some of these are nationally important for their commercial values. There is over 80 percent of the total Laos population still highly depend on NTFP products for constructing their shelters, herbal medicines, and food and cash incomes in Laos.

There are several potential factors contributing to transition forest in sustainable management and rehabilitation in the future in Laos. One of the main key is the Lao government strategy to increase forest cover rate up to 70% by 2020. In order to achieve this target, the Ministry of Agriculture and Forestry has to encourage all governmental forest organizations from national to local levels. The relevant agencies and donors also need to plan their work relating to forest development both in natural forest and plantation management. Another important key achievement for the government goals is forest plantation. The state has encouraged more incentive of forest plantation by supporting free seedling, especially on the Lao national forest plantation day (1st June every year). In addition, the government also reforms forestry law and regulation by extension a longer period time of land concession for industrial tree plantation investment in the country. The government has also strengthened forestry law and regulation in terms of natural forest participatory management and use through national to local levels. Forest management has been more involved by local people in terms of sharing their right ownership and benefits from forest management. Finally, forest transition to sustainable management and rehabilitation in the future would be affected by gradually increasing for local people incomes, particularly for the rural people who highly depend for forest and forest resources for their living condition. These groups would reduce for shifting cultivation (slash and burning forest) and cutting forest for fuel, which are mainly previous keys for deforestation in Laos.

6.2 Limitation of the study

This literature review has realized that there are two main data limitations for this study. The first data issue is that there are too many data available in Laos, which are recorded by different organizations such as private consultancy companies, international development agencies, researchers and governmental organizations. However, mostly the data recording in Laos is joined with international supporter/authors. Some of this information has different figures even the same issues and as well as each report has recommended in different ideas and directions for future issues development in the country. Therefore, sometimes, it is quite complicated to consider for the accurate figures and issues. In addition, there are not many updated data available in the country. Therefore, some of these data reviewing for this report would be different figures compared to the current country situation.

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Appendix

Case Study

Industrial Tree Plantation Investment and Production Forest Change in Champasack Province (Case study summarized from Say kham Bouthavong, Nakhalake Somboun and PAFO 2012)

Brief information of Champasack Province

Champasack Province is located in the southern part of Laos with a total area 1.535 mil ha. According to the geographical system, there are two parts of the Province: flat land is 74% and mountainous land covers only 26%. Forest area in the Province is 861 000 ha covering with 57% of the total Provincial area. The Province covers three national conservation forest areas with 329 000 ha, four national protection forest areas with 87 600 ha and three production forest areas with 152 600 ha. The Province has also seven provincial conservation forest areas of 81 940 ha, and about 29 660 ha of regeneration and degradation forests, and over 25 173 ha of forest plantations (Champasack PAFO 2012).

The total population of Champasack Province is 642 785 people, female 326 926. The growth rate of population is 0.7% per year. The Provincial GDP increases annually about 9.8% with income per person about USD1097. This figure shares agriculture sector 42%, Industry sector 27% and service sector 31% (Champasack PAFO 2012).

Forest plantation in the Province

There are 22 projects invest of forest plantation in the Province with 25 173 ha. Mostly the tree species growing in this place is rubber tree. Others species such as eucalyptus and teak are growing in a small scale by local households and private sectors.

Table A. Rubber plantation in Champasack.

Age of trees	Ha
New growth	253
One year growth	3 376
Two year growth	957
Three year growth	4 363
Four year growth	6 239
Five year growth	7 186
Mature tree (ready for harvesting)	2 799
Total	25 173

Source: PAFO Champasack 2012

Land tenure and concession at Champasack Province

The process of land tenure and concession in the Province is following the Forestry Law 2007; Decree Nos 13, 34, 36 and 56, clearly state that forest plantation is being one of the government priority developments. However, the site choosing for forest growing must be the degrading forest or no forests. These kinds of places can get permission from the government for forest plantation investment, such as land tenure and concession in the country. In addition, the forestry law, decree number 44 records that transferring a kind of land to be another purpose uses have to get permission from the national land committee.

Currently, the total number of land tenure and concession in Champasack Province is 39 110 ha, which includes both international land investment of 33 533 ha and domestic 5 577 ha. The total value

of international investment is about USD 227 716 255 and the total value investment for domestic is USD41 203 411.

There are two ways to gain land tenure and land concession in the Champasack Province, bottom up and top down processes. Each process for getting land tenure and concession in the Province depends on the network situation and scale of land tenure.

The bottom up process of land tenure and concession starts from the local authority such as Village, District and Province levels. The land investors ask for available lands from the local authorities and then go up to the national levels to get permission (Figure A).

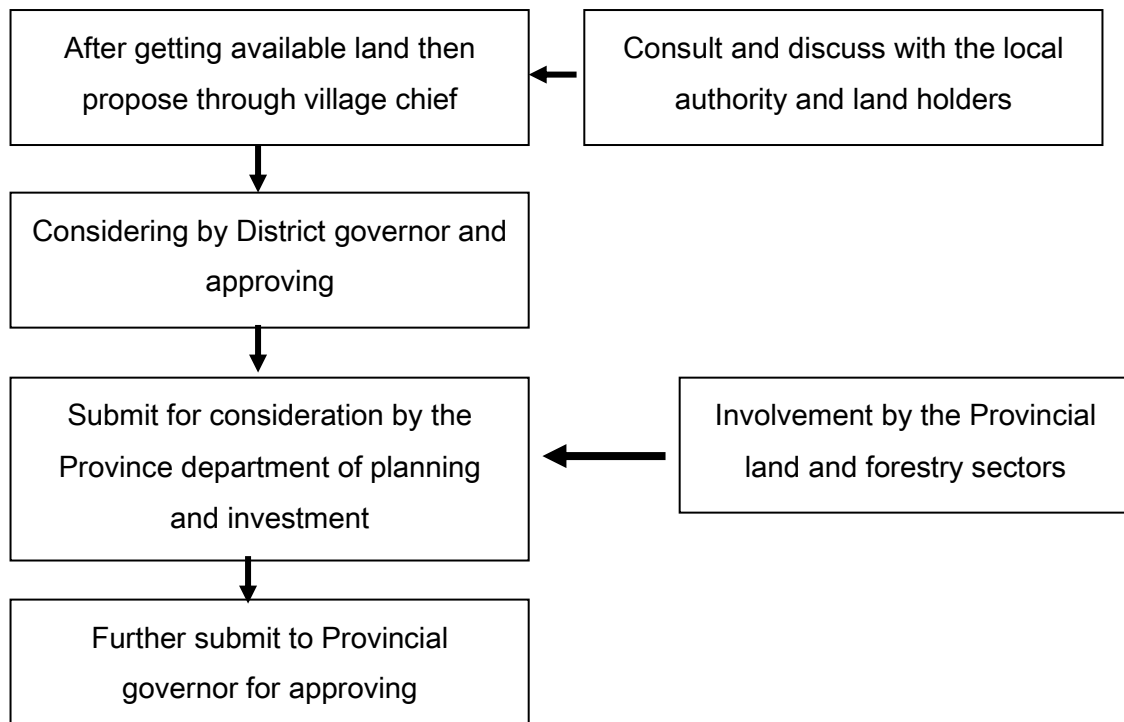


Figure A. Bottom up process of land tenure and concession Champasack Province.

The second case, the land investor can get the land tenure and concession from top down process. Mostly this process is for the large scale of land tenure. And it often happens when the investor get for the land tenure permission from national level, but there is no land available for them at the local level. The top down land tenure and concession starts from submission of investment project proposal to the National Department of Planning and Investment Management, details as in Figure B.

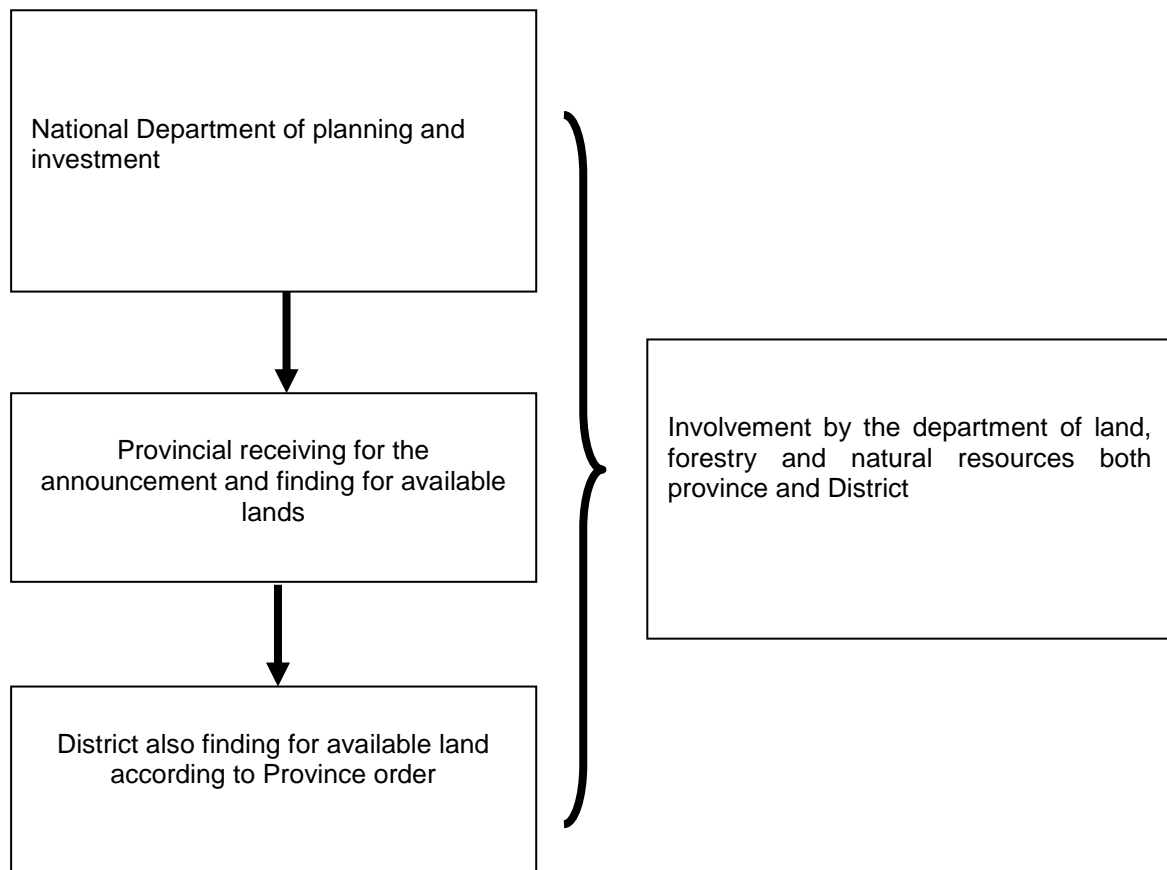


Figure B. Top down process of land tenure and concession.

Forest change between 2006 and 2011: A case study in Barchieng District, Champasack Province

The site of this case study was conducted at the Kengnyao production forest, which is located between attitude of 105°57'44" and 106°05'33", and the longitudes of 15°15'25" and 15°22'42". The total area of the site is 12 780.60 ha. This place is under controlled by Barchieng District, Champasack Province. There are nine local villages inside the area: Kengnyao-thongsala, Nongboknyai, Songkhone, Thongthing, Nongboknoi, Maknyoi, Palai, Nongkang and Kengtuen Villages with 1 283 households and 6 423 people, female 3 267 (Champasack Provincial Agriculture and Forestry 2012).

This site was carried out for land use planning and land allocation activities in 2006. Therefore, this area was surveyed in detail for the area such as land zoning types and forest resources clarification and types by using remote sensing tools "landsat7". In 2011 the site was assessed and monitored for the land and forest change in the place by using the same tools "landsat7 MT" geographical mapping analysis 2011.

The result comparing land and forest change between 2006 and 2011 shows in Table B.

Table B. Comparing land and forest change between 2006 and 2011 (5 years).

Forest types	Year 2006		Year 2011	
	Area (ha)	(%)	Area (ha)	(%)
Virgin forest/primary forest	1 749.9	13.7	1 715.5	13.4
Regeneration forest	3 321.2	26.0	3 321.2	26.0
Degradation forest	5 458.0	42.7	4 688.4	36.7
Agriculture areas (paddy, upland and garden fields)	372.3	2.9	302.7	2.4
Forest plantation area	0	0	871.5	6.8
Villages and others constructions	1 879.2	14.7	1 879.2	14.7
Total area:	12 780.60	100	12 780.60	100

Source: Champasack Provincial Agriculture and Forestry 2011)

The result comparing for land and forest change in the site between 2006 and 2011 (5 years) indicates that mostly the land and forest changed by only replacing rubber tree plantation in the site. However, some land and forest types are still remain the same figure during a period of 5 years (2006–2011), especially for the regeneration forest area and village area (Table C). The forest types appearing to significantly change in the site are the primary forest, degradation forest and agriculture zoning lands (paddy, upland and garden fields). These areas were changed by mainly growing rubber tree species in the sites. Therefore, if the model of forest covers assessment includes plantation forest, it would be highly potential increasing forest cover in the future. And it could conclude that forest cover in Laos has a positive trend to increase in the future.

Table C. Amount of land and forest change and its reasons (2006–2011).

Land and forest types (2006–2011)	Forest changed reasons	Areas changed (ha)	Areas changed (%)
Virgin forest/primary forest	Rubber tree plantation	34.4	0.26
Regeneration forest	No changing	0	0
Degradation forest	Rubber tree plantation	769.6	14.10
Agriculture areas (paddy, upland and garden fields)	Rubber tree plantation	67.5	18.13
Villages and others construction areas	No changing	0	0
Total land and forest change (2006–2011):		871.50	6.82

Source: Champasack Provincial Agriculture and Forestry 2012

Case study conclusion

Forest plantation investment in Champasack Province is mostly for rubber tree plantation. The forest plantation involves about 14% approximately for domestic investors and over 85% of international investors in the Province. The study found that there are two possible ways accessing to land tenure and concession in the Province, top down and bottom up processes. Sometimes, the system is quite complicated to access for the international investors, because they don't which systems they should go through (top down or bottom up processes). Furthermore in some cases, investors get a number of land tenure from the national level, but there is no land available at the local levels (Province, District and Village).

The study also found that there is lack of forest plantation investment assessment (economical terms of the project plan) as well as lacking of regular follow up and monitoring for the investment projects after getting land tenure from the government. Previously, some lands getting for tenure for a period, but the land doesn't have any develop accordingly to the project proposal. This kind of issue will lose the land values or get nothing income from the land. It should be more law enforcement in terms of practical issues. And the government should allocate clearer land zoning as well as clearer definition of degraded forest types for different use purposes. This is in order to avoid cutting good forest area to

grow industrial tree species or destroying any good forest for other construction and development purposes in the future.

It was also preciously found that some areas of land and forest types in Barchieng District Champasack Province were changed during a period of 5 years (2006–2011) with an average of 6.82% of the total forest area 12,780.60 ha in the region. The land zoning and forest change appear mostly for primary forest, agricultural zone areas and degradation forest. The main reasons for changing in these areas are industrial tree plantation, such as rubber tree species. However, according to the data assessment some forest types land zoning are still remain the same number during a 5 years period (2006–2011). In general, it seems that Laos has highly potential and positive trend in terms of forest cover increasing rate in the future based on the number of forest plantation and forest regeneration areas in the Country.