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Meeting Regional and Global Demands for Rubber:
A Key to Poverty Alleviation in Lao PDR?

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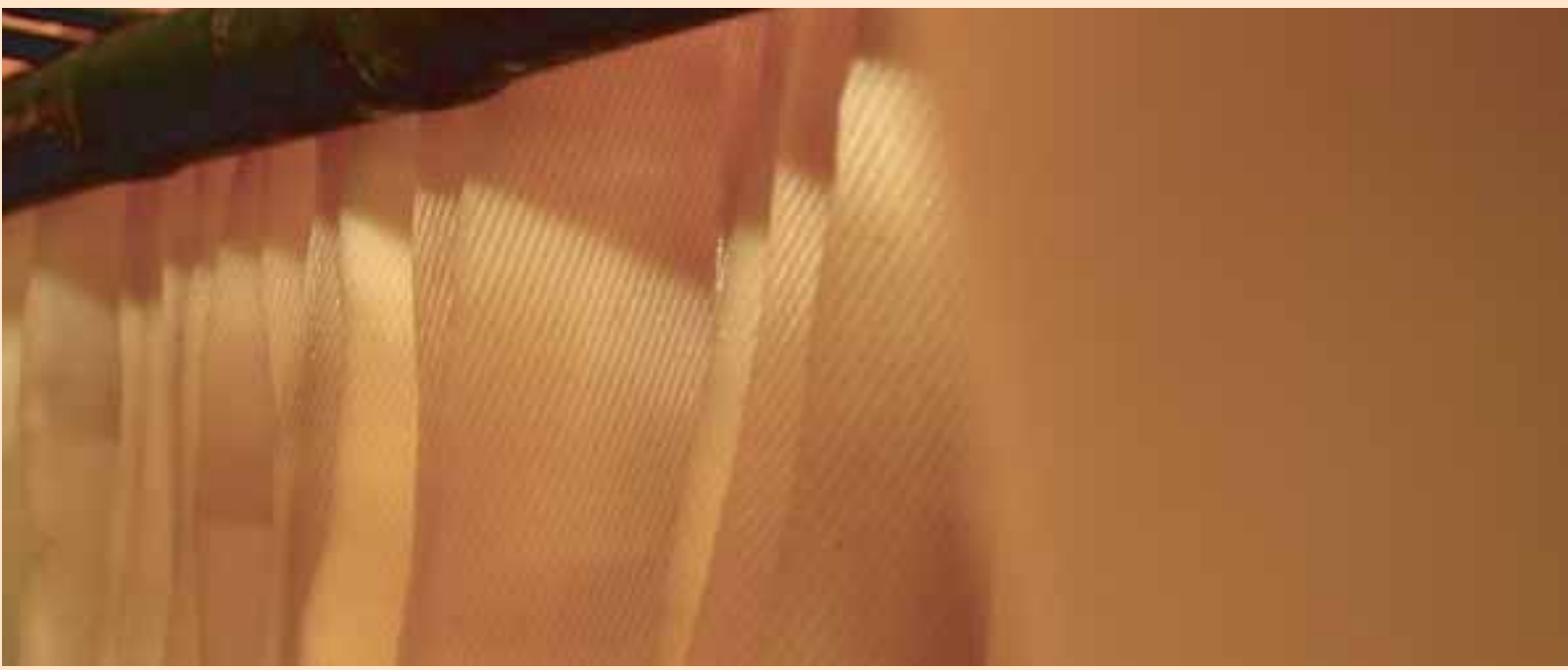

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Meeting regional and global demands for rubber: A key to poverty alleviation in Lao PDR?

Abstract

This paper discusses a brief history of rubber production in China, Vietnam and north-eastern Thailand and then focuses on the current rapid increase of rubber production in Lao PDR that is being driven predominantly by investors from China and Vietnam.

Global demand for rubber production has increased dramatically over the past several years predominantly due to growth in the Chinese and Indian economies. Dramatic rises in the price of crude oil have further increased the price of synthetic rubber, making the production of natural rubber a viable option in meeting this insatiable demand.

Drawing upon the experiences of Thailand, Malaysia and India there is clear evidence to support the notion that smallholder rubber production is a viable and effective proposition in moving households and communities out of poverty. Recent assessments of the financial viability of smallholder rubber production in Lao PDR support this observation. However, there are structural impediments that could negatively influence the viability of rubber production.

Problems associated with land concessions to private investors mean that this mechanism may not always result in equitable distribution of benefits to both state and citizens, thus forcing the Government of the Lao PDR (GoL) to impose a moratorium of the granting of concessions for plantation crops in 2007. Moreover, the development of contracts between private investors and farmers may not have legal jurisdiction and may in some cases prejudice the grower.

There is a need for the development and enforcement of institutional policies that protect the rights of growers from investors and secure benefits for the state. In order to promote the establishment of a vibrant smallholder rubber sector in Lao PDR there is a need for the Government to establish institutional structures that provide low interest loans to farmers and cushion the impacts of wild fluctuations in rubber prices common to the industry. Finally, it is important that the development of rubber does not compromise or negatively impact other economically viable sectors that support poverty reduction. In this respect ecotourism may be a more viable and sustainable livelihood option in certain cases.

1. Background

The goal of this paper is to review and analyse data from a number of publications on rubber production in Lao PDR, and to establish the current state of knowledge on the subject including the impacts of the rubber demand boom and trends that experts have agreed upon to date. It also aims to summarise the driving forces behind current trends, draw conclusions and make policy recommendations towards building a sustainable pro-poor rubber industry in Lao PDR.

2. Introduction

The uplands of South-East Asia have undergone dramatic changes associated with regional economic growth. In many of these regions there is a gradual transition from subsistence-based shifting cultivation to more sedentary and commercially orientated production systems. The drivers of this change are the increased integration of regional economies, in particular China, and government policies that have a specific focus on upland development (Thongmanivong and Fujita, 2006). In the case of Lao PDR most of the recent changes in the agricultural sector have been driven by market forces and investors, particularly from neighbouring China. Adding to this, government policies that focus on stabilising shifting cultivation and improving road access have assisted in this process of change (Manivong and Cramb, 2007).

Natural rubber and its derivatives are in great demand on world commodity markets. Led by rapid economic growth in China and India, world rubber consumption has increased at an average rate of 5.9% per annum since 1900 to about 18.97 million tons in 2003 (7.81 million tons for natural rubber (NR) and 11.16 million tons for synthetic rubber (SR)). With strong and robust economic growth, China surpassed the United States and Japan as the world's number one consumer of rubber in 2002 with estimated demand of 3.45 million tons or 18.2% of global consumption (Prachaya, 2004). It is predicted that China will increase its vehicle fleet from the current level of 10 million to 200 million by 2020, as household incomes rise and over 20,000 kilometres of new roads are built.

Associated with these greater numbers of vehicles on the road, demand for tyres will dramatically increase.

Global demand for natural rubber demand has driven dramatic rises in world spot prices for rubber on international markets (**Figure 1**) over the last 6 years, reflecting overall global economic growth. These increases in the price of rare rubber can be attributed to a number of factors that include:

- Rapid rises in crude oil prices have made synthetic rubber more expensive, making natural rubber an attractive option. The continued upward trend in oil prices is pushing natural rubber prices higher and driving further expansion in this industry.

- There are a number of environmental implications associated with the production of synthetic rubber and demand is shifting, particularly in developed economies, to more sustainable and environmentally friendly sources of raw materials. This has been partly driven by consumer willingness to pay a premium for products that are based on renewable resources.

- Rubber is often viewed as plant species that can be used to rehabilitate degraded land, and hence has been promoted to achieve this objective.

- There is an aesthetic appeal associated with the establishment of tree plantations.

A further consideration that has influenced recent growth in the industry is the establishment of better market coordination and cooperation between major producers (i.e. Indonesia, Malaysia and Thailand) resulting in a more cohesive and united voice for producers. Alton *et al.* (2005) suggests that this can be seen as analogous to the OPEC cartel.

The following discussion is confined to a brief historical synopsis of rubber production in the region and, more recently, the increased interest in rubber production in Lao PDR as a means of addressing poverty. An overview of current policies and investments in Lao rubber production is provided, and discussions of possible models of rubber production that assist in poverty reduction are presented.

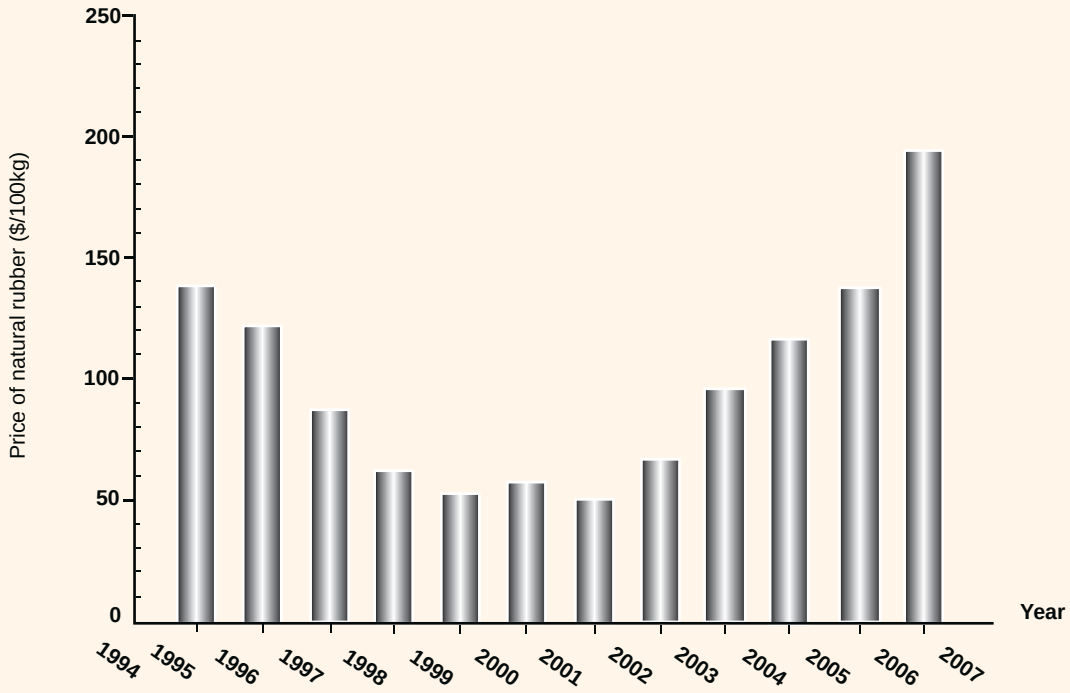


Figure 1: Average world spot market prices for natural rubber from 1995, prior to the Asian economic crisis, during the crisis, and during the recovery phase to 2006.

3. Historical perspective of rubber production in China and lower Mekong basin countries

Over the past decade rubber production in China and the lower Mekong basin has expanded dramatically, driven by increased internal and external demand along with the availability of large amounts of investment capital. This section provides a brief historical overview of rubber production in China and selected lower Mekong basin countries, as well as current and future trends.

3.1 China

Rubber trees were first introduced to China in 1904 after an aboriginal chief returned from a trip abroad, bringing with him 8,000 seedlings purchased in Singapore. These seedlings were established in Yingjiang county, Yunnan province (altitude 24° 50' north). Rubber plants were introduced to the islands of Taiwan and Hainan in 1905 and 1906 (Guangxia and Lianmin, 2005). Due to a lack of technical expertise and financial support, natural rubber production in China did not become industrialised until 1949, when approximately 2,800 ha had been established with a total annual production of 200 tons. Historically four distinct phases have been identified that characterise the development of natural rubber production in China (described below).

3.1.1 Exploration (1951-1957)

In the early 1950s, China was surrounded by a number of countries that were opposed to the Government. In order to secure economic recovery and development, and to become self sufficient, it became strategically necessary to increase domestic rubber production. To effect this growth the Central Government invested heavily in scientific research using scientists from Guangdong, Hainan and Yunnan provinces. Furthermore, the demobilisation of large numbers of troops from the Red Army provided an opportunity to utilise this manpower to establish state run farms, initially in the southern provinces of Guangdong and Guangxi, and then in Hainan, Fujian and Yunnan.

Between 1951 and 1957 a total of 48 state farms were established on the island of Hainan, which has since grown to over 90 rubber farms. Yunnan started planting rubber trees in 1956, with over 24 farms established in 2006 (Yeyong, 2006). The growth of the rubber industry during this phase was dictated by the Central Government and driven by an under-utilised labour force largely made up of decommissioned soldiers and local people, with support from overseas Chinese investors. The industry grew rapidly to 78,000 ha of rubber plantations with an annual production of about 600 tons.

3.1.2 Developing (1958-1965)

China's natural rubber industry grew rapidly with new state run farms being established. In order to control this rapid expansion, the Central Government put forward guidelines under the title of "Adjusting and Consolidating, Supplementing and Enhancing". The rate of establishment of farms slowed and greater attention was paid to caring for the newly established trees and plantations. This new approach to managing plantations was termed "the four popularisations", based on 'breeding, net, terrace and cover crop'. The philosophy was that: good quality clonal material ensured higher yields (breed); woven shelter belts nets provided protection from the ravages of typhoons (net); terraces protected soil and water (terrace); and cover crops conserved the soil and improved rubber growing conditions (cover crop). By 1965, the area established to rubber plantation had expanded to 212,000 ha and annual production of natural rubber had increased to 18,000 tons.

3.1.3 Rash and Frustrated (1967-1977)

China's "Cultural Revolution" movement brought about significant implications to the fledgling industry. Effective administration of the large state run farms and research throughout the country was abandoned or stopped, and the Red Army took over the administration of natural rubber production in 1969. Administrators and scientists were sent to the fields to undertake menial physical tasks. The military administrators developed a five-year plan that called for the establishment of an extra 349,000 ha between 1970 and 1974, with a target of 500,000 ha, in total, established by the end of 1974. Total natural rubber production was predicted to rise to 150,000-160,000 tons per annum. The programme was irrational, based on no scientific principles and pursued blindly.

The planted area was increased. However, large numbers of trees died due to poor management and husbandry. It is estimated that only 30% of trees planted during this phase survived. In addition, because of over tapping and stimulation of trees, tapping panel diseases became a significant problem. Military administration of state rubber production was terminated in 1974 and, by the end of 1977, the total area planted to rubber was estimated to be 350,000 ha with an annual production of 90,000 tons.

3.1.4 Reform and Advance (1978-present)

China's political landscape has undergone dramatic change over the past three decades. The importance of scientific research was recognised with respect to the location of plantations. Consequently, rubber plantations in the provinces of Guangxi and Fujian were gradually converted into farm production units and the natural rubber industry was concentrated in Hainan, Yunnan and Guangdong.

Reform of state farms took place up until the mid-1990s. Regional state farm bureaus became corporations, although the societal function of these production units did not change. Under the state cooperative system, these production units were miniature autonomous entities with their own hospitals, schools, public security system, and courts. However, from 1995 onwards natural rubber prices started to decline, resulting in plantations being taken out of production and the land used for more lucrative crops.

State rubber farms once again underwent reform in 2002 through the establishment of single-crop farming units. With the assistance of state farms, individual farmers were encouraged to plant rubber in Hainan and Yunnan. With peasant farmers granted autonomous control over their land use decisions, many began establishing rubber. The area under rubber plantation grew rapidly and steadily. Encouraged by increases in natural rubber prices, individual farmers have again enthusiastically turned to establishing rubber.

Over the past 56 years, China's rubber plantations have increased consistently despite the negative impacts associated with politics, administration and markets. By the end of 2005, the total rubber plantation area in China was 740,000 ha, with Hainan provinces having the greatest share (53%), followed by Yunnan (41%) and Guangdong (5%). State farms comprised 57% of the total area planted while private farms and smallholdings make up 43% (RRIC, 2006).

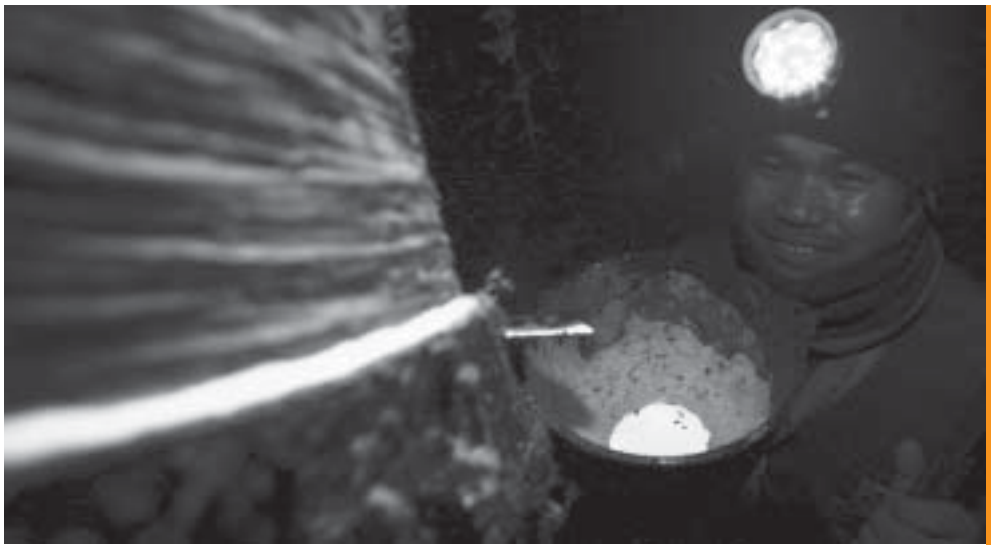
China's annual natural rubber production in 1949 was a mere 200 tons, with an average yield of per hectare of 122 kg. Since 1950 rubber production in China has steadily increased. Record production levels were achieved in 2004 when production reached 573,000 tons. In 2006 state farms made up 68% of the total production. On a regional basis Hainan accounts for 58%, Yunnan 38% and Guangdong 4% of the total production. Average yields have increased to 1,270 kg per hectare, with the highest yield of 1,700 kg per hectare recorded in Xi-shuang-ban-na, Yunnan province (Yeyong, 2006).

China's natural rubber industry accounts for 6% of world natural rubber production, ranking China equal fifth (with Vietnam) behind Thailand, Indonesia, Malaysia and India. Despite this, most is used domestically and its overall share of the global rubber market is small compared to countries such as Thailand. Natural rubber was considered a very important strategic raw material in China and hence its production and sale was under state control before the 1980s. State farms sold their rubber to state owned companies which then distributed the raw material to manufacturing facilities. In order to stabilise price fluctuations and enhance the expansion of natural rubber production, the Central Government set the base price paid for raw rubber in the 1960s, resulting in the development of a 'sheltered' industry and associated inefficiencies.

By the end of the 1980s, local farms and smallholders were being encouraged to produce natural rubber. As a further loosening of the market, the Central Government allowed local governments to buy raw natural rubber (include latex and sheet rubber) from local farms and smallholders and then sell it on to state farm factories. With these moves towards a more liberalised economy, by the early 1990s local farm factories and private factories were established and local farms and smallholders were allowed to sell their raw rubber directly to them.

China further liberalised its domestic natural rubber market in 1995, with state farms and private factories now allowed to sell their products to manufacturers directly. Exchanges in natural rubber were founded in 1996. This included the Hainan Rubber Exchange Market, which later became listed on the Shanghai Future Exchange in 1998. In 2000 the Electronic Business Exchange of Hainan State Farms was established, which was later reformed as the Sino Rubber Electronic Exchange at the end of 2005 (Webpage is http://www.e-hifarms.com).

In the 1970s it was thought that the introduction of rubber into north-eastern Thailand as a viable commercial tree crop was worth investigating, especially as an alternative to cassava production. Trials and demonstration sites were established in resettlement areas in Nong Khai, Udon Thani, Nakhon Phanom and Buriram (Alton *et al*., 2005). Later the Isaan Khiao (Greening of the North-East) campaign of Prime Minister Chatchai Choonhavan and General Chavalit Yongjaiyuth promoted rubber tree cultivation to provide an income generation alternative for resource poor farmers, and as a means of reducing poverty (Alton *et al*., 2005). In recent times there has been a concerted effort by successive governments to relocate the epicentre of the rubber industry to the north-eastern region, thereby freeing up land in the south for the production of oil palm. From a strategic perspective, the establishment of a rubber industry in the North-East will enhance the competitiveness of the sector as demand for rubber grows in markets such as China.



3.2 Thailand

Rubber has long been a strategic commodity in Thailand, with production historically being concentrated in the south of the country. Para rubber was first introduced in 1911, from Malaysia, into Trang Province in Southern Thailand as an exotic variety. Early Thai Government restrictions on foreign investment led to the development of an industry dominated by local smallholders who were predominantly rice farmers (Viswanathan and Shivakoti, 2008). Land under rubber plantation expanded rapidly in the 1930's, owned mainly by Chinese, Thai and Thai Malays, in contrast to the large European-owned plantations common in other Asian countries.

In north-eastern Thailand, externally funded donor projects were implemented to promote rubber production. This included an EU funded pilot project for the Development of Rubber Tree Cultivation, which established the Nong Khai Rubber Research Center and the Center for Extension and Development of Farmer's Livelihoods. Other government sponsored infrastructure and services have been established such as the Buriram Rubber Research Station, demonstration rubber tree plots on various land settlement programmes, and the many Offices of Rubber Replanting Aid Fund (ORRAF) that are found throughout north-east Thailand.

[1] Except for years when the industry suffered from the effects of devastating typhoons and low temperatures.

Production of rubber in the north-east is prefaced on the area having sufficient rainfall. By 1989, interest among north-eastern farmers in growing rubber had increased. This was partly due to the fact that many north-easterners had worked as tappers on rubber plantations in southern Thailand and therefore had learnt the skills required to grow, harvest and produce rubber sheets. It is estimated that about 70% of the hired labour force working in rubber industry in the southern Thailand were north-eastern Thais. It is upon these acquired skills that the foundation was laid for rubber tree cultivation and expansion into the north-east.

By 2003, about 47,894 ha of rubber trees were being tapped in Thailand's north-east region, out of a total of 116,004 ha that had been established. Total rubber production in 2003 was 73,774 tons. Provincial yields ranged from 715 kg/ha in Mahasarakham to 2,141 kg/ha in Srisaket, with a regional average of 1,540.6 kg/ha compared to the national average of 1,750 kg/ha. Nong Khai and Loei provinces have the largest areas of established rubber trees (RRIT, 2003).

Because of current strong demand and high prices on world markets, the Royal Thai Government (RTG) initiated a new programme to increase farm income in north-eastern and northern Thailand by expansion of the rubber tree cultivation area by 160,000 ha, of which 112,000 ha is targeted for the north-east and 48,000 ha in the North. The north-eastern provinces of Nong Khai, Loei, Udon Thani and Nong Bua Lamphu have been identified for the establishment of 64,000 ha to rubber over a five year period.

Of importance in assessing the growth of a viable rubber industry in north-eastern Thailand was the considerable experience that farmers have in commercial agriculture. This more commercially-orientated outlook, coupled with their experience gained in southern Thailand, was an important factor in the expansion of the industry. This experience also helped them develop marketing channels and establish a viable marketing system.

To date we are aware of two major companies with rubber processing factories in north-eastern Thailand: Thai Hua Rubber Company Ltd., which has a factory in Nonghaan district in Udon Thani province; and Thai Rubber Latex Company Ltd in Beungkaan district, Nong Khai province. There are a number of agents and representatives of these companies (and perhaps other companies with factories elsewhere) throughout the north-east. They are involved in a seemingly highly competitive bidding process for farmers' rubber.

3.3 Vietnam

Nine years after the successful introduction of Hevea varieties to Vietnam in 1897, the first commercial rubber estate was established in the south of the country. In the highlands, rubber trees were first introduced in 1923 with the development of rubber plantations reaching a peak in 1960–1962, before expansion halted due to the civil war. In the north, state-owned rubber estates were established between 1958 and 1963 with a total area of 6,000 ha planted. After the civil war, a massive programme of rubber rehabilitation was launched in the south, which then moved to the highlands and recently to the central coastal region of the country.

In 2005 the total area under rubber cultivation was approximately 480,200 ha producing 468,600 tons of rubber, as compared to 77,000 ha and 39,000 tons in 1976. In terms of export market share, Vietnam is the fourth largest exporter of natural rubber following Thailand, Indonesia and Malaysia. Rubber superceded coffee as the second most important agricultural crop after rice (Vietnam Rubber Association, 2006).

Consumption of natural rubber in Vietnam is still low, with around 10-12% of the total production However, the production of rubber-based products is on the increase under Government policy initiatives to encourage the establishment of a rubber manufacturing sector. Production facilities have been established, producing tyres and tubes for heavy vehicles, motorcycles, bicycles and non-tyre products (e.g. gloves, mattress, technical rubber products), supplying domestic markets and also exporting in increasing quantities.

In recent years, rubber wood products have been developed so rapidly that they require more imported sawn timber. The replanting of rubber trees is considered an important source of raw material for rubber wood factories in the near future. According to the Government's strategy, Vietnam plans to reach 700,000 ha by 2020, in which smallholdings and the private sector would hold 50% of the total rubber areas and most new plantings would be set up in the sub-optimal regions (Hoa, 2005).

The Government encourages various economic sectors to participate in the development of rubber industry. Vietnam General Rubber Corporation (Geruco) has been considered as a nucleus enterprise to expand rubber areas in the country and to invest in rubber plantations in neighboring countries. Geruco will act not only as natural rubber producer, but also as an industrial corporation in future activities.

Development of a smallholder rubber sector in Vietnam

Up until 1980 most of the rubber plantations in Vietnam were run by state owned companies, with the smallholder sector accounting for a limited share of production. However, since 1990 the smallholder sector has developed tremendously throughout the country. The rubber plantation area in Vietnam was increased to 454,075 ha in 2004 from 394,900 ha in 1999. The area in the estate sector has declined slightly (from 287,342 ha

Box 1: Rubber production at Baan Hat Nyao, Luang Namtha Province, Lao PDR.

Baan Hat Nyao, near the town of Luang Namtha, is the first village to collectively plant rubber and commence tapping in Lao PDR. White Hmong village leaders became interested in the cultivation of rubber trees as an alternative to both opium poppy cultivation and shifting cultivation. Some of their relatives had been refugees working on rubber collectives in Sip Song Panna in southern Yunnan, China, in the early 1990s. They negotiated with the GoL to allow themselves to be resettled back into the Lao PDR, and took advantage of the skills they developed whilst in Yunnan to initiate rubber production in the village.

By 1996 approximately 154,000 of rubber trees (342 ha) had been established on older fallow land (i.e. fallowed for 7-12 years), out of 1,700 hectares of village-designated agricultural land. Frost in December 1999 resulted in a loss of 75.5 ha. Tapping of juvenile trees began in 2002 with 23 households (HHs) participating in this activity. In 2003 and 2004 a further 170 ha was established bring the total area under rubber production to 437 ha.

The Provincial Agriculture and Forestry Office (PAFO), whilst lacking experience in rubber tree cultivation, did assist the villages with technical advice. The Governor established a special fund to provide low interest credit of Kip 1-3 million per household at a fixed interest rate of 2% for 15 years, in order to assist households in purchasing seedlings and barbed wire. From 1995 onwards the fund was administered by the Agricultural Promotion Bank (APB) at a fixed interest rate of 7% over 15 years.

For future projections a conservative price of ¥ 5.0/kg (US$ 0.63/kg) is used. Raw rubber sheets and liquid latex have better net returns, but a lack of information on the parameters prohibits reliable projections. It is conventional to include the sale of rubber timber at the end of the production cycle. While there is market in Sip Song Panna, there is no market in Lao PDR itself yet. It is estimated that timber sales would amount to Kip 13,390,000 (US$ 1,300) at a cost of 140 person days (PDs) of hired labour.

The estimated returns on household labour are Kip 123,476 (US$ 11.99), and on all labour are Kip 111,678/PD (US$ 10.84). These amounts are almost five times the current wage rate. The returns on capital are Kip 6.65 per Kip invested without household labour, and 2.73 Kip per Kip with all labour included. The internal rate of return or interest rate on investment is 8.63%, which is also quite low. However, looking at present scarcity of alternatives for farmers in Luang Namtha, it is probably worthwhile. The benefit/cost ratio is 1.86 at a discount rate of 20%, reflecting the approximate opportunity cost of capital. At a B/C ratio 1.86 the enterprise would be considered feasible. The net present value of the income stream for the period is Kip 6.7 million for 30 years, which is relatively low for such an investment in international terms.

down to 284,995 ha), in contrast the area of the smallholder rubber producers has increased rapidly (from 107,468 ha up to 169,080 ha).

With a Government target of 700,000 ha of rubber by 2020, the proportion of the smallholder producers to estates is expected to be reversed due to

(a) government policies that encourage the development of smallholdings;
(b) high prices in recent years encouraging farmers to plant more rubber; and
(c) a shortage of land for the development of large estates.

Although the largest proportion of smallholder rubber producers have been in the south east region, the other two non-conventional regions, the highland and central, have had higher growth in new plantings of rubber. This trend is predicted to continue in the future. The holding size varies greatly depending on the regions, ranging from 1.43 ha in the central northern region to 3.21 ha in the highland. The average holding size is 2.49 ha. In terms of organisation, the smallholder rubber producers mostly consist of individual holders; only a few rubber cooperatives have been established. The Government has helped rubber farmers through rural infrastructure improvement, agricultural credits, tax exemptions for perennial crops, and the provision of rubber extension.

3.4 Lao PDR

The history of rubber production in Lao PDR is relatively short, with expansion of the industry having occurred in the last decade. No significant establishments occurred until 1995 when 50 ha were established in the Bachiangchalernsouk district of Champasak province by the Development of Agriculture, Forestry and Industry (DAFI) state company (Manivong and Cramb, 2007). During

the period 1994-1996 plantings were undertaken in Luang Namtha province among the Hmong communities of Hadyao, where a total of 342 ha of smallholder plantations were established (Manivong and Cramb, 2007) (**Box 1**). Recent rubber planting projects have been viewed as a potential solution to problems facing upland farmers by addressing three goals of the GoL, namely:

- Elimination of swidden systems
- Cessation of opium cultivation
- Poverty alleviation

The Provincial Committee Party concluded, at their fifth conference, that rubber planting should be made a priority to address endemic poverty amongst upland communities. A plan to initially establish 20,000 ha by 2010 was put in place. At present 10,000 ha have been established in Luang Namtha (Province Governor of Luang Namtha, 2006).

In 2000 three companies from China invested in Luang Namtha as part of their commitment to rubber production in the province:

- Yunnan Local Product Import-Export Co., Ltd.
- Rubber Company Bejing Jinxianglian Co., Ltd.
- Foreign Economic Commerce Co., Ltd.

In 2001 the Foreign Economic Commerce Division of Yunnan Province approved "Project Agreement No. 002", which allowed these three companies to form the Sino-Laos Rubber Co. Ltd. A rubber processing factory was established in Luang Namtha by the consortium, with the capacity to process 6,000 ton rubber/year. The company has also established rubber nurseries in three locations using new clonal material from Yunnan, which includes strains Yuyan 77-2 and Yuyan 77-4, in:

- Na Lae district, 220,000 seedlings
- Namtha district, 1,500,000 seedlings
- Meuang Sing district, 300,000 seedlings

In 2003 Sino-Laos Rubber Co., Ltd. established rubber trees on 59 hectares in Oudomxay province. In 2004 the planting plan was increased to 100 ha and two more rubber nurseries were established using clonal material that included strains Yuyan 77-2, Yuyan 77-4 and RRIM 600 in:

- Houn District, 50,000 seedlings, by Jianfeng Company
- Beang District, 1,000,000 seedlings by Sino-Laos Rubber Co. Ltd (Oudomxay)

All rubber seedlings were imported from Yunnan, China (Sino-Laos Rubber Co., Ltd. 2004).

4. Lao PDR rubber production and poverty alleviation

What began as a modest supplemental farm enterprise to enhance livelihoods for upland farmers in Lao PDR has grown into a rapidly expanding agro-industry that is becoming shrouded in mounting concerns over the lack of governmental regulation and controls (Asia Times, 2007). Strong market demand for latex and the presence of several private investors from China, Vietnam, and Thailand have triggered the sudden increase in rubber planting, especially in the northern and southern provinces.

The current growth in rubber production in the northern regions is largely driven by the influence of Yunnan and Chinese businesses seeking lucrative opportunities in Lao PDR (Alton *et al*., 2005). However, in Southern Laos the influences of Vietnamese and Thai investors are clearly evident. Although the Chinese market will continue to drive demand for rubber, it is also argued that China may see rubber production in Lao PDR from a more strategic perspective due to an abundance of natural resources, favourable climate and cheap labour (Alton *et al*., 2005).

Rubber as a farm crop presents an interesting opportunity for smallholders. The potential for intercropping on short-rotation makes it more attractive over other plantation crops with long gestation periods. In addition, it can be intercropped both during the years before tapping as well as placed within the context of a longer-term agroforestry systems. Therefore rubber, as part of an integrated farming system, can be considered an ideal option for stabilising shifting cultivation and reducing poverty in the uplands. Indeed, there is evidence from India, Thailand and Malaysia that rubber cultivation, when integrated into existing farming systems, can result in significant increases in household income and greater resilience in the face of volatile markets (Viswanathan and Shivakoti, 2008).

While there is an increasing number of smallholders in Lao PDR entertaining the idea of producing rubber as part of their farming systems, there is poor provision of technical and market information for improving economic returns. Amongst basic production information provided locally, there is little on topics such as intercropping options, varietal selection of planting materials, ecological growth requirements, improved tapping, processing and marketing systems, or the environmental and social impacts of the tree crop (Alton *et al*., 2005). Due to the immature nature of the industry in Lao PDR, it will inevitably be dependent on external inputs of knowledge and investments from neighbouring countries, particularly China, but it couldalso benefit from the expertise that is across the border in northeast Thailand.

4.1 Rubber production systems and their profitability in Lao PDR

Rubber production systems common to Lao PDR are primarily under a monocropping system, although in the first three years rows of rice, maize, or pineapple are usually intercropped (Alton *et al*., 2005). After the fourth or fifth year no further intercropping is undertaken due to excessive shading associated with canopy closure.

On the plateaus of Hainan, PR China, the forage plant sytlosanthes is intercropped with juvenile stands of rubber and fed to livestock in a cut-carry system. This may be a possible option for these production systems in Lao PDR (Noble, personal communication). There is also evidence to suggest that intercropping of legume cover or forage crops significantly improves the performance of rubber trees due to their nitrogen inputs to the soil (Webster and Baulkwill, 1989). A study undertaken in China also shows that rubber trees actually yield more when intercropped than monocropped (Cheo, no date). Other benefits of intercropping are the provision of surface cover and hence less erosion, income stability through diversification of crops and food security during the non productive years of the rubber tree.

Intercropping rubber on a longer-term basis has the potential to yield greater incomes for farmers than monocropping. Intercropping is particularly important for farmers to generate an income during the first couple of years when the latex is still not tapped.

A comprehensive economic assessment of smallholder rubber production has recently been undertaken in Luang Namtha Province, and extrapolated to other areas of the province. Key attributes considered in this assessment werethe inclusion of resource quality characteristics and accessibility to markets, which have direct impacts on the economic viability of these smallholder systems (Manivong and Cramb, 2007). Using a discounted cash flow approach under current market conditions and subsidised credit supports with low interest rate, investment in smallholder rubber production in the uplands of Northern Laos can be viewed as being profitable. They have estimated that approximately 239,600 ha (or 26% of the total area of Luang Namtha Province) were considered economically suitable for smallholder rubber plantations.

The role for government, as in other countries where smallholder rubber has played a significant role in rural development, is to:

- Ensure the provision of good quality planting material
- Assist financially during the long start-up investment period when no income is generated
- Invest in roads and marketing infrastructure, particularly to maintain secure access to the China market (Manivong and Cramb, 2007)

Whilst the study of Manivong and Cramb (2007) was on smallholder rubber plantations in Lao PDR, Viswanathan and Shivakoti (2008) undertook a comparative study of production between India and Thailand. The smallholder sector dominates rubber plantations in these countries with 90% in Thailand, followed by 89% in India and Malaysia and 83% in Indonesia (Rubber Board, 2005). In their analysis of the viability of rubber production systems they observed that rubber monoculture systems are viable, provided the rubber prices remain remunerative throughout the entire life cycle and the marketing practices remain efficient.

However, their analysis shows that new marketing practices in the Songkhla region have a deleterious effect on the rubber-based farm livelihoods of smallholder communities. This, coupled with the prevailing contractual arrangements in rubber tapping and higher dependency on income from rubber among the smallholder families, makes the rubber farming families less economically resilient (Viswanathan and Shivakoti, 2008).

Contrasting this, an analysis of integrated farming systems in India showed that combinations of rubber and livestock could maximise household income. Similarly, in the Thai context, rubber integrated with fruit crops and indigenous vegetables offered the highest household income. However, it is important to note that income from rubber cultivation is the dominant share for most of the combinations studied, reflecting the relative profitability and stability of cash flow from rubber vis-à-vis other cropping livelihood options.

The aforementioned studies offer insights into the financial viability of contrasting rubber production systems. Smallholder monoculture of rubber can be profitable only if it is complemented by financial incentives and government support, and as long as the price of rubber remains buoyant. However, potentially declining prices and lack of support would bring the financial viability of these systems into question. It is also clearly evident from the study of Manivong and Cramb (2007) that resource quality and market accessibility are important variables in considering the economic viability of a rubber industry in Northern Laos. The establishment of integrated rubber production systems offers greater income stability and livelihood options for households. Such systems would therefore reduce smallholder communities' risk exposure to rubber price fluctuations. Within the context of Lao PDR it may be appropriate to promote integrated smallholder systems as the sector expands.

Apart from the risks of uncertain market prices, there are also risks from climatic effects and unanticipated pests destroying rubber plants. Yet, unlike other commodities, rubber seems to offer good long-term prospect of economic returns and flexibility in terms

of its market for both latex and timber. However, there are questions over where these revenues end up.

Contracts between foreign investors and farmers are often vaguely written or non-existent, and thus pose a major concern for farmers since it is unclear who will benefit from the profits of rubber planting. Many rural farmers are also illiterate, and the notion of a contract and its sanctity is still not well understood by either investors or farmers in Lao PDR. For example, certain contracts are not legally binding due to lack of jurisdiction. These issues are highlighted in further detail in the next section.

4.2 Current expansion in rubber production in Lao PDR

This shift to the production of agricultural cash crops is partly associated with the introduction of the New Economic Mechanism (NEM) in 1996 by the GoL to transform the economy to a market-based economy. The programme has encouraged farmers to move away from a subsistence-based production ethos towards cash crops including industrial timber (teak, eucalyptus and rubber).

Within the context of the upland areas of Laos there have been significant impediments to moving this programme ahead. This is largely attributed to a lack of basic infrastructure and financial resources. However, the entry of Chinese farmers and small-scale entrepreneurs from across the border (i.e. Yunnan province) has added a new dimension to this extremely dynamic discourse. As Sithong and Thoumthone (2006) allude: "While we believe political stability is facilitating regional and economic integration, we also believe that a scarcity of agricultural lands in southern Yunnan province is promoting Chinese farmers and small-scale entrepreneurs to cross the international border between China and Lao PDR….." Clearly there are concerns associated with these developments within certain sectors of the Lao community.

The GoL stands on promoting the expansion of rubber production for the following reasons.

(a) The Government sees the production of rubber at a household level as a means of addressing endemic poverty amongst communities. This is based on the belief that the tapping and production of rubber is a viable household industry that does not require large investments in labour; and that there is significant market demand. Hence the introduction of this 'new' crop is not associated with having to establish a market, an extremely important point when introducing new crops into a region.

(b) The production of rubber would meet two long-standing issues that the Government is trying to tackle: it is a highly valued crop that would substitute for opium cultivation; and a crop that would replace unregulated swidden/slash and burn systems.

(c) The production of rubber fits well with the concept of contract (quota) farming in that prices are set in advance and therefore households potentially have secure and reliable income streams.

(d) Rubber production lends itself to intercropping in the early years of plantation establishment before canopy closure, therefore allowing farmers to make a living through crop diversification.

In the assessment of land suitability zoning for rubber production line agencies have identified appropriate sites for establishing rubber in order to minimise conflict with other land uses or with communal lands of villagers. Land use planning for rubber is an absolute necessity because:

- Agronomically, it helps to select areas where rubber can achieve maximum productivity.
- Economically, it helps farmers maximise profit and minimise costs. Other economic infrastructure factors such as roads and market access are also important considerations that need to be taken into account with respect to assessing the economic viability of the sector (Monivong and Cramb, 2007).
- It also reduces encroachment on forest zones, mitigates negative impacts on watersheds, and validates land use plans as a tool for making natural resource management decisions.

The potential areas for rubber production have been identified by the National Agriculture and Forestry Research Institute GIS map (NAFRI GIS map) team and are presented graphically for the northern, central and southern regions in **Annex 1-3**. Each has distinct climatic conditions. A synopsis of the current extent of rubber planted and the anticipated area to be established by 2010 based on suitability maps and the current known investors is presented in **Table 1**. The climate in the northern growing region is colder than central and southern regions, thereby limiting the establishment of rubber. In the three northern provinces of Xiengkuang, Huaphan and Phongsaly, which are at an altitude higher than 800m and with lower temperatures, rubber has not been introduced. However, it has been reported that very small plantings of rubber have taken place in the area, even though provincial authorities do not allow the establishment of rubber at altitudes over 800m in order to protect natural forests, watersheds, limit soil erosion, and negative impacts on wildlife.

It is clear from Table 1 that over the next two years significant increases in rubber plantings are anticipated. Coordinating this almost eight-fold increase in plantings will require considerable inputs from officials and significant investments. The current large scale move to establish rubber production in the north is driven by Chinese investments that are based on the success of

Table 1: The total rubber currently established in Lao PDR, the plan area to be established for each province by 2010 and the current investors.

No	Province	Current planted	Predicted area planted to rubber by 2010 (ha)	Investors
1	Phongsaly	13	14,000	-
2	Luang Namtha	8,770	20,000	Sino-Laos Rubber Co., Ltd (China)
3	Bokeo	701	15,000	Sino-Laos Rubber Co., Ltd (China)
4	Oudomxay	4,530	20,000	Sino-Laos Rubber Co., Ltd (China)
5	Xayaboury	66	50,000	JPBPG (China)
6	Luang Prabang	2,467	2,000	
7	Vientiane Province	100	10,000	JPBPG (China)
8	Vientiane Capital	474	-	-
9	Bolikhamxay	1,026	-	-
10	Khammuane	1,447	-	-
11	Savannakhet	243	-	-
12	Salavan	1,418	19,840	Cao Su Dak Lak Company (Vietnam)
13	Champasak	6,719	13,000	Cao Su Dak Lak Company (Vietnam)
14	Sekong	100	10,000	Cao Su Dak Lak Company (Vietnam)
15	Attapeu	500	10,000	Cao Su Dak Lak Company (Vietnam)
	Total	***28,574***	***183,840***	

(Source: Forestry Research Center, 2007)

rubber production systems in Yunnan (**Box 2**). Contrasting this, investments in the south are predominantly Vietnamese investors. This clearly shows that there are two main competing interests in rubber production in Lao PDR between investment sources. Because of the different modes of investment being used to contract farmers to grow rubber it is important to discuss the contrasting models.

4.3 Investment models and support systems used in Lao PDR

Three common management arrangements and investment models are currently being adopted in the country, particularly in northern parts (i.e. Luang Namtha province) of the country to facilitate the establishment of rubber plantations. They are as follows:

4.3.1 Individual farmers

Individual farmers take on the role of growing rubber as a viable enterprise in their farming systems. They are responsible for all of the activities associated with the selection of varieties, the production of seedlings, grafting, selecting areas to be established, land preparation, planting, care, tapping latex, drying and sale of the rare latex to intermediary outlets.

4.3.2 Farmer associations

The farmers are organised in groups and land is allocated to individual farmers who are members of the group. They share labour in planting. Each farmer has to sign an agreement with the association. If some farmers ignore the agreement, their area of planted rubber trees will be handed over to other farmers for continuous care and maintenance.

4.3.3 Rubber companies

There are two approaches to the establishment of rubber advocated by the companies: a) concessions granted by the Government; and b) individual companies making direct agreements with farmers in the planting of rubber.

a. Concession granted by the Government:

Within the agricultural law policy of the GoL there are effectively three hierarchies of decision making for granting concessions to private companies. These are:

- For areas of 3–100 ha the provincial authority is the approving body

Box 2: A case for rubber production in Yunnan (China)

The liangshanyidi programme, started by the Yunnan government in 1983, attempted to limit swidden agricultural through land titling and demarcation (Jianchu *et al*. 2005). The liangshanyidi programme moved forest management from the state to individual households who were contracted to regenerate forest resources. This programme appears to resemble other social forestry programmes with village contract reforestation elements common to some Asian countries in the 1980's. In China, the result was a massive increase in land allocated to monocrop rubber and consequent loss of forest resources.

Several authors (Guangxia and Lianmin, 2005 and Jianchu *et al*., 2005) attribute this rapid and large scale expansion of rubber to several factors:

- Moves towards privatisation of agricultural and forest resources gave villagers land base on which to plant rubber.
- The Chinese Government protected domestic rubber prices in that period, creating strong production incentives.
- New clonal selections helped boost rubber production.
- Privatisation of land resources caused an increase in agricultural production and a consequent increase in household income. Farmers sought further investments to enhance agricultural productivity, thus many farmers turned to rubber.

A number of researchers question the economic returns, long term sustainability of rubber, and opportunity cost of growing rubber in Yunnan. Guangxi and Lianmin (2005), in an otherwise positive outlook on the effect of rubber on shifting cultivation in Yunnan, acknowledge that other countries in the region have a comparative production advantage in rubber. They say that the continued success of the rubber system is contingent upon fair prices and an adequate energy supply for processing. In addition, they stress the development of cold tolerant varieties for better production in Yunnan. They argue that rubber has brought significant economic benefits to farmers, especially small farmers, in Yunnan.

The International Rubber Study Group (2003) contends that the future for rubber in China is good. They do not distinguish between production areas in China, but note that the Chinese rubber industry has benefited from import tariffs as high as 30%. For example, of 76,667 ha of rubber planted in Mengla County (from 1960-2004) approximately 50% was undertaken by smallholders (i.e. Kmhmu communities who have integrated rubber into their tea and rice system) and 50% by collectives. The average productivity of smallholders is 1,200-1,350 kg/ha and that on collectives is 1,950 kg/ha. The collectives have a higher productivity, according to collective officials, due to more technical advice, better clones, more progressive management of collectives, and more recent smallholder plantings resulting in rubber trees that are lower on the yield curve. Not only does a significant yield difference exist between the two sectors, but one must remember that state collectives received total state support. As above, some of that capital is turned over through loans to private farmers. Finally, Jianchu *et al*. (2005) makes three important observations:

1. Marketing of large scale cash crops (e.g. rubber) is controlled by the state and sometimes by large state enterprises.
2. Large state farms or enterprises control rubber processing and marketing in Sip Song Panna, so small farmers are often forced to shoulder the market risk of low prices.
3. Rubber plantations in Sip Song Panna have eroded customary boundaries and resource management institutions, as well as the capacity of farmers to manage ecologically diverse landscapes and participate in market networks.

- For areas of 100–10,000 ha the Ministry of Agriculture is responsible for granting concessions, after permission is granted from the government
- For areas over 10,000 ha the government is responsible for the granting of concessions, after approval by the parliament

The whole process of granting concessions has been fraught with problems. On 9 May 2007, the Prime Minister Bousane Bouphavanh announced an indefinite moratorium on large land concessions for industrial trees, perennial plants and mining (VT, 2007a).Citing widespread lack of attention to soil, topography, landownership and ecological zoning information, and stressing the need to "improve our strategy and address the shortcomings of our previous strategy", the Prime Minister explained the nature of the problem as simultaneously social, economic and ecological. Land conservation disputes had arisen in Laongam (Salavan) and in Bachieng (Champasak) where the Governor succinctly described the issues as "investors destroy crops and teak owned by villagers to make way for rubber plantations without informing them first" (VT,

2007b). In this case, rubber was being established on land that might be better used for high-value crops, while in Pakkading district (Bolikhamxay) valuable forest had been cut down without being paid for or replaced with productive investment (Dwyer, 2007).

In reflecting upon the Prime Minister's speech, the issue associated with land concessions can be viewed as multi-dimensional. In development projects involving land concessions several undesirable aspects have emerged, including:

- Uncompensated losses of assets, both villagers' private assets and state/public assets
- Uncompensated losses of non-asset resource entitlements by villagers (e.g. non-timber forest products (NTFPs)) and of public goods (e.g. watershed protection services) by the state
- Configurations of resource use that secure resource control but decrease net benefits, and that in doing so fail to capitalise effectively on Laos PDR's overall comparative advantages (Dwyer, 2007)

The Prime Minister's speech, coupled with recent events in the energy sector, suggested a changing landscape of development activities in which the Lao government seeks to make use of land concessions more selectively by:

- Encouraging an increased reliance on ("2+3") contract farming
- Continuing to use small land concessions (less than 100 hectares) to attract investment in strategic sectors (e.g. tourism, industry, agriculture)
- Reassessing concession activities in the mining sector
- Limiting land concessions over 100 hectares largely (although not exclusively) to the energy sector (Dwyer, 2007)

The structure of concession agreements that have been signed to date are such that the company hires villagers for 20,000 kip/day/person to work on the concession areas and all inputs invariably come from China. Other than the offer of employment there are a few positive direct impacts at the local level.

As indicated above, an approach that is common in the northern provinces of Lao PDR is the "2+3" contractual agreement. In this structure the villagers provide land and labour, whilst the company provides technology, capital and a secure market. The total export cost will be shared 60% to farmers and 40% to the company.

b. Companies enter into individual agreements with farmers:

In this case investment companies make agreements/ contracts with individual farmers who are required to plant rubber trees under the supervision of Chinese specialist. Under this approach the company provides seedlings to the farmers to plant; they will be paid for the work they undertake; and once the trees begin to produce the latex yields are shared between the farmer and company at a ratio of 70:30.

5. Government strategies for rubber production in Lao PDR

5.1 Requirements for a viable and sustainable smallholder rubber production enterprise

Lao PDR is one of the poorest countries in East Asia. Lao PDR's social indicators are amongst the lowest in the region. Per capita income is very low (around US$400 per annum in 1997) and the incidence of poverty is very high (at 36%, using 1997/98 data) in a predominantly agricultural/rural economy. Poverty incidence in the rural areas is much higher (the rural poor account for more than 90% of all poor); and overall, the central parts of the country are generally better off in comparison with the south and north.

In order to address these issues the GoL has developed a comprehensive range of policies and strategies to fight poverty. The National Growth and Poverty Eradication Strategy has been drafted and, once implemented, is set to be completed by 2020. A key aspect of this strategy is to attain a target of increasing forest cover by 60%.

Rubber tree cultivation is viewed as one of the alternatives available through its impact on reducing shifting cultivation. To make the policy relevant, the Ministry of Agriculture and Forestry is drafting a research and implementation strategy for trees and NTFPs, within which varieties of rubber trees are included. In addition, the GoL policy has outlined opportunities for foreign and local investors to invest in rubber tree cultivation.

Many regional experts emphasised that a number of considerations need to be taken into account when promoting rubber. These include:

Identification of agroecotypes that are best suited to rubber production. This largely involves the development and identification of areas most suited to rubber production **(Annex 1-3)**

Clear and effective government policies that support smallholder rubber producers. There are wild fluctuations in the price of rubber and hence there may be a need for government policies to protect smallholders from these fluctuations and reduce the financial risk of producing rubber

Viable farming units capable of supporting household income generation. Farming units must be large enough to support a household and allow adequate

income generation. It is not clear whether this has been studied

- A need to enhance the skill base of growers in the production, including the storage and processing aspects of rubber production. Research and development aspects in this area are needed (Alton *et al*., 2005)

5.2 Pro-poor rubber production

In order to develop a viable and pro-poor rubber sector there are a number of factors that need to be addressed. These include, but are not restricted to:

- Expansion of rubber needs to be carefully planned and take into account appropriate agroecological conditions and market access. Such planning can increase the profitability and productivity of rubber while reducing potentially negative environmental impacts.

- Finance and credit are extremely important aspects of the package for smallholders credit mechanisms need to be integrated into the rubber development plans from the outset. The importance of favourable credit support systems have been clearly demonstrated in the analysis of current rubber systems in Lao PDR and, without this support, the economic viability of smallholder rubber producers would be compromised (Manivong and Cramb, 2007).

- Defining alternative options and models for rubber development that reflect the diversity of situations in Lao PDR and respect ethnic group livelihoods and cultural needs should be considered and imbedded in policies.

- A range of rubber-based, integrated farming, intercropping and agroforestry systems should be considered within the development mix of options in order to reduce risk to smallholders, i.e. “to not put all eggs into one basket”. This would cushion impacts of market fluctuations commonly associated with production of rubber and other commodities, ensuring security of food and environmental services (water, soil, biodiversity). Examples of diversified and integrated smallholder rubbe production systems can be drawn from Thailand, Malaysia and India (Viswanathan and Shivakoti, 2008), and these could form the basic framework of such approaches in Lao PDR.

- Investors should be provided with guidelines and standardised contracts, as Lao PDR lacks clear investment policies and guidelines. In addition, there is no monitoring of how current contracts are implemented Contracts and concessions lack supervision, jeopardising potential returns and placing farmers in economically risky situations.

- Respect for existing land use plans to ensure rubber is not being planted in conservation forests, village forests or other areas inappropriate for rubber cultivation. This will require monitoring and enforcement of laws, as well as consultation and integration with community activity.

- Provision of concrete guidelines and standards to ensure contract transparency, and to ensure contracts are economically, environmentally and socially beneficial.

- Enforcing and monitoring the implementation of policies related to rubber development.

- For poor farmers, mixed farming systems that integrate livestock and/or inter-cropping should be encouraged, and such systems will require policy incentives and rewards for both smallholder and private investors.

The Northern Agriculture Forestry Research Center and the Provincial Agriculture and Forestry Extension Service

may consider conducting surveys to assess the needs for rubber research and extension in northern, central and southern provinces. A range of options for planting rubber, particularly agroforestry systems, should be considered by smallholders and those providing research and extension support.

A clear priority should be given to developing an adaptive research-extension programme for smallholder rubber development. As expertise in this area is limited in Lao PDR it may be appropriate to draw upon the resources in neighbouring countries, particularly Thailand. As planting of rubber expands within Northeast Thailand, which has similar agroecotypes to that of Lao PDR, it makes sense to draw upon expertise that is currently present in the region.

6. Summary of Lessons Learned

There is a growing demand and market for natural rubber and this will continue to increase over the next 10 years. However, markets for rubber, like many perennial tree crop systems, commonly go through "boom and bust" cycles. As such these systems are extremely risky for smallholder farmers to undertake. Therefore structures and mechanisms need to be put in place to reduce the negative impacts of inevitable price fluctuations on smallholder growers. In this respect, the Government's role in supporting farmers during periods of rubber price declines is vital. The lessons from Thailand are clear. There is an important role for government in supporting smallholder rubber cultivators through policy support mechanisms such as the Bank of Agriculture and Cooperatives (BAAC).

It is also clear that the largest rubber producing countries in the world (Thailand, Vietnam, Indonesia, Malaysia and India) have all made conscious institutional decisions to support smallholder rubber production. The reasons for this vary but are linked to on-going land reform policies in the different countries, interest from smallholders in establishing rubber, and lack of control over large estates. In Lao PDR it is estimated that 75% of rubber plantations currently established have been done so through concessions granted to the private sector. It is imperative that policies are put in place and enforced to prevent the risk of wholesale exploitation of resources by investors.

Rubber is different from other commercial crops and needs substantial organisation and institutional support at all levels. This could include national strategies integrating technical issues, extension, credit, transport and marketing. In all rubber producing countries there is a governing and coordinating body that works closely with all sectors related to the rubber industry. At the local level, smallholder farmer groups need to be organised and/or supported in order to strengthen rubber cultivation, tapping, processing and marketing. These institutional arrangements need to be considered by policymakers as an imperative to support the sustainability and economic viability of the sector.

The following are some key constraints related to rubber planting in Lao PDR:

- Lack of knowledge of rubber variety selection
- Lack of access to information sources and information exchange on rubber
- Lack of knowledge of suitable rubber variety for specific areas
- Lack of funds to expand rubber plantation
- Conflict between permanent resident and migrants
- Insufficient water and electricity for rubber processing within villages
- Lack of knowledge about latex storage and processing practices
- Low bargaining power among villagers and traders
- No agreements between Lao and Chinese Governments on rubber trade
- Large concession areas affected by land use planning and land allocation
- Research on rubber is still weak, because rubber is a new issue for Lao PDR and the country lacks rubber expertise

7. Conclusion

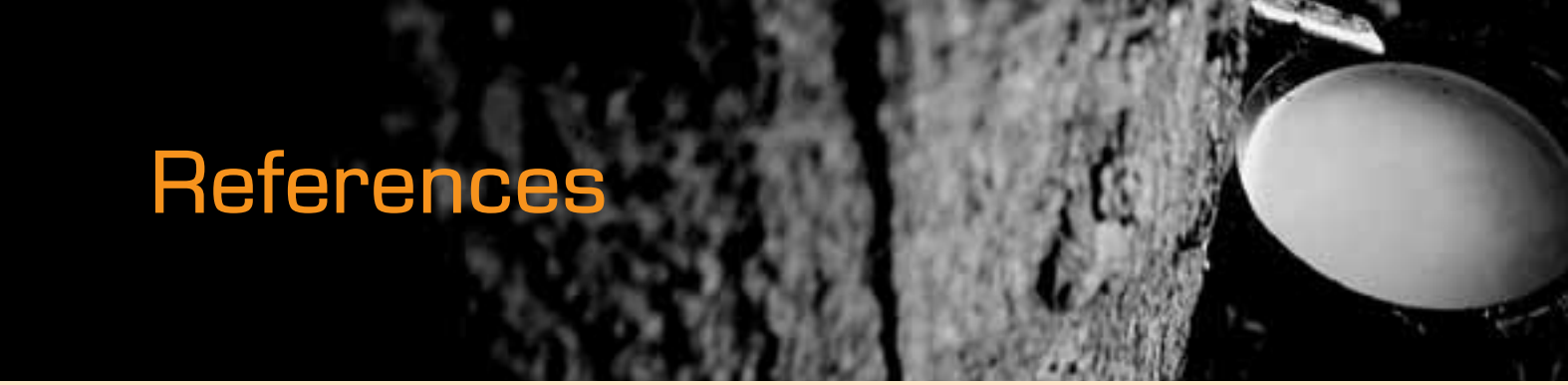
An understanding of the rubber sector in Yunnan is vital as it has a direct bearing on how rubber systems can be implemented in Luang Namtha. Every factor related to rubber from technical advice, labour, seed supply, bud wood, equipment and other inputs, and, most importantly, rubber markets comes from China. In addition, both small and large scale rubber contracts are the result of Chinese businesses seeking lucrative opportunities in Lao PDR. Therefore, though the Chinese market will continue to drive demand for rubber, Lao PDR will need to closely follow the production of rubber in China and assess trends in rubber production systems. It is argued that there are other viable and sustainable models for small scale rubber production that may be more appropriate than the Chinese model currently dominating the northern regions of Lao PDR.

It may be that Lao PDR is seen by the Chinese as a strategic, albeit small, producer of rubber with abundant land resources, cheap labour, and a more favourable climate. Yet Lao PDR's productive capacity pales in comparison to Thailand or Vietnam, and technically Lao PDR has yet to reach even the most elementary level of knowledge about rubber. This would clearly indicate that there is a long way to go before the sector is a viable entity. Clearly there may be alternative sustainable livelihood options that could be compromised by the growth of the rubber sector. Ecotourism is an extremely lucrative sector, particularly in the north of the country,

and has been shown to be economically more profitable than rubber (Schipani, 2007). The challenge to policy makers is balancing the development trajectory of the country without compromising its natural assets.

Rubber production appears to be promising long-term income generation that would contribute to stable incomes for smallholder farmers and national gross domestic product. Important aspects that should be considered include policies associated with land use planning and industrial support for rubber investment, to ensure equitable and sustainable growth and environmental security.

Production of rubber in Lao PDR offers significant export opportunities. Its close proximity to established markets in China, Thailand and Vietnam is a significant advantage for the development of this industry. However, there are structural issues that need to be addressed by policy makers. The debate on land concessions and the current moratorium on large concessions clearly reflect lessons learned. There are challenges facing the GoL in transforming relatively 'untapped' resource rich landscapes and capabilities into a configuration that produces significant outputs for both the state and citizens. Developing robust policies will require significant thought, research and consultation with all stakeholders.



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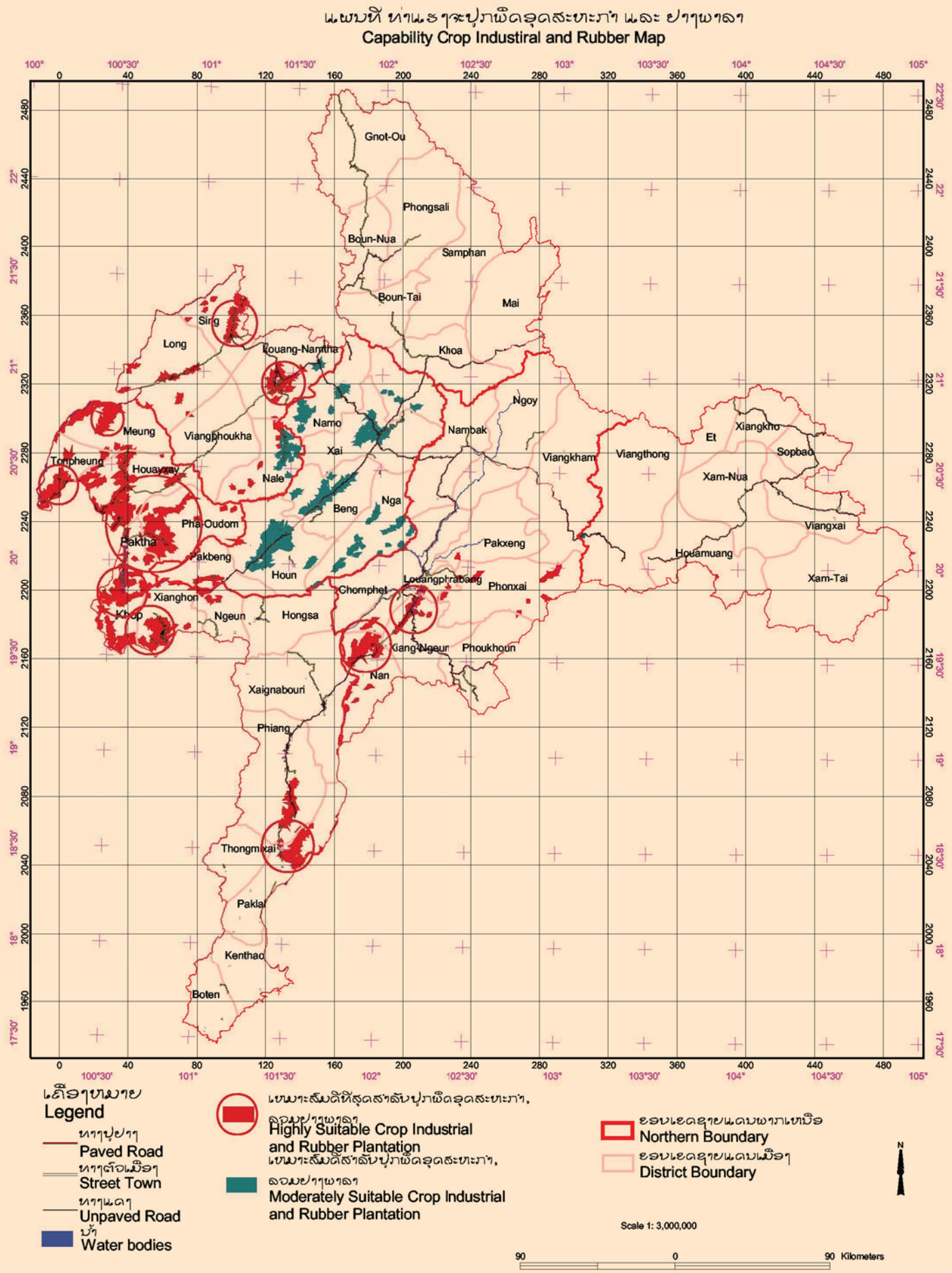
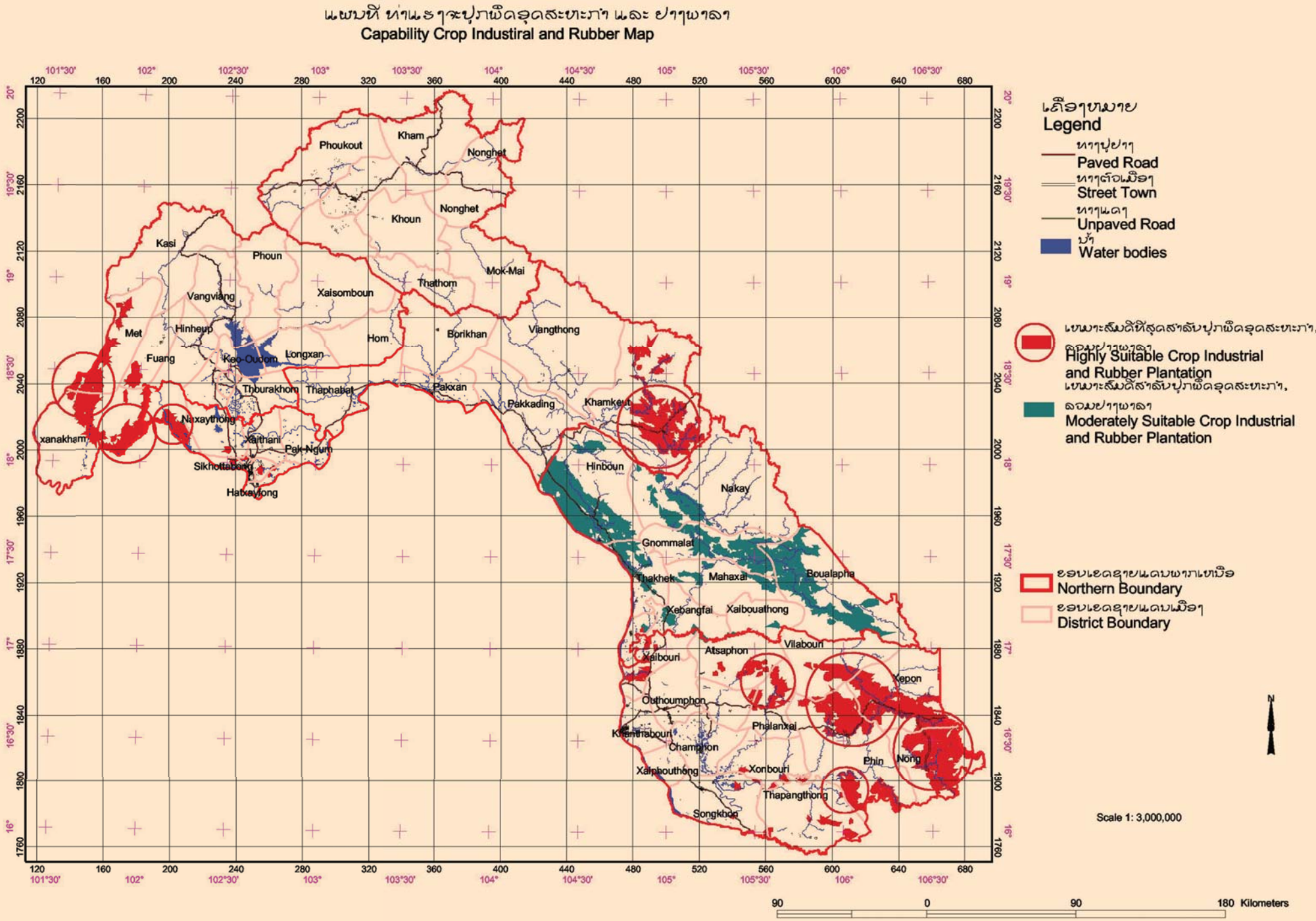
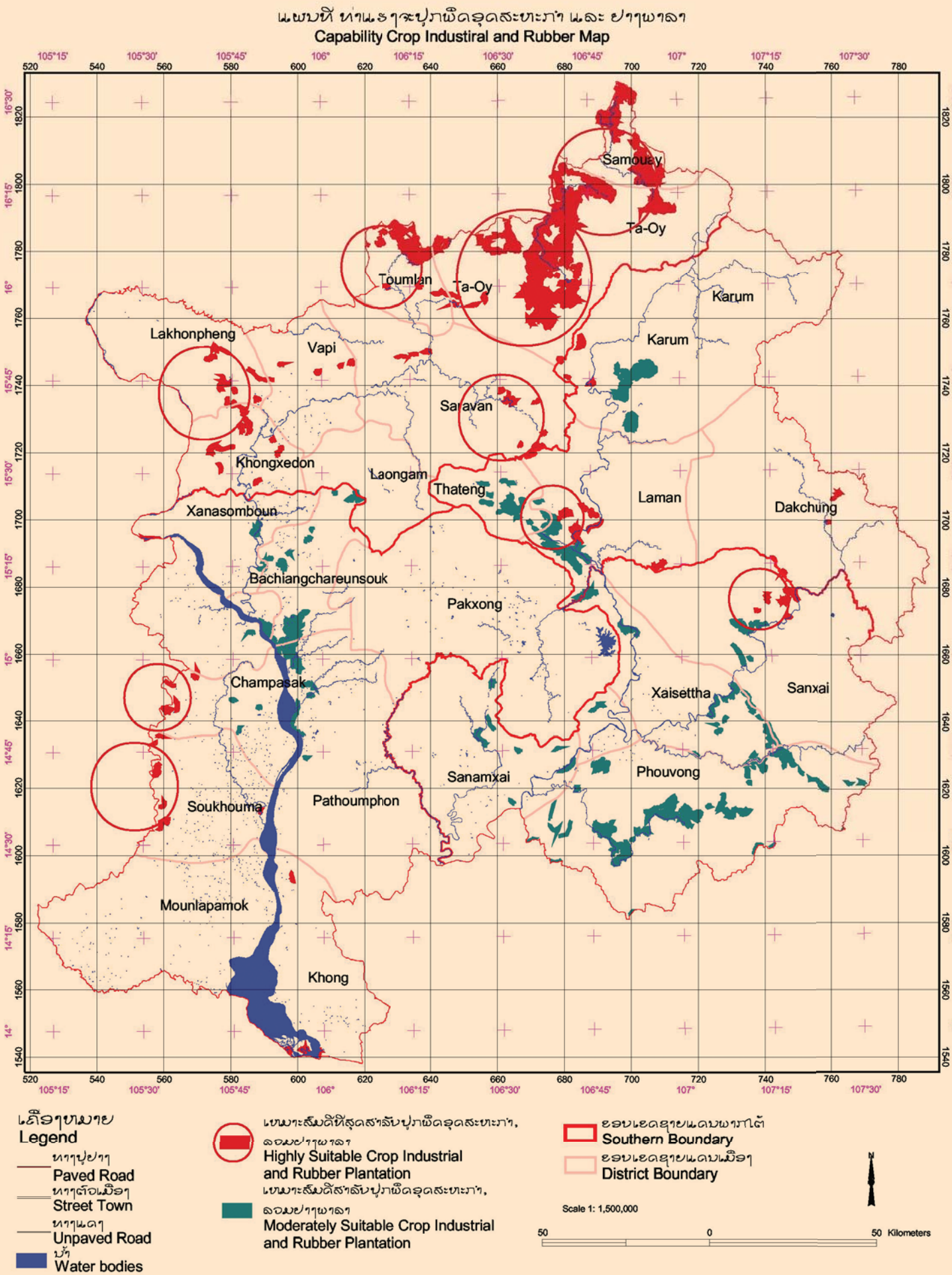
Annex 1: Capability map for rubber production in Northern Lao PDR




ແຜນທີ ທ່າແຮງຈະປຸກພືດອຸດສະຫະກຳ ແລະ ຢາງພາລາ
Capability Crop Industiral and Rubber Map
ເຄື່ອງໝາຍ
Legend
ທາງປູຢາງ
Paved Road
ທາງຕົວເມືອງ
Street Town
ທາງແດງ
Unpaved Road
ນ້ຳ
Water bodies
ເໝາະສົມດີທີ່ສຸດສຳລັບປຸກພືດອຸດສະຫະກຳ, ລວມຢາງພາລາ
Highly Suitable Crop Industrial and Rubber Plantation
ເໝາະສົມດີສຳລັບປຸກພືດອຸດສະຫະກຳ, ລວມຢາງພາລາ
Moderately Suitable Crop Industrial and Rubber Plantation
ຂອບເຂດຊາຍແດນພາກເໜືອ
Northern Boundary
ຂອບເຂດຊາຍແດນເມືອງ
District Boundary
Scale 1: 3,000,000
90 0 90 180 Kilometers
Phoukout
Kham
Nonghet
Khoun
Kasi
Phoun
Mok-Mai
Thathom
Vangviang
Xaisomboun
Met
Hinheup
Hom
Borikhan
Viangthong
Fuang
Keo-Oudom
Longxan
Thourakhom
Thaphabat
Pakxan
Pakkading
Khamkeut
Naxaythong
xanakham
Xaithani
Pak-Ngum
Sikhottabong
Hinboun
Nakay
Hatxayfong
Gnommalat
Thakhek
Mahaxai
Boualapha
Xebangfai
Xaibouathong
Vilabouri
Atsaphon
Xaibouri
Xepon
Outhoumphon
Phalanxai
Khamthabouri
Champhon
Phin
Nong
Xonbouri
Xaiphouthong
Thapangthong
Songkhon

Annex 3: Capability map for rubber production in Southern Lao PDR



Authors

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Dr Andrew D. Noble is Head of IWMI-SEA and Principal Research Scientist with a strong background in agronomy and soil science. Prior to joining IWMI in 2002, he was a Principal research Scientist with CSIRO Land and Water based in Townsville, far north Queensland, Australia, where he worked in both the wet and semi-arid tropics on issues associated with land degradation including soil acidification and the potential role of clay based materials in rehabilitating degraded soils. He has held Lecturing positions (1982-1989) at the University of KwaZulu Natal South Africa and Project Leader and Principal Research Scientist with the Institute for Commercial Forestry Research (1989-1992) working in the area of commercial plantation forestry. He has over 108 peer reviewed journal articles and book chapters and over 100 conference proceedings. He has supervised several MSc and PhD thesis and is on the editorial board of several international journals.

Mr Bansa Thammavong

Mr Thammavong obtained his Masters of Science in Natural Resources Management at Asian Institute of Technology, Thailand. Year awarded 2003 and currently works as a Researcher at NAFRI's Forestry Research Center in Lao PDR.

Over the course of his research career, Mr Thammavong has participated in many environmental study fields including research on silviculture, charcoal and firewood production; Rattan in Lao PDR; tree seed and botanical research. His research at NAFRI's Forestry Research Center currently focuses on non-timber forest products (NTFPs) and rubber in Lao PDR.

Dr Linkham Douangsavanh

Since 1999 Dr Linkham Douangsavanh has worked at the National Agricultural and Forestry Research Institute (NAFRI) in Lao PDR, where he currently holds the position of Director of Agriculture and Forestry Policy Research Center (PRC).

After completing a Bachelor of Economics and a Master of Science in Agricultural Economics at the Higher Institute of Economics in Sofia, Bulgaria, and a Master of Science in Regional and Rural Development Planning from the Asian Institute of Technology, Thailand, in 2006 he obtained his Doctorate degree in Systems of Agriculture from Khone Kaen University, Thailand.

Over the span of his career Dr Douangsavanh is a highly published author. His most recent published research has focused on Lao PDR and included work on indigenous knowledge and soil classification, alternative land-use and cropping scenarios, utilising agriculture and forestry for improving livelihoods, poverty reduction and sustainable farming.

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