Rubber Plantation Value Chains in Laos: Opportunities and Constraints in Policy, Legality and Wood Processing

Authors: Hilary Smith, Juliet Lu, Phuc Xuan To, Soytavanh Mienmany, Khonethong Soukphaxay

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This report refers to the following currencies:

- LAK: Laotian Kip; Lao Kip, National currency of Lao PDR
- VND: Vietnamese Dong, National currency of Viet Nam
- Yuan (¥): the unit of account of China's economic and financial system
- USD ($): United States Dollar, National currency of the United States of America

We have retained original references to currencies provided to us in interviews and in literature cited.

Unless otherwise stated all photos are by H. Smith.

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Executive Summary

Studies on rubber (*Hevea brasiliensis*) in the Lao People's Democratic Republic (Lao PDR, Laos) have largely focussed on land allocation and relations between the Lao State, investors, and Lao rubber farmers. The history and international context, and some environmental and social impacts have been investigated to a lesser extent, and there are no comprehensive studies that consider entire rubber value chains in Laos.

Concerns for the sustainability of natural rubber and rubberwood are rising among manufacturers and consumers, spurring interest in tracing these social and environmental impacts along the commodity chain, as well as product legality. However, there are gaps in knowledge, particularly with respect to rubberwood. This study starts to address these gaps by exploring the four themes of land, labour, latex, and wood. It traces interactions along the rubber value chain, including the role of foreign investors specifically from China and Viet Nam, the top foreign investors in rubber in Laos, the primary market destinations for Lao produced rubber and the likely destinations for rubberwood.

Key observations:

1. The policy position with respect to the rubber sector in Laos is unclear, due to an extended moratorium on rubber concessions.
2. Administrative complexities within and between government ministries and agencies confuses decision making and creates uncertainties for investors.
3. Rubber plantations are by far the largest plantation type by area covering approximately 275,000 ha, or 58% of the total area of planted forest.
4. Rubber has been planted by farmers, through contracts between farmers and companies and under concessions from the government. Concessions have been granted for over 210,700 ha of which 128,800 ha have been planted, 120,000 ha of contract farms have been approved with 68,000 ha planted and there are 78,000 ha in rubber smallholdings. Detailed information about these investments is limited, hindering long term and strategic planning for the sector.
5. Rubber has been planted though-out Laos. In Northern Laos, smallholder and contract farming are common, while in the centre and south investments are dominantly concession-based. The main foreign investors are from China and Vietnam.
6. Approximately 44% of rubber plantations are mature enough to be harvested for latex. Natural rubber latex is a significant and established industry with important socio-economic contributions, nationally and in the local areas where the sector operates.
7. Rubber latex markets are volatile.
8. There is considerable, and likely growing market demand for rubberwood products. Rubberwood could provide significant income for Lao rubber growers and an opportunity for domestic wood processors to value add to this resource.
9. The potential contribution of rubberwood to producers and nationally, has not been quantified, and its value is not widely understood by key stakeholders in Laos. Rubberwood represents a potentially significant sector on its own and an important source of income to growers and for state revenue.
10. Some of the earliest rubber plantations are already being harvested, and this will increase as trees mature, with rubberwood becoming available to industry at scale in around 2030-2035. Without incentive to replant, the area of rubber plantations could start to decline quickly in around 2040.
11. Investment in research into the quality, quantity, and long-term supply of rubberwood, processing technology and market development are needed now so that the opportunity to value-add is not missed.
12. The diverse ownership arrangements for rubber plantations will pose challenges for demonstrating legality and sustainability of both timber and latex. It is difficult to differentiate between owning trees for the purpose of tapping latex and outright ownership giving rights to harvest and sell trees for wood.

13. Lack of regulatory clarity, including on land and production agreements, and tree ownership could result in conflicts over benefit sharing when the opportunity for harvesting rubberwood arises.
14. There are several international organisations involved in setting standards, advocacy, and research in the rubber sector. However, Laos is not a member of any of these organisations.

Recommendations

A. The Government, together with the private sector should decide quickly if they wish to have a high-performing, sustainable, long-term, and locally beneficial rubber sector, and develop the right policies to support this. To enable this, a review of rubber concessions and contracts should be expedited, producing clear actions for investors and government authorities to resolve outstanding issues, followed by a resolution of the moratorium.

B. There is a need to develop a consolidated spatial database of information about rubber plantations in Laos including on concessions, leases, contract-farms, and farmer-owned plantations. A strategic field inventory of existing rubber plantations should be undertaken by the Department of Forestry with partners, for the purpose of estimating wood volume, and long-term rubber latex and rubberwood supply. This could inform strategic planning for the sector.

C. To capture the value of rubberwood within Laos, geographically strategic primary processing, with targeted investment by the industry within rubber-growing provinces is needed, and this represents a good opportunity to value add to the tree crop within Laos. There are good opportunities for participation by small and medium enterprises.

D. Rubberwood processing infrastructure and skills are needed in Laos. Skills and technology are already available in the National University of Laos and industry training centres and these could be expanded. This could be aided by a targeted study tour of rubberwood processing in China/Viet Nam/Thailand for Lao Government agencies, research and industry representatives with subsequent information dissemination to smallholders.

E. Further research is needed to better understand the properties and quality of Lao rubberwood and to establish niche products that are regionally competitive. This could be catalysed through partnerships between wood processors, the National University of Laos Faculty of Forestry, The Ministry of Industry and Commerce, NAFRI's Rubber Research Institute and donors.

F. Market research in demand for rubberwood, particularly for niche products, in neighbouring countries, should occur.

G. Communication materials are needed to inform rubber growers, wood processors, manufacturers, and the government of the potential value of rubber plantations for rubberwood.

H. Rubber plantations and rubberwood must be adequately addressed in the Lao-European Union (EU) Voluntary Partnership Agreement (VPA) and Laos' Timber Legality Assurance System (TLAS).

I. An integrated rubber sector plan including latex and rubberwood industry development should be developed– targeting existing rubber growing provinces, strategically engaging with the private sector and strengthening the role of the newly established Lao Rubber Association as a focal point for connecting growers, industry and the government.

Introduction

The global rubber (*Hevea brasiliensis*) plantation estate totals about 13 million (M) hectares (ha) in the humid tropics (Fern 2018). The main product, natural rubber latex, is used widely in many sectors, but predominantly by the automotive, aviation and healthcare industries. In addition to latex, harvesting and replanting old plantations produces rubberwood which is, arguably the world's most widely traded tropical hardwood used for sawn wood, furniture, and veneer products. About 90% of the world's natural rubber is produced in Asia[1]; an estimated 11 million hectares of the global estate are managed by several million smallholders whose production comprises about 80% of the global supply of natural rubber. The remainder is under the ownership or control of companies.

Studies on rubber in Laos have largely focussed on the processes and consequences of land allocation and the impacts of the different relationships between the State, investors, and local people. To a lesser extent the history and international context, and some environmental and social impacts have also been investigated. While the question of the sustainability of natural rubber latex production is gaining attention from the perspective of market drivers and consumer consciousness,[2] the role and contribution of rubberwood as a final commodity has been largely unresearched in the country, and this has a range of implications including understanding the full value of the tree crop and with respect to timber legality. Policies have been based on incomplete evidence. This study starts to address this deficit by examining on interactions along the entire rubber value chain focussing the four themes of land, labour, latex, and wood. We consider the role of smallholders, contract farmers and foreign investors in the sector, most of whom come from China and Viet Nam.

This research was initiated by the ACIAR project *Advancing enhanced wood manufacturing industries in Laos and Australia* ("VALTIP3"), which is being undertaken jointly by Melbourne University, the National University of Laos (NUoL) Faculty of Forestry, and Australian National University (ANU) in collaboration with Lao partner organisations such as the Department of Forestry (DOF) and Ministry of Industry and Commerce (MOIC).

This study was conducted in collaboration with Forest Trends, with support from Norad.

The VALTIP3 project supports the development of innovative wood processing industries to enhance markets for planted timber resources within Lao PDR and Australia. Opportunities from the three main plantations types in Laos – teak, eucalypt and rubber - are being explored through the following questions:

- What are the principal value chains for Laos' plantation resources?
- What are the key elements of the policy, governance and administrative environments that constrain the development of plantation forests and value-adding to their products, and what are the most important and promising pathways for policy change to address these?
- What are the barriers that prevent small and medium plantation-based enterprises in Laos from investing and developing new technologies, and how can they be rectified?
- What are the major impediments to resource availability for domestic processing, and how might they be addressed?

To answer these questions, we addressed the following:

- What is area of rubber is planted in Laos?
- Who owns rubber trees and plantations?
- Who will have the right to harvest and sell rubber trees for wood?
- How much rubberwood will there be?
- What are the markets for rubberwood and latex?
- What policies and regulations exist for rubber plantations and products?
- How has the legality of rubberwood been considered by Laos and consumer countries?

[1] International Rubber Study Group, http://www.rubberstudy.com/welcome

[2] See, for example Mighty Earth http://www.mightyearth.org/, The Global Platform for Sustainable Natural Rubber (GPSNR - https://www.gpsnr.org/) and the International Rubber Study Group's Sustainable Natural Rubber Initiative (SNR –i) http://snr-i.org/

Research Methods

Literature review and legal/policy analysis

A review of literature, policies and regulations was undertaken. Our analysis of policies and regulations draws extensively on outputs and observations from this project (Smith et al. 2018) and from two other ACIAR projects undertaken on Laos on plantations and plantation policy (Smith 2014, Smith 2016, Smith, Ling and Boer 2017, Smith et al. 2017a; Smith et al. 2017b, Ling et al. 2018). Other sources included Lu's work on rubber in Laos (Lu 2017, Lu and Schönweger 2019) and the Forestry Legality Compendium (Smith and Alounsavath 2015 compiled for Pro-FLEGT).

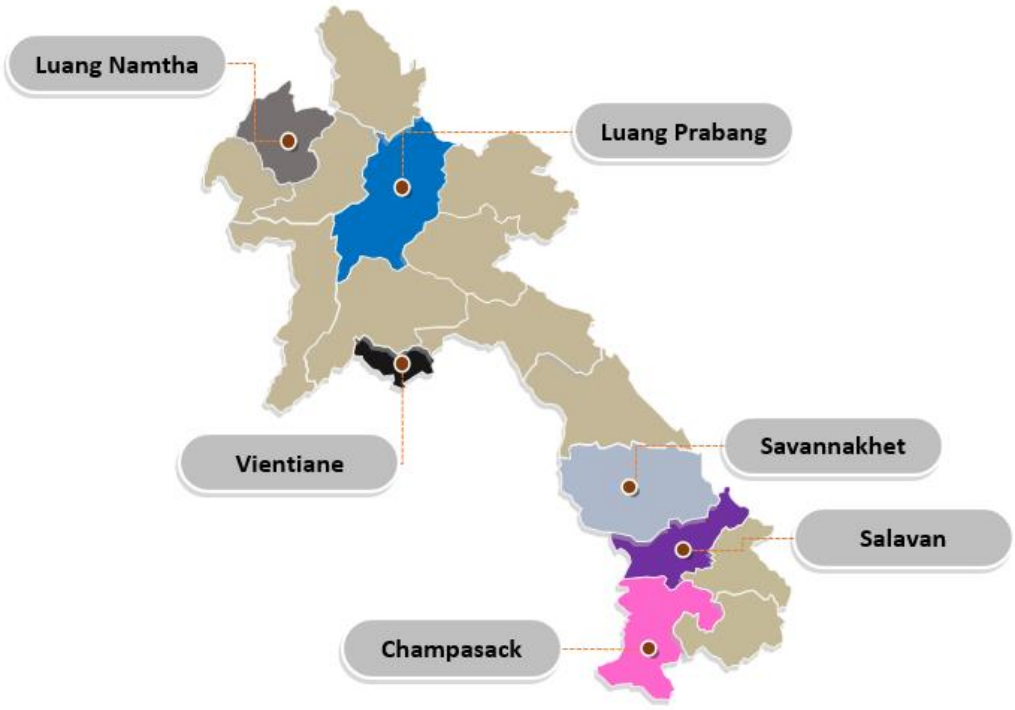
Further policy and regulatory analysis followed the identification of specific sources relevant to the rubber sector, and land and agriculture policy in Laos. These were accessed through the Lao Gazette, the Lao Trade Portal, and other online portals, as well as directly through government offices, other projects, and companies (e.g. with respect to contracts). A broader review of literature relevant to this research utilised significant repositories of reports and information held in LaoFAB which holds over 1000 documents referring to 'rubber', as well peer reviewed journal articles.

Key informant interviews

In June-December 2019 Interviews were undertaken with stakeholders from Government organisations at national, provincial, district and village levels, other institutions, rubber growing and latex and wood processing companies, non-government organisations (NGOs) and rubber farmers. The names of individuals and companies interviewed have been kept confidential through generic titles (Company A, Company B, Village A etc).

Study areas in Laos were Vientiane Capital City, Luang Prabang Province (Xieng Ngern and Nambak Districts), Luang Namtha Province (Namtha and Sing Districts), Champasack Province (Pakse, Bachiang and Sanasomboun Districts), Savannakhet Province (Phin, Nong and Sepon Districts) and Salavan Province (Figure 1). A visit was also made to the Xishuangbanna Region in China. Field research was planned for case study areas in Viet Nam, however due to travel restrictions imposed in early 2020 (due to COIVID19) this was not possible. A list of interviewees is provided in Appendix 1.

Figure 1: Research Locations



Value Chain Analysis

Value chain assessment methods were adopted for this study. Snowball sampling, which is a non-probability sampling technique, was initially proposed to identify influential actors from growers to processors and to end market consumers (where possible). This approach was utilised in similar studies undertaken by this project for teak (Smith et al. 2018) and *Eucalyptus* (Ling et al. 2020, forthcoming). However, due to the nascent and limited rubberwood value chains in Laos, snowball sampling was found to be ineffective and instead strategic geographic areas with well-established rubber plantations, and actors operating in those areas were identified through key informants. Rubber companies were identified through investigation of national databases and past research connections established by Lu and To. Within villages, interviewees were identified by village authorities based on information we provided about desired traits, for example, we explained that we wanted to interview rubber growers both with and with-out contracts with companies. Semi-structured interviews and field observations were used to gather the data for analysis. We interviewed rubber plantation growers, rubber latex traders and processors, and wood processors. For interviews with households, responses were recorded by handwritten notes utilising an open format – on large paper, visible to all participants – sometimes written in Laos and sometimes in English (Figure 2, photo: Lu).

Interviews were undertaken in Lao and translated into English.

Figure 2: Village interviews in Luang Prabang Province

Research Findings

We present our research findings and recommendations generally, and with an emphasis on four key themes: land, labour, latex, and wood.

Key observations

1. The policy position with respect to the rubber sector is unclear, due mainly to an extended moratorium on rubber concessions.
2. Administrative complexities within and between government ministries and agencies confuses decision making and creates uncertainties for investors.
3. Rubber plantations are by far the largest plantation type, by area, in Laos, covering approximately 275,000 ha, or 58% of the total area of planted forest. Rubber has been planted by farmers, through contracts between farmers and companies and under concessions from the government. Concessions have been granted on over 210,700 ha of which only 128,800 ha have been planted, 120,000 ha of contract farms have been approved with 68,000 ha planted and there are 78,000 ha in rubber smallholdings. Detailed information about these investments is limited, hindering long term and strategic planning for the sector.
4. Rubber has been planted though-out Laos, with concentrations in the north, the centre, and the south. In Northern Laos, smallholder and contract farming are common, while in the centre and south investments are dominantly concession-based. The main foreign investors are from China and Vietnam.
5. Approximately 44% of rubber plantations mature enough to be harvested for latex. Natural rubber latex is a significant and established industry sector with important socio-economic contributions, nationally and in the local areas where the sector operates.
6. Rubber latex markets are volatile but there is some resilience within the production system.
7. There is considerable, and likely growing market demand for rubberwood products. At the prices currently being paid in China and Viet Nam, rubberwood could provide considerable income for Lao rubber growers and an opportunity for domestic wood processors.
8. The potential contribution of rubberwood has not been quantified, and its value is not widely understood by key stakeholders in Laos. Rubberwood represents a potentially significant sector on its own and an important source of income to growers and for state revenue.
9. Some of the earliest rubber plantations are already being harvested, and this will increase as trees mature, with rubberwood becoming available to industry at scale in around 2030-2035. Without incentive to replant, the area of rubber plantations could start to decline quickly in around 2040.
10. Investment in research into the quality, quantity, and long-term supply of rubberwood, technology and market development are needed now so that the opportunity to value -add is not missed.
11. The diverse ownership arrangements for rubber plantations will pose challenges for demonstrating legality and sustainability of both timber and latex. It is difficult to differentiate between owning trees for the purpose of tapping latex and outright ownership giving rights to harvest and sell trees.
12. Lack of regulatory clarity, including in land and production agreements, and tree ownership could impact benefit sharing when the opportunity for harvesting rubberwood arises.
13. There are several international organisations involved in advocacy and research in the rubber sector. However, Laos is not a member of these.

General Findings

1. There is a significant body of research on rubber in Laos, but this has neglected rubberwood. As such, there is limited country specific information on which to base policies or investment decisions.
2. Early Laos policies focussed on promoting sedentary agriculture and planting trees, developing land markets, and enabling concessions and land rental arrangements. There has been little

emphasis on contracting procedures and safeguards or on guidelines for crop production and processing of either latex or rubberwood. More recent, reactive policies (including the moratoria on rubber concessions), focussed on addressing perceived immediate and direct impacts of investments and on failures in the land allocation process. The 2012 moratorium on rubber concessions remains in place while a review of the sector is ongoing. This has created a policy vacuum and has implications for existing company projects as well as smallholders. This policy uncertainty, together with market fluctuations in latex price and the price of other agricultural commodities, makes rubber plantations more vulnerable to land competition and conversion to other crops.

3. As a multi-product tree crop that straddles the agriculture, forestry and industrial processing sectors rubber faces some unique policy and governance challenges. Rubber has been somewhat neglected in legislation for agriculture and forestry; there are few legal instruments specifically for the rubber sector. While it may be desirable to have few regulatory constraints, there are also risks that important issues, such as environmental and social protection are overlooked, with adverse outcomes.
4. The range of investment models for rubber is much more diverse than is represented either in the literature or in policy. This will create challenges in the making and implementation of new proactive policy that incorporates rubber growing, latex production and rubberwood into strategies for the forest plantation sector.
5. Early established rubber holdings are already at the age at which they can transition from latex to wood production. Some owners are harvesting these and selling or using the wood for fuel, others are exporting the wood under special permits. Some intend to replant rubber, while others may convert to alternative crops. Some farmers are already clearing and converting young and still productive rubber plantations to other uses due to low latex prices.
6. The future potential supply of rubberwood, based on the current planted area, is potentially significant and will start to increase in around 2030-2035. Predicting actual volumes and the timing of wood supply is difficult because of the lack of good quality data, the variety of arrangements for tree ownership and management, and conflicting perceptions about the right to harvest and sell wood – particularly under contract farming models. There will be a 'boom' in rubberwood production and care will be needed to develop a rubberwood industry in Laos.
7. There is a strong risk that some investors may not replant rubber after the first rotation, which has implications for long term latex supply and a viable wood processing sector should one emerge. For large-scale investors lack of available and suitable land and labour are key issues, for farmers decision will be influenced by other more profitable commodity crops and household income opportunities, and labour availability. Understanding the full value chain, including land, labour, latex, and wood, is needed to understand the range of scenarios that may emerge.
8. The opportunities for rubberwood processing have not yet been considered so there has been limited research or promotion of this. There has been no domestic policy or industry support and consequentially local industry capacity for processing rubberwood is low. Lack of awareness and the absence of domestic markets means that the potential value of rubber trees for wood could be lost to Laos.
9. International markets would be interested in Lao rubberwood but there are technical, logistical and policy constraints to this. Countries like China, Thailand and Viet Nam have well-developed rubber latex and rubberwood industries and can provide useful examples for Laos. Lao State authorities could benefit from establishing partnerships with research and industry organisations in these countries to help in the establishment of a Lao rubberwood sector and in investments in new and future-rotation rubber plantations that are optimal for Lao conditions and that take into account both latex and wood quality.
10. There are lessons to be learnt from other countries about the growing of rubber in agroforestry systems to provide intermediate crops during the years before latex is produced at volume, and ways to minimise adverse social and environmental outcomes across the sector as a whole.

Overarching recommendations

A. The Government, together with industry should decide quickly if they wish to have a high-performing, sustainable, long term and locally beneficial rubber sector and develop the right policies to support this. To enable this, the review of rubber concessions and contracts should be expedited, producing clear actions for investors and government authorities to resolve outstanding issues, followed by a resolution of the moratorium.

B. There is a need to develop a consolidated spatial database about rubber plantations in Laos including on concessions, leases, contract-farms, and farmer-owned plantations. A strategic inventory of existing rubber plantations should be undertaken by the Department of Forestry with partners, for the purpose of estimating wood volume, and long-term rubber latex and rubberwood supply. This could inform strategic planning for the sector.

C. To capture the value of rubberwood within Laos, geographically strategic primary processing, with targeted investment the industry within rubber-growing provinces is needed, and this represents a good opportunity to value add to the tree crop within Laos.

D. Rubberwood processing infrastructure and skills are needed in in Laos. Skills and technology are already available in the National University of Laos and industry training centres, and these could be expanded. This could be aided by a targeted study tour of rubberwood processing in China/Viet Nam/Thailand for Lao Government agencies, and industry representatives.

E. Further research is needed to better understand the properties and quality of Lao rubberwood. This could be catalysed through partnerships between wood processors, the National University of Laos Faculty of Forestry. The Ministry of Industry and Commerce and NAFRI's Rubber Research Institute and donors.

F. Market research into demand for niche rubberwood products in neighbouring countries, should occur.

G. Rubber plantations and rubberwood must be adequately addressed in the Lao-European Union Voluntary Partnership Agreement and Laos' Timber Legality Assurance System (TLAS).

H. Environmental, social, health and safety standards should be developed for all key stages of rubber latex and rubberwood processing.

I. Communication materials are needed to inform rubber growers, wood processors and the government of the potential value of their rubber plantations for rubberwood.

J. An integrated rubber sector plan including latex and rubberwood industry development plan should be developed– targeting existing rubber growing provinces, strategically engaging with the private sector and strengthening the role of the newly established Lao Rubber Association as a focal point for connecting growers, industry and the government.

K. Biosecurity and forest health monitoring is needed to protect existing rubber investments.

With respect to LAND

- Rubber is the largest tree plantation type in Laos by area, but information about it is poor. Official records are incomplete, particularly for contract farming and smallholder plantations.
- Land allocation, plantation ownership and investment models for rubber are diverse. Many farmers grow rubber on their own land without issue. Contracts are made between companies and many different actors (farmers, villages, local government leaders, the state, military organisations) and terms vary, reflecting discrepancies between different levels of government and among different agencies at the same level in the land allocation process. There are also inconsistencies in legal compliance and enforcement.
- Companies may be granted large areas of land 'on paper' but are unable to access an equivalent suitable area on the ground. Lack of detailed information to inform land use planning hinders this process. The types of land granted may be swidden fallows, degraded forestland, village land or others. The task of finding land has often been left to companies with contracts based on their surveys; in cases where unsuitable land has been allocated, attempts by companies to 'exchange' the land have been unsuccessful; as a result some plantations have failed.

- Where rubber plantations occur in high density in the landscape (either as large or many-small holdings) there can be land shortages for local people, resulting in conflict between villages and with companies. Conversely, concentrations of rubber plantings bring benefits – more competitive trade, greater options for selling the latex and rubberwood and more options for rubberwood processing.
- Due to a lack of clear land boundaries, rubber plantations have at times been inappropriately established within legal state forest categories.
- In Northern Laos, many smallholders have planted rubber, either on their own, with government or financial support or under contract farming agreements with companies. Rubber may be planted as a stand-alone investment, as part of an integrated livelihood strategy or for other reasons - such as to 'book' or claim rights over land. Smallholders have a range of land use rights for their rubber-holdings.
- Smallholder rubber investors are making decisions about their land based on latex price fluctuations and those of other crops.
- Some research suggests a natural forest to rubber transition but the scale and dynamics of this, including the interactions with other agricultural activities, and whether this is causing new forest clearing, is not clear. Rubber has replaced forest, swidden fallow land (and hence upland rice) as well as crops such as Teak, Job's Tears and maize. In some places, farmers are now converting rubber back to other crops or for grazing, and forest regrowth is encroaching into abandoned rubber stands.
- In Southern Laos, concession agreements are more common than in Northern Laos where contract farming has been promoted. Regulations coupled with lack of data enabled the clearing of areas of degraded forestland for rubber plantations which are creating more homogenous landscapes.
- Some companies planted rubber trees before land concession contracts were signed, the plantings may exist outside allocated areas, extending into village lands or inappropriate forestlands (e.g. Conservation forest).
- Rubber plantations have been overlooked in regulations for tree plantations because they have been viewed as an agriculture crop, and many plantations do not comply with the existing land or forest regulations.

We recommend:

- The results of the review of investment projects should be finalised and published, and issues remaining with respect to land for rubber investments should prioritised and resolved to give existing investors with some certainty, and provide state officials clearer guidelines for monitoring and governing these projects.
- Clear and transparent land allocation procedures for future investments should be established, communicated, and systematically enforced.
- Contract farming guidelines, including processes for dispute resolution and mediation should be developed and communicated to all parties.
- Clear rules and documentation of entitlements to the land use rights and tree rights after contracts and concessions end should be established.
- Existing conflicts between companies and communities over land should be mediated by the government and resolved.
- Requirements to identify and recognise household, customary and collective land use rights in the making of land concessions must be clarified.
- Fit for purpose and clear requirements on the environmental and social standards for plantations and plantation land during and after contracts and concession are needed.
- Plantation policies and regulations that consider a range of administrative and procedural options for investors (large and small) to demonstrate land use rights and to register their rubber plantations, as required for legal supply chains should be considered.

With respect to LABOUR

- The rubber sector is important for formal employment, and informal labour for rural households. Actual labour participation in the sector is unquantified.
- There are specific rules for domestic and foreign worker employment - on labour, trade unions, social security, and dispute resolution, but these are not always applied by companies or enforced by the government. New strategies on social protection and rural employment have recently been drafted by the government with donor support.
- The Lao Government has expressed concern about inadequate opportunities for local labour arising through concessions and contract farming. Manual labourers on company plantations, contract farms and in factories are typically Lao, although foreign migrant labourers may also be used. Managerial staff and trained technicians tend to be from the investor's country of origin.
- There is high competition for labour between rubber companies and with other sectors, however, wages in the rubber sector remain relatively low and susceptible to market price fluctuations where payment is a proportion of volume harvested. When latex prices are high returns from labour are good and employment is sought after - rubber labour is viewed positively when compared to some other options, including upland rice cultivation. Low prices reduce income to largely uncontracted labourers and result in labour loss to other sectors.
- Rubber labour, as in some other agriculture sectors, is insecure employment. Most Lao workers do not have contracts - contracts may not be offered or may not be preferred by workers. Income for tappers is seasonal, stopping during the cold season, and may be suspended at other times, such as under extremely dry conditions or when prices are low. Monthly payments typically consist of a piece-rate based on harvested volume and in some cases include a fixed salary. While this is intended to increase productivity, it also marginalizes those who are older or less able.
- Where companies cannot attract local workers at the offered wage, they recruit migrant Lao labourers or import foreign workers.
- Where there is conflict between local people and companies (for example over land), locals may refuse to work for the company, and may prevent migrant workers from gaining employment.
- Smallholders work on their own plantations, often in family teams, with good returns, but sometimes paying others, to help with site preparation, planting or tapping. This informal employment is significant in the sector but leaves people vulnerable to exclusion from social protection and they are often overlooked in policy.
- There are documented health risks associated with rubber - directly from contact with chemicals, or indirectly through disease carrying mosquitoes more active at the time that rubber is tapped (early morning).
- The Government has developed generic Good Agriculture Practice Agreements there are no specific standards for the rubber sector
- There will be new domestic labour opportunities in skilled wood processing when a rubberwood manufacturing sector develops but this requires some specialist training, including in health and safety procedures-in some cases rubberwood processing requires treatment with potentially toxic chemicals.
- As a rubberwood sector emerges, compliance with legal requirements for labour, including worker rights, health and safety will need to be traceable for timber legality verification.

We recommend:

- Fair and equitable labour standards for labour participation in latex and rubberwood sectors are needed and can be adapted from elsewhere. The International Labour Organisation (ILO) has a system of international labour standards many of which are relevant to the rubber sector.
- The development of new guidance on the use and contracting of local and foreign labour in investment projects and better enforcement of the existing rules.

- Monitoring of the flow, quality of contracts and conditions of Lao local and migrant labourers and foreign workers in the sector.
- Further research to understand the dynamics of labour contracts between companies and Lao workers, the role and value of informal labour sector and impacts on families.
- Occupational health and safety standards are needed for all stages – planting, tapping, latex processing, wood harvesting and processing. Lessons can be learnt from neighbouring countries.
- Up-skilling of the Lao labour force to undertake technical tasks in rubberwood processing.
- Integration of smallholder perspectives and the informal labour sector into any planning for a future rubber sector
- Improved access to and recognition of dispute resolution and mediation processes and institutions (such as village mediation units and committees for labour dispute resolution), including through communication, implementation, and enforcement of the regulations on labour dispute resolution.

With respect to LATEX

- About 44% of the area of rubber in Laos is mature enough to be tapped but most of the rubber areas are under-tapped. In Southern Laos, all rubber companies are tapping latex but in Northern Laos dry weather and stopped some companies and farmers tapping in 2019. Market (low price) and labour availability are also limiting factors.
- For rubber plantation growers and labourers, latex price volatility is the main challenge. Markets (and hence prices) for natural rubber latex are strongly influenced by the market for synthetic rubber which is determined by oil prices. Low prices have affected the robustness of contracts between farmers and companies; in some cases, contractual obligations to buy latex are not being met and in other cases contracts are being abandoned. Extra-contractual markets have emerged, and, it is not clear whether, if the price rises, contracts will be restored. There is an expectation that the Government can provide latex price guarantees.
- Most smallholders are not aware of market drivers and are largely 'price-takers'. However, the lack of an immediate imperative to tap and sell latex means that growers can absorb low prices if they have other income sources.
- Most companies have, or plan to build, their own processing factory and source latex from their own plantation and smallholders. Latex products (block or crumb) are mostly exported to China and Vietnam. Manufacturing of rubber products in Laos has not yet developed as an industry. Unprocessed latex (e.g. cup lump or sheet) is also exported directly, where it is mixed with rubber produced by the importing country, creating problems for traceability.
- Some Lao rubber growing entrepreneurs feel disadvantaged by export quotas for Chinese companies in Northern Laos. Quotas allow producers to import their rubber to China without paying import tax, but these are only available to Chinese companies through the Opium Replacement Program, not to other producers and processors.
- There are weaknesses in contract farming models. Some companies have stopped buying latex from contracted farmers or have abandoned contracts. Those farmers may benefit by retaining all the latex they tap but are disadvantaged if they cannot access markets.
- Companies are concerned about the theft of latex by farmers, and the role of independent traders (Chinese, Vietnamese, and Lao) in mobilising a market for this. Some companies are advocating for the Government to ban independent traders, while traders argue companies are trying to monopolise the market and that they provide an alternative, more competitive market for smallholders to sell their latex.
- Grower groups and family networks are important for sharing knowledge and resources during plantation establishment, tapping and for trading of latex.
- There is currently no rubber standard in Laos. The Government is working with partners from China to address this.
- Some products, with latex from mixed sources are exported to Vietnam and China, labelled as Vietnamese and Chinese products, creating problems for traceability.

We recommend:

- A strategic survey of the rubber plantations to understand the dynamics of latex production. This would help understand future supply.
- Facilitation of collaboration between Lao Rubber Association and Vietnamese, Thai and Chinese Rubber Associations for cross-learning and information exchange.
- Determining a clearer role for registered independent latex traders, providing for transparent and sound competition among growers and rubber companies.
- Support for the formation of collective entities and networks of smallholder rubber growers to strengthen their bargaining power when they sell their rubber to traders and companies and to facilitate the dissemination of best management practices and up-to-date market information.
- Strengthening the capacity of Lao Rubber Association, including to facilitate connections between the government and rubber companies, and to undertake market analysis and act as an information channel to rubber growers.

With respect to WOOD

- Based on the existing area of plantations there will be a 'boom' in rubberwood production from around 2030-2035 as plantations mature. This could provide a significant resource to the domestic wood processing sector.
- The opportunity for a rubberwood sector in Laos has been neglected in policy, in research and by industry. Without a clear policy position Laos risks missing out on the opportunity of adding value to rubber plantation investments through rubberwood.
- Detailed data on rubber plantations is poor and there is no published country-specific information on tree growth, wood volume, or quality. Official records are incomplete particularly for contact farming and smallholder plantations.
- Other than for independent smallholders, the ownership of rubber trees, and therefore rubberwood, is not clear.
- There is demand for rubberwood in neighbouring countries and beyond, but limited awareness among smallholders and Lao state officials of the value of rubber trees as timber.
- Some of the oldest rubber plantations are already being cleared because they are non-economic, due to disease, or farmers are turning to other crops due to unreliable latex prices. Some wood is being exported under special permits, and some is being burnt for fuel.
- Due to volatile markets and unclear policies for large-scale rubber investments, there is a risk that some investors may not replant after the first rotation. This could affect long-term supply of latex and rubberwood.
- There has been no investment by industry in rubberwood processing technology.
- A rubberwood sector in Laos would find it challenging to meet sustainability and legality standards due to non-compliance with domestic regulations and international traceability requirements.

We recommend:

- A single spatial database of information about rubber plantations including age, spacing, ownership, clone, and condition. This would help industry predict the long-term supply of rubberwood and invest accordingly. Supporting information is also needed including in relation to transport and logistics.
- A targeted field inventory of rubber plantations is needed to inform analysis of the growth, yield, and quality of rubberwood under different conditions in Laos.
- Research into markets for rubberwood products, in Laos and neighbouring countries which are already processing rubberwood, would inform options for industry development. A targeted study tour could help inform this.
- Communication materials to inform rubber growers of the potential value of their rubber plantations for wood should be developed.

Context

Rubber Value Chains

There are two main - and a number of supplementary - product chains from rubber plantations. The main products are rubber latex and rubberwood. Other product chains exist for biofuel (e.g. from rubber seed) and bioenergy (e.g. from harvesting wood processing residues). In addition, rubber may be intercropped with rice, Job's tears, maize, pineapple, or other crops. These secondary crops are important to rubber growers in the immature period before latex production commences. They can provide important subsistence needs and income from commodity production, but also add costs and complexities in terms of plantation establishment and management (see e.g. Hougni et al. 2018, Romyen et al. 2018, Langenberger et al. 2016) with labour availability being a significant factor. These intermediate crops are potentially an important component of rubber sustainability, as are non-timber forest products such as oil produced from rubber seeds (see e.g. Morshead et al. 2011) and they should be included in value chain studies of different production models. The main production chains for latex and wood are summarised in Figure 3.

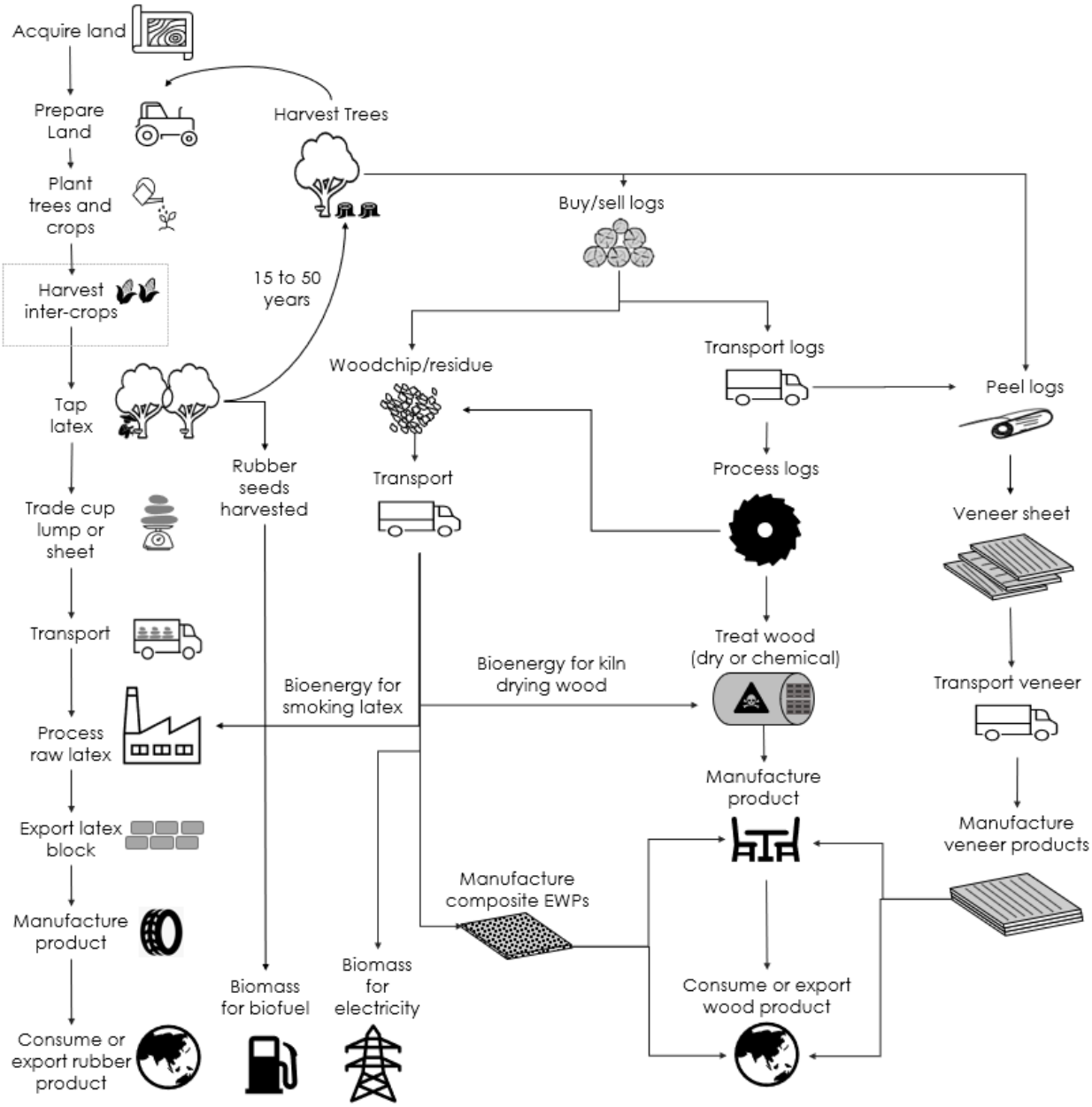


Figure 3: Natural rubber and rubberwood production chains

Rubber plantations in Laos

Data and information about rubber plantations is important for a range of purposes including monitoring land-use change, policy making and industry development, and for understanding forward trends in latex production and the transition to rubberwood supply. Reliable, consistent, and consolidated information on the location, area, age, ownership, condition, and fate of rubber plantations in Laos is lacking. Available information suggests that the cumulative area of planted forests of all species established in Laos since 1975 was around 470,227 hectares (ha) in 2016 (DOF 2018), around 478,000 ha in 2018, and 502,000 ha in 2020 (DOF unpublished data). Of this total, rubber plantations are the largest by area, covering an estimated 276,131 ha (58%) (DOF 2020 and see Figure 8 for other species). In 2018 NAFRI estimated that 121,394 ha of rubber were being tapped (Table 1).

Table 1: Rubber area from 2008 to 2015 - 2018

Province	2007 planted area (ha) [1]	2008 planted area (ha) [2]	2010 planned area (ha) [2]	2013 planted area (ha) [3]	2018 [4]	
					Planted area (ha)	Tapped area (ha)
Phongsaly	13	12,600	26,400	17,841	22,173	1,751
Oudomxay	4530	17100	21000	28,293	29,190	688
Bokeo	701	9800	25000	25,222	19,150	9,114
Luang Namtha	8,770	21700	20000	33,264	35,493	22,000
Xayaboury	66	5200	50000	1,213	13,718	1,251
Luang Prabang	2467	9500	22000	17,652	18,191	7,245
Houapanh		0	2100	3		
Vientiane	100	9200	10000	23,248	12,984	6,705
Vientiane Capital	474	600	0	1,466	1,330	931
Xaisomboune					7,707	53,95
Xienghouang		50	0	124		
Bolikhamsay	1026	5100	4000	12,627	14,000	9,000
Khammoune	1447	6100	6300	5,519	7,480	4,936
Savannakhet	243	4600	14000	13,192	18,181	10,000
Champasack	6719	20100	33500	33,853	28,824	26,378
Sekong	100	6200	5000	7,468	6,466	3,000
Salavan	1418	4700	6500	5,853	6,000	5,000
Attapeu	500	8000	3500	22,008	17,000	8,000
Total	28,574	140,550	249,360	248,846	258,446	121,394

Sources: (1) Douangsavanh et al. (2008); (2) NAFRI 2009; (3) NAFRI 2013 in Southavilay 2016; [4] NAFRI 2018 unpublished data.

In addition to official government figures, there are other sources of data about rubber, which can be difficult to reconcile. In 2018, for example, the area of rubber over 16 provinces was reported to be 258,446 ha (NAFRI 2018, Table 1), lower than the officially reported area of rubber in Laos that year, 275,146 ha (DOF 2018).

Locally there are also discrepancies. At a provincial level, in Luang Prabang for example, the area of rubber officially reported in national statistics in 2018 (Table 1) was 18,191 ha, in unpublished provincial data the area was 17,793 ha while mapping undertaken by this project in 2018 using mostly 2016 satellite imagery from Google Earth identified 15,349 ha of rubber in total (

Figure 4. When compared on a district-by-district basis there is both over and under reporting (Table 2, this project). Similarly, in Champasack Province, using Landsat data Özdogan, Baird and Dwyer (2018) mapped over 30,000 ha, compared to the officially reported total of just over 28,000ha.

There are many reasons why reported statistics and data may not align:

- The reported area may be 'approved', 'granted', 'allocated' or 'planted' land. Concession areas, for example, may have been granted (investors signed a contract for a certain area of

land with the government or other granting authority) or allocated (mapped out with boundaries) but not yet established with trees.

- Businesses are required to submit progress reports to the Provincial Department of Planning and Investment (PPI) annually – based on the company's own data. This may be susceptible to purposeful or benign inaccuracies. For example, Chinese companies may be motivated to over-report to qualify for opium replacement subsidies provided by the Chinese government (Shi 2008; Lu & Schönweger 2019).
- A large portion of what is planted by villagers may be attributable to informal investors who enter some form of 'contract farming'. Villagers do not necessarily share such schemes with authorities (Shi 2008) and so they are not included in official statistics.
- Even formal contracts between companies and smallholders may not be lodged with, or approved by, the relevant authority; and if they are, they may not be compiled into a central database.
- Villagers may under-report their plantation to minimize taxation (Shi 2008, and Smith, Ling and Boer 2017 who report to a similar phenomenon for teak).

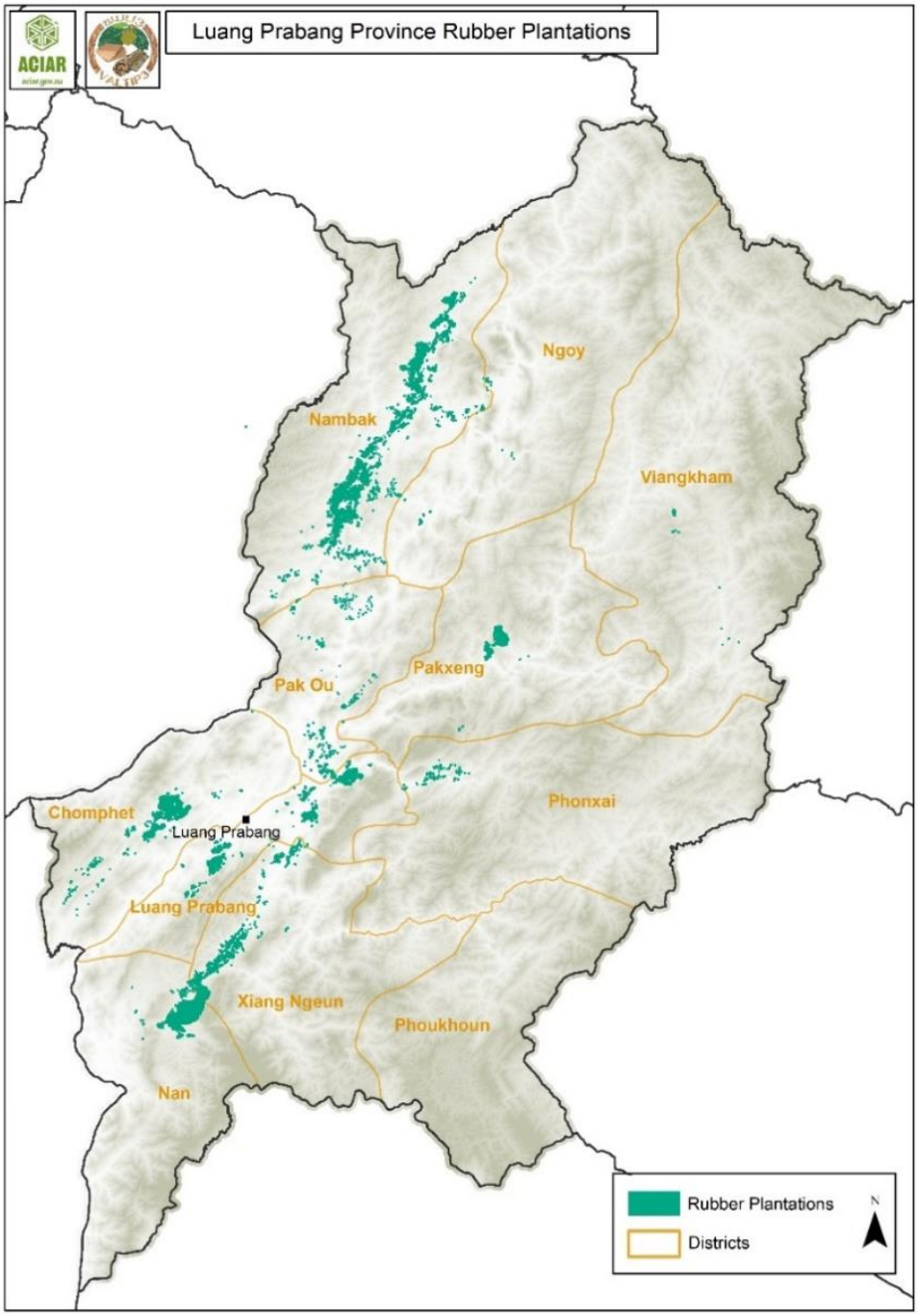
  Many plantations are not officially registered. However, when they do register their plantations growers/owners may overstate their area, or pre-emptively register yet-to-be planted land for the purpose of gaining land tax exemptions.
- Changes from rubber to another land use may not be recorded.
- Plantations expand at a rapid, largely unregulated pace, making it difficult for measurement and estimation efforts to keep up.
- A dynamism of plantation turnover and consolidation by wealthier holders has made many of the government efforts to keep track of rubber statistically out of date (Vongvisuouk and Dwyer 2016).
- Reported areas are not necessarily based on spatial data. Area statements may be extrapolated from the number of trees planted and the spacing.
- The date of imagery used may not be consistent with the timing of reports.
- Large areas have been abandoned due to low prices or poor growth, and re-growth of other species is occurring due to lack of management, making them more difficult to map.

Table 2: Rubber in Luang Prabang - Mapped and reported

District	Mapped	Reported
Chomphet	2303	2218
Luang Prabang	1679	245
Nambak	5731	9616
Nan	2346	2889
Ngoy	86	20
Pak Ou	520	901
Paxxeng	799	564
Phonxai	153	415
Viangkham	44	74
Xieng Ngern	1688	851
Total	15,349	17,793

Satellite imagery has been used by some projects to map the extent of rubber plantations. The 2015 National Forest Inventory, based on the classification satellite imagery, reported the combined area of forest and agriculture plantations (which includes rubber as well as other species) to be 221,265 ha (DOF 2018). A 2014 study by Fox and Hurni (reported in Hurni and Fox 2018) using time-series satellite imagery suggested 7,656 km^2 (or 765,600 ha) could be classified as rubber. Differences in imagery resolution and classification techniques are important here.

Figure 4: Mapped Rubber in Luang Prabang, 2018, using Google Earth



Smallholder rubber investors are making decisions about rubber based on latex price fluctuations and those of other crops. Some research suggests a direct transition from natural forest to rubber has occurred (Thongmanivong et al. 2009). The scale and dynamics of this transition, including interactions with other agricultural activities, and the degree to which this is causing new forest clearing is not clear. Rubber has replaced forest (Thongmanivong et al. 2009, Liu et al. 2016), swidden fallow land (and hence upland rice) as well as crops such as Teak, Job's Tears and maize (our research). In some places, farmers are now converting rubber back to other crops or for grazing and in others natural forest is regenerating in abandoned rubber stands.

In Northern Laos rubber landscapes are heterogenous, mixed with other crops, fallow land, remnant natural forest, degraded forests, and other plantations, enabled in part to the smaller scale (contract and smallholder) investments and agricultural transitions. In Southern Laos, where concession agreements are more common, regulations coupled with lack of data for land use planning and

allocation have resulted in the clearing of areas of fallow and degraded forestland by companies for rubber plantations, which are creating more homogenous landscapes (Özdogan, Baird and Dwyer 2018).

In addition to basic spatial data, information on other factors is needed to determine the volume and quality of rubber latex rubberwood and the timing of when it will be available for processing. These include: rubber clone, site conditions, stocking, spacing, management, tapping skill planting age, rotation length, and factors that influence the timing of harvesting, such as ownership/management intent and clear rights to tree ownership, harvesting and sale and replanting. In Laos there is limited available information on many of these factors. To be able to predict when, how much and what quality wood will become available inventory and biometric data are also needed.

Available data only summarises the area of rubber plantations under generic investment models in Laos (Table 3) based on data from DOF 2018). The models vary based on company preference, influenced by practice in investor countries. Generally, company investments in Laos are Vietnamese concessions in the south and central Laos, and dominantly Chinese contract farms in the north. There are more smallholders in Northern Laos than in the south. Southavilay (2016) summarised this distribution on a province-by-province basis (Figure 5).

Table 3: Proportions of rubber plantations under different investment models in Laos (FSIS 2018)

Species	Smallholder	Contract (e.g. 2+3)	Concession	Total
Planted	78,002	78,320	128.823	275,146
Approved	NA	119988	210,780	330,768

Data on concessions and some contracts have been compiled for the Land Concession Inventory project (Schönweger et al. 2012), and at the time of writing a Land Concession Inventory System was under development (pers. Com. Ingalls, 2020). This data does not include smallholders and some contracts. Data on concessions shows that between 2001 and 2015 around 220,000 ha were approved for rubber plantation development (DOF 2018, Figure 6), but this does not provide any indication of area actually planted, or tree survival rates.

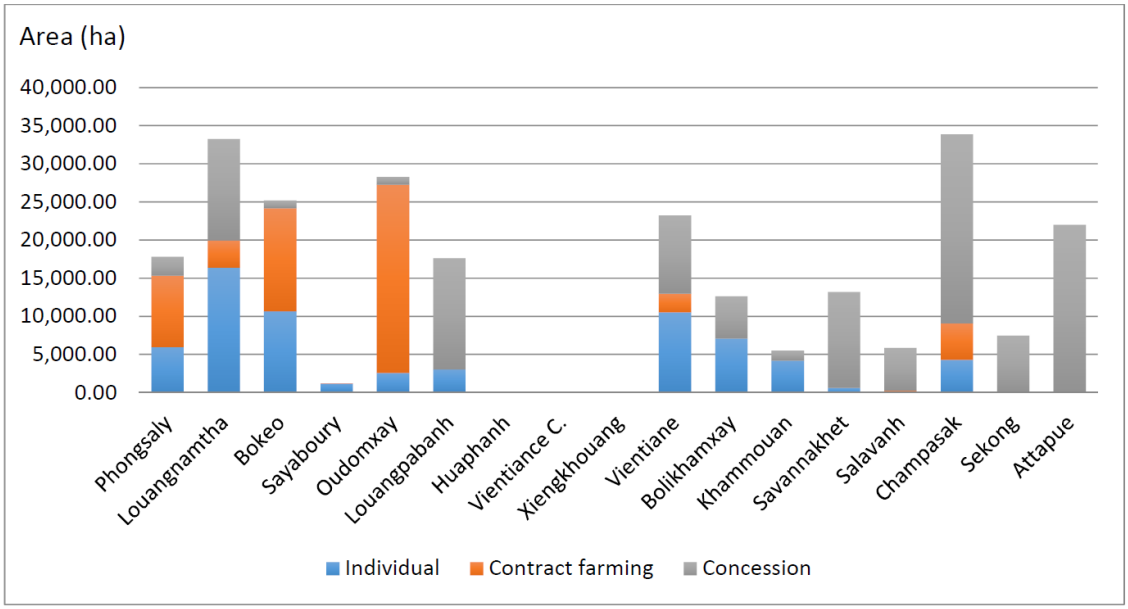


Figure 5: Rubber Plantation ownership in Laos

Precisely determining the age of plantations and sourcing other relevant information for predicting latex and wood supply will require the consolidation of information held by companies and investors - such as clones planted, planting date, management practices and plantation conditions as well as stand level timber inventory of plantations.

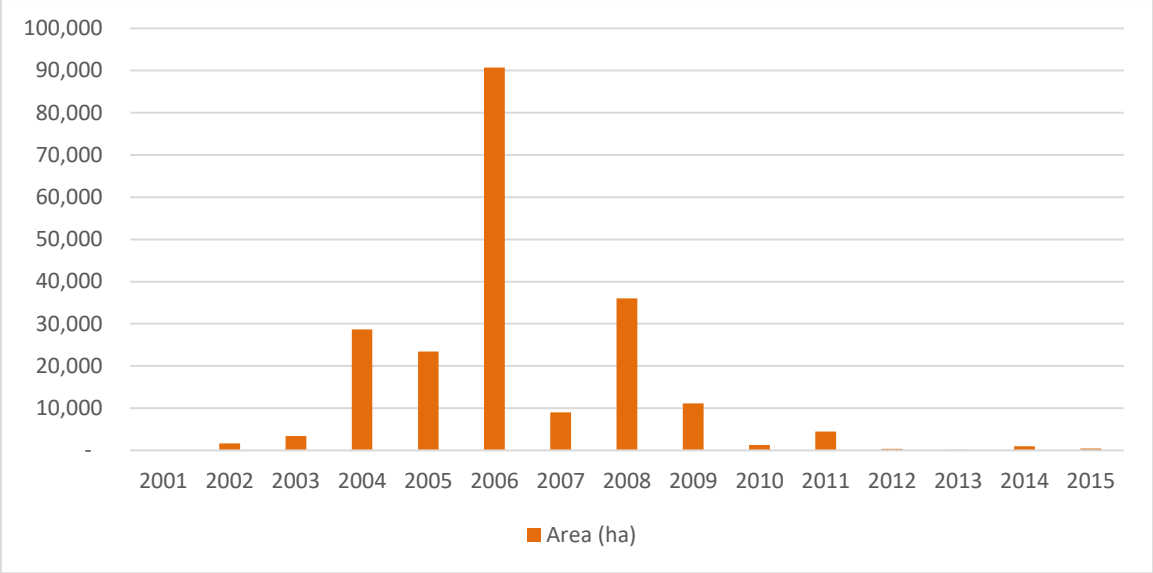


Figure 6: Area of rubber in approved concessions 2001-2015

Latex production

We were unable to source current national data for rubber plantation productivity in Laos. Southavilay (2016) reported yields in the first year of tapping at 904 kg/ha, 1,380 kg/ha in the second year, and 1,999 kg/ha in the third year; a pattern consistent with the normal yield profile of a rubber plantation reported in Manivong, (2009). Southavilay also reported (using data from NAFRI in 2013) the average productivity in the north to be about 1.86 ton/ha/year, in the centre about 2 tons/ha/year and in the south about 0.7 tons/ha/year (NAFRI, 2013). In 2016, the Ministry of Industry and Commerce reported a yield 1,360 kg/ha.[3] Data provide by NAFRI (Duangsavanh and Manivong 2011) used 1,300 kg/ha to compare rubber investments with other crops (Table 4). Companies we interviewed in Southern Laos reported yields of 2.19 tons/ha or 5.39 kg/tree in 2018, and Baird et al. 2018, reported 40 litres per day per tree and up to 80 litres/day, also on Vietnamese plantations in Southern Laos.

Laos is a small producer of natural rubber on a global and regional scale. According to the International Rubber Study Group (IRSG) the global area of rubber in raw rubber producing countries totals 13.3 M ha, of which 12.3 M ha are in Asia and account for about 90% of the global rubber tree growing area. Indonesia has the largest area of rubber at 3.6 M ha, of which 83 % are harvestable for latex, yielding 1,104 kg/ha. Thailand, the largest producer of rubber, has the second largest area, at approximately 3.1 million ha of rubber plantation (about 1.6 million hectares are owned by rubber farmers)[4] yielding 1,394 kg/ha. However, the Government of Thailand is planning to withdraw 790,000 ha from rubber cultivation over the next 20 years, while increasing the value of rubber exports more than threefold. Malaysia has 1.07 M ha, with around 45% harvestable and yielding 1,400 kg/ha, but much of which is reportedly abandoned.[5] China's rubber tree planting area ranks third, with a total area of 1.2 M ha, of which 720,000 ha (62.0%) can be harvested, with a yield of 1,075 kg/ hectare. Vietnam has 946,000 hectares of rubber plantations with a total productive area of 672,000 hectares, with a yield of 1,659 kg per hectare.[6] In India around 614,500 hectares of the country's 822,000 hectares are being tapped[7] at 1,402 kg/ha), The proportion of small farms in India (planting area less than 40 hectares) is relatively high, accounting for about 90% of the total area. Myanmar ranks seventh, with a total area (in 2015) of 650,800 hectares.

[3] Presentation on Developing a Value Chain Analysis of and Strategy for the Rubber, Cassava, Maize and Cattle Sub Sectors in Laos: Introduction & Background, prepared by Global Development Solutions.
[4] https://intelligence.businesseventsthailand.com/en/industry/tire-and-rubber
[5] https://themalaysianreserve.com/2019/10/14/more-than-half-of-rubber-plantations-are-abandoned/
[6] Unpublished data compiled by Vietnam Rubber Association from the Vietnam Statistic Office
[7] https://commerce.gov.in/writereaddata/uploadedfile/MOC_636871123490373426_National%20Rubber%20Policy%202019.pdf

Table 4: Comparison of rubber with other crops production

Crop	Yield (kg/ha/yr)	Price (LAK/kg)	Price (LAK/ha/yr)	Cost	Crop	Yield (kg/ha/yr)
Rubber	1,300	10,500	13,650,000	1,570	250	55,000
Eucalyptus	16,500	210	3,465,000	400	90	38,000
Teak	3,978	2797	11,130,000	1,280	130	86,000
Upland Rice	1,500	2,500	3,750,000	430	295	13,000
Maize	3,000	1,300	3,900,000	450	110	35,000
Cassava	7,600	300	2,280,000	260	100	23,000
Coffee	600	22,000	13,200,000	1520	265	50,000

Rubber Latex Markets

Laos' rubber latex production chains are export driven, with most natural rubber undergoing only primary processing before being exported. Despite its relatively small scale, the country is well situated within an Asian "rubber-basket", with market connections likely to be improved with investment in regional transport infrastructure. Nevertheless, Lao producers of rubber products (latex and wood) will have to compete with their larger neighbours - Thailand, Indonesia, Malaysia, India, Vietnam, and China - the world's top six natural rubber producers. Since 2016 most rubber latex has been exported as technically specified rubber (TSR, Table 5). In 2019, rubber latex exports from Laos were valued at USD$169M, or 2.1% of Laos' national export value,[8] although other sources report the value to be as high as USD $259M.[9]

Table 5: Rubber export forms (net weight, '000 kg)

Year	Natural rubber latex	Natural rubber in smoked sheets	Technically Specified Natural Rubber	Other Natural Rubber
2010	259.4	2.0	55.9	-
2011	-	-	1,078.0	352.4
2012	48.9	47.5	-	-
2013	4,942.1	-	-	-
2014	8,602.9	324.9	7,270.4	3,294.0
2015	13,231.9	-	9,790.6	10,621.4
2016	6,303.8	53.3	29,493.2	17,566.0
2017	10,466.4	-	65,502.8	5,340.2
2018	10,000.8	-	73,009.7	5,849.9
2019	68,895.0	760.0	137,049.0	17,216.5

Source: UN Comtrade Database

Data provided to us from MOIC listed 24 registered rubber factories in Laos in 2019 (Table 6).

Table 6: Registered Rubber Factories in 2019

Province	Large	Medium	Small	Total
Attapeu	1			1
Bokeo	3	2	1	6
Champasack	3			3
Khamouane	2		1	3
Luang Namtha	4		1	5
Oudomxay	1			1
Sekong	1			1
Vientiane	1			1
Xayaboury	1	2		3
Total	17	4	3	24

[8] https://trendeconomy.com/data/h2/Laos/TOTAL

[9] http://www.worldstopexports.com/natural-rubber-exports-country/

According to the 2018 Forestry Sector Indicator Survey (DOF 2018), almost all the natural rubber latex produced in Laos is exported to China and Vietnam. In 2019 the main destinations for Laos' rubber were Vietnam (45%) and China (54%), with small volumes exported to Malaysia and India (and see Table 7, Source UN Commtrade).

Table 7: Rubber Exports from Laos 2010-2019

Year	Rubber Export Destinations (kgs)						Total
	China	Viet Nam	India	Malaysia	Thailand	Other	
2010	315,243				1,991		317,234
2011	575,609	848,712			6,068		1,430,389
2012						15,676	
2013							
2014	8,352,275	9,664,903	23,716	581,540	350,488	519,267	19,492,189
2015	12,544,416	18,293,369		1,759,184	603,217	443,718	33,643,905
2016	16,840,499	34,519,648	413,623	943,714	352,766	346,043	53,416,291
2017	43,329,058	36,667,779	66,466	732,790	43,381	469,965	81,309,443
2018	40,793,995	47,800,475	94,915	171,024			88,860,411
2019	121,757,594	100,079,180	483,840	1,600,000			223,920,614

Between 2000 and 2016 the export value of natural rubber increased from around USD$0.1M to over USD$151M, overtaking coffee as the most valuable export cash crop in 2013 (source DOF 2018). In 2018, the export value was over USD$168M (Source UNCommtrade, Table 8) and in 2019, rubber latex exports from Laos were valued at USD$217M, or 2.1% of Laos' national export value[10], (although other sources report the value to be as high as USD $259M)[11]

Table 8: Export value of rubber (HS4001) by importing country (million USD, '000 metric ton)

Year	Value (USD $'000)
2010	$613.65
2011	$4,554.58
2012	$10,892.45
2013	$40,380.30
2014	$45,616.66
2015	$60,707.42
2016	$75,041.82
2017	$152,525.71
2018	$168,159.28
2019	$217,486.40

Source: UN Comtrade

There has been price volatility in natural latex, reaching a high of over USD$6/kg in 2011 and a low of under USD$1.50/kg in 2015 (Figure 7, Source UNComtrade). Forecasts (based on Malaysian rubber) are for a steady price increase to over USD$2.4/kg by 2030,[12] but near-term forecasts are poor, due in part to the impacts of COVID19 on demand in the manufacturing sector.[13, 14] Natural rubber imports by China, the world's biggest consumer, could fall by 5.1% from a year ago to 4.8 million tonnes, according to the Association of Natural Rubber Producing Countries (ANRPC).[15]

[10] https://trendeconomy.com/data/h2/Laos/TOTAL
[11] http://www.worldstopexports.com/natural-rubber-exports-country/
[12] https://www.statista.com/statistics/469630/rubber-price-forecast/
[13] https://www.beroeinc.com/category-intelligence/natural-rubber-market/
[14] https://globalrubbermarkets.com/219584/natural-rubber-industry-in-crisis-as-pandemic-depresses-demand-association.html
[15] https://globalrubbermarkets.com/219584/natural-rubber-industry-in-crisis-as-pandemic-depresses-demand-association.html

Figure 7: Rubber price 2003-2018

Note: Rubber, No. 3 Smoked Sheet (RSS3), Singapore Commodity Exchange, 1st contract (Source: Singapore Commodity Exchange (SICOM))

Rubberwood Markets

Due to the relatively young age of most of the rubber plantations in Laos, there are limited existing markets for rubberwood. Markets for rubberwood in neighbouring Viet Nam, China and Thailand have been strong and are likely to become destinations for Laos rubberwood in the future.

Chinese rubberwood processing and manufacturing is aimed predominantly at the domestic market, which is large enough to consume most products. Official projections by the State Forestry and Grassland Administration of the People's Republic of China (SFR-PRC) in 2018 for the year 2020, accredits a domestic timber supply capacity of 300 M m^3 per year with an increased industrial demand of 467 M m^3, leaving a deficit of 167 M m^3 to be covered by imports (Hoffmann, Jaeger and Shuirong 2018). The annual consumption of sawn rubberwood in China is estimated at around 6 M m^3 with some 80% imported from Thailand. The imported rubberwood is sawn, treated and dried in Thailand before being shipped to China. Secondary processing takes place in China for joinery and furniture. Some finger jointing processes are completed in Thailand. Analysts suggest that 45% of the imported rubberwood is used for furniture manufacturing with 24% for wooden doors and 26% for cabinets. Most of the balance is said to be used for flooring.[16]

In Viet Nam, rubberwood has become important raw material for the wood products industry; and is Viet Nam is the world's third-largest natural rubberwood exporter. Over the past few years clearing of senile rubberwood has yielded between 4.5 and 5 M m^3 of roundwood, around 70% of which is utilised by manufacturers. In 2017, exports of rubberwood products were worth around US$1.7 B, accounting for almost 25% of Vietnam's wood products exports (ITTO 2019). Vietnam has around 970,000 ha of rubber trees, of which an average 25,000 hectares produce over 4.5 M m^3 of wood each year. Almost all wood belongs to subsidiaries of the Vietnam Rubber Group[17].

Thailand's rubberwood sector has also been booming. With over 3.7 M ha[18] of rubber plantations the value of rubberwood exports from Thailand, 90% of which goes to China, was 29.4 M Thai Baht in 2019. In the long term rubberwood production was expected to expand by approximately 5% per year, reaching 35 M tons in 2030 as plantings in 2000-2005 mature (EIC 2016). In March 2020 Thai Hevea Wood Association estimated that around 60 per cent of Thai rubberwood entrepreneurs were expected to be out of business due to the outbreak of Covid-19, following a decline in imports by China.[19]

[16] http://www.globalwood.org/market/timber_prices_2019/aaw20190301d.htm
[17] https://english.vov.vn/economy/vietnams-rubber-wood-available-in-over-100-nations-territories-384315.vov
[18] https://www.reuters.com/article/thailand-rubber/thailand-aims-to-reduce-rubber-plantations-ramp-up-value-of-exports-idUSL4N28E2EW
[19] https://www.nationthailand.com/news/30384807

Policies

The expansion of rubber in Laos has been driven by, and emerged in response to, parallel and intersecting policies, particularly related to land marketization, opium replacement, industry development and forest cover and land degradation. Regional policies and those of neighbouring countries have also been highly influential. Here we explore several of the main policy threads to understand the context of the current settings for the Lao rubber sector.

Land Marketization or 'Turning Land into Capital'

Policies for land marketization have been instrumental in rubber expansion in Laos. After the establishment of Lao PDR in 1975, all land was officially nationalized and managed by the government on behalf of the national community. Land use rights were not formally granted to individuals or households. In 1978, a collectivization initiative was introduced, but then halted during the 1980s and in 1986 the government initiated the New Economic Mechanism (NEM) (Yamada 2013) which included multilateral collaboration, economic reforms with price and trade liberalization, policy and structural reforms, promotion of direct foreign and private investments and a market economy as the key to economic growth with security of assets, collateral-based investment, and a tax base dependent on property ownership (Boutthavong et al. 2016). The Government began making laws to bring these reforms into effect, with both citizens and foreign investors seeking legal protections. However, the new laws lacked a constitutional basis (Stuart-Fox 1991) until the 1991 Constitution introduced some protections for investors. Article 15 of the new Constitution provided for 'ownership', although this remained with the national community, with use rights provided by the state.

Not long after, in 1992 the Government enacted a Decree No. 99 on Land[20] and on Land Tax in 1993[21] with provisions for the allocation of land use rights to individuals and foreigner's through leases or concessions. Article 2 of Decree No. 99 stated:

> The State organizes the distribution of land to Lao citizens for legally supported long-term possession and use and considers the approval of lease or concession for foreign residents and expatriates.

A Decree on Land Forest Allocation[22] was made in 1994 followed by a policy on forest and land use planning and allocation in 1996 through Prime Minister's Decree on Land Allocation No. 03/PM. This process has been extensively described by others (see for example GTZ 2005, Boutthavong et al. 2016). The Land Forest Allocation project was in part aimed at addressing the 'problem' of shifting cultivation in the uplands, including by providing alternative and sedentary land uses. It was also in 1994 that Provincial agriculture and forestry staff visited Mengla in China for training in rubber cultivation and brought seed back with "a buying agreement of rubber between Namtha district and Department of Business Management of Mengla"; rubber was promoted in the Namtha District plan to reduce poverty (NAFRI 2003).

In 1997 a revised Land Law promoted land development, and, while it provided for land leasing, concessions over state land were not mentioned. Also, in 1997 Laos joined the Association of Southeast Asia Nations (ASEAN) and applied for full membership of the World Trade Organisation (WTO). The following year Laos joined the ASEAN Free Trade Area.

In the early 2000s, policies were further amended to mobilise land markets, and promote land-based investments supported through another revision to the Land Law (in 2003) and new laws on both domestic and foreign investment (in 2004, superseding those made in the mid-1990s). It was this 2003 Land Law that provided for the granting on concessions over state land, supported by a Law on Foreign Investment that was also strong on the issue. The Forestry Law, first made in 1996 and then subsequently revised in 2005, 2007 (and most recently in 2019) also included specific provisions for the leasing and granting of concessions over state forestland.

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[20] Decree No. 99 on Land, 1992

[21] Decree No. 50 on Land Tax 1993, this abrogated a Decree No. 47/CCM, on Agricultural Tax and Land Tax made in 1989 (unable to be sourced for this study)

[22] Decree on Land Forest Allocation No. 186/PM 1994

Throughout these reform processes various efforts were also being made to formalise the land use rights of individuals (albeit very slowly) and the issue of customary and community rights and land allocation to villages were also being grappled with, mostly at the behest of NGOs and donors. Temporary and permanent land use rights could be granted to individuals and households as well as other legal entities. Land was allocated based on use and household labour capacity, and formal allocation provided for rights for land use, usufruct (including generate income through lease), transfer (by sale, transfer, or exchange) and inheritance. Land allocation included up to 3 ha per labour unit in each household for growing industrial agricultural crops and agricultural and tree plantations on forestland. This facilitated the planting of trees by households, particularly of teak (See Smith, Ling and Boer 2017), and rubber.

Foreign investment in Laos increased as was hoped, but the revenue from land leases and concessions remained relatively low; in 2004-2005, for example the proportion of revenues from state land accounted for only 0.24% of GDP (GTZ 2006). A study undertaken by the German Land Policy Development Project (part of Land Titling Project II), reviewed the background to this dilemma, and presented options for "*transforming state land into capital*" (GTZ 2006, our emphasis).

The catch cry 'Turning Land into Capital' (TLIC) began to circulate in the government and amongst researchers and donors. Precise interpretations of the slogan's meaning differ, but there is a general common logic that foreign investment in land should be harnessed as a way to raise capital (through government revenues derived from fees and taxes) for the establishment of much needed infrastructure improvements throughout Laos. Relevant policies which facilitated the commercialization of land markets in Laos included those providing heavier tax breaks for more remote investments (with the expectation that companies willing to be based more remotely would build infrastructure around their projects) and providing holidays on taxation until a company was productive (e.g. in rubber, many companies were not required to begin paying certain fees and taxes until the 7th year as this was when latex was expected to begin being tapped). Initiatives like the Land and Forest Allocation Policy and other land, forestry, and agricultural reforms were also seen as paving the way for the agricultural commercialization efforts carried out under the banner of TLIC (Dwyer 2007).

Over time, concerns about policy implementation and the governance of land-based investments, including rubber, emerged. The limited revenue to the government budget derived from these investments (as reported by the 2006 GTZ study) did not correlate with the skyrocketing number of land deals which increased fifty-fold between 2000 and 2009 (Schönweger et al. 2102) and there were increasing concerns about environmental and social impacts of large scale land acquisitions (Barney 2007, Baird 2014). National Land Conference Resolution No. 06/PM (30 May 2007) instructed the Government to suspend all proposed land leases and concessions greater than 100 ha for both domestic and foreign investors growing industrial tree crops or short rotation cash crops (Article III.5) and review all existing leases and concessions (Article III.6), but simultaneously promoted land contracts under '2+3' arrangements (with 2 inputs of land and labour from farmers and three from companies – capital, technology and markets). The moratorium was effectively (although not explicitly) repealed in 2009 with the making of a Decree on State Land Lease or Concession (No. 135/PM) in May 2009 which (Article 1) "determines the principles, procedures, and measures regarding granting of state land for lease or concession with the aim to ensure the uniform management and use throughout the country, to boost the development of state land, *to turn land into capital* (our emphasis) to promote the investment for cash crop production and for services, and to build income for the state budget". Less than two months later, approvals for concessions greater than 1000 ha were reportedly suspended (Vientiane Times 2009) following a Cabinet meeting at which concerns were raised by members of the National Assembly and The Ministry of Agriculture and Forestry (Baird 2012, Kenny-Lazar 2012 and Lu and Schönweger 2019), although no formal instrument to this 2009 suspension has been found. Both Resolution No. 06/PM 2007 and Decree No. 135/PM triggered reviews of existing concessions, and with support from donors MONRE undertook a nation-wide examination of concessions and leases (Schönweger et al. 2012). That review resulted in a new suspension order on all new investment projects associated with mineral ore exploration, and rubber and eucalyptus plantations (PM Order No. 13, 2012, 'PMO13'). The Government of Laos has since been undertaking a 'Quality of Investment Review'.

Following Resolution No. 06/PM 2007 and PMO13, the reviews of investment activities and ongoing and protracted reviews of the Land Law, Forestry Law and the Decree on Plantation Investment Promotion, the investment climate for large-scale tree plantations including rubber, stagnated; a situation compounded by new concerns about the performance of other land-based investments, particularly bananas (Mienmany et al. forthcoming). The National Land Allocation Master Plan, made in 2018, raised concerns about the impact of the conversion of agricultural land to tree crops and required that the allocation of lands for these must to be included in land use planning at the provincial, district and village levels.[23]

As the Quality of Investment Review progressed, and with advocacy from donors and industry, PMO13 was lifted in part in 2018 through PM Order No. 09, dated 2nd July 2018[24] ('PMO09') which lifted the ban on some tree plantations (Eucalyptus, Acacia, *Acacia mangium*, Teak, Bamboo and other native species); but the ban on new concessions or leases for rubber remains in place. The Order allows individuals, legal entities and organizations to use land under their ownership to plant rubber, but all existing rubber concessions and all new and existing '2+3' investments require inspection and review, and, if necessary, to be re-negotiated. New instructions have been issued by the Ministry of Agriculture and Forestry[25] (MAF) and Ministry of Planning and Investment[26] (MPI) on the implementation of PMO09, and Decrees on Security Deposits for Concessions (Decision N. 2735/MPI dated 2/11/2018[27]) and on the Approval of "Controlled Business Activities[28]" (Decree No. 03/PM 2019) have been made. In 2019, some rubber investors, including those we interviewed, had been inspected by MAF and were receiving letters from MPI reviewing the performance of their existing concessions and retrospectively applying the terms of these instructions, including for security deposits.

Forest policies

While land governance reforms were occurring, Laos was also committing to address issues related to forest decline - including forest cover and condition. With the NEM and its a shift towards a State led market-oriented economy came the 2nd National Socio-economic Development Plan (1986-90) which highlighted a program to curb and eventually stabilize shifting cultivation, as its second priority after increasing food production - a major Government policy issue since 1975. The program stressed that 300,000 ha of forests were being destroyed annually by shifting cultivation, causing serious environmental degradation. In 1989, the first National Forestry Conference was convened to review and assess the forestry situation and to outline the measures for action towards forest management and protection. This was a turning point in the forestry sector with a theoretical shift signalled from exploitation-based forestry to the "preservation, planting and development of forests" (Resolution of the First National Forestry Conference, 1989). The conference effectively laid down the basis for the formulation of the Tropical Forestry Action Plan for Laos and shortly after the conference Decree 117/CCM (October 1989) on the Management, Use of Forest and Forest Land was adopted (Tsechalicha and Gilmour, 2000). That Decree provided for the granting of 2-5 ha of forests and forested land for farmer households to use, and 100-500 ha to villages and cooperatives to safeguard, regenerate and reforest. It also promoted the voluntary regeneration and reafforestation of fallow land and degraded forested land, the right to which could be recognized by the state, provided the provisions and regulations on forestry were strictly respected. The Conference agreed on steps to reverse deforestation and resolved that forests cover should be returned to 70 percent by the year 2020.

In 1990, the Tropical Forestry Action Plan for Laos was produced and several other forestry regulations were subsequently made including a Logging Ban (Decree No. 67/PM, 1991), a Decree on the Management of Forest and Forest Land (No. 169/PM, 1993) and a Decree on the Allocation of Land

[23] Based on an Unofficial translation made in 2019.
[24] Prime Minister's Order No.09/ Concerning the enhancement of governance in the use of concession lands for industrial tree plantation and the plantation of other crops within the country, dated 02.07.2018.
[25] Instruction No. 1758/MAF on the implementation of Order No. 09/PM, dated 02 July 2018, on the enhancement of management and use of land areas for concession of industrial tree plantation and planting other crops nationwide, dated 30/07/2018.
[26] Instruction No. 457/MPI On Investment Approval and Land Management Mechanism for Leasing or Concession to Cultivate Crops dated 27/02/2019
[27] Decision No 2735/MPI Decision on Security Deposit for Concession Activities dated 2/11/2018)
[28] Decree NO. 03/PM on the approval of the controlled business list and concession activity of Lao PDR dated 10/01/2019

and Forest Land for Tree Plantations and Forest Protection[29] (No. 186/PM, 1994) (Ohlsson and Inthirath, 2001). Decree No. 186/PM provided a basic legal framework for the promotion of tree planting and included exemptions from land tax for plantings of more than 1,100 trees/ha, rights to ownership of planted trees (use, harvest, sale, transfer and inheritance) and relief from royalty payments. The primary stimulus for this decree was to secure foreign and domestic investment in tree planting (MAF 2005). The timing aligns with the initial post-independence arrival of rubber in Laos.

The first Forestry Law was made in 1996 (repealing the decrees described above) and in 1997 a "Vision 2020" was developed by the Department of Forestry to translate policy into strategies. As part of this vision, the Government again included the 70% forest cover target (Tsechalicha and Gilmour, 2000) - a target that remains in place to this day. Also in 1997, the Land Law allowed for the granting of forestland to individuals and households and the granting of leases over larger areas of land; this same provision was provided for in the 1996 Forestry Law for the purpose of forest development. There was increased emphasis on tree planting, promoted through multiple and over-lapping policy objectives –to address forest degradation, restore forest cover, as an alternative (and sedentary) livelihood option to slash and burn, addressing poverty through income generation, and for commercial wood production and industry development. These themes have dominated Lao forest policy ever since and have also been perpetuated in donor discourse and research agendas. It was also within this Vision 2020 that the target of 500,000 ha for re-afforestation was first set (Kingsada, 1998, in Tsechalicha and Gilmour, 2000) and the approach to forest plantation management and forest rehabilitation shifted towards small-scale plantations. The promotion of the planting of trees by farmers on their allocated land ramped up.

In 2000 a regulation concerning the development and promotion of long-term tree plantations (No. 196/AF) was introduced to promote development of 'long-term' plantations to reduce the use of timber from natural forests and promote investment. This regulation included detailed provisions for larger scale plantations and the approvals required for foreign investment. These were further elaborated in subsequent instructions (No. 115/MAF 2002) with efforts to further mobilize tree planting made in 2003 (Decree No. 96/PM) including with the introduction and expansion of financial incentives such as fee and tax exemptions. Decree No. 96/PM remained in force until 2019 when a revised Decree was issued (Order No. 247/GO). In all cases these have been species neutral regulations - with no emphasis on what should be planted – and none specifically mentioned rubber.

In 2005 the Forestry Strategy 2020 (MAF 2005, FS2020) was launched, and this reiterated policies for protecting and restoring forest cover, improve rural peoples' livelihoods, as well as the development of the wood processing sector. With respect to plantations FS2020 includes a policy to: "promote tree planting and management by setting clear purposes with relevant target owners and markets, and investment schemes to strengthen wood supply base and farmers' income base" to be implemented via specific programs and actions including the formulation of a National Tree Plantation Development Plan with comprehensive coverage from tree breeding to plantation management and processing, with clear target groups and incentives. The incentives include tax exemptions, access to plantation inputs and extension services. Rubber was included in the plan.

The Forestry Sector Development Report for 2006/07 (MAF 2007), reporting on the implementation of FS2020, noted a tree planting boom in Laos of not only large foreign and domestic investors but also farmers converting their fallow land to rubber, Agarwood and teak plantations. The role of '2+3' type investments was highlighted. The report noted forest land use investment in crop and tree plantations, especially large-scale investment in the form of state land concession, was rapidly increasing. The requested land area for investment proposals in plantations at the central level was close to 2 million ha. Various conflicts related to land use and concessions were being reported and the Government suspended new concessions to review the approval process and field operations of all existing concessions. While commercial crop/tree plantations were priority areas for the promotion of foreign investments, relevant Ministries and Provinces were not well prepared or equipped to manage and control investment in plantations. Rules and regulations concerning investment appraisal, selection of land for concessions including consultation with local villages and monitoring of actual investments were not fully developed or enforced. Consequently, there were many cases of conversion of intact

[29] This has also been translated as "Delineation and Allocation of Land and Forest for Tree Planting and Protection"

or degraded forest or village forest/land, without subsequent plantation establishment, and inconsistent application of fees and land rental charges.

Over time the Forestry Law has maintained some emphasis on the promotion of tree planting on degraded and barren forest land – for commercial production and restoration, and to increase forest cover. Several orders have introduced to improve forest management and conservation, regulate wood processing and promote the manufacture of finished products, whilst attempting to limit round log exports – both legal and illegal (Orders No. 31/PM 2006, No. 17/PM 2008, Decree No. 32/PM 2012). None made any reference to rubber cultivation.

The rapid expansion of rubber became an important contributor to achieving the forest cover and plantation targets, but also became a cause for concern for some with criticism of commercial plantations (including rubber) as being one of the causes of the clearing of primary forests (Ducortieux 2001 in Foppes and Ketphanh 2004). The Government and others began to worry about the consequences of unplanned spread and the impacts on local people and the environment, with studies initiated and workshops held to explore key issues and make recommendations (for example Alton et al. 2005 for GTZ, sponsored by the Lao-German Program Rural Development in Mountainous Areas of Northern Lao PDR; Raintree 2005, for NAFRI).

Concerns about labour availability to support the anticipated large-scale investments were also beginning to be raised. At a workshop in 2006, organised by NAFRI, a temporary moratorium on all private rubber investment in Laos was proposed to provide time for guidelines to be developed. The 2007 moratorium, described above, was introduced just over 1 year later. It was also at that workshop that it was noted that "rubber planting booms create regional and landscape level changes" and "that rubber should not be classified or considered as a forest substitute" (NAFRI 2006). This latter point highlights a tension that has existed for plantations generally and rubber specifically in the context of forest policies in Laos, particularly the 70% forest cover by 2020 target. Without rubber, progress towards the goal of establishing 500,000 ha of plantation to contributes to the 2020 target would have been poor (Figure 8, based on DOF unpublished data 2019).

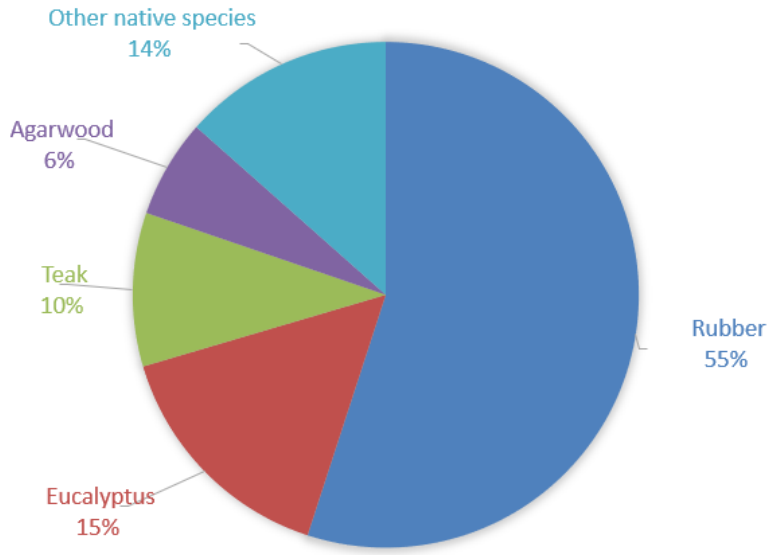


Figure 8: Plantation contribution to 2020 500,000 ha target

Scrutiny of rubber investors and investments increased - covering a wide range of issues, particularly by academics (Diana 2006, Diana 2007, Mazard 2007, Manivong 2007, Manivong and Cramb 2007, Hurni 2008, Shi 2008, Haberecht 2009, Kenney-Lazar 2009, Khounsy 2009, Thongmanivong et al. 2009a, Thongmanivong et al. 2009b, Baird 2010, Srikham 2010, Baird 2011, Castella et al. 2011, Baird 2012, McAllister 2012), donors (Obein 2007, World Bank 2008, UNDP 2010) and international NGOs (Castella et al. 2009, Thanthathep et al. 2008, Lang 2008, Earth Rights 2008, Wehrmann 2008, Hicks et al. 2009, Douangsavanh et al. 2009), but also by the Government and its policy research centres (NAFRI 2007, NAFRI 2009, MAF 2009, MONRE 2009, NLMA 2009).

In around 2012 the Forestry Law entered a protracted period of review and revision which ended in June 2019 with the approval of a revised law by the National Assembly. In 2020 the government commenced a review of Forestry Strategy to 2030, although the 70% forest cover target remain in place and opportunities for concessions and leases of state forestland have been expanded.

Policies for Investment, Markets, Trade and Processing

With its early forest sector activities dominated by revenue from large-volume log exports from the unsustainable and illegal harvesting and clearing of natural forests, following the NEM Laos turned to policies to increase domestic industrial processing, including through foreign investment in that sector.

The 1994 a Law on Foreign Investment listed several sectors in which foreign companies could invest including agriculture and forestry, manufacturing and handicrafts and allowed these entities to lease land for that purpose. It was on this basis and the Land Law that rubber concessions and contracts for rubber investments have been, or should have been, approved. Subsequent investment promotion laws in 2004, 2009 and 2016, introduced various conditions and incentives, including with respect to the environment, labour, concessions, and the processes for making them, and promotional measures.

For the processing sector specifically, the 1999 Law on Industrial Processing, sought to promote investment in industrial and handicrafts processing for the production of consumer goods as import substitutes, and to produce goods for export by utilising domestic raw materials, primarily from agriculture and from forestry. In that Law the domestic processing of wood and wood products was listed as the second most important sector (after food and beverage processing), with processing of "rubber and plastic products" listed 9th. The Law identified the need for a policy to promote the production of raw materials (Article 17) stating that the "industry and handicrafts sector and the agroforestry sector [shall] jointly issue a policy to promote and create a plan to encourage cultivation [and] animal husbandry by households, cooperatives, and other economic parties in order to supply raw materials to industrial and handicrafts processing factories as required". It also recognised different types of investment:

1. Investment by households.
2. Joint investment by groups of people.
3. Investment by State enterprises.
4. State enterprises investing together with the domestic private sector or foreign investors.
5. Investment by the domestic private sector.
6. Investment by the domestic private sector together with foreign investors.
7. Investment by a foreign investor in its sole capacity.

While there have been several attempts to reform the wood processing sector since the mid-2000s, including through Prime Minister Order No. 31/PM in 2007 and Order No. 17/PM in 2008, their success has been limited. These resulted in policies for processing and products standards, value adding, occupational health and safety and the establishment of wood processing associations. In response to Order 17/PM, MOIC began to strictly regulate wood exports and promoted the utilization of plantation timber in place of natural timber to supply wood processing factories. However, just as the nascent plantation wood processing sector began to grow, it was impacted by ongoing efforts to mitigate the remnants of the unsustainable and illegal harvesting and export of natural timber, including from development areas which some cases were for projects approved for the establishment of new industrial plantations (Baird 2014) including rubber. Some of the complexities of regulations over natural forest were imposed on the plantation sector, stymying progress. These are still being addressed to this day.

Prime Minister's Order No. 15, On Strengthening Strictness of Timber Harvest Management and Inspection, Timber Transport and Business, which was issued in May 2016 ('PMO15'), although not aimed at the plantation sector, had the effect of mobilizing MOIC to review all processing enterprises with a view to closing those operating illegally or within or near protected and conservation areas, and improving the standards of those remaining. Many small plantation wood processors were impacted by this action. Micro/household and small enterprises were particularly targeted in this review process, and this is an indication of an ongoing policy dilemma in the sector. While there are policies to support and promote Small and Medium Enterprises (SMEs) these are not reflected in

practice in the wood processing sector at least. Additionally, PMO15 banned the export of round and unprocessed wood products - and this had impacts for both plantation wood processors and plantation growers (see Smith et al. 2019 for a discussion of the impact on teak in Northern Laos). Lists of products that could be exported were developed and this initially did include rubberwood. These lists were felt by industry and some other stakeholders to be unnecessarily restrictive for products from plantation grown timber and subsequently revised.

Despite plantations being a persistent theme in forest sector policies, the promotion of a plantation-based wood processing sector has taken second place to other priorities. In an industry heavily dominated by the processing of more-readily available natural species into typically low-quality products, the available plantation grown wood has mostly been processed by small and medium scale local enterprises, with only a few investments in larger factories – by both domestic and foreign companies. Policies have sought to promote domestic processing into finished products but the reality for a plantation wood processing sector is that, with the exception of farmer-grown teak and some early Eucalyptus plantings, there has been a shortage of available wood. Wood produced from rubber plantations has been largely overlooked.

Opium replacement policies in Laos and China

Concurrent with these domestic policy processes were influential programs driven by the policies of Laos' neighbours. As recently as 1998, Laos was the third-largest illicit opium poppy producer in the world and had one of the highest opium addiction rates. Grown mostly in the Northern Provinces, opium had been an important crop for local people both for income generation and personal consumption since the French colonial era when the opium trade constituted a primary source of revenue for the colonial state. The Lao National Programme Strategy called 'The Balanced Approach to Opium Elimination in the Lao PDR', was prepared in 1999 in response to an agreement between the government and the UN Office of Drugs and Crime to eliminate opium in six years through an accelerated rural development programme in major opium producing districts (UNODC 2000). In 2005 it became illegal to cultivate opium poppy leaving many farmers without the means to make a living. By 2005, the joint efforts of the UNODC and the Government of Laos resulted in a dramatic reduction in opium cultivation in the country. By 2006 Laos was declared almost opium-cultivation free.[30] But recidivism was a considerable fear and the Government of Laos endorsed a national programme strategy for the post-opium scenario and in 2006 the UNODC Strategic Programme Framework for the Lao PDR 2006 – 2009 described the lack of alternative livelihoods for former opium farmers as resulting in a significant risk of a return to opium cultivation.

The UNODC's Opium Surveys started considering coping strategies for opium growers around 2006 and identified rubber as a substitute crop in the 2007 report into Opium Poppy Cultivation in South East Asia (UNODC 2007) in a case study from Myanmar. The report noted crop diversification as one of the most important strategies helping farmers to cope with change. It also noted that lack of inputs caused by the lack of capital to invest, in addition to the lack of agricultural techniques and poor quality of soil, hampered the success of agricultural diversification. In Myanmar rubber was reported to be "mostly owned by Chinese companies and Wa authorities, and offer(ed) casual labour to villagers. However, the low salary paid makes this unattractive. These plantations also reduced the amount of land available to villagers and increased the competition for labour during the peak agricultural season. Rubber plantations were not developed at the village level, because local farmers could not afford the setup costs or the delay of 7 to 9 years before latex production commenced" (UNODC 2007).

A major factor in the timing of the rubber boom in northern Laos was China's narcotics policy, starting in the 1990s China initiated opium-replacement schemes in neighbouring Burma and Laos for the purposes of curbing the influx of drugs into China from the Golden Triangle and the surge in the number of drug addicts (particularly heroin addicts), and also fostering Chinese foreign investment abroad.

The Opium Replacement Program (ORP) commenced in 2004, funded by the central government in Beijing and implemented primarily by the Yunnan Province Ministry of Commerce. The ORP provides

[30] https://www.unodc.org/unodc/en/press/releases/press_release_2006_06_26.html

subsidies, administrative support (e.g. with getting employee visas and paperwork granted), and import quotas allowing participating companies to export agricultural products back to China tax free. China protects domestic producers with a 37% import tax on natural rubber (see also Lu 2017; Shi 2008, Su 2013, Kramer & Woods 2012). Specific investments through the Chinese ORP are described by Jie (2008) in a presentation to the regional seminar on 'Sustaining Opium Reduction' and more generally by Lu (2017) who explores the motives behind these policies and the influence that OPR companies have on rubber markets.

However, the years before ORP companies arrived, Lao smallholders with connections to Chinese rubber farmers had already planted rubber and, seeing their early success, some Lao provincial governments began further promoting it. Only after smallholders began planting did small-scale investors begin seeking modest contract farming and concession arrangements. By the mid-2000s, the ORP and China's Going Out Policy had catalysed larger companies' interest in Laos, and most Chinese rubber investors were granted land between 2004 and 2008 (Schönweger et al. 2012). Cohen (2009) described the emergence of rubber cultivation in the context opium replacement beginning with the early adoption in Luang Namtha through the arrival in the 1980s Hmong refugees from China who had experience of growing rubber on a collective farm in adjoining Muang La county of Xishuangbanna in Yunnan province, China. This was facilitated by the Deputy Governor of the province. Rubber cultivation in the province took off in 2003/2004 because of the convergence and interaction of a number of economic factors. As Cohen describes it, "Neighbouring China had become the world's largest rubber consumer and importer and world prices were high. Also, many of the rubber trees in Xishuangbanna (the major rubber-growing region in China) had reached maturity and required felling; and the vast unused forests of northern Laos offered a solution to declining yields in Xishuangbanna. At the same time there was an urgent demand in Laos for a cash crop to replace opium. Government officials embraced rubber enthusiastically as a godsend solution to the problems of shifting cultivation, opium eradication and poverty reduction (Alton et al., 2005, p. 27). It was even heralded deceptively as an ecologically friendly form of "forest cover"" (Cohen 2009, p. 3).

According to Tan (2015) the government of Yunnan Province was also actively involved in the design of a new master plan for the development of northern Laos from 2003 at the time. In May 2008 in the "North Plan" 2008-2020[31], a technical assistance project that the Chinese government rendered to Laos, continued to promote rubber and stated that "By 2020…. Natural rubber-based agricultural and forestry products processing industry and tourism will become backbone industries of North Laos" (p.4) and that 200,000 hectares of rubber would be planted (p.22), with an output value of USD $240 million US dollars (p,22). The success of opium substitution policies was reported in the plan, although not in direct connection with rubber.

Of all Chinese rubber projects in Laos, 89 percent were established between 2005 and 2008 with the majority of ORP rubber projects located in Luang Namtha (47), Bokeo (19), Oudomxay (14) and Phongsaly (20) – the four provinces bordering China (Lu 2017, 12-13).

In 2008, at a regional seminar on 'Sustaining Opium Reduction in Southeast Asia: Sharing Experiences on Alternative Development and Beyond' the 'issue of rubber' was raised. The report on the seminar noted:

> *Rubber is being intensively promoted as cash crop in the northern regions of Laos and Myanmar and, to a lesser degree, in Thailand. To many, rubber seems to have many advantages. There is a steadily growing market in China (although at the end of 2008 the price fell). Rubber grows in most areas where poppy used to grow (but not over 1,000 metres in elevation). The skills needed to grow rubber are not complicated and can be learned easily by the hill people. Little special handling and no refrigeration is required. The rubber can be transported easily in most places where it is being promoted on the developing road network*

[31] "Planning for Industrial Economic Development and Cooperation in Northern Part of Lao People's Democratic Republic" ("North Plan") was technical assistance project that the Chinese government rendered to Laos, including the Comprehensive Plan and four special plans (Construction of Infrastructures, Development of Industries and Handicraft Industries, Industrial Development of Agriculture and Forestry, Trade, Investment and Foreign Cooperation).

to the markets in China. The potential income is higher than for almost all other alternative crops.

However, there are risks. Although in China there have been very successful rubber schemes, such as among the Khmu in Mong La [Muang La or Mengla] *in Xishuangbanna who have grown it for years and are probably the richest of their ethnic group in the Mekong Region, the private enterprises promoting its cultivation elsewhere are not always fair in their dealings with local people or even provincial governments. While the soil under rubber cultivation is not particularly damaged, biodiversity will be reduced.*

Traditional skills of the growers could be reduced if they abandon their former crops. There is a delay of seven years before the rubber trees yield a marketable amount of latex. If the villagers end up monocropping rubber, they will be subject to fluctuations in prices. Many of the same risks apply also to sugar cane cultivation.

In 2009 the South East Asian Opium Survey considered alternative incomes in two Alternative Development Fund (PADF) target villages in Phongsaly. The survey noted an intensification of rubber planting 'encroaching on food security' with 'rice shortage due to a Chinese company having convinced farmers to replace upland rice with rubber plantations'. Due to the Chinese rubber companies normally discouraging intercropping, farmers were rendered highly dependent on constant rubber prices, as well as sufficient supplies of rice available on the local market. NAFRI (2009) reported that in 2008 over 12,000 ha of rubber was growing in Phongsaly.

By 2011 ORP rubber companies constituted between one and two thirds of all rubber companies registered in each bordering province, representing a significant portion of the rubber sector in the region. They have also, both through specific functions of ORP support and by buoying interest in rubber, catalysed further rubber expansion and come to shape the Northern Lao rubber sector far beyond their own plantations. By 2014 opium poppy cultivation in Laos had risen to 6,800 hectares (ha), nearly back to 2004 cultivation levels[32] (based on UNODC Opium Survey Reports in Laos and the region from 2001-2015[33]).

Figure 9: Opium Replacement Project Sign, Nambak District, Luang Prabang

[32] https://www.unodc.org/southeastasiaandpacific/en/laopdr/2013/10/opium/story.html
[33] https://www.unodc.org/unodc/en/crop-monitoring/index.html

Governance in the Rubber Sector

In Laos, the governance of rubber sector is expansive because its production chains straddle the mandates of several Ministries. The various government organisations involved in the plantation sector in general are described in Smith et al. 2017a, Smith et al. 2017b, Smith and Alounsavath 2015. Other papers (Lu and Schönweger 2019) and reports (Hett et al. 2015) also describe elements of rubber sector governance. This section builds on these and describes specific authority and functions associated with investing in, growing rubber and the processing and export of latex and rubberwood. Several of these organisations were interviewed about their roles during this study.

National Assembly and Provincial Assemblies

The National Assembly and Provincial assemblies have authority to approve investment activities on state land (concessions and leases) including: (i) the use of protected forest zones, (ii) the development of projects with significant adverse environmental or social impacts and (iii) projects requiring large areas of State land. Provincial People's Assemblies are delegated the National Assembly's approval authority for certain smaller scale projects.

Local Administration

Provinces, Districts, and Villages are delegated the responsibility "to manage the territory, natural resources and population in order to preserve and develop a modern, civil and prosperous society". They have authority to prepare a strategic plan incorporating socio-economic development plans, budget plans and defence and security plans based on national strategic plans and manage political, socio-economic, and cultural affairs, natural resources, the environment and national defence and security. At the local level, offices of the sectoral ministries, are part of the organisational structure of the local administration and are required to manage their own sector's responsibilities as assigned by the line ministry as well implement legal acts of higher-level authorities and the socio-economic development plans for the province, capital city and district.

Ministry of Planning and Investment

The Ministry of Planning and Investment (MPI) has a mandate over foreign and domestic investment including plantation investment projects. Their functions are primarily in the start-up and final approval phases, through the Investment Promotion and Supervision Committee, which operates at central and Provincial Levels. The Central committee is chaired by the Prime Minister, with the Minister of MPI and Minister of MOIC acting as co-chairs, and at the Provincial level is chaired by the Governor. It is the role of these committees to consider and approve investments in controlled businesses and concession (depending on investment size). They have limited ongoing direct operational involvement other than monitoring and reporting on investments. Each Ministry on the committee (or Department if at the Provincial level) must establish a once-stop-service office.[34]

The Investment Promotion Department (IPD) administers the foreign investment system ('the One-Stop-Service'[35]) and processes investment applications. IPD is the lead agency in administering applications for investment activities seeking access to state land through leases or concessions, and it coordinates with all other relevant sectoral agencies in the decision-making process such as the issuing of the concession registration certificates.

The Provincial Planning and Investment (PPI) offices are often the point of contact for investors. They can issue provincial guidelines for and instructions to investors within their jurisdiction.

Ministry of Natural Resources and Environment

The Ministry of Natural Resources and Environment (MONRE) is responsible for the implementation of land policies in Laos and for developing national land use masterplans, with which forestry plans and the identification of land for plantations should be consistent.

[34] Law on Investment Promotion No. 14/NA 2016

[35] http://investlaos.gov.la/start-up-business/one-stop-service/

The Department of Environmental and Social Impact Assessment reviews, confirms and approves the environmental and social impact assessments (both Environmental Impact Assessments (ESIA) and Initial Environmental Examination (IEE)) for investment projects, including for tree plantations, before concession agreements are signed. It monitors and inspects the implementation of environmental management plans, including the promotion of the participation of all stakeholders and people affected by investment projects.

The Land Allocation and Development Department (LADD) is responsible for the administration of land, land registration, surveys, and the issuing of land titles.

The Land Management Department (LMD) is responsible for the land use planning process during which it consults with stakeholders to propose and issue land use permits, land transfers, lands leases or land concessions, and coordinates with related line agencies and local administration.

Provincial office of Natural Resources and Environment

The Provincial office of Natural Resources and Environment (PONRE) plays a role in locating, mediating, and approving local access to land, and in approving contracts for land for investment projects. The role depends on the model of investment. According to the PONRE office in Luang Namtha it is their responsibility to issue the land use certificate to the plantation investor – including companies who are granted concessions. PONRE should also give permission for contract farming arrangements, including measuring the area of land that are to be included in the contracts.

Ministry of Agriculture and Forestry

The Ministry of Agriculture and Forestry (MAF) has broad ranging functions and responsibilities for rubber plantations and because of its multiple uses in agriculture and forestry.

The Department of Policy and Legislation (DOPLA) is responsible for the formulation of policies under MAF and the coordination and oversight of the development of relevant legislation. Relevant areas of policy focus include commodity products, forest management, rural development, green growth sustainable agricultural sustainable and labour in agriculture. The Department has also been coordinating the development of a roadmap for the possible development of a decree on contract farming.

The functions of the Department of Forestry (DOF) are to develop and implement strategies, programs and policies on forestry activities, undertake forest planning, zoning, surveys, monitoring, formulate forestry laws and other legal instruments related to forestry and to operationalise these through regulations, policy and technical instructions. DOF can consider and comment on proposals for domestic and foreign investment in fields of agriculture, forestry and rural development and propose the cancellation of these types of investments.

Within DOF the Afforestation Promotion and Forests Rehabilitation Division, together with the Division of Technical Standards, is responsible for the development of regulations with respect to plantation investment and plantation management. It also collates and maintains plantations statistics.

The Department of Agriculture (DOA) has functions with regards to the management and development of the agriculture sector at the macro level by setting technical standards in increasing farming productivity, with the application of advanced and modern technologies, following the directions of sustainable agriculture development, clean agriculture, ensuring food security, quality of plant production, for supplying raw materials to processing industry, domestic consumption, and commercial production, based on market demands.

The Department of Agricultural Land Management and Development (DALAM) is responsible for the implementation of surveys, classification and zoning of agricultural land, and for studying and collaborating with other parties to review the feasibility study reports and impact assessment reports for proposed investments, leases or concessions on agricultural lands. They should also undertake field monitoring of the land areas used by investors and entrepreneurs to check compliance with contracts and laws.

The Department of Forestry Inspection (DOFI) is responsible for the enforcement of forestry related legislation and is empowered to conduct forest control operations, investigate illegal logging, make

arrests, and pursue prosecutions in Court. DOFI is responsible for developing measures to prevent all forms of deforestation and forest resource degradation, including encroachment into forestlands and illegal forest clearing. DOFI will have a role in the assurance of legality of rubberwood supply chains under then VPA and TLAS.

The National Agriculture and Forestry Research Institute (NAFRI) is responsible for managing and implementing agriculture and forestry scientific, technical and policy research activities for ensuring effective, highly efficient, and sustainable agriculture and forestry production. Two divisions within NAFRI perform important roles for the rubber sector – the Forest Science Research Centre and the more recently established National Rubber Research Institute. To date NAFRI research has focussed largely on latex production; rubberwood has not been considered in any depth, although following a visit to the National University of Laos' (NUOL) Faculty of Forestry wood processing facility to observe peeling of rubber logs for veneer undertake by VALTIP3 they are interested in exploring this further. NAFRI are collaborating with the Yunnan Rubber Company on research, including establishing a rubber testing facility to enable latex quality testing and certification of origin. Currently Lao rubber cannot be exported to countries that require this and this affects the price that is paid for growers.

Provincial Agriculture and Forestry Office

Provincial Agriculture and Forestry Offices (PAFOs) are responsible for implementing the functions of DOF as well as helping to perform sectoral activities at the provincial administrative level. This includes consideration of proposals for plantation projects as well as plantation registration. PAFOs are responsible for studying and preparing agriculture and forestry development plans at the regional level, selecting focal areas, formulating specific projects, and undertaking land classification and zoning for the agriculture and forestry sector. They manage, support, and monitor the implementation of projects, and should enhance and mobilizing investments in agriculture and forestry production. PAFO also have a role in promoting the organization of production groups, credit groups, village development funds and agriculture and forestry cooperatives for commercial production.

With regards to agriculture and forestry investments, PAFOs should undertake land surveys, classification and zoning for industrial and environmental tree planting and facilitate the process of investments in tree planting, to individuals, domestic and foreign companies. They should also review and comment on applications for proposed investments in the agriculture and forestry sector. PAFOs have an important role in identifying and allocating land for rubber and in disseminating information about production activities. In implementing policy and administering and monitoring compliance with regulations these provincial offices are at the coal face in terms of the governance of the rubber sector and directly witness the outcomes and impacts.

District Agriculture and Forestry Office

Each district has an Agriculture and Forestry Office (DAFO) to undertake functions that include the registration of plantations, providing advice on plantation management and planning, pre-harvest surveys, the approval and monitoring of harvesting operations and the preparation of log origin documentation. DAFOs are responsible for finding land for plantation investors. They also propose for approval by PAFO, the establishment, improvement or cancellation of agriculture and forestry production groups, associations and cooperatives and provide comments on applications for domestic investment in the uses of agriculture and forest lands for agriculture and tree plantations. DAFO staff are often the direct interface with village administrators and local people.

Ministry of Industry and Commerce

The Ministry of Industry and Commerce (MOIC) regulates all types of industry and trade in Lao PDR. It oversees the trade, processing and export of latex and wood products. The relevant Departments that fall under the MOIC include:

- Department of Industry and Handicraft
- Department of Production and Trade Promotion
- Department of Import and Export
- Department of Foreign Trade Policy
- Department of Domestic Trade

- Department of Inspection
- Lao National Chamber of Commerce and Industry
- Economic and Trade Research Institute

The Department of Industry and Handicraft (DOIH) is responsible for the regulation of the natural rubber and timber industry sectors, including industry standards, environmental performance, product standards, chain of custody for products, and developing policy and incentives for investment in processing. Industry promotion and the provision of advice as well as information dissemination, including of policy are key roles of the department. The regulation of processing and product standards occurs through instructions issued by the department and these are reviewed intermittently.

The Department is undertaking a review of the rubber sector, with financial support from China. This is focussing on latex production and processing. If industries based on rubberwood are to be promoted, MOIC will have an active responsibility.

The Department of Import and Export (DIMEX) is responsible for issuing import and export licenses for all products that require them, as well as Certificates of Origin for countries that are part of a preferential trade agreement. It collects and maintains national statistics on imports and exports and maintains the Lao PDR Trade Portal which is the Government's website that provides a single reference point for all trade related information including laws, regulations, procedures, and tariffs. The Lao PDR Trade Portal can be found at: http://laotradeportal.gov.la.

The Department of Enterprise Registration Management administer and collates data on the registration of enterprises through a process which is undertaken provincially. That data is stored in a centralised database which is accessible online (although with limited search function) - http://www.erm.gov.la/index.php/en/.

Provincial Industry and Commerce

Provincial Industry and Commerce (POIC) Offices are responsible for industrial enterprises in each Province. With respect to the rubber sector they are responsible for the management of rubber latex production and the export of rubber covering the administration of enterprises including business registration, the monitoring of enterprise standards and approvals for export. In the wood sector they are also responsible for implementing the standards of wood processing enterprises and for chain of custody certification of wood products.

There is an expectation amongst latex producers that we interviewed that POIC can play a role in setting prices, this is part because of the Government's early role in promoting the sector, particularly under contract farming models. In Luang Namtha, pressure is being placed on the office by rubber growers because the price of latex has declined. This is particularly a problem for smallholders without contracts with companies because they feel disadvantaged by the Chinese quota system, but also for contracted farmers and labourers whose incomes are pegged to latex volumes and hence prices. In Luang Namtha the Government has set up a rubber group in the Domestic Trade Department to try to deal with the ongoing issue of price.

Ministry of Finance

The Ministry of Finance (MOF) is responsible for the collection of taxes and royalty payments. Within the Ministry of Finance, the Department of Customs is the agency tasked with determining and collecting the duties on goods exported from Lao PDR. The Department of Customs also has an enforcement role.

The State Assets Department is responsible for the registration of assets that belong to the state as set out in The State Assets Law No. 14/NA 2012 - this includes assets existing in nature (such as land and forest) and assets acquired by the state through a range of means including purchase, compulsory acquisition and confiscation. State assets must be registered on the State Assets Register, and they may be sold, rented, or conceded to organization or individuals for use or management. This should be done based on market value. Procedures for the creation of new state assets, including requirements for transparency are set out in the State Assets Law.

Ministry of Labour and Social Welfare

The Ministry of Labour and Social Welfare (MLSW) is responsible for worker health and safety, labour skills development, recruitment, and labour protection. With the support of the International Labour Organisation (ILO), MLSW is developing a rural employment strategy and policies for social protection including a social welfare system.

National University of Laos

The National University of Laos has several research activities associated with the rubber sector, primarily within the Faculty of Forestry. Researchers have investigated the geography of and land use transformation associated with rubber (Thongmanivong et al. 2009a, Evans et al. 2011), the impacts of rubber concession on livelihoods (Thongmanivong et al. 2009b), the impacts on conservation (Vongvisouk et al. 2016), reactions to the rubber price drop (Vongvisouk and Dwyer 2016a) and land grabs (Dwyer and Vongvisouk 2019) and more recently with respect to the technical properties of rubberwood (Belleville et al. 2020).

Financial Institutions

Financial institutions such as the Agriculture Promotion Bank and Nayboy Bank facilitate investment in the rubber sector through the provision of loans, either directly or through Government-led promotional campaigns that may provide low interest subsidies. An example of this is a program implemented in Luang Namtha Province, promoted, and implemented through PAFO, in which households were provided with low interest loans for up to 1 ha each of rubber.

Industry Associations and Organisations

The rubber industry in Laos can be categorised into to four main sectors: rubber plantation growers (and supporting industries such as nurseries), latex traders and brokers, latex processing companies and exporters, and wood processing companies (noting there are no known rubberwood processors in Laos).

There are two plantation wood processing associations, one plantation sector group and three rubber associations/groups in Laos. There are no know associations that specifically focus on rubberwood.

- The Lao Wood Processing Association represents mostly primary and secondary wood processors.
- The Lao Furniture Association represents furniture manufacturers
- The Lao Plantation Forests Group includes the main timber plantation growing companies and some processors of plantation grown wood.
- The Lao Rubber Association, newly established in 2019, aims to support smallholder Lao rubber growers
- Yunnan Rubber Group, a Chinese provincial level state-owned company. They are a primary participant in the Opium Replacement Programme and have become the main processing company for central and northern Laos with factories in Xayaboury, Luang Namtha, and are slowly purchasing or renting out other companies' factories (e.g. one near Thakek).
- Vietnam Rubber Association is a voluntary organization of enterprises, organizations and units operating in the Viet Nam rubber industry and related industries.

There are some small grower groups of rubber plantation owners in Luang Namtha (the group in Ban Hat Nya being the most well known and most studied) and teak plantation owners in Luang Prabang (Ling 2016, Ling et al. 2018).

Association of Natural Rubber Producing Countries

The Association of Natural Rubber Producing Countries (ANRPC) is an inter-governmental organisation with member open rubber producing countries. It has 13 members: Bangladesh, Cambodia, China, India, Indonesia, Malaysia, Myanmar, Papua New Guinea, Philippines, Singapore, Sri Lanka, Thailand,

and Vietnam. These 13 countries account for about 90 per cent of the global production of natural rubber.[36] Laos is not a member.

The functions of the ANRPC are:

- Serving as an authentic and up-to-date information resource centre for the natural rubber industry.
- Promoting activities conducive to sustainable growth in production, processing, marketing, and consumption of natural rubber.
- Promoting natural rubber as an environment-friendly industrial raw material by projecting its green credentials and socio-ecological contributions.
- Identifying short, medium, and long-term challenges and opportunities by undertaking suitable studies on rubber industry.
- Establishing linkages with relevant institutions including international rubber organisations for information sharing and technical cooperation.
- Making policy recommendations to Member Governments whenever necessary.

Non-Government Organisations

Village Focus International

Village Focus International (VFI) is a Lao not for profit that aims to facilitate policy, research, and capacity building efforts on-the-ground to address challenges faced by rural communities. VFI are being funded by Forest Trends and Norad to undertake research into rubber investments in Southern Laos. Part of that project will be disseminating results and capacity-building for those working a) in proximity of the rubber investments studied in southern Laos and b) working on land rights, rubber, and responsible investment issues more broadly

Mekong Region Land Governance

The Mekong Region Land Governance (MRLG) project is a multi-partner initiative funded through the Government of Switzerland, via the Swiss Agency for Development and Cooperation (SDC). It is implemented by two organizations: Land Equity International from Australia who have partnered with Gret (Professionals for Fair Development from France. The MRLG project has two main aims to (i) assist the emergence of more favourable policies and practices for securing the rights and access of family farmers to land and natural resources; and (ii) to strengthen the effectiveness of concerned stakeholders through learning, alliance building and regional cooperation. With respect to the rubber sector MRLG has undertaken several relevant studies including on Responsible Investment (Sylvester 2018) and responses to falling rubber prices in Laos (Vongvisouk and Dwyer 2017).

OXFAM

Oxfam has been involved in MRLG's responsible agricultural investment work and will be coordinating a rubber responsible investment project over the next two years (2020, 2021) funded by MRLG and other partners. The Vietnam branch of Oxfam has considerable connections to the Vietnam Rubber Association and companies in Vietnam, while Oxfam Hong Kong has connections to a handful of Chinese rubber companies.

Earthworm

Earthworm, formerly The Forest Trust (TFT) undertake work in both natural rubber and timber supply chains. Their work in Laos has focussed on smallholder teak, in partnership with the Luang Prabang Teak Project and with ACIAR. Thailand has been the focus of the organisation's work in the rubber sector.

Centre for Development and Environment

The Centre for Development and Environment (CDE) of the University of Bern undertakes the State Land Lease and Concession Inventory Project and the LaoDECIDE info project which seeks to stimulate

[36] http://www.anrpc.org/html/default.aspx?ID=4&PID=5

data and information sharing between relevant sectors and administrative levels to improve evidence-based socio-economic planning and decision-making in Lao PDR. Funded by the Swiss Agency for Development and Cooperation (SDC), the project supports the Lao Department of Statistics in providing user-friendly statistical and spatial data to a wide range of users. CDE has undertaken a stocktake of land concessions in Laos (Schönweger et al. 2012) and supported a quality of investment review (Hett et al. 2018).

Other Organisations

ASEAN Consultative Committee for Standards and Quality Rubber- Based Product Working Group

The Scope of Activities for the Rubber-Based Product Working Group of the ASEAN Consultative Committee for Standards and Quality is

i. To enhance cooperation in conformity assessment, development and implementation of standards and technical regulations for rubber-based products among ASEAN Member Countries.
ii. To strengthen and enhance networking and exchange of information among ASEAN Member Countries pertaining to standards, quality, and regulations of rubber-based products, with the view to facilitate cooperative undertakings in this area.
iii. To identify standards for rubber-based products for ASEAN to harmonize with international standards and quality.
iv. To enhance joint actions and approaches on international issues and adopt common positions in relevant international organisations, agreements, and arrangements.
v. To identify fields of cooperation with related ASEAN Member Countries and Third-Party countries and organisations in order to promote the development of standards for rubber-based products.
vi. To strengthen human resource development in standards and quality for rubber products.
vii. To share equal responsibility to the tasks and activities agreed at meetings.

Laos is not currently a member of the ASEAN Consultative Committee for Standards and Quality Rubber- Based Product Working Group – because it cannot afford the fees

International Rubber Study Group

The International Rubber Study Group (IRSG)[37] is an inter-governmental organization with the main objective of improving the transparency of the world rubber market and strengthening the international cooperation on rubber issues, including s Sustainable Natural Rubber initiative. The Group has nine member countries and more than 100 industry members. Laos is not a member country

The roles of the IRSG are:

- To collect, process and publish improved statistics on rubber markets, both for natural and synthetic rubber.
- To compile and publish other relevant information on rubber, including environmental, health and safety regulations.
- To provide a forum for consultations on issues of interest to rubber producing and consuming countries and their industries (from smallholders to the final consumers)
- To undertake economic analysis, on topic such as price volatility, capacity building and social issues.

The International Rubber Research and Development Board

The International Rubber Research and Development Board (IRRDB)[38] is a research and development network which brings together natural rubber research institutes in almost all the natural rubber

[37] http://www.rubberstudy.com/welcome
[38] https://www.theirrdb.org/irrdb/frontpage/index.php?menu=about

producing countries, covering 95 per cent of world natural rubber production. Laos is not a member of the IRRDB.

Certification Organisations

Two certification standards currently dominate the market – the Forest Stewardship Council (FSC) and Programme for the Endorsement of Forest Certification (PEFC). Other standards are the International Organization of Standardization (ISO) and Sustainable Forestry Initiative (SFI). The FSC uses a system of national and regional standards consistent with ten global principles that were developed by a partnership of stakeholders and apply to all tropical, temperate, and boreal forests. All national and regional standards are derived in-country from the ten principles. The PEFC is a mutual recognition mechanism for national and regional certification systems. PEFC's environmental, social and economic requirements for SFM build on international guidelines, criteria and indicators derived from intergovernmental processes such as the Ministerial Conference on the Protection of Forests in Europe (MCPFE), and the African Timber Organization (ATO) and International Tropical Timber Organization's (ITTO) processes for tropical forests among others.

Forest certification is a system for verifying the sustainability of managed forests and branding products from these forests for markets. Products from certified forests can move into production streams through certification of the chain-of-custody that allows consumers to know that the product they are purchasing came from a certified forest. Third-party forest management certification is generally based on the application of internationally developed principles and criteria with locally developed and approved standards

Global Platform for Sustainable Natural Rubber

The Global Platform for Sustainable Natural Rubber (GPSNR) is an international, multi-stakeholder, voluntary membership organisation, with a mission to lead improvements in the socioeconomic and environmental performance of the natural rubber value chain. Development of the GPSNR was initiated by the CEOs of the World Business Council for Sustainable Development (WBCSD) Tire Industry Project (TIP) in November 2017. Members of the platform include Producers, Processors & Traders, Tire makers and other rubber makers/buyers, Car makers, other downstream users and Financial Institutions, and Civil society. Representatives from each of these stakeholder groups have contributed to the development of the Singapore-based platform and the wide-reaching set of priorities that will define GPSNR strategy and objectives. GPSNR is not currently focussed on rubberwood.

Mighty Earth

Mighty Earth is a global campaign organization that works to protect the environment. [39] It focuses on conserving threatened landscapes like tropical rainforests, protecting oceans, and solving climate change. With respect to the rubber sector it aims to address issues associated with not deforestation and human rights abuse.

[39] http://www.mightyearth.org/about-us/

Rubber in the Regulatory Framework

As a tree crop that produces agricultural and forest products the rubber sector is regulated by several series of cascading regulations along multiple thematic streams, which sometime overlap. We have differentiated these broadly as "Land", "Plantations", "Agriculture", "Environmental Management", "Processing", "Labour" and "Trade", loosely following the production chain.

Accessing land for rubber plantations

To implement policies for land marketization, described above, the Government introduced a Decree on Land in 1992 and a Decree on Land Forest Allocation 1994 and again in 1996. Instructions on the implementation of the Land Forest Allocation program included promotion of plantations to smallholder and the making of contracts for tree planting by foreigners with the state or directly with people[40]. Leases of land were provided for in the 1994 Law on Foreign Investment.

In 1997 the first Law on Land was made, and this provided for allocation of land sue rights to individuals, households and other legal entities such as economic organizations, army units, state organizations, political and social organizations, and leasing of land by aliens[41] and apatrids.[42] It prohibited the buying and selling of land. This Law applied to the earliest rubber plantations in Laos.

A revised Land Law (No. 03/NA) was made in 2003 and remains in force today. It defines land use types (a. 12), the allocation of these for use and the rules by which these may be granted or transferred to others including through lease or concession. With respect to permitted uses both Agriculture Land and Forest Land can be allocated for the cultivation of trees including for industrial purposes. This law introduced the allowance of allocating up to 3 ha per labour unit in a household for commercial and tree crops on agricultural land and degraded forest land.

Plantations can be established on Forest Land that has been allocated to individuals and households, or on State land (including village land) that is granted by concession or lease. Generally, land areas for plantation projects should never include any of the following:

- Protection Forest.
- Conservation Forest.
- Local Production Forest.
- Watershed Areas.
- Forestlands with more than 20% of forest coverage.
- Areas with slope more than 35% for tree plantations.
- Military strategic areas.
- Historical or tourist sites.
- Other Government approved land concession project land.

In all cases plantations are to only be approved on land that is classified as 'degraded forestland' or 'barren forestland' located in rural or suburban areas.

Land Use Rights

Plantations may be established by individuals or households on land allocated to them through the Land and Forest Allocation Process. According to the Land Law (No. 04/NA 2003[43])

For Agriculture Land (a. 17):

- For those using land for industrial plantation and growing crops, the maximum area is three hectares per labour force in the family

[40] Instruction No. 03/PM on The Continuation on Implementing Land Management and Land Forest Allocation, dated 25th June 1996, article B.7 (unofficial translation)
[41] foreigners
[42] stateless people
[43] The Land was under review at the time of writing and these provisions were not in the revised drafts available. However, it was on the basis of the 2003 Land Law that most rubber investments were made.

- For those using land for fruit tree plantation, the maximum area is three hectares per labour force in the family.
- An individual who wishes to use agricultural land in an area larger than the amount determined for the category of land for which he has land use rights may apply to receive a lease or concession from the State.
- Temporary land use certificates are issued and perm anent land use rights may be applied for.

For Forest Land (a. 21):

- Each labour unit in a household can be granted up to 3 ha of forest land which is unstocked land or degraded.
- Any person wishing to use a larger area has the right to apply to receive a lease or concession from the State.
- Temporary land use certificates are issued, and permanent land use rights may be applied for.

The allocation of areas greater than 3 ha for plantations requires a lease or concession.

Land Leases and Concessions

The Land Law (a. 13) allows the leasing of land and for the State to concede land to Lao Citizens, aliens (foreigners) and apatrids (a person who is not a citizen of any country) (a. 64 in general and a. 17, a. 21).

With respect to leases

- Lao citizens may lease land from the State for a period of not more than 30 years.
- Lao citizens can rent land to which they have allocated rights, to another on the basis of a contract which must be certified by the village administration [and] notary office and must be registered at the district or municipal administration where the land is located.

A land concession is a contract between the Government and another actor that gives specific rights to that actor to control an area of land for a fixed period and for the conduct of specific activities. General provisions for the granting of land concessions are provided in the Land Law (Chapter 2). The Government also has specific regulations for land concessions.

Concessions or leases have been granted under agreements with National, Provincial, District and sometimes village authorities. The rules are currently set out in the Law on Investment Promotion No. 14/NA 2017, the Forestry Law No. 64/GOL 2019, and Land Law No. 04/NA 2003. Presidential Decree No. 135/PM on State Land Leases and Concessions made in 2009 established a set of general principles for the granting of leases or concessions of state lands, and Presidential Decree No. 02/NA 2009 provided range of land rates for concessions. The approval for concessions of State land can be granted by the National Assembly, with agreement by the Government, or at the local level (Provincial Governors or Capital Mayor). A supervising committee, chaired by MPI, has oversight of the concession or lease process[44] (Smith and Alounsavath 2015).

The processes through which applications and approvals for concessions and leases are to be made are articulated in many legal sources and administered through several agencies at different administrative levels (Lu and Schönweger 2017). The National Assembly, MAF, MONRE, Local Government and MPI all have responsibilities for approving plantation investment projects, allocating land, registering plantations and managing the timber arising from them, compounding the costs and time required for investments to commence, become productive and provide a return.

The Law on Investment Promotion No. 14/NA 2016 formalises the requirement for the National Assembly giving final approval of special tax and other incentives to projects, including plantations, and for: (i) the use of protected forest zones, (ii) the development of projects with significant adverse environmental or social impacts and (iii) projects requiring large areas of State land. A new role has

[44] Prime Minister's Decree No. 67/PM on the Organization and Function of the National Land Management Authority (2004); Decree No. 135/PM on State Land Leases and Concessions 2009,

been created for the Provincial People's Assemblies which are delegated the National Assembly's approval authority for smaller scale projects. The Law includes specific incentives to be applied, to certain sectors. For plantations, for example there are incentives for "clean, toxic free projects including seed production, industrial plantations, forestry development, protection of environment and biodiversity, activities promoting rural development and poverty reduction. Incentives are also applied based on financial or local employment thresholds". In addition to common tax incentives these investments can also receive exemptions from concession rental fees.

The Law on Investment Promotion also grants to Provincial People's Assemblies the authority to approve, upon request by the provincial/capital administration, the conversion of one hundred hectares or less of degraded forestland that cannot self-regenerate, the conversion of completely deforested land [presumably barren forest land] from 30-100 ha per business operation, the lease or concession of degraded forestland that cannot self-regenerate of 150 ha or less, with the maximum term of 30 years and business activities that have impact on the environment, nature or society (Article 49). Articles 73 and 74 of that Law include specific social and environmental obligations with which projects must comply.

State land concessions for industrial tree plantations can only be granted on land appropriately zoned as:

- Zone 1: mountains, plateaus, plains without economic infrastructure which encourages the investment.
- Zone 2: mountains, plateaus, plains with partial economic infrastructure which encourages the investment.
- Zone 3: mountains, plateaus, plains with good economic infrastructure which encourages the investment.

Except for in necessary cases concession land areas should not cover land which is:

- Land held on private land title.
- Land that is under collective title.
- Paddy land.
- Agricultural land for growing rice (not including swidden) or annual crops by local farmers; and
- Land on which people are residing or making a living, whether on a periodic or permanent basis.

In the event such land exists within a concession or state lease area, consultation must occur with the affected persons and compensation must be paid. In the case of paddy land, specific approval from MAF and the Land Management Department of MONRE must be obtained.

Contracts

The Law on Contract and Tort (No. 01/NA 2008) determines the principles, regulations and measures on the conclusion and implementation of contracts. Contractual obligations must be performed in accordance with the following basic principles (a. 5):

1. Voluntariness.
2. Equality.
3. Honesty, cooperation and in good faith.
4. Respect and compliance with the laws and regulations, customs, and traditions of the Lao nation.

A contract between individuals may be made in writing, oral or by other means (a. 15).

Contracts between the State or collective organizations, the State or collective organizations and other legal entities or individuals, legal entities, or legal entities and individuals must be in writing (a. 15). A contract in writing may be written by hand, typewriter or by electronic means by the contracting parties themselves or in the presence of the chief of village and at least two reliable witnesses (a. 15). To ensure legal compliance the contract should be notarized by the notary office (a. 15).

Asset rental contracts apply to the leasing of land (a. 64) and can be made for an indefinite term. The lessor or lessee has the right to terminate the contract at any time, provided that a notification to the other contracting party is made three months in advance for immovable assets and in the case of agricultural land rental, a notification of termination of contact should be made at the end of the harvesting crops or at the beginning of a new growing season. The land can be sub-let with permission from the lessor.

Dispute resolution

Dispute resolution may be by way of self-conciliation (a. 101). If agreement cannot be reached, disputes can be submitted to the Village Dispute Resolution Unit, to the Economic Dispute Resolution Office or to the Court for consideration and resolution.

Plantations

Most existing rubber plantations were established under Land Forest Allocation Program and two Forestry Laws - the 1996 Forestry Law, which was replaced in 2005 and 2007, and the 2007 Forestry Law (No. 06/NA). The 2007 Law has been repealed following the approval of a new Forestry Law by the National Assembly in June 2019 (Forestry Law No. 64/GOL, dated 13 June 2019). Each law was implemented through various supporting regulations, which have also been revised over time.

Land Forest Allocation

Plantations were promoted with the allocation of the Land Forest Allocation program. Prime Minister's Decree No. 186/PM of 1994 on the Allocation of Land and Forests for Tree Planting and Preservation promoted the allocation of degraded and bare land for plantations, specifying fast growing species and teak. Authorized local private businesses and individuals were encouraged to invest in plantations on their own land or based on contracts with others. The authority for approving tree plantations was based on area (1-101 ha; 101-1000 ha; >10001 ha), with no approvals specified for < 1ha. Further instructions were provided in 1995 in a Ministerial Directive[45] and in this case, approvals were scaled differently:

- < 5 ha on allocated land with own funds> no approval required>after planting, application for inspection and certification by village forestry unit and DAFO
- < 5 ha on own land, with a bank loan> submit land certificate, sketch map, application for bank loan, and a technical and economic feasibility; it is not specified to whom these should be submitted.
- 5-100 ha technical/feasibility study > submitted to village forestry unit, DAFO and PAFO for consideration>submitted to Provincial Governor for approval> licence issued by District Governor
  101-1000 ha technical/feasibility study > submitted to village forestry unit, DAFO and PAFO for consideration>submitted to Provincial Governor for approval> licence issued by Provincial Governor
- >1001 ha technical/feasibility study > submitted to MAF for consideration>submitted to Government for approval> licence issued by MAF Minister

In this directive, it was specified that rubber trees should be planted at a spacing of 5m x 5 m and have 65 trees per *rai* or 400 trees per ha. It also emphasised the engagement of farmers practicing traditional slash-and-burn farming as labourers, consistent with policies to promotion of sedentary employment.

The Forestry Law

The 1996 Forestry Law continued the promotion of tree planting and provided clear rights of ownership to trees planted by individuals and organisations *with their own labour or funds.* It articulated the allocation of land use rights to up to 3 ha per labourer in a family of degraded or barren forest land for the planting of trees and also provided for individuals to lease more forest land from the State if

[45] Directive No. 0234/MAF of the Minister of Agriculture and Forestry regarding the management of plantation and planted forest, dated 9/11/1995

needed (based on the household production capacity). That law also made it clear that trees individuals or organisations have planted with their own labour or funds and with acknowledgment of the State became the property of the planter with the right to possess, use, benefit from, transfer and bequeath them.

Plantation registration is the process though which tree and plantation ownership is formalised. In the case of rubber plantations, which have largely been treated as an agriculture crop rather than tree plantation, this has (until recently) not been required; here has been a common perception that plantations only need to be registered when trees are to be harvested. In the case of smallholder plantations this regulation is not widely complied with due to prohibitive costs, lengthy and technical administrative procedures, unclear regulations, and lack of enforcement (Smith Ling and Boer 2017, Smith et al. 2016). Where is has been adopted, plantation registration has come to be viewed as a means of *de facto* land ownership and markets for plantations and plantation land have emerged. Plantation registration has, more recently, been elevated as evidence for demonstration of legal source of origin for plantation timber in the development of the Lao TLAS; legally plantation timber cannot be sold unless the plantation is registered. Given the now large number of rubber smallholdings and contract farms, this is a significant issue for future legal rubberwood supply. Efforts to reform the costly and time-consuming processes for plantation registration continue to be addressed by DOF with donor partners, including IFC and this ACIAR project.

The Forest Land Allocation Program (Fujita and Phanvilay 2004) has continued as an implementing mechanism of the Forestry Law, and together with the 1997 Land Law some farmers and companies took up the opportunity to plant rubber (and other tree species), in some cases supported by government funding, bank loans and other incentives, such as land tax exemptions. In the following years more supporting regulations were made to simultaneously regulate (Regulation 0196/AF 2000) and promote investment in trees plantations (Decree 96/PM, 2003) (See Smith 2014, Smith et al. 2017). Notably, within these, the processes for approving investments of different sizes varied, requiring District governor for any investments on land not under the investor's ownership.

The Forestry Law (No. 06/NA) made in December 2007 retained many of the features of the 1996 Forestry Law, particularly with respect to promoting plantations. A key feature of the 2007 Forestry Law was the promotion of concessions on forest land (in line with other laws and regulations), somewhat ironically not long just after the Government introduced its ban on plantation concession (in Resolution No. 06/PMO in May 2007). Perhaps not surprisingly, there were very few changes to plantation regulations for many years, and plantation promotion Decree No 96/PM, was not revised until 2019 (Decree No. 247/GoL). Despite this, the rubber sector has grown most in the period since the Forest was made – and this is likely to be due to the variety of arrangements for land access that farmers and companies have been able to utilise.

As with past laws the new Forestry Law made June 2019 and Decree No. 247/PM promoting commercial plantations are species neutral – they neither promote nor ban rubber. There is tension, however with PMO09 (and its various implementation instructions) which maintains the ban on new rubber concessions and which may have consequences in the future for a sustained rubber sector, and for rubberwood supply, should an industry emerge around this resource. It will these policies that motivate or discourage rubber investors from re-planting after the first rotation.

The Agriculture Law

The Agriculture Law No 01-98 which was promulgated in 1998, not long after the Land and Forest Laws, has remined relatively static ever since. Like the other laws it does not specifically refer to rubber cultivation or production, but it is relevant because it regulates the use of agricultural land and the conversion of agricultural land for other uses. The Agriculture Law also regulates production inputs such seeds, agro-chemical, water, tools, and machinery as well as the processing and storage of agriculture products. The protection of 'farmers interests' is also specified in the law.

We were unable to source any specific regulations implementing the Agriculture Law that are relevant to rubber cultivation until around 2001 when the Government started to develop standards for Good Agriculture Practices including for environmental management, product quality management and worker health, safety and welfare.

Environmental Protection

With an Environment Protection Law (No. 02-99/NA) 1999, the Government introduced requirements for environmental protection including for development projects; each sector had to develop its own regulations on procedures and methods for environmental assessment, based on the general regulations issued by the Science, Technology and Environment Agency. Development projects had to submit an environmental assessment report including participation of the local administrators, mass organisations, and affected people, to gain an environmental compliance certificate. A general on Regulation 1770/STEA on Environment Assessment was issued in 2000 and in 2010 a Decree on Environment Impact Assessment was made. We were unable to source any specific environmental guidelines for plantation projects although regulations around this time (such as Regulation No. 0196/AF.2000) refer to regulations, technical and socio-economic and environmental guidelines". The Decree on State Land Leases and Concession (No. 135/PM) requires projects granted state land for industrial plantations or farming business to have a feasibility study and a social and environmental impact assessment certified by the concerned sectors.

In 2012 the Government enacted a new Environmental Protection Law (revised), No. 29/NA as the core framework law for environmental management and the application of environmental safeguards during project development. Environmental and social management and protection measures were based on considerations about the type of activity, the scale and the magnitude of the risks involved. The Environmental Protection Law incorporated the concept of an environmental impact assessment (EIA) as a key tool for the protection of environmental and social values and provided "principles, regulations and measures related to environmental management, monitoring and protection". The focus was mainly on measures associated with what can be considered larger scale or industrial developments, however they also applied to activities associated with household business activities and require (a. 23) households that undertake production and cultivation (amongst other activities) that may impose negative impacts on the natural environment, to have plans to address those issues. Households are required to make environmental protection commitments (EPC), develop plans and gain approval for these plans as stipulated in specific regulations. The roles, responsibilities, obligations, and requirements are outlined under Ministerial Agreements and Instructions.[46]

In 2014 the United Nations Development Program (UNDP) and Department of Environmental and Social Impact Assessment, commissioned the development of an Environmental Impact Assessment Agriculture and Forestry Technical Guidance Note (TGN) to improve the effectiveness of environmental and social impact assessments of investment projects and as a safeguard for sustainable and climate-resilient development within Lao PDR. The TGN was developed to support the preparation, review and monitoring of both IEE and ESIA for agriculture and forestry plantation (AFP) investments.

A new Decree on Environmental impact Assessment (No. 21/GOL) was made in 2019 which sets out the requirements for a process of undertaking an Environmental impact Assessments (EIA) which must take into account direct and indirect beneficial and adverse impacts as well as immediate and cumulative effects of developments. It incorporates a list of types of projects which may, or may not, require an EIA, and provide a common framework for an Initial Environmental Examination (IEE) or for an Environmental and Social Impact Assessment (ESIA), depending on project scale. Forestry plantation projects are divided into two categories for environmental and social impact assessment and reporting purposes: Category I - Small scale investment projects with minor environmental and social impacts requiring an IEE; and Category II – Large-scale investment projects which are complicated or create significant environmental and social impacts requiring an EIA. Industrial tree plantations of 20-200 ha are considered Category I projects while plantations >200 ha are Category II projects. Projects that are outside the above listed categories are either too small to require an IEE or EIA, or will be individually screened by MONRE based on additional criteria, possibly with the advice

[46] Ministerial Agreement on Endorsement and Promulgation of a List of Investment Projects and Activities Required for Conducting Initial Environmental Examination or Environmental Impact Assessment, No. 8056/MONRE 2013; Ministerial Instruction on Initial Environmental Examination of the Investment Projects and Activities, No. 8029/MONRE 2013, and Ministerial Instruction on Environmental and Social Impact Assessment of the Investment Projects and Activities, No. 8030/MONRE 2013

of MAF, to determine if either an IEE or EIA is required or if no assessment is necessary (EIA Decree Article 6) (UNDP 2014). Additional "social categories" exist with respect to the social studies and plans that an investment project is required to conduct. For example, a project with large-scale social impacts may be required to submit a Social Impact Assessment, a Resettlement Plan and/or Ethnic Minority Development Plan, and/or a Land Acquisition and Compensation Report, to DESIA for approval.

Despite this legal framework, current implementation if environmental protection is largely based on the level of knowledge of the consultant company that is engaged to undertake the assessments or of the government employee reviewing reports. Government employees who are responsible for the ESIAs reportedly have limited capacity in terms of their expertise, experience, and knowledge of plantation investment (Smith et. al 2017, Carmichael 2017). The scale at which assessments are required also exposes grey areas and potential loopholes, particularly in the case of contract farming in which company investments may be an accumulation of many small holdings' which require only limited assessment. Table 9 summarises these requirements.

Table 9: EISA requirements for Plantation Projects

Land Type	Plantation size	Forestry Assessment required	Environmental assessment required
Allocated to individuals or households	<0.16 ha (scattered planting)	Nil	Nil
Allocated to individuals or households	0.16-3 ha	Nil, unless plantings are grouped with a combined area >5 ha	EPC
Allocated to individuals, households or businesses under lease or concession	3-5 ha	Nil, unless plantings are grouped with a combined area >5 ha	EPC
Allocated to individuals or businesses under lease or concession	< 5 ha (using bank loan)	Technical assessment	unclear
Allocated to individuals or businesses under lease or concession	5-20 ha	Technical assessment	unclear
Allocated to individuals or businesses under lease or concession	20-200 ha	Technical assessment Feasibility Study	IEE
Allocated to individuals, or businesses under lease or concession	>200 ha	Technical assessment Feasibility	EIA

In planning for plantation investment, companies we have spoken to in this and other projects have reported that adequate and fit-for-purpose environmental assessment and the design and implementation of appropriate protection measures for plantations is hampered by several factors:

- The absence of forest cover and other essential environmental data which impedes the identification of suitable land (e.g. degraded forestland), and of the assessment and monitoring of the impacts of plantations. (e.g. forest clearing)
- The absence of comprehensive land use planning such as a land cadastre or land use information which affects the identification of available land (land not allocated to or used by others)
- A lack of technical knowledge about plantations and limited capacity within government agencies responsible for EISA's to assess plantation projects.
- Limited technical guidance for government at the different levels in verifying that ESIAs for plantations are compliant.

- Limited technical guidance for companies in undertaking ESIAs to ensure ESIAs are compliant, and that they are consistent between projects. Some companies apply their own, best practice, others do not.
- High costs to companies in completing ESIAs and high fees for government inspection and verification of the ESIAs, which are of varying quality.
- Inconsistent application of rules at different government levels, slow approval processes and unexpected fees and charges. Where regulations are unclear this provides avenues for local interpretation and misapplication of the rules.
- Once plantation projects are approved, there is limited monitoring of company performance against environmental protection and management measures, and enforcement of the regulations does not occur, largely due to limited capacity and low priority at the local level.

Biosecurity

The importing of rubber genetic material and products is subject to biosecurity laws and procedures. A Law on Plant Protection[47] was made in 2008 followed by the strengthening of the Department of Agriculture's plant protection mandate in 2009. Instructions implementing the Law were made in 2012[48], along with a suite of other general regulations. In 2007, in response to recent and anticipated requests for permission to import young rubber plants and seeds, and due to increased awareness of the risk of pests and diseases, MAF introduced an instruction on import inspection and monitoring.[49]

There are phytosanitary restrictions that apply to the export of processed goods - including rubber cup lump, slabs, and scraps. Importing countries have their own specific regulations and standards.

Rubber and Wood Processing

As with other sectors, the Government of Laos introduced a Law on Industrial Processing in 1999, with the multiple objectives of transforming, promoting, and regulating a processing sector. It listed types of industrial and handicrafts processing factories in order of their relative importance, with wood factories ranked 2nd and rubber factories 9th and included a policy for the industry and handicrafts and the agroforestry sectors to jointly promote and create a plan to encourage cultivation by households, cooperatives, and other economic parties to supply raw materials to processing factories.

A new Law on Industrial Processing was made No. 48/NA 2013 which regulates the establishment, operation and administration of industrial and handicrafts processing and including rubber latex and wood.

Rubber latex processing

We found no specific regulations specific to rubber latex processing.

The Law on Standards (No. 55/NA 2014) is relevant with respect to development of standards in rubber processing. In 2013 draft standards for rubber-based products was developed. The Ministry of Science and Technology issued a Decision on the Adoption and Proclamation of National Standards on Rubber Products No. 0538/MOST, dated 16 May 2017 and a second (No. 1171) in November 2017[50]. We were unable to obtain a final version of these standards.

Wood processing and manufacturing

The Government has had various forms of wood processing legislation aimed at promoting and improving domestic wood-processing factories (WPF) and the export of wood products. Many attempts have been made to both regulate and develop the wood processing sector and limit the export of round logs. Rubberwood has not, until recently been specifically mentioned in this context.

[47] Law No. 06/NA on Plant Protection, dated 9/12/2008
[48] Decree No. 229/GoL on the Implementation of the Plant Protection Law, dated 31/05/2012.
[49] Instruction No.0131/MFA.07 Import inspection and monitoring of young trees and rubber seed, dated 18/06/2007
[50] English versions were not available.

In the 1990s and early 2000s WPFs were primarily regulated under the Forestry Law 1996, but there were interactions with the Law in Industrial Processing. Forestry business were licenced under the Forestry Law and MAF was also responsible for the allocation of wood quotas to them. In 2006 MOIC took over the responsibility for wood quotas and regulating the wood processing industry and issued a series of new regulations aimed at making the export of timber and wood-based products from natural forests the exclusive right of the central government. The transition in administration from MAF to MOIC was not straightforward. Various efforts (e.g. Order No. 17/PM, 2008) were supposed to improve collaboration between MOIC and MAF across a range of areas concerning the operational standards and management of wood processing factories and to develop regulations with respect to operation of harvesting businesses, tree plantation groups, wood and wood product merchants and wood product exporters.

In 2009 Decision 0719/MOIC was implemented to reform and modernize all levels of timber processing. It defined three levels of processing, classified manufacturers according to International Standard Industrial Classification (ISIC) codes and specifies processing standards, including for environmental protection and Occupational Health and Safety (OH&S), as well as products standards.

Following PMO15 in 2016, MOIC undertook a review of wood processing facilities. In September 2016[51], over 1154 family processing and furniture factories were shut down for operating without a permit or for being in or near forest conservation areas. With the closure of these factories there are now around 445 registered wood processing and timber manufacturing plants in Lao PDR. In February 2020 MOIC, in partnership with MAF and with support from the International Trade Centre (ITC), commenced the development of a roadmap for the wood processing sector.[52]

Under the recently revised Forestry Law it is a still a requirement that forestry business must have technical permission from MAF, be registered with MOIC, meet standards set out in the Law on Industrial Processing, and apply for their investment through the Ministry of Planning and Investment. The types of businesses to which this applies includes:

- Tree and NTFP planting.
- Wood processing.
- Processing of NTFPs.
- Export of timber, tree species and NTFPs.
- Import and transit of timber, tree species and NTFPs.
- Distribution of NTFPs.
- Distribution of wood products.

It remains unclear as to whether and how these apply to smallholders.

At present there are no wood processing facilities that are known to processing rubberwood in Laos.

Labour

Providing for employment, including sedentary agriculture and in non-agricultural sectors has been an important component of several socio-economic development strategies in Laos. A Labour Law No. 02/NA was made in 1994, which sets out basic provisions with respect to employment conditions, the making of contracts, limitations on the employment of foreign workers, special rights for women., the role of trade unions, insurance, the setting up of a social security fund, safe working conditions, accident protection, dispute resolution and other features relatively common in such laws. The Labour Law was revised in 2006 and again in 2013. Laws on the Protection of Children[53], the Rights of Women,[54] Trade Unions[55] and Social Security[56] have also been made.

The early investment promotion Laws included measures to prioritise employment of Lao citizens but have also provided enterprises the right or opportunity to employ skilled and expert foreign personnel

[51] Vientiane Times 2nd September 2016 "More than a thousand furniture plants ordered to shut down".
[52] http://www.intracen.org/news/Lao-Peoples-Democratic-Republic-to-design-roadmap-for-wood-processing-sector/
[53] Law No. 05/NA on the Rights and Interests of Children, dated 27/12/2006
[54] Law No.08/NA on the Development and Protection of Women, dated 22/10/2004
[55] Law No. 12/NA on Trade Unions, dated 25/12/2007
[56] Law No. 13/NA on Social Security, dated 26/07/2013

when necessary (such as when such expertise is not available in Laos). Investors have also been required protect the health and safety of their workers and the public at large and contribute to the social insurance and welfare programs for their workers.[57]

One of the concerns about the performance of plantations projects has been the limited opportunities provided to local people for labour associated with investment projects, and this issue was touched on briefly in the 2012 ban on concessions. It is also inherent in some policy statements that 2+3 contracts provide better opportunities for rural employment than wage labour, but the Law on Contract[58] and Tort is outdated, and our research, and that of others, indicates that compliance with contracts made in the rubber sector have been highly variable. Increasing numbers of labour disputes has resulted in the making of a Decree on Labour Dispute Resolution No. 76/GOL[59] in 2018. The Government is also developing a National Rural Employment Strategy (although we were unable to obtain this) and consideration is being given to the development of a specific decree on Contract Farming.

Laos has had a program of social security for decades, introduced soon after independence for government employees and in 1999 for employees of private enterprises, but coverage is limited. For example, in 2010 the ratio of health care fund contributors to the total population was only 2.9% (Leeboupao 2010). In 2013 a Law on Social Security (No. 34/NA) was made to "better protect rights and interests of employers and employees who contribute to the Social Security Fund, and receive social security benefits, as well as to assure livelihood improvement, social solidarity and national socio-economic development" (a 1). 'Social security' is a set of assistance-based arrangements guaranteed by the National Social Security Fund in case of health care, child-birth or abortion, working capacity losses, human organ losses, sick-leave, old age, death, family allowances and unemployment. The Law applies to employers, employees and his/her family members, self-employed people, and voluntarily insured persons. Obligations with respect to social security affairs are described as:

1. The Government shall allocate some parts of the Government Budget to the National Social Security Fund and guarantees the sustainability of the fund.
2. The Employer (all enterprises with more than 10 employees) shall contribute 6% of an employee salary to the National Social Security Fund.
3. Employees, self-employed and voluntarily insured people shall be registered and contribute 5.5 % of his/her monthly insurable earning to the National Social Security Fund.

Combined employer and employee contributions of 11.5% of the employee's salary and are, in practice, typically paid by the employer.

Contributions are also required from "self-employed person and voluntarily insured persons" and foreign workers who receive wages or salaries, although these are unspecified.

Trade and Export

The Government of Lao introduced a Customs Law in 1994 and a Decree on Import and Export Management in 2001. The Customs Law has been revised several times since (in 2005, 2011 and most recently in 2014). The Law provides the legal framework for the import, export, and transhipment of goods.

The Law on Customs No 57/NA 2014 and the Decree on the Import and Export of Goods No 114/PM 2011 currently regulate the import and export of all products. Numerous subordinate instructions regulating the import and exports of wood and timber have been issued and repealed over time. The resulting complexity in export procedures has been recognised and reforms are underway to improve efficiencies and remove barriers in the process.

Timber and wood products from all sources can be exported from Lao PDR. However, in line with efforts to reform and promote the wood processing sector, as well as reduce deforestation and illegal

[57] See For example, article 20 of the 1994 Law on Foreign Investment No. 01/NA 1994.
[58] Law No. 01/NA on Contract and Tort 2008, dated 8/12/2008
[59] Source: https://www.lexology.com/library/detail.aspx?g=12151161-d729-40b0-9182-480522f00bc0

logging, various bans on the export of round timber and sawn wood have been introduced. In 2016 the Prime Minster issued an Order (No. 15[60]) which placed a ban on the export of all unprocessed wood, including plantation grown wood. MOIC introduced specific requirements for wood products that can be exported - a product export list', which set the standards for wood product processing. While this sent strong messages to wood processors it also started to limit market opportunities and had the potential to stymie innovation in the sector (which is desperately needed). This list has been revised several times, and in 2019 a Ministerial Decision Regarding Approval on the List of Wood Products for Export (revised) was made (No. 0939/IC-DEXP) that allows the direct export of most plantation wood products – including rubberwood, as sawn product and round log.

For latex we have been unable to find any specific regulations related export other than with respect to duty exemption.

Timber Legality

Under the Forestry Law No. 64/GOL 2019 (a. 5) "The State acknowledges legal operations of forestry-related businesses by establishing certification systems and wood and wood product legality assurance systems, in accordance with internationally recognized forest management standards.

The Law includes a specific article (Article 43) on Timber and Wood Product Legality Assurance in which:

> *Timber and wood product legality assurance is a system for the management of timber and wood supply chains, inspection and certification of their source through all processes of surveying, harvesting, transporting, importing, trading, processing and distribution domestically and for export.*
>
> *The Ministry of Agriculture and Forestry, in coordination with other concerned ministries and organizations, shall develop the timber and wood product legality assurance system in accordance with the law, other relevant regulations and international conventions and treaties to which Lao PDR is a signatory.*

In 2018 the Minister of Agriculture and Forestry issued an instruction (no. 007/MAF) on the Development of a Timber Legality Assurance System the purpose of which is to ensure unity on the implementation of the FLEGT process for a VPA and the enable the strict implementation of forest management, timber harvesting, timber import, the use of labour, wood processing, the use of wood products domestically and for export. Laos' progress towards a VPA is described further below.

[60] PM Order No.15/PM dated 13 May 2016 regarding intensification of strictness in terms of management and inspection on timber exploitation, logs trafficking and timber business.

Rubber Arrangements - Land, Latex and Labour and Wood

One of the main questions in the VALTIP3 project research is about who owns and will have the right to harvest and sell rubber trees for wood products when the time comes. Answering this question is inextricably linked to other factors associated with the types of plantation investment models and the parties involved. Companies, contract farmers and smallholders will have different motivations for investing in rubber and the ways they manage their plantations will vary. In this section we explore the models of investment focussing on the interconnected issues of land, labour latex and rubberwood.

Research on rubber in Laos to date has focussed on the models of acquisition, ownership and benefit sharing associated with the land and latex, with little emphasis on the trees or the wood. Manivong's 2007 study in Luang Namtha is the most notable exception with respect to wood but this explored only one model of plantation investment (smallholders) and necessarily drew on experience from elsewhere to predict future wood supply under idealised circumstances. Interest in tree ownership has increased recently (see Shi 2015, Dwyer and Vongvisouk 2019) but this did not extend to the issue of rights to harvest trees and sell wood. We delve into the extensive body of literature to contextualise our research.

Various typologies have been used to describe the ways in which farmers, companies, labourers, state agencies and others perform roles or functions associated with plantation investments. Castella et al. 2009 describe a typology of ownership and investment arrangements for rubber plantations (Figure 10, Smith et al. 2017a after Castella et al. 2009) and (Bouahom et al. 2009a; 2009b; 2009c and 2009d) describe the ways in which these and associated institutions and policies have emerged. Drawing on studies from other countries, Cramb et al. 2017 further explore the range of models of interaction between smallholders and agribusiness enterprises with a continuum of modes of production from independent smallholders to fully integrated agribusiness concerns. They highlight a broad suite of functions, although a similarly narrow set of actors to those described by Castella et al. 2009.

Figure 10: Typology of Plantation regimes

Regime	Land	Labour	Capital	Market	Technology
Smallholder (5+0) with own capital	●	●	●	●	●
Smallholder (5+0) with government officials	●	●	●	●	■●
Contract Farming 4+1 smallholders (credit)	●	●	●	■●	■
Contract Farming 3+2	●	●	■●	■	■
Contract Farming 2+3	●	●	■	■	■●
Contract Farming 1+4	●	■●	●	●	■●
Concession Farming	■	■	■	■	■
● = farmer inputs; ■company inputs					

Lao government policies generally refer to just three models: smallholder (SH), contract farming (CF), and concession agreements (CA). Typically, companies enter into concession agreements with the government or make contracts with local people, generalised as 'contact farming' and in both policy and literature contract farming is often simply described as either '2+3' or '1+4'. Throughout Laos, farmers are also independently investing in rubber - these are mostly commonly described as 'smallholders' although there is no formal definition of 'smallholder' in Laos. The actual manifestations of rubber arrangements stretch the three categories.

How plantations are incorporated investment models and livelihood will be affected by a range of factors. For company investors, this includes integration with other business activities, for example diverse agricultural systems, connections to markets and policies of investors' countries. For farmers and smallholders this includes general access to land, access to land for agriculture, quality of land for plantations, household size and available labour, income, access to markets, cost-benefit of other crops, capital, access to finance and credit, labour availability, off-farm labour opportunities and their investment perspectives (Sikor 2011; Sandewall et al. 2010). Sikor 2011 identifies three "ideal types of household" to illustrate the range of practices associated with investment in, and financing of plantations:

- 'Survival-focussed households' who concentrate on meeting their immediate needs, primarily food and basic consumer items, and possibly saving a small surplus as a buffer against unexpected expenses.
- 'Surplus oriented households' who are more likely to integrate plantations into the household economy seeking to maximise surplus from all their activities combined.
- 'Investment-oriented households' make decisions about plantations independently of other livelihood decisions.

This differentiation is important because it impacts the resilience of households to changes in latex price, and the effectiveness of policy measures designed to influence their behaviour including with respect to regulatory compliance.

Rubber in **Luang Namtha Province** has been extensively researched, as one of the oldest rubber-growing areas in Laos.

- Alton et al. (2005) detail the emergence of 'smallholder' rubber in Ban Hat Nyao supported through government subsidized loans and in Ban Huay Dam with limited technical support, subsidized loans and which communal labour. Village regulations apply.
- Also, in Ban Huay Dam, contract farming emerged with a Hmong businessman supplying seedlings and the labour for preparation and planting and farmers supplying some fencing materials. Farmers were responsible for early maintenance of the trees and when the trees survived the first two months a division in tree ownership was made - initially a 40:60 (with 60% to the businessman) and later re-negotiated to 50:50. After the trees were planted and established the businessman paid taxes and registered the land.
- In Ban Mom and Ban Buak Khu, Diana's (2006) research on smallholders emphasised family and social connection in adoption, including cross border knowledge sharing and market access. Usually the Lao farmers provide land, while the investor supplies capital covering establishment expenses. The contracts could be verbal, an informally written contract between the two parties not ratified by local authorities, or legally signed contracts approved by local authorities. Typically, once tapping began, the plantations were divided into two with the share ratio depending on the terms of the contract. After the land partition, each party manages its own part independently.
- Diana also describes a concession-like plantations established through large investments by Chinese businessmen based on contracts with the Lao Government.
- The importance of strong family ties and community organization including in the development of a Rubber Grower Association in a cluster of early rubber growing villages has been described by Manivong (2007) and Douangsavanh et al. (2008). Farmers are organized into groups, land is allocated to individual member farmers; labour is shared, there is collective price fixing and farmer signs an agreement (see also Ling 2014 and Ling et al. 2016). While community cohesion and self-initiation are important defining success factor is the ability to secure a substantial amount of low-interest credit (Vongvisouk and Dwyer 2016). Manivong's 2007 thesis is one of the few pieces of research into rubber in Laos that considers the value of rubberwood.
- As well as policy triggers Junquera and Grêt-Regamey (2019) describe the 'rush for land' and the role of 'imitation' in the expansion of rubber amongst households in two villages, in which 'following others' was a significant determinant in farmers' decision to adopt the tree crop. They also highlighted to importance of cross-border social networks with family in China.

  Baird and Vue (2015) describe a distinctly Hmong '4+1' smallholder model in which strong social networks and cross-border relations were also important, but labour (at least in the tapping phase) was done by others. Agreements were between landowners and field laborers with the earnings split 50:50 during the first two harvest years, and once production increases earnings are split 70:30 with the landowners getting the larger share.

  Shi (2008 and 2015) suggests that "rubber is planted in Luang Namtha Province under a myriad of circumstances and arrangements". In her 2008 report she describes the following approaches:

- Smallholder/villages promoted by the district government, funded through a loan from Mengla County government in Xishuangbanna and channelled to villagers through the Agricultural Promotion Bank as subsidized loans. A Chinese company was contracted to complete the actual planting of 400 ha of rubber. Villagers had little involvement in the process.
- Contract farming where '2+3' exists but is actually more like '1+4'. The '2+3' model promotes profit sharing, but this often translated into a partition of trees or land, particularly if the pre-partition period is short. Labour input is part of their contribution to the venture and not compensated. In the '1+4' approach villagers work for the investor for wages.
- Large contract farms – typically '2+3' contracts with a high level of local government facilitation at least at the initial phase.
- Concession agreements, although these are relatively less common. She notes that in October 2005, three northern provinces, Luang Namtha, Bokeo, and Oudomxay, formed an official consensus that land concessions should not be given to rubber investors. Instead, contract farming should be promoted with a profit-sharing scheme of villagers obtaining 70% and investors 30%.
- Subsequently in 2015 Shi noted that villagers and companies had split their shares, with villagers typically obtaining 30% of the trees after the company cared for the plantation with hired labour for the first three years. Villagers and companies were managing their share of the plantations separately. After the split it became common for villagers to sell their share of trees due to declining latex prices and labour challenges. Shi suggests the depressed latex prices masked both labour shortages and possibly disputes - with companies having little interest in hiring tappers and no-one caring about contractual obligations for latex sales.

Ling (2009) summarises a joint venture in **Bokeo Province** for a 'Rubber and Integrated Development' between a Lao investor (Bokeo Development and Industry Rubber Company) and a Chinese Company (Yunnan Rubber Investment Company): the Lao company being the agent for Chinese company, responsible for getting the project approved, negotiating land issues, and mobilising the clearing and planting while the Yunnan company provides most of the capital, Chinese technical staff, and is responsible for the future management of the plantation. In this case land (through a lease) and labour was provided from the village. A contract was drawn up, and signed by the Yunnan company, the Bokeo company, village heads, and included the thumbprints of all the 301 villagers, but it was not approved by the government (PAFO or DAFO).

Habarecht (2009) emphasises the role of different actors, particularly development partners and CSOs in rubber investments in Muang Mai, **Phongsaly Province**. Independent 'wealthier' smallholders are described as following on from early plantings that copied neighbouring China and the role of district and provincial authorities in driving 2+3 contract farming associated with Chinese Company – a program initially proposed by DAFO to PAFO, with government recruiting the Company but farmers provide the land and labour.

Thongmanivong et al (2009b) explore rubber investments in **Oudomxay Province** in particular the Sino-Lao Oudomxay Rubber Project (Sino-Lao project). This was officially classified as a 'cooperative investment project' by local authorities and project managers but is more commonly referred to as a 'concession' by residents of the villages. Areas of agriculture and forest land previously zoned and allocated by the government were reallocated by local government officials to be used for the project's rubber plantation development. The land was able to be re-zoned (effectively acquired as State land) because of the absence of permanent land use rights and there was therefore no need for compensation – either financial or land. The authors describe two interpretations of the situation by informants: i) the area belonged to the state, not to the people (company and government perspective) or ii) land ownership remained with villagers but the ownership of the trees is 50-50 (village perspective). Villagers who participated in the project were offered wage labour during the clearing and planting period, and then were supposed to collectively receive ownership over half of the rubber trees planted, which should either have been distributed amongst themselves equitably or managed collectively. Villagers were expected to manage the trees allocated to them and eventually sell any rubber collected to the Sino-Lao project. The company retained ownership over the remaining half of

the trees planted and was expected to hire local laborers to take care of and tap those trees. While ostensibly a 2+3 model, this arrangement more closely resembles a 1+4 model. Thongmanivong et al describe it as 'concession-like' because it employed economic coercion to induce the participation of local farmers. After planting occurs, the trees should be partitioned equally between villagers and the company so that each side gets half of the total 5,000 ha, and that the company has the right to buy the liquid rubber and labour from villagers.

McAllister (2012 and 2015), Kenney-Lazar (2012) and Friis et al. (2016) describe different types of rubber investment that have emerged in **Luang Prabang Province.**

- McAllister's research focusses on a '1+4' concession with Chinese Company Jinrun. In 2005 the Provincial Finance Office, with the approval of the Provincial Governor, signed a contract granting the company joint-venture concession rights in Nambak and Pak Ou Districts (see also Vongkhamor et al. 2007). The District Governor of Pak Ou approved a 40-year lease of 7000 hectares of 'state forest lands' to the company for the development of a rubber plantation. The concession area encompassed the territories of five neighbouring ethnic minority Khmu villages. Farmers were to be paid a set wage for each task for site preparation. The land would enter company control for 40 years, and farmers would no longer be able to use it. District officials argued that because the final step of LFAP had not been formally implemented, the land still officially belonged to the state and they deployed the final stage of the LFAP to redefine village boundaries by allocating private household rights to only half of the village territory, legally freeing up the remaining village land for lease to the rubber concession. For villages where land allocation had been fully completed, land rights were respected, and villagers were encouraged to voluntarily enter into contract farming arrangements with the company.
- Kenney-Lazar (2012) describes an 'absentee' smallholder example involving international family financing and hired labour. The situation that emerged combined private land purchases with a sharecropping agreement with US relatives, and a contract farming agreement with a Chinese company.
- Friis et al (2016) describe a concession – nominally 1+4, in Nambak, which was followed by contract farming by less well-off households and smallholdings by wealthier households. Initially, rubber was introduced by small-scale minority Chinese farmers with close familial and ethnic ties across the border (see Lagerqvist 2013 and Sturgeon 2013). Both Chinese investors and Lao government officials used the relative success of these smallholders to promote rubber through large-scale concessions and contract farming schemes (Sturgeon 2013).

Chinese Sino-Lao Chilan Rubber Development Company Ltd. (the Sino Company, also known as Jinrun) set up a rubber plantation of 100 ha in 2006 as part of a 7000-ha land concession granted by the provincial authorities in Luang Prabang in 2004. Since the land was formally classified as state land, the villagers did not receive any compensation. By 2012, the Company had established rubber in 12 villages in the district, and many households had been incorporated in contract farming and smallholder out-grower schemes as well. The contract farming was set up as a 2+3 scheme where farmers provide land and labour and the company delivers the planting material, equipment, and market. Profits from the latex sales were split, with 65 per cent going to farmers and 35 per cent to the Company. There were wage labour opportunities in the start-up phase, but the work-to-wage ratio was too low for the plantation work to be attractive compared to alternative income opportunities. The villagers anticipated employment opportunities in tapping once the rubber matured; however, these jobs had not yet materialized in 2016.

Several examples of rubber investments are described by Douangsavanh *et al*. (2009) - including in Thakhek district in **Khammouane Province** which is one of the oldest rubber-growing areas in Laos, with planting commencing in 1993, in two villages. The rubber was planted by the Phatthana Ketphoudoi Group Company with grafted plants imported from Thailand. A major attraction of the Thai Project was that they undertook to pay the equivalent of 3 years of land tax in advance to the District Land Office to gain a temporary land use certificate which could be used as the basis for rent arrangements with the company (S. Midgley pers comm). Other companies in Khammouane include the Lao-Thai Hua Rubber Company (since 2006) adopting contract farming and concession with the Lao Army in

an area previously Protection Forest and the Jong Ji Hong Ching Company under a concession followed by promotion of rubber in villages, renting land from villages to establish nursery and then selling them plants to plant rubber on their own land

Kenney-Lazar (2012) describes two small concession-style projects in **Vientiane Province.** One involved a concession with a supply chain contract in Hin Heup District in which a Hmong entrepreneur gained land for cultivating rubber without cost, granted by the government, after which the he encouraged relatives to cultivate rubber. Those who agreed were allocated a few hectares no charge. The initial batches of plants were bought from a Chinese company for 3000 LAK (US$0.38) per plant with the cost to be repaid when harvesting began, via the Hmong entrepreneur. The entrepreneur and the Chinese company agreed that rubber could only be sold to the company. The second was a small concession operating as independent smallholders in Phonehong District in which a group of families purchased approximately 500 hectares of land with money received from Hmong relatives overseas. The land purchased is viewed as a concession by the Lao government, and as such, the Hmong farmers are required to pay taxes once rubber tapping begins. The group divided the acquired land into smaller plots and sold them to other Hmong families. There is no contract with any Chinese company, no sharecropping, and no contract farming. People manage their own pieces of land.

In Bachiang District of **Champasack Province,** Obein (2007) (see also Gironde and Portilla 2015) describes concession agreements between the Government of Laos and Viet-Lao Rubber Company, and the role of the Provincial People's Committee in approving the granting of land by the Government, with the Company providing all other inputs, including obligations to preferentially hire Lao labourers. Concession agreements in Champasack are also the focus of Zurflue's 2013 study in which the Dak Lak Rubber Company Limited, a branch company of the state owned by Dak Lak Rubber Corporation (DAKRUCO), obtained its licence for what Zurflue described as a 50 year 'land lease' from the Government of Laos (GoL) in late 2004. We explore both these arrangements further in our study.

Rubber plantations invested in by Vietnamese companies in Lao Gnam and Bachieng Districts of **Champasack Province** were reported by Sophathilath (2010) as showing negative socio-economic impacts. In particular, a in decreased landholdings, food production, and household incomes. Sophathilath refers to a study by Leonard (2008) which revealed that between 2005 to 2007, villagers lost their productive lands at nearly 2.8 ha per household and about half of the 210 households interviewed had become landless.[61]

Baird (2010) focussed his analysis in **Champasack** on contract farming and the responses of villages and the local government to the detrimental impacts of the concessions. He highlighted the potential for wide variety of arrangements arising from the 'hidden details' in contracts and that despite the wage labour opportunities that should come under 1+4 models, these are not guaranteed. Companies often employ workers from outside the affected villages - either other Lao people, or foreign workers. Baird also noted that the simplified descriptors of plantation models refer to the inputs without reference to the benefits.

Kenney-Lazar (2012) also describes a concession granted to Vietnamese multinational corporation Hoang Anh Gia Lai Joint Stock Company (HAGL) in **Attapeu Province**. The project contract stipulated that HAGL was limited to only using state land, but they acquired land that the Attapeu government had previously allocated to seven villages through the LFA process between 2004 and 2008. After HAGL had cleared the land, they compensated villagers in exchange for their temporary land use certificates and tax receipts to the land, although this was not universal and occurred only when confronted/requested and at rates determined by the company. Villagers only received compensation to land to which they held some form of documentation, such as a temporary land use certificate or tax receipt. Any customary or village land without title was not compensated.

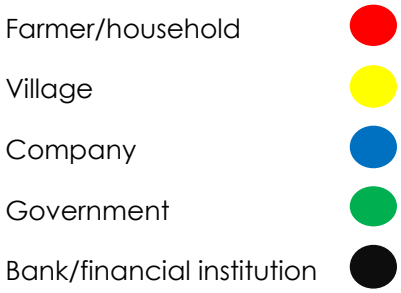
[61] Sophathilath references "Leonard, R. (2008). Socio-economic and environmental implications of large-scale rubber plantations invested by three Vietnamese companies in Lao Gname and Bachieng districts". We were unable to source this document.

Our Research Findings

We build on this already extensive body of information, through interviews with government organisations, companies, farmers, and others to explore four specific themes – land, labour latex and wood. In Northern Laos, our research focussed on Chinese company investments and those of independent smallholders. We interviewed two Chinese companies that had been operating in Laos since mid-2000s - called here: Company A and Company B. A third company, Company C participated in village interviews in Xieng Ngern District. We also interview rubber growing households in one village in Xieng Ngern District of Luang Prabang (Village 1), an entrepreneur in Nambak Luang Prabang (Village 2, Rubber Entrepreneur) and households in two villages in Luang Namtha Province (Villages 3 and 4), which were associated with a fourth Chinese company (Rubber Company D), whom we interviewed in Vientiane. To supplement these interviews, we reviewed company contracts compiled during ours and Lu's own research (see Lu 2017, Lu and Schönweger 2019). In both Luang Prabang and Luang Namtha we also interviewed representatives from Provincial and District Government authorities.

In Central/Southern Laos our research focussed on Vietnamese Rubber Companies referred to as Companies E, F, G, H, and I and one joint venture company (Company J). The interviews of Companies E-H were supplemented by a review of company annual reports and contracts and for Company J we also reviewed public documents regarding their investments. The investment arrangements are summarised in Table 11.

We adapted the Castella approach to representing plantation typologies based on inputs and added a description of the distribution of the outputs or benefits (Table 11). We use the following descriptors:



The thickness indicates the degree of contribution of that element to the investment – as either an input or benefit.

Land

Company A

'Company A' signed a concession agreement in 2005 for 50 years over 4000 ha in two districts of Luang Prabang Province. It also operates a rubber processing factory on leased land. This company initially planned to undertake contract farming, but this has not occurred, and its investments also include banana farming. The progress of this company has been affected by PMO13 after which it was only allowed to plant on land that had already been mapped. According to the company, the Provincial government interpreted the moratorium as banning all further rubber expansion. The company has recently received letters from PPI regarding the continuation of their concession agreement. Their interpretation of the letter was that PPI were requesting that they return the concession, accepting 10M LAK per hectare, and to not be involved in rubber after 2020. A 500,000/ha LAK deposit was also requested in the case that the company did not stop cultivating after 2020. They were in the process of clarifying the letter with government counterparts when interviewed.

Company B

'Company B' arrived in 2004, grows rubber under a concession agreement and under contract farming (see also McAllister 2012 and 2015). It has also established a rubber processing factory. The Company has a 33-year contract for 14,000 ha in two Districts in Luang Prabang, although the company has failed to develop in one of these. They started planting in 2005 and now have 3000 ha;

1400 ha is concession on state land and remainder is under contact farming. For the concession area -land rental increases in two phases from year 8-23 USD$3/ha/year and year 24 onwards at USD$6/ha/year. After PMO13 MAF inspected their concessions but they did not know what MAF were looking for. They had heard about other companies getting letters (like Company A), but they had not got received one themselves.

Company C

'Company C' arrived in Laos in 2006 (initially in Oudomxay Province), has a concession agreement and undertakes contract farming. As well as in Luang Prabang the company has investments in Oudomaxay and Xayaboury for rubber and other crops such as sugar cane. The company has 80 ha of concession land for 50 years in Village 1 where they also participate in contract faming under the '2+3' model, and where there are also independent smallholders and enterprise farmers, who were growing rubber before the company arrived. The concession land was identified by the District Government. The land of thirty-seven households was allocated to the Company, with once-off compensation paid. The reported amount of compensation varied: 200,000 LAK/ha (reported by one household), 500,000 LAK/ha (reported by several villagers and a village official), 4-5M LAK/ha and up to 10M LAK/ha (reported by District Government official). We were unable to obtain a copy of the agreement between the Company and the government to verify these amounts. While the villagers believe the land will return to them, the government officials we spoke to were of the opinion that the land will become state land because they paid the compensation for it. The village authorities understand that the land agreement is for 50 years after which the villagers will get their land back. District officials we spoke to said that there was no clear plan for the land after the concession ended, and that the land may be reallocated back to villagers.

Village 1 and Company C

Contract farming in 'Village 1' developed with Company C following a village meeting, at which villagers decided if they wanted to join. Initially the Company provided free seedlings (for those willing to sell cup lump to them), technology and purchased the rubber latex. Subsequently famers were charged for plants (2000 LAK each). Plantation management requirements and the volumes collected are recorded in a contract 'red book'.

In 'Village 1' we encountered three broad types of rubber 'smallholder':

- "Early adopters" (EA) - around two-thirds of the area of rubber in the village belongs to Hmong absentee owners who came in 2005/2006 and started to plant rubber on fallow land that they bought from local farmers. All inputs were paid for by the investors, who sell latex to whomever they want, and they own the trees. They are aware, from their relatives, that rubberwood can be sold but are not aware of any markets for it.
- "Supported smallholders" (SS) households who planted rubber after 2008 and who were given plants by the Company C, with "red books" but now act as independent smallholders selling rubber to whomever they want
- "Followers" (F) – those who have planted rubber on their own land following the Early Adopters and arrival of Company C - but had to buy the plant and are just following others in the village.

The land use rights on which smallholders were growing rubber were established either through "Yellow Certificates" or record in their Land Tax Book. Holdings of the farmers we interviewed ranged in size from 0.5 to 7 ha, with an average number of rubber trees owned at 1200 per household. Tree survival was variable and in one case was only 56% of initial tree stocking.

In most cases land use had transitioned from upland rice/fallow through one or more commodity crop (Job's tears and/or maize) to eventually be planted with rubber. In a few cases some farmers had converted teak plantation to rubber. Some villagers planted the plants provided to them and left them to grow, some planted and then chopped rubber trees down due to the low latex prices and planted Jobs tears and maize. Some have kept the trees.

None of the farmers we interviewed had registered their plantations with DAFO.

Village 2

In 'Village 2' in Nambak a rubber entrepreneur we spoke to invested in rubber plantations on his own land after seeing it in Luang Namtha in 1994. He told us a story about Hmong refugees who came to the village and brought their knowledge of rubber in China with them. He first planted rubber in 2004, which he bought in Mengla in China for 3.5-4 Yuan (¥) per plant (he bought 17,000 plants). He also told us of a smallholder groups in the District. The Rubber entrepreneur also has contracts with households for 25,000 trees (62 ha) for 50 years.

Village 3

'Village 3' in Luang Namtha has 159 rubber growing households (100% of households in the village) most of which was planted around 2008, although farmers told us they also planted earlier, associated with demonstration planting in around 1995-1998 during which time five households received plants from DAFO. These 'supported smallholders' also received training on management and tapping techniques. In this village, there is also a group of Hmong growers (who are connected to the growers in Nambak in Luang Prabang) whose relatives planted rubber in 1994 after bringing seeds and the knowledge back from China. The descendants (children and grandchildren) have kept growing rubber. Some have propagated their own rubber through grafting and are also germinating their own seeds. Others took loans from the bank to buy seeds, with government permission. The Provincial Forestry Section told us of a low interest loan scheme – the Provincial Rural Development Fund with PPI and PAFO. Between 1995 to 2003, in 18 villages, 4 Billion LAK was made available for 10-year contracts at 2% interest. There was a limit of 1 ha (6.5M LAK) per household, one time only. Farmers were required to start to pay back the loan when the latex started being tapped. It has been more than 10 years but 12 billion (B) LAK has yet to be paid back. There are 8600 ha planted under this scheme.

Village 4

Rubber came to 'Village 4', in Sing District of Luang Namtha, in 2000 and about two thirds of the households grow rubber. People paid for the rubber plants (3 ¥ each). In 2004 a 'small company' came to village and leased communal land to plant 2500 trees under a 15-year contract. The company owns the trees, but the village owns the land. A further 2300 plants were planted by villagers on their own. About 50% of people growing rubber have since converted some of their rubber to other crops -at first banana and now sugar cane; this started around 4 years ago. We sensed that villagers were reticent to discuss the cutting of rubber to plant bananas and later other crops, possibly because of recent regulations in Luang Namtha banning the conversion of rubber and rice to bananas. However, we learnt that farmers converted rubber to banana because the land rental opportunity was higher, and the contracts were for 5 years.

- Year 1 – 15,000/¥/ha
- Year 2 – 8-10,000/¥/ha
- Year 3 – 8,000/¥/ha

The banana company stayed for 4 years and then they left 'because of the ban on bananas and an increase on border tax on the Laos side'. While some of the households have gone back to rubber, others are planting sugar cane or fodder for grazing cattle.

In Luang Namtha Government officials described a 'concession like' 1+4 model in which village land (or villager land) becomes effectively state land after the contract is made (this is similarly described in Luang Prabang). Initially the land area is surveyed by PONRE and the original land certificates are cancelled. The company is then issued the land documents and the company pays land tax in the form of the concession fee, to the government. The farmer does not get paid anything. The company owns the trees while it is still in the contract term. But afterwards it is not clear who owns the trees.

Company D

'Company D' arrived in Laos in 2003 and has three rubber processing factories in Bokeo, Xayaboury and Luang Namtha.

Company E

'Company E' applied for a concession agreement in 2004 for land in Champasak Province. The company's total land area is 10,003 ha which is the entire area requested. The concession agreement

duration is for 50 years and they started planting in 2004/05 in the two districts of Bachiang and Sanasumbu. Their investments incorporate four enterprises focusing on plantation growing and latex processing.

Company F

'Company F' operates in Savanakhet Province where is obtained 30-year concession agreements in 2007, 2008 and 2009. The main objective of their investment is 'to help Laos develop large-scale plantations' based on a general model 'to access land from villagers and turn the villagers into company workers. The total land area under the three land concession agreements is 8,650 ha, of which 8,371 ha was intended for rubber plantation and 278.5 ha for timber plantations. The company has 3 land rental contracts from MONRE for plantations: 3,246 ha (dated 23 Dec 2011), 2,787.6 ha (13 March 2017) and 72.6 ha (15 March 2018) and one contract for 3.1 ha, used for constructing a processing factory. The total land area under the four contracts 6,109 ha. The remaining area (2,541 ha) is occupied by villagers.

However, the company actually has 7,335 ha of rubber planted (which is larger than the area of land under contract), comprising:

- 5,103ha of "Effective rubber plantation area", of which
  - 4,051 ha are being tapped: (the first tapping was in 2014 over 200 ha)
  - 1,052 ha of newly re-planted area (because the original area was damaged by villagers' cattle and burning)
- 957.7 ha of poor quality (small and unhealthy) rubber trees on the land where *Dipterocarpaceae* grows – with inherently poor soil quality
- 1,274 ha of rubber trees in areas that have been encroached upon and damaged by villagers (276.2 ha) and their cattle, and cannot regrow

'Company F' planted rubber trees two years before it received land concession permits from the government and have experienced land conflicts and plantation failure. The company met with DOF to complain about land conflict and according to the company, DOF agreed to establish a team to look into this issue. The Company explains that the land given to the them for rubber was poor forestland and swidden land belonging to villagers. They want to return the land that is unsuitable to the government (about 3000 ha of the 8650 they applied for) and they argue the government should give them more land. The company plans to ask for 20 years extension over 5,103 ha of land most suitable for rubber (totalling 50 years, or 2 rotations of rubber). Land rental is about $30 US/ha/year and land tax is payable when rubber is tapped increasing every year by 6%.

Company G

Rubber 'Company G' was granted a 50-year concession in 2004 for four enterprises in Laos, two each in in Salavan and Champasak Provinces. The company also has a processing company in Champasak province, where there are three other latex processing companies operating. Their concession land originally belonged to villagers and to the government. Totalling 9,326 ha, the project includes 8,810 ha of rubber, 498 ha is of cashew, and the remaining 17.6 ha is for other crops/trees. The area of rubber being tapped is 8,300 ha. The remaining area (500 ha) is not ready for tapping. Of this 500 ha, 306 ha are under a contract between the company and 'District [Provincial] People's Committee' which is land directly controlled by the district administration ('1+4'), 85 ha are under a contract with the provincial military agency ('2+3'), 53 ha are under contracts with district leaders, and 63 ha are rented directly from villagers. The company did not reveal the information on benefit-sharing for their area under the contract with the provincial military agency and district leaders. The Company is paying land tax at rate of US$7/ha/year, which is increasing over time.

Company H

'Company H' is a partnership between provincial authorities in Vietnam and Laos, with plantations located in Champasak and Salavan Provinces, with different experiences negotiating land access described as follows: "at the beginning of the process, Champasak provincial authority was open, and 'land access was easy'. In Salavan, the provincial authority was not open". The Company was granted a concession for 50 years – 2 plantation rotations, but in 2012 the Central government decided to stop granting land to companies. Company G found it difficult to locate land because

they came after Company E and Company G, so 'they planted rubber wherever they could find land' and all the land they obtained is within 80 km of its processing factory. According to the company, land located further away is not economically viable because transportation cost would be too high. Company H has 6,722.6 ha of land – about 30% of the total area approved by the government. The total rubber plantation area is 6,711 ha, of which 5,500 ha is being tapped. Land tax is free during the first 5 years before the tapping. During the first 3 years, the company allowed villagers to intercrop with rubber.

Company I

'Company I' is a small company operating in Salavan province, established by a timber trader who stopped operating after the introduction of PMO15. The company has 300 ha of rubber plantations on land granted by the district authority under 3 contracts made in 2005, each with 100 ha. The land is both government and villagers' farming land. A field visit reveals that the company actually has 700-800 ha, with the additional land 'bought' from smallholders. It is not clear how the land was acquired or whether the transaction was approved or reported to the government.

Company J

'Company J' was established as a Lao-Thai Joint Venture in 2006 but has recently been acquired by a Chinese state-owned agribusiness enterprise. They have both concession and contract farming models of rubber plantation and report that they have planted more than 2 million rubber trees in the provinces of Vientiane, Bolikhamsay, Khammouane and Savannakhet. Their concession has a 50-year term and covers 15,000 ha and they aim for a further 15,000 ha under contract farming. Currently the contract farming project, which covers 970 ha in Bolikhamsay, is registered under the Verified Carbon Standard (VCS). It is described as a '2+3' contract model involving 402 families with formal land certificates/land titles. The land lease period is 30 years, which can be renewed for 20 years more. The company paid for the plants (5000 LAK/plant which is repaid once tapping commences) and pays the landowner USD $8.00 per hectare per year as for land rental, paid upfront for a period of 5 years, after which the rental should be paid annually by the company until the end of contract. In addition, the company should pay USD$5.30 (45,000 LAK) per hectare per year to the Government as the tax for land (this was described as 'royalty' by the company).

Labour

Company A

'Company A' employs 30 tappers who get paid based on the volume tapped. They reported that the best tappers are Hmong. Each of the plantation areas has a Chinese technician, who supervises labourers and monitors tapping quality. Their factory employs 40 local people and four Chinese supervisors. They work in teams of 8 and earn 400,000-600,000 LAK per day which is divided between them (1.5-2.5M LAK pp/per month). Teams work 8-10 months per year and 8 hours/day; they close the factory when tapping stops. Male and female workers were observed in the factory and when asked if they were happy working in the factory – they replied: 'it's better than upland rice'.

Company B

'Company B 'pays tappers who work on their concession lands by volume for the first three years when latex production is low. After year three, 70% of the latex value goes to the company and 30% to worker. The company pays workers in latex; it does not pay a set salary because they feel that 'labourers will not work as hard'. Most of their workers are people who do not have their own land. Each year Company B trains around 100 tappers who might tap for them or they might go and tap somewhere else. A tapper earns around 10,000,000 LAK per month if they tap very well, but on average it is around 4,000,000 LAK per month. At the time of our interviews the latex price was only 6000 LAK/kg cup lump and it had been as low as 3000-4000 LAK. When the company started the price was 10,400 LAK/kg.

Company C and Village 1

'Company C' initially provided a salary to those households in Village 1 who lost land to their concession take care of the trees, at a rate 300 LAK/tree/month. Villagers reported to us that they undertook the work for two years but were never paid. Despite seeking resolution through the District Government this was not resolved, and they did not receive any further contracted work. From 2011

the Company employed others to care for the trees on the concession area. Twenty-two tappers were employed under a payment arrangement based on a 50:50 split in cup lump in 2017, reducing to 45% to the tapper and 55% to the company in 2018. In 2019 payment was a flat rate regardless of the market price - reported by villagers to be 2000 LAK/kg and by the company as 2,300 LAK/kg – villagers told us the labour terms change every year.

Under the rubber farming contracts, according to the Company, farmers are supposed to undertake management activities such as weeding, and this is recorded in the 'red book'. For tapping training, farmers were required to pay 200,000 LAK unless they tap for the Company for one season. Over 1 month they learnt how to tap trees, but the company inserts the tap and cup. The farmer pays for the acid and tapping equipment. Farmers reported that they enjoyed planting the trees because they 'worked together'. When tapping they earn around 800-900 LAK per tree each time or around 800,000-1M LAK per fortnight from the company. On their own land, income could be 3M-5M Lak/month depending on how many trees they had.

Village 2

The rubber entrepreneur in 'Village 2' employs labourers to tap his plantations, the income for a tapper is 3-4M kip per month. He mostly employs Hmong tappers from outside the area as he considers these to be the best tappers. On the contract farms in the 1st year of tapping the tapper gets 100% but pays back the cost of the tapping equipment, after which the tapper receives 70% of latex, while he gets 30%. From his 30% the entrepreneur pays 3% to a management team which includes 4 people (all men) who undertake inspections and monitoring. He does all the paperwork.

Village 3

In Luang Namtha, households in 'Village 3' start tapping their trees after 7 years and work in family teams – often the husband and wife together, after learning from their parents and grandparents. They tell us the work is hard and it is difficult to work at night. They retain all latex and so can sell to the highest price.

Village 4

'Village 4' is divided into 7 units and each unit is responsible for tapping trees. The income is divided between the village, the Village unit, and tappers -for example if they earn 1.5 M, 1M goes to the village, 500,000 is divided between the unit and the tapper (50:50).

Company E

'Company E' hires labourers to tap their trees, with 60% of the harvest going to the company, and the remaining 40% to the labourers. Each worker receives a certain area of rubber plantation from the company to manage. They initially hired more than 3,000 labourers and now 2,666 labourers of which 2,304 are Lao; the remaining (362) are Vietnamese, working at managerial levels. Management staff earn 10.67 mil VND/month ($460 US). A labourer's average salary is 5.56 mil VND/month (roughly $240 US). A shortage of labour poses some problems for the company and they have had to switch from tapping a tree every 3 days (D3 tapping) to tapping every 4 days (D4 tapping).

There are incidents of workers harvesting rubber and selling it to traders ('rubber stealing') and the company estimates that it loses 20 tons of cup lump/day and has to hire district police and military to protect its plantations. Some of the company's rubber trees have also been sabotaged by local villagers, because of land conflict.

Company F

All of 'Company F's' labourers are Lao, but very few Lao people work at the managerial level. They aim for Lao people to occupy 50% of staff at management levels in 5-10 years from 2019. They claim that their salary level for workers is the highest among rubber companies in the Province with the annual salary of a Lao worker exceeding 30 Mil LAK/year. The average monthly salary in November 2019 was 3 mil LAK/month with the salary comprising two parts: a) a fixed rate per month and b) based on the volume of latex harvested by the worker. Each worker manages 6 to 7 ha of rubber. The company says "rubber is part of a worker's life (similar to French rubber plantation during the colonial time). Each labourer taps 11 tons of rubber/year, compared to a Vietnamese labourer who taps around 6-7 tons of rubber/year.

Many workers do not have labour contracts, and most do not have health and social insurance. According to the company, workers want all payments in cash and do not want to have to have their pay reduced for insurance. Company F has had some difficulty with labour in areas where villages lost land to the company's concession; these communities prevent workers from other areas coming to work on company's rubber.

Table 10: 'Company F' Labour Statistics 2016-2019

	2016	2017	2018	Jan – Sep 2019
People	371	641	932	833
Average salary (mil Kip/month	1.31	1.59	1.78	2.2

Company G

'Company G' employs 2,500 labourers including 2,300 Lao workers (100 at the processing factory) and 200 management staff who are mostly Vietnamese. Labour supply is unstable, with workers moving in an out, and securing enough labour is a big issue. Traditional customs (e.g. wedding, funeral) have strong impacts on labour stability and to mitigate this problem, the company trains villagers who can replace those who leave. Labourers receive training in tapping technique. Each worker is responsible for 3 'rubber gardens', and because most workers live in nearby villages, they also engage in their own agricultural activities. On average, each worker taps about 30 kg of latex per day. Their average monthly salary is 2.5 M LAK/worker. The average monthly salary of the worker in the processing factory is 4.2 M LAK/person (up from 3.6 M LAK in 2017). Most of their workers do not have labour contracts with the company – only 232 of 2500 workers labour contracts and social insurance (accounting for less than 9% of the company's total labour), and most of these were Vietnamese employees (166 people); only 66 Lao labourers who are management staff have contracts. The company reports there is a drug problem among workers.

Company H

'Company H' employs 1,765 labourers of whom only 172 have a labour contract. About 300-400 workers are from outside the local area due to labour shortages arising through competition with the other rubber companies in the province. These workers live on the rubber plantation in accommodation provided by the Company, which also constructed deep wells and provides electricity for workers. Each worker is responsible for 3.2 ha of rubber. They start working at 3 am and finish tapping at about 7 am, with a 1-2 hrs break after which, they collect latex until noon. Tapping takes place for 10 months/year (until Chinese New Year), when leaves drop. During the two-month period workers take care of the plantation (e.g. weeding). A worker's monthly salary is 2.8 – 3.7 mil Kip/person. The Company reports that there are re are social problems in the area, particularly drug addiction.

Company I

Currently, 'Company I' has 163 labourers only 100 of whom have contracts. Their labourers come from nearby villages.

Company J

Under the contract farming model of 'Company J' the landowner provides the labour for planting and maintenance depending on their personal capacity, and the company makes payments according to the work done. For the cup lump, the company takes 70% and the farmer receives 30%; but recently the prices have been so low that they changed this to 40% to the farmer and 60% to the company. The company owns all the carbon credits.

The company also engages in an outgrower scheme, which it calls "Song Seum Khop Keua" under which the company provides technology, all inputs and marketing, while land and labour are the responsibility of the villagers. The villagers receive 90% of the income from latex sales to the company while the company takes the remaining 10% until the cost of the inputs provided by the company are paid back. Once the cost of plants is paid back to the Company the farmers take 100% of the latex.

Under their concession arrangements the tapper receives 40% of the latex.

Latex

Company A

'Company A' uses several clones in their plantations - GTI 600, 707,772,774, some of which are quite old. Tapping starts in years 8-10 and can continue for 30-40 years in good trees, after which they may continue to produce latex, but the volume is low. Two new clones are also being planted by the company- 879 and 628 which produce 2-3 times the yield of latex and grow more quickly than other clones. If managed well, the tapping of these trees can start in the 5th year, the total yield is higher the other varieties, but after 15 years latex stops. However, these trees are more susceptible damage and have more defects.

Half of their plantations are already being tapped but this has been affected by dry weather decreasing yield to 50%, and the value has declined. The company has its own factory which opened in May 2018 and is supplied with latex from their own plantations as well as others'. Their monthly output of smoked-block rubber is about 1 metric ton and is exported to China for 200¥/ton.

Company B

'Company B' selected tree clones based on the latex production and conditions in Laos; wood quality was not a consideration. They use 774 and 772 clones from Yunnan State Farms because they are the most suitable to Laos. They propagate from grafts from mother trees brought in from China and have their own nursery. All of their latex goes to a state-owned enterprise in Xishuangbanna in China which processes it into higher quality latex, and it is then used by Chinese tyre companies. The company has experienced problems with paperwork for export of latex, but otherwise has not experienced any adverse policies. They were not familiar with Sustainable Natural Rubber Initiatives or standards.

'Company B' has '2+3' contracts and they provided the growers free plants and free training. The ownership of the cup lump and trees has changed over time. Initially ownership was divided 70% to the company and 30% to the farmers. However, the company has been unable to monitor what people are tapping or who they sell latex to, and they have effectively abandoned the contracts and farmers own 100% of the trees and latex.

Company C

'Company C' started tapping in 2017. The cup lump from the trees on their concession is sold to Company B, via a village trader who works for 'Company C'. It is unclear in the contact farming model whether there is a firm requirement to sell rubber to Company C. Some informants from 'Village 1' reported that they have to sell to the company, some said they sell latex to whomever they want, others said they should sell the latex to the company if the company comes to buy it, but this does not always happen. It seems that the contacts have broken down and many contract farmers are operating as independent smallholders.

Village 1

Smallholders in 'Village 1' were selling their cup lump to 'Company C' but also to other companies who send traders to the village. They expressed concern that Company C was preventing outside traders entering the village and family groups were consolidating their harvest and selling directly to the factory of 'Company A' at the factory gate. Low and un-reliable prices were a concern to all farmers we interviewed with prices in 2017 dropping to as low as 4000 LAK/kg and sitting at around 6000 LAK/kg at the time of our interviews. However, farmers generally expressed satisfaction at the income the received from rubber investments.

There was an expectation (or a hope) that the Government could intervene to stabilise prices. With a further reduction in price some farmers indicated they would stop tapping and even consider converting rubber to other crops.

Village 2

In 'Village 2' the entrepreneur started tapping his own trees in 2011 and the contract farming trees in 2013. He also buys cup lump from others in the area including a rubber farmer group (on commission). He sells latex to 'Company A', 'Company B' and 'Company D' – depending on who is offering the best price. 'Company D', in Luang Namtha, offers the highest price but the transport costs (2M -2.5M LAK per truck load) and taxes (200,000 LAK per border crossing) mean that selling at a lower price to

Company A or Company B in Luang Prabang, or even in Vientiane is more profitable. He is the only rubber trader in his village, but there are at least three others in the District.

Village 3

In 'Village 3' most of the households own all the cup lump that they harvest and can sell it to any company, although a few have contracts with Company D. Some report that Company D buys about two-thirds of the latex while the rest is bought by a Lao broker who sells to another Chinese buyer. At the time of out interview the broker was paying 200-300 LAK/kg more than Company D. There are many groups in 'Village 3' who have more power to negotiate but we were told "the big groups don't work well".

Village 4

In 'Village 4', villagers who grow rubber did not report having any contracts with companies, despite the presence of the small company's plantations on village land.

Company E

Of their total plantation area (10,003 ha) 'Company E' is tapping 8,420 ha, latex production is already declining on 528 ha and this is scheduled to be replanted in 2014 and tapping ceased on 300 ha in 2018 of which 224 ha were replanted in 2019. A further 1,289 ha is considered not to be suitable for rubber and 460 ha of this have been converted to other crops. The company belongs to the Vietnam Rubber Group (VRG) and every year they receive an annual quota from them. In 2019, the VRG requested 17,000 tons of latex, 300 tons of which comes from smallholders.

There is a tough competition among traders for buying latex from smallholders with 30-40 permits approved for Vietnamese, Chinese and Laos traders operating across 22 collecting points near the company's plantation area. They report that Chinese traders have come to southern Laos to buy cup lump from smallholders, taking it to Chinese factories in the north. In its own factory 'Company E' is producing two major products: SVR 3L (90% of the company's total export) and SVR 10 (on average, the company produces 9,000 tons of SVR 10 per year). China is the main market, accounting for 84% of the total company export (via the Bokeo border crossing). Vietnam is the second largest export market (the remaining 16%).

Company F

'Company F' has the only processing facility in Savanakhet Province, with 10,000 tons/year of capacity. The processing enterprise has been operating since 2017. The Company does not produce enough cup lump to supply to its own processing enterprise and must buy rubber from smallholders in 3 provinces to make up the shortfall. On average, each household has 30-40 ha. The company also buys rubber from other companies. In total they source latex from 14,000 ha of plantation owned by smallholders and other companies, paying 5-6,000 LAK/kg at the time of our interviews.

They also face stiff competition from traders who buy rubber from smallholders and to reduce this competition, the company reportedly lobbied the provincial government to ban all other traders operating in the province – so the company is the only enterprise buying rubber.

Company G

'Company G's' latex processing capacity is 20,000 tons/year and all latex are from the Company's own plantations with no supplementary buying from smallholders. They do not buy rubber from smallholders because 'if they buy, they will create black market for stealing rubber' (Company's deputy director). In 2017-2018, they processed over 18,000 tons of cup lump, an average yield of 2.19 tons per ha, or 5.39 kg/tree. The company uses chemicals to increase yield – about 200 kg of fertilizer is used per ha per year and Ethepon[62] (imported from Thailand) is used to increase latex production. Investment into the plantation area under the tapping includes weeding, fire protection, leaf collection, materials, and chemicals.

In 2018 'Company G' had 86 sales contracts with an average price of USD$1,298/ton of block rubber (down from USD$1,510 USD/ ton in 2017). Their rubber products are SVR 3L (70% of the total production)

[62] Ethepon is a chemical yield stimulant 2-chloroethyl phosphonic acid, see An et al 2016;

– producing this product requires more chemicals than producing other products and SVR10 (30% of the production) which are sold to three markets: other companies with processing factories in Laos, the Vietnam Rubber Group or exported to Thailand.

Company H

'Company H' started tapping in 2012. In the first 10 months of 2019 the company produced 1,617 tons of rubber, accounting for 65.5% the volume intended for 2019. Yield was 1.71 ton/ha. Their processing capacity is 9000 ton/year/ of '3L' and 7500 tons/year 'VN10'. They are unable to meet demand for their products, which supply markets in Vietnam, China, and Japan. Their rubber is sourced from their own plantations, smallholders and other companies located in Champasak and Salavan. 'Company H' established another smaller company to buy rubber from smallholders, from Bachieng and other districts - buying 7,000 tons each year, however, they find it difficult to control the quality of the rubber from smallholders. We are told there are at least 50,000 ha of smallholder rubber in Champasak, and another 50,000 ha owned by companies. The latex bought from smallholders is mixed with that from the company plantations.

The number of traders with government permits buying rubber from smallholders is viewed as problem, promoting rubber theft and a market for stolen rubber. When the rubber price is high, the Company's workers sell rubber to them, but when it is low, they sell to traders; the company views this as stealing the company's rubber. When the company complained to district authorities about the number of traders, the authorities said permits had already been granted and they could not take them back and suggested the company should wait until the permits expire.

Company I

'Company I' started planting rubber in 2006 and tapping began in 2012. They have a simple processing factory, located near the plantation which produces smoked sheets. Their buyers are from Vietnam and China, with a priced of $USD 1,500 – 1,600/ton.

Company J

'Company J' allows contract farmers to sell their latex two whomever they want – based on current market price.

Wood

Company A

'Company A' believes it owns 100% of the trees but their concession agreement does not refer to the wood. The value of the wood was considered in their investment decision. In China, a 30-year-old tree is worth 400-500 ¥/tree but a specific price was not factored in because at that time the price of latex was very high. Their plan is to sell the trees, and harvesting will occur when less than 50% of the trees are producing enough latex to be economical. There is currently no market for rubberwood in Laos and no one has ever asked to buy their trees for wood, although other companies want to buy the trees for the latex.

Company B

'Company B' believes it owns all the trees on the concession land, but the contract does not specifically mention the trees or the wood. They considered the value of the wood at the time of investing when the price in China was 600 ¥ for a tree harvested at 35 years of age. However, they did not select their clones with any consideration for wood properties – latex and suitability for growing in Laos were the primary considerations. They believe it will be 20-30 years before they cut their trees and that is too far away to know the price for wood. They do not manage the trees on their concession for wood volume or quality, only for latex. There is no specific mention of the wood ownership in the contracts they have with farmers.

Company C

'Company C' is aware of the potential value of the wood in their trees and believes that it owns the trees on the concession area. They do not undertake any specific management activities for the wood and have not established a market for the wood because their plantations are too young.

They did not comment on the trees or wood on the contract-farms.

Village 1

In 'Village 1' almost all smallholders we spoke to were certain that they owned their rubber trees. Early Adopters, with connections to other areas of Laos and to China were aware of the value and potential use of trees for wood, whereas others were not, and in most cases felled trees were being used for firewood. None of the smallholders we spoke had registered their rubber plantations.

Village 3

The entrepreneur in 'Village 2' was also certain that he owns his trees, was aware of the value of the rubberwood, and plans to sell them in the future if there is a market. Regarding the rubber trees on the land that is under contract farming with him the ownership of the trees is split 70% to the farmer and 30% to him and this is documented the contract, which he showed us. None of the plantations we discussed with him were registered.

Village 3

Households in 'Village 3' were aware that their rubber trees could be harvested for wood. These farmers own their rubber trees and some of them know, from their relatives and connections with China, that they will be able to cut and sell their trees for rubberwood. However, the contracts associated with the loans make no reference to the ownership of the trees.

Village 4

In 'Village 4' farmers were cutting rubber trees and using the wood for fuel, although they commented that it does not make good charcoal. Those we spoke to were unaware that the rubber trees could be harvested for wood.

Company D

'Company D' considers the value of the wood in their investment decisions and has facilities in China looking at products from rubberwood. The company representative interviewed suggested that local people should establish processing factories when the wood is ready to cut because the wood must be processed quickly after trees are cut. 'Company D' expects their latex production to peak in Laos in about 2025, but rubberwood harvesting from their plantations will not start until 2045 in part because they planted later, and in part because they manage their rubber trees carefully to extend their productive lives. The company representative asserted that their plantations produce better quality wood than smallholder plantations because bad tapping techniques reduce the tapping life of a tree to 20-25 years and affect the wood quality – the heartwood can turn black if damaged. They believe local people do not yet know about the value of the wood.

Company E

'Company E' considers all rubberwood on the concession to be their property. They are already exporting rubberwood logs to Vietnam under a special permit from MAF, harvested from an area of rubber plantation destroyed by a storm in 2018. Every year an amount of rubberwood is harvested from the areas that are no longer being tapped. According to the company, there is no one buying rubberwood from Lao at present so they either export the logs to Vietnam or burn them in preparation for replanting.

Company F

In 'Company F's' project proposal to the Lao government (in 2007), after the 30 years concession period ends, whatever is on land is returned to the government. This means that any standing rubberwood belongs to the government (assuming the company has not harvested before 30 years). The project proposal emphasized rubber latex, not rubberwood. In 2018 thousands of cubic metres of rubberwood were harvested due storm damage. However, they reported that nobody in Laos wanted the wood and the Company described the export process as complicated, so they 'just dumped the wood'. According to the Company's estimation, about 100,000 m^3 of rubberwood are harvested each year because of storms from all plantations in Laos. The company thinks that it is important to establish a wood processing company in southern part of Laos for processing rubberwood and the benefits from this will be huge.

Company G

'Company G' perceives that the rubberwood on their concessions belongs to them. However, as the company has plantations under different contractual arrangements, the ownership and legality of the rubberwood under those arrangements is not clear. According to the company's representative, Vietnamese rubber companies in Laos are requesting the Lao government allow them to establish their own rubberwood processing facility in Laos to process rubberwood when latex harvest declines.

Company H

'Company H' believes the rubberwood belongs to them and the future they plan to ask for permission from the Lao government for a processing facility and wood exports to Vietnam. They plan to build a rubberwood processing factory in Champasak and start to harvest wood in 2025. This also has to be approved by Vietnam Rubber Group. At present, they do not understand the procedure (for obtaining the permit) for harvesting trees. As the Province has 100,000 ha of rubber. in the future wood from this source could be huge. Some staff of 'Company H' have received training on FSC and they are part of a sustainable rubber production project run by Oxfam and PanNature (local NGO in Vietnam).

Company J

The arrangement for the ownership of the wood in the trees is described in the VCS documents for 'Company J' - 10% of the value of the wood after harvest goes to the farmer and 90% to the company. However there are two choices: either the company gives the trees to the farmer who then covers all expenses e.g. associated with cutting, and sells the trees themselves, or the company cuts the tree and after that they will calculate net benefits and divide it - farmer receiving 10% and company 90% of the price they receive. It is not clear if this is in the contract between the company and the farmer and given the age of the investment, this situation has not yet been tested in practice.

'Company J' also established a Clean Development Mechanism (CDM) project in 2007 and subsequently registered with the Verified Carbon Standard in 2017 with 100% of carbon credits generated owned by the company.

Summary

Our findings, summarised in Table 11 and Table 12, together with the research of others, demonstrate the complex legacy of land investment approaches in Laos, and that pose challenges in resolving issues associated with latex sustainability, timber legality and in developing and policies for any future rubber industry.

While efforts are being made to address some of the past failings associated with concession agreements the resolution of issues associated with existing investments appears to be creating some uncertainty amongst company investors. Despite being actively promoted contract farming approaches have not been without their shortcomings and there are lessons to be learnt in any moves to further promote this type of partnership, especially as an alternative to concessions.

For smallholders and some rubber labourers - either tappers or in workers the one factory we visited, positive comments were made about rubber work. It was viewed as better than 'upland rice' but still difficult work, particularly working at night. The regular income – which for tappers came every 15 days, was commonly cited a benefit of rubber contributing to improved livelihoods through access education and affordability of goods such as medicine. However, the link between latex price and wages was of concern – with low latex prices reducing motivation to take up rubber work (as labourers) or for smallholders to tap their own plantations.

For rubber companies, competition for labour is a significant issue – both within the sector and with others. Low latex prices and lack of contracts made switching from tapping to working in other sectors attractive and easy for labourers, and labour force instability was an issue for most companies. It is not clear whether the lack of contracted labour is because companies are unwilling to offer contracts or because workers are unwilling to enter into them. Some companies suggest that social protection requirements (such as insurance) may be a deterrent to workers.

There are clear connections and tensions between companies, villages and smallholders in the trading of latex (Figure 11), with the breakdown of contracts in Northern Laos facilitating the flow of

latex from contract farmers to a broader network of buyers. In Northern and Southern Laos companies are trying to control their supplies (and prices) that they see as threatened by the presence of independent traders. Even where they are registered, companies perceive that these traders encourage theft and enable a 'black market' in latex. Farmers view traders as increasing competition and possibly price. Low prices have impacted contracts and supply, with some independent smallholders willing to stop tapping and considering exiting rubber altogether. The mixing of latex from different source has implications for both product quality and market sustainability standards.

The arrangements over the ownership of trees and rights to harvest and sell wood vary. Sometimes these seem clear – smallholders and farmers who have planted rubber independently and on their own land are certain their tree rights are secure; similarly, companies with concessions are confident they own the trees they have planted. In the case of contract farming rights to trees and to harvest are much less clear, despite some assertions that 'trees will be split the same way as latex', this is not consistently described in contracts. In almost all cases in our research, rubber plantations do not comply with plantation regulations, such as registration. This will create issues with respect to timber legality. While the is no rubberwood market in Laos at present rubber companies are aware of this opportunity and, in Southern Laos, are starting to plan for this phase of their investments. For some of the earliest plantations, a transition to harvesting in Northern and Southern Laos this is imminent or has begun. Smallholders and contract farmers are not as aware of this opportunity and risk missing out on a significant income stream from their investments.

Table 11: Rubber Plantation Investment arrangements.

Interviewee	Region	Inputs					Benefits/Outputs			
		Land	Labour	Capital	Market	Tech	Land	Latex	Wood	Carbon
Village 4	North									
Village 1 Smallholder ('EA' and 'F') ('5+0')	North									
Village 2 Entrepreneur ('5+0')	North									
Village 3 Smallholder ('IS') ('5+0')	North									
Village 1 Smallholder ('SS') ('5+0')	North									
Village 3 Smallholder ('SS') ('5+0')	North									
Village 2 Group (CF) ('2+3')	North									
Company B (CF '2+3')	North									
Company C (CF '3+2')	North									
Company J (CF '2+3')	Central									
Company C (CF '2+3')	North									
Company C (CA '1+4')	North									
Company B (CA '1+4')	North									
Company A (CA '1+4')	North									
Company E (CA '1+4')	South									
Company F (CA '1+4')	South									
Company G (CA '1+4')	South									
Company G (CA '1+4')	South									
Company G (CF '2+3')	South									
Company H (CA '1+4')	South									
Company I (CA '1+4')	South									

Table 12: Summary of Rubber investment scenarios

Interviewee	Country	Region in Laos	Started	Land	Labour	Latex F = Farmer C = Company L = Labourer	Wood F = Farmer C = Company
Village 1	Laos	North	2005	Smallholders	Self and family labour Hired labourers	F: 100%	F: 100%
			2008	Contact Farming 2+3		F: Y1 50% F: Y2 40-45% F: Y3 2000/kg	Unclear – not specified in contracts
Company A	China	North	2005	Concession Granted: 4000 ha Planted: unspecified	Lao hired labourers	C: 100%	C: 100%
Company B	China	North	2004	Concession Granted: 14,000 ha Planted: 1,400 ha	Lao hired labourers	C: 100%	C: 100%
				Contact Farming 2+3 Planted: 1,600	Contracted farmers	Initially F: 70%, C; 30% Now F: 100%	Unclear; not specified in contracts
Company C	China	North	2006	Concession Planted: 80 ha	Lao farmers and hired labourers Chinese technicians	C: 70% L; 30% taper	Company 100%
				Contact Farming 2+3 Planted: 600+ ha	Lao hired labourers Chinese technicians	F: Y1 50% F: Y2 40-45% F: Y3 2300/kg	Unclear; not specified in contracts
Village 2	Laos	North	2004	Concession Planted: 62 ha	Contracted farmers	F: 70% C: 30%	Farmer 70% Entrepreneur; 30%
				Smallholder Group	Group members	100% to group	Group: 100%
Village 3	Laos	North	1995/98	Smallholders	Self and family labour	F: 100%	F: 100%
Village 4	Laos	North	2000	Village Group	Village unit	2/3 to village 1/6 to village unit 1/6 to tapper	Unclear

Interviewee	Country	Region in Laos	Started	Land	Labour	Latex F = Farmer C = Company L = Labourer	Wood F = Farmer C = Company
Company E	Vietnam	South	2004	Concession Granted: 10,000 ha Planted: 10,003 ha	Lao labourers Vietnamese technicians/managers	L: 30% C: 70%	Company 100%
Company F	Vietnam	South	2007	Concession Granted: 8,650 ha Planted: 7,335 ha	Lao wage labourers Vietnamese managers	Split between L and C % not specified.	Company 100%
Company G	Vietnam	South	2004	Concession Granted: 10,000 ha Planted: 8,810 ha	Lao wage labourers Vietnamese managers	C: 100%	C:100% if harvested before end of concession
				Contact Farming 2+3 P: 85 ha	Contracted farmers	Not specified	Not specified
				Contact Farming 1+4 Planted: 63 ha	Unclear	unclear	unclear
Company H	Vietnam	South	2007	Concession Granted: 20,000 ha Planted: 6,722.6 ha	Lao wage labourers Vietnamese managers	C: 100%	C: 100%
Company I	Vietnam	South	2005	Concession Granted: 300 ha in 3 Planted: 700-800 ha	Lao wage labourers Vietnamese managers	C: 100%	C: 100%
Company J	Lao/Thai	South/ Central	2006	Concession Granted: 15,000 ha Planted: unspecified	unknown	unknown	unknown
				Contact Farming 2+3 Planted 970 ha	Contracted farmers	F: 30%, now 40% C: 70%, now 60%	10% of wood volume/value
				Concession Planted: unspecified	Contracted farmers	F: 90% C: 10% until inputs are paid then 0%	unknown

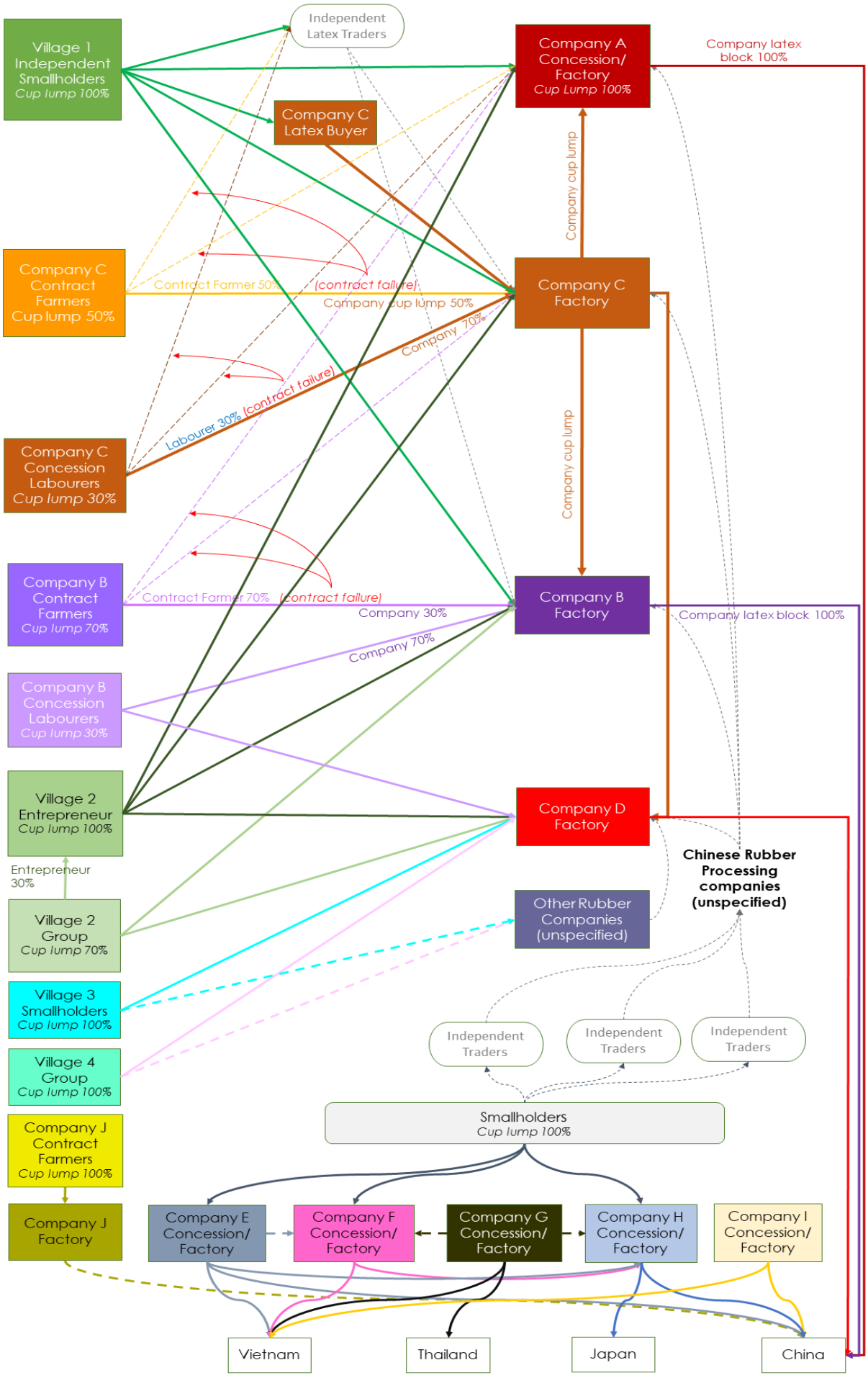


Figure 11: Rubber latex networks

Production and Processing

Natural Rubber Latex

The natural rubber production chain has been generally described by others, for example see Haustermann and Knoke 2019. In this section we briefly describe key elements of latex production in Northern Laos.

While much of the initial planting material for rubber plantations in Laos was imported from China, Viet Nam or Thailand, some companies and entrepreneurial farmers have their own rubber nurseries using seeds collected from their own and other's trees to be used as root stock. Companies may have mother trees of known clones. In this example (Figure 12) seeds have simply been collected from plantations, scattered on furrowed soil, and left to germinate. In other cases, seeds or other genetic materials are imported

Figure 12: Rubber Nursery

Planting density is typically standardized and optimized for latex production and collection. Variation in spacing is mostly due to slope. However, we found a wide variety in the villages we visited.

When young, trees are tip pruned to create a fork and increase crown density (visible in Figure 13) which in turn increases latex yield. This also has implications for wood yield and quality. Plantations may be intercropped in the early years -with, for example, rice, maize, Job's Tears, pineapple, coffee, tea, yams, and peanuts, until canopy closure.

In some cases, the transmission of fungal pathogens along planting lines occurs. Farmers attempt to stop transmission through the digging of trenches.

To extract latex, the tree bark is cut or shaved and latex is collected, via a gutter in a cup (forming cup lump) attached to the tree Figure 14). The tapping may be done by company technicians or smallholders. Farmers may be offered training as part of their agreements.

Tapping technique and other management actions affect latex volume and tree longevity because the depth of cut may introduce fungal pathogens. Scoring of the tree bark is typically done in the early hours in the morning when latex best flows.

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Figure 13: Rubber plantation monoculture

Figure 14: Rubber tap and cup

The cups are later emptied and mixed with acid to form cup lump. These are amalgamated into 'slabs' through the application of acid. Cup lump is carried, either manually or via 'lot sing' or motor bike, to the roadside for sale and/or collection, where it is weighed (Figure 15) and transported to the factory (Figure 16).

Figure 15: Trading cup lump

(photo: Mienmany)

Figure 16: Cup lump at factory

Cup lump is shredded and washed into 'crumb' (Figure 17), prepared for smoking into blocks (Figure 18) - a process that emits strong and pervasive odour.

Blocks are smoked using a kiln is fuelled by either wood or coal. Smoked crumb blocks are manually weighed - each block weighs 17kg (Figure 19) and the blocks are trimmed to achieve a standard weight (Figure 20). Two 17 kg blocks plus trimmings are pressed together to make one 35 Kg block (Figure 21) and each 35 kg block is packed for transport and exported for further processing (Figure 22). This is currently the end of the production chain in Laos.

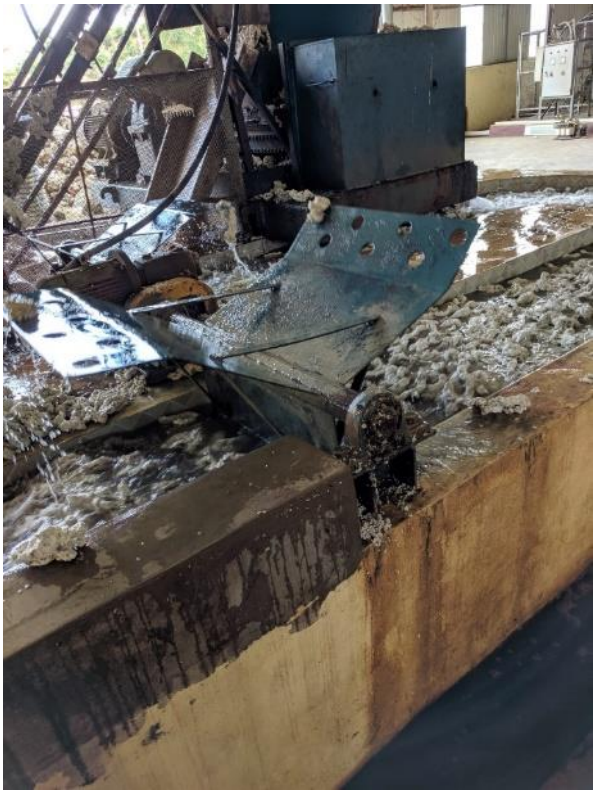

Figure 17: Cup lump washing and shredding

Figure 18: Rubber crumb before smoking

Figure 19: Weighing rubber block

Figure 20: Trimming rubber block

Figure 21: Pressing rubber block

Figure 22: Packing rubber block

Rubberwood processing and manufacturing

Once the latex production of rubber trees starts to decline, they can be harvested and used for timber. The age at which this occurs varies - between 15 years and 30 years and up to 50 years- depends on clone, site conditions and management. In Northern Laos there are some areas of rubber plantation that are entering this phase; in Luang Namtha, for example, trees planted in the mid-1990s are large in size and latex is beginning to decline (Figure 23; Figure 24); but this wood is currently being used for fuel. In Southern Laos, companies are already starting to consider the harvesting of trees planted in the mid-2000s. One company reported that they are already exporting rubber logs from storm damaged plantations. Some ply/veneer companies are considering the use of rubberwood as a substrate for other products and solid-wood product manufacturers are looking to rubberwood as supply while other plantation investments mature. We found no studies that have explored recovery of wood from rubber plantations in Laos or the quality of wood produced. Opportunities for the use of this wood are being examined through this ACIAR project (see Belleville et al. 2020a and Belleville et al. 2020b) including engineered wood products using rubber veneer.

Similarly, few studies in Laos have considered, in any detail the contribution of wood, to the investment decisions or derived benefits from rubber plantations. Our literature review identified the following:

- NAFRI (2003) reported rubber trees being sold in Mengla China, for 80-100 ¥/tree (1,200 ¥/m^3 of processed wood) which was being used to make furniture by companies such as Ikea.
- Alton et al. (2005) described some contracts for rubber between Lao Farmers and Chinese investors. In one case, in Maung Sing, Luang Namtha, "*villagers get 40 percent of the rubber harvest/trees, but at the end of the contract the Chinese get all the rubber wood. The Chinese can sell their trees/harvest rights without any objection from the villagers*".

They also reported that:

> *It is conventional to include the sale of rubber timber at the end of the production cycle. While there is a market in Sip Song Panna, there has been no sale in Laos. A rubber timber price of ¥360/m³ ($45/m³) is cited in Mengla and the authors estimate that the farm gate price in Laos would be about ¥280/m³ ($35/m³). They estimate that the 70 m³/ha would be available for timber sale (valued at $2,450 or LAK 25,350,000) and another 130 m³ of branched wood for charcoal (for a total valuation of $1,300 or LAK 13,390,000). It is estimated that 140 PDS [person days] of hired labour would be required to harvest this.*

Figure 23: Rubber tree planted in 1994, no longer being tapped

Figure 24: Rubberwood logs harvested from 1994 plantations in Luang Namtha

- Manivong (2007) considered the potential contribution of wood from rubber to the economics of smallholder growers in Luang Namtha, drawing on information from similar production systems in Indonesia. He estimated the benefit from rubber wood based on a predicted merchantable 'butt-log' volume of 64 m^3 per hectare with the remaining volume likely to be burnt in the field. Using pricing from the nearest available market in Yunan Province of China and the 2005 price of rubber wood of 360 ¥/m^3 (from Alton et al. 2005), he estimated the farm gate price in Laos to be about 280 ¥/m^3 or 364,000 LAK/m^3 (1 ¥ = 1,300 LAK, August 2005). Manivong noted, however that the yield would be dependent on resource quality and could range from 34-68 m^3/ha (and see Manivong and Cramb 2007; 2008)
- Douangsavanh et al. (2008) describe the rapid increase in demand for rubber wood in Viet Nam but did not draw on this to explore the opportunities for this in the then still emerging Lao rubber sector. They wrote:

  In recent years, rubber wood products have 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).

Other reports and papers touch even more briefly on rubberwood include:

- Shi (2008), in her study of rubber in Luang Namtha reported prices of around 200 ¥/tree at around 30 years of age.
- Hicks et al. (2009) briefly describe the emergence of certification for rubberwood.
- Douangsavanh et al. (2009) summarise the benefit distribution under three rubber models, with reference to timber in which smallholders (self-financed, sometimes with credit from government) profit from latex and timber, under contract farming profits from latex and timber sales are shared among farmers and investors (investors purchase products) and through concession they infer that profit from latex and timber goes to entirely to the company. They identify a lack of preparedness in a range of areas including technology and timber sales.
- TERRA (2009) note the potential contribution of several non-latex products and the absence of Lao industry for:
  - rubberwood, for processed wood, construction materials, flooring, picture frames etc,

    - rubber bark, used in producing biological fertilisers,
    - roots, for producing fibreboard.
- Nhoybouakong and others (2009) recognised the value of rubberwood and noted that due to its susceptibility to insect and fungal attacks, rubberwood has to be processed shortly after the trees are cut. They put forward that many experts have argued that rubberwood cannot be economically produced from remote and fragmented smallholdings, even though smallholder resources are usually included in [wood supply] projections. Drawing on experience from Thailand and Malaysia they indicate the potential for rubber wood but highlight environmental concerns.
- Kenney-Lazar (2012) describes the expectations of one Vietnamese company (HAGL) as including significant volumes of wooden products from rubber investments. It is not entirely clear if this refers to volumes from natural forests harvested in the clearing of land in preparation for planting rubber plantations or wood from the rubber plantations themselves.
- Zurflueh (2013) describes Vietnamese rubber investments in Southern Laos and notes the Vietnam General Rubber Corporation's (Geruco) interests in rubber latex and rubberwood.
- Vongvisouk and Dwyer (2016) consider rubberwood briefly in the context of tree ownership and the clearing of rubber plantations in response to falling latex prices. They report the wood from cleared trees being sold for firewood. They also touch on this in discussions of different 'product sharing' arrangements under rubber investment models; describing the shift from '4+1' to '3+2' resulting in "slippage from dividing latex to dividing trees" (Vongvisouk and Dwyer 2019). Although they do not describe what this means for the rubber wood.

It is difficult to distil from the literature the distinction between owning trees for the purpose of tapping latex (i.e. usufruct) and outright ownership. This difference is fundamental in understanding the distribution of the full benefits from rubber plantations; principally the right to harvest and sell the trees for wood at the end of their rubber-tapping life. It is also important for the purposes of regulatory compliance and enforcement including with respect to market standards for wood products. For other wood producing plantation crops this is challenging even where ownership appears straightforward. Where complex contractual arrangements are involved this could prove even more difficult.

Rubberwood Peeling trials

Research into the utility of spindle-less lathe technology for peeling veneer from rubber is being undertaken by VALTIP3 (see Belleville et al. 2020, Belleville and Chounlamounty 2020). Of interest is applicability in village settings, as occurs in Viet Nam (Leggate et al. 2017). Product testing of the characteristics and quality of Lao rubberwood is occurring at NUoL. Fifteen rubber trees were harvested and purchased for 50,000 LAK per tree, from a 25-year-old plantation in Village, with diameters ranging from 22 to 50 cm (Figure 24). The tree tip was cut at age 3, resulting in forked trees, and the stands were otherwise unmanaged. Early findings are promising (Figure 25). Rubber trees past their latex-producing prime from un-thinned and unpruned stands have qualities and desirable traits to produce certain high-value engineered wood products. With industry development rubberwood could provide an important resource for processing and a significant income to smallholders. Investment in treatment and peeling technology is required. Extension material and training is also needed to increase farmer awareness of the opportunity to add value to their plantation through wood. Belleville et al. 2020 found that forked form of trees created by the practice of tip cutting when rubber trees are young, affected wood volume and characteristics.

Figure 25: Rubberwood Veneer peeled at NUoL

Observations on Rubberwood in China

In the absence of a functioning rubberwood value chain in Laos we visited Xishuangbanna province of China to observe rubberwood processing. Locations visited included Mengla, Jinhong and Kunming. Xishuangbanna has a long history of rubber cultivation and has a well-developed rubberwood processing sector. In some areas rubber cultivation is entering a third rotation. Rubber cultivation and production in China, and in particular in Xishuangbanna, has been extensively described by others (Kou et al. 2018, Chen et al. 2016, Hammond et al. 2015, Sturgeon 2013, Sturgeon and Menzies 2006, Wu et al. 2001 and others) and we do not describe it again here. For our research we visited a rubber growing village, two wood processing factories, retail stores and a research facility.

We found that there is no formal cross border trade in rubberwood between Laos and China, although there are anecdotal reports of some activity. For example, one informant told us that in Phongsaly, Chinese traders buy rubber-tree logs as 'firewood' and then export them to China. The volumes are relatively low as the resource is sparse. Villages are happy to sell them the timber as firewood as it is viewed by them as a no-value product. Similarly, in Sing District of Luang Namtha it was suggested to us that some rubberwood is being traded across the Panghai Border.

Chinese processors that we spoke to reported that they do not buy rubberwood from Laos because the resource is too far away, logs could not currently be imported from Laos (due to the log export ban – PMO15), because the wood would deteriorate too much given that there is no primary processing or treatment in Laos and because it takes a long time to procedurally clear the border. When asked whether they would consider buying rubberwood from Laos the Chinese processors we spoke to said it would be better for Laos to have its own rubberwood industry - at least for primary processing.

One of the significant issues of rubberwood that sets it apart from other plantation species grown in Laos, is the need for rapid processing after harvest. Two to three days was considered, by one factory we visited, as the maximum time rubber logs could be left untreated or unprocessed (see also Teoh, Don and Ujang 2011, Balfas 2019) before serious decay occurred. This presents risks, challenges, and an opportunity for a Lao rubberwood sector. In the absence of rapid treatment and processing rubberwood can quickly lose its value, so having primary processing close to the resource is important. In the absence of such processing there is a risk the added value will be lost. Herein lies an opportunity for strategic investment in several provincial or district centres in Laos - close to areas with high density rubber plantations. To identify these strategic areas and promote investment good quality spatial, and growth and yield data on the rubber plantation resource is needed; and as we report, this is not available.

The necessary treatments for rubberwood are drying or chemical - either submersion in or pressure treatment with preservative chemicals such as boron and copper–chromium–arsenic (CCA). Boron compounds are odorless and relatively less toxic compared to other preservatives that can pose serious health hazards to the workers performing the treatment and processors of treated timber (where this is a manual task). CCA-treated rubberwood is rarely used due to the unnatural colour of the treated wood unless the timber will be used for construction or structural purposes. The use of this chemical is of environmental concern and has resulted the search for an alternative approach to rubberwood preservation, especially utilizing natural resources (Teoh, Don and Ujang 2011; Oldertrøen *et al*. 2016). Balfas (2019), for example has tested treatment using extractives from fast grown teak, a plantation species also common in Laos. Training and investment in this technology will be needed, together with the development of necessary health and safety standards. In China past environmental and safety concerns have reportedly prompted the government to increase new regulations requiring only pressure treatment using orthorboric acid (H_3BO_3) (Figure 26) rather than submersion.

Processors in China reported that small rubberwood trees (8cm diameter at breast height) can be used for wood products. While large trees are preferred because the wood density is higher, the wood quality of larger trees may also decline due to prolonged tapping; processors we spoke to reported that 'shaving skill' is a factor in determining rubber wood quality (Figure 27), and that damage is more likely to occur on farmer grown trees than on trees on State farms. This is consistent with findings of

Balsiger et al. 2000, but others report that tapping does not affect wood quality if used for structural purposes (Severo et al. 2013 in de Jesus Eufrade Junior et al. 2015).

Figure 26: Pressure treating rubberwood for fungal decay

Figure 27: Rubber logs showing tapping damage

While retaining trees for as long as possible to maximise return on investment for latex production will also maximise log size, it should not be assumed that small trees are not economical or that large log size is optimal. If plantation owners choose to harvest their rubber early, there may be market opportunities for small logs with treatment and processing into engineered wood products. In China, and elsewhere small wood pieces are finger-jointed and glued into board (Figure 28 and Figure 29) and this type of processing technology already exists in Laos. Peeling of veneer from small dimeter logs using spindle-less lathe technology is also possible (Khoo et al. 2018).

Figure 28: Finger jointed rubberwood

Figure 29: Sanded rubberwood boards

According to the factories we spoke to in in China the tree clone influences the type of products that can be produced; for example one suggested that clone 107 is good for boards but is not good for veneer while clone 600 is good for peeling but not good for furniture. In our interviews, companies and some entrepreneurial farmers were aware of their clones but did not take wood quality into account when selecting them but for most growers their knowledge was limited to the clone country of origin or company from which seeds or seedlings were purchased.

Potential for Rubberwood in Laos

Calculation of tree biomass is necessary to estimate the potential production of wood from harvested rubber plantations. We were unable to source biomass data or allometric equations for Lao rubber trees, and while there is information from other countries, research shows variability due to the influence of clonal material (see e.g. Hytönen et al. 2018 – Thailand, Brahma *et al*. 2017 - India, Khun et al. 2008 - Cambodia), age, intercropping (Gonkhamdee, 2010) planting density and others factors (Blagodatsky, Xu and Cadisch 2016).

Some research into the allometric relationships of tree components has been undertaken for the purpose of predicting rubber biomass by Hytönen et al. 2018, and by Yang et al 2017 who found that in China the relationship between tree diameter and height, which are commonly used for estimating biomass were influenced by tapping and planting density as well as environmental conditions (see also Rahayu, et al. 2015). Bruun et al (2018), for their study comparing carbon accumulation in rubber in swidden in Luang Namtha, utilised allometric equations based on a study in Western Ghana (Africa), being unable to identify suitable alternatives.

However, no similar research has been undertaken in Laos and no basic forest inventory data has been collected on which to base analysis and estimate wood volume or biomass with any reliability.

Given the lack of data specific to the Lao setting, our research can only broadly extrapolate from results in neighbouring countries to estimate the potential for wood production from rubber plantation in Laos:

- Balsiger et al. (2000), based on a global rubberwood study carried out by Indufor under the auspices of the International Trade Centre, estimated that rubberwood plantations yield 140 to 200 m^3/ha, with the higher ranges observed in countries where plantations are carefully managed, i.e. Malaysia, Thailand, India and Sri Lanka. Using data from the 1990s from Malaysia they propose that rubber estates and smallholdings can yield 190 m^3 and 180 m^3 of greenwood per hectare respectively, 57 m^3 and 54 m^3 per hectare of usable logs and about 18.1 m^3 and 10.8 m^3 per hectare of sawnwood (recovery rates of 32% ad 20%).
- FAO (2001) reported the available log volume for rubber trees with diameters above 15 cm to range from 52 m^3/ha to 162 m^3/ha with the usable wood volume per hectare depending upon numerous factors such as clone, site conditions and management. In their estimates, sawn timber recovery lies between 25% and 45%.
- Data from China reports harvested log volumes of between 4m^3 and 12m^3 per *mu* (or 60-180 m^3/ha) (ITTO 2009).
- Research in Malaysia (Ratnasingam et al. 2011) estimated 180 m^3 per hectare of biomass upon harvesting, producing 50 m^3/ha sawn lumber (28% recovery)
- The output of mixed grade sawn timber from rubber plantation harvest in Thailand has been estimated at 53.1m^3/ha (based on Ponchaisuree date unknown), with sawn wood recovery at 25% of harvested volume (Phungrassami and Usubharatana 2015).

Conservatively, using data from Balsiger et al., the total sawlog volume from Lao rubber plantations could be in the order of 12.5M m^3 or 3.9M m^3 of sawnwood assuming all plantations reach maturity. This is the equivalent of around 157,000m^3 sawnwood/year, assuming a 25-year rotation. However, based on data from Thailand, Laos rubber plantations could produce around 14.5M m^3 of sawlog, or in the order of 500,000 m^3/year over a 25-year rotation. Should all of the land allocated to rubber plantations under concession be planted (over 400,000 ha), survive, and b harvested when trees are senile, this volume would be higher. **These estimates are only indicative and should be used with caution.**

In order to estimate standing volume, growth and yield of wood from rubber plantations in Laos the following would be needed: i) up-to-date information on plantations, including their area, ownership, management and environmental situation; and ii) a statistically valid inventory of tree size (diameter/height), clones and density. Broad level or strategic estimates of standing volume could be quantified more quickly using remote sensing-based inventory (e.g. LiDAR). Estimating standing volume of merchantable log products requires the measurement of tree quality characteristics, log types and dimensions.

Of the rubberwood produced in Laos around 46% could come from concessions, in which the tree and wood ownership rests with the company; 28% could come from smallholders who likely have reasonably clear ownership rights assuming plantations are registered according to the regulations. The ownership of the remining 28% of rubber plantations, which are under diverse contact faming arrangements, is unclear and it is uncertain as to under whose control this will enter the market. For example in rubber investments we explored – some contracts did not mention the ownership of the trees; some allocated a small percentages to farmers (e.g. 10% by Company J), with options for the farmer to harvest and sell the wood themselves or for the company to undertake those activities at cost to the farmer, in other cases (e.g. JongWu Rubber Oudomxay Company) up to 50% of the value of the wood is allocated to farmers

The need for rubber to undergo some form of treatment, either drying or with chemicals soon after harvest in order to protect wood quality presents a challenge and an opportunity in Laos. In Viet Nam and Thailand small sawmills and veneer lathes have been successfully used to mobilise dispersed plantations resources (See e.g. Leggate et al 2017 in Viet Nam). In Thailand, the notional size of a small (but economic) sawmill with a kiln for rubberwood could have an output capacity of about 1,000 m^3/month, requiring in the order of some 6000 ha of plantations based upon a nominal 25 year rotation (*pers. comm.* S. Midgley). Such technology could be deployed in rubber growing areas in Laos.

The residues from harvesting and waste from processing can be utilised as feedstock for bioenergy (Hytönen et al. 2019, Wongsapai et al. 2020) and can also be used for the manufacture of composite wood products.

Importantly, and unlike other plantation grown wood sources, rubber plantations produce significant commercial products (latex) prior to becoming a wood resource. They are therefore potentially more vulnerable to intermediate market forces that may encourage establishment (with latex price increase) or result in early harvesting or abandonment (with price decrease), as is already being seen in parts of Laos. This will impact the predictability of wood supply. It is therefore important to understand these drivers. Even if we can estimate a possible per hectare production of rubberwood, a bigger challenge is understanding when rubberwood will begin to flow to industry, when it will peak, and for how long it will continue. As we know that trees planted in the mid-1990s and early 2000s are already being harvested the time to start preparing for a rubberwood sector is now, because in about 10 years, time results of the rubber planting boom will start to be seen in wood supply.

Rubberwood and Timber Legality

Like other plantation resources, rubber has been scrutinised for impacts on the environment and people, and increasingly both rubber latex and rubberwood manufacturers are mindful of these; market-driven mechanisms such as certification and timber legality are playing an increasing role. How latex and rubberwood producers respond is important, and the mechanisms that are put in place, for example the inclusion of rubber plantations and rubberwood in EU Voluntary Partnership Agreement (VPA) timber legality definitions in both export and import countries, will be significant to the development and operation of markets.

Laos

In Laos, a VPA is still being negotiated. Then scope of the VPA is all sources of timber and all markets, so rubberwood will be covered whether consumed locally or exported. Rubberwood has not been explicitly addressed in the VPA process and rubber plantations are likely to face similar, if not greater, hurdles to demonstrating legality as other plantation timber species, particularly for smallholders and rubberwood produced through contract farming. These hurdles have not yet been considered in detail primarily because of the perceived length of time until rubberwood will come into production. There are likely to be significant challenges for rubberwood producers and other supply chain actors in meeting existing proposed Timber Legality Definitions (TLD) for plantation grown wood and other supply chain steps. While the Timber Legality Definition for "Plantations" is still under development, it is listed for consideration at the next Lao-EU negotiations scheduled for December 2020 and despite ongoing regulatory reforms, it is possible to foresee obstacles to demonstrating compliance with a number of key criteria and indicators related to:

a) Land use rights – especially for concessions and contracts, but also for smallholders.

b) Plantation registration - where land use rights and tree ownership are unclear.
c) Tree ownership and rights to harvest - especially under contract farming arrangements where proportional ownership of trees has emerged and/or where these are no specified in contracts. It is possible to foresee disputes over tree rights emerging, without adequate avenues for resolution.
d) Labour and social welfare- if an emerging rubberwood processing industry is not carefully planned and adequate safeguards are not put in place.

Outside the VPA, other market driven standards for timber have not generally taken hold in Laos, although some foreign plantation companies are certifying their own plantations and supply chains. Donor supported certification initiatives have failed, with low market penetration for smallholder teak (Ling et al. 2018). Laos has been considering the development of a Lao Forest Standard for some time, and has committed to certification of areas of the production forest estate, but a moratorium on timber harvesting in those areas, which has eliminated revenue from timber sales has somewhat curtailed interest in this. Despite this, the recently enacted Forestry Law (discussed below) has included specific articles with respect to developing a certification system for forest, timber, and wood product legality assurance in accordance with the international forest management standards.

Awareness of sustainability programs for natural rubber, such as the Global Platform for Sustainable Natural Rubber[63] was low among the companies we spoke to. Those who were familiar with the concept viewed this as applicable to the 'market' elements of the supply chain (for example tyre production) rather than the plantation growing end. Amongst Chinese investors there was some awareness of the China Chamber of Commerce of Metals, Minerals & Chemicals Importers & Exporters (CCCMC) Sustainable Natural Rubber Guidelines[64] but those we spoke to view these as more important for rubber product manufacturers.

Viet Nam

In Viet Nam, rubberwood originates from four types of producers: state-owned Vietnamese Rubber Group (VRG); enterprises managed by the Provincial People's Committee (PPC); households; and private companies. In 2015 the VRG was responsible for 90% of total domestic harvest of rubberwood but this proportion is expected to decline due to increasing supply from plantations managed by households and enterprises managed by the PPC (Trần 2008 in NEPCon 2015). Some of the VRG plantations in Vietnam are now certified under the Vietnam Forest Standard[65]

Initially rubberwood was not part of the negotiations for a VPA between Viet Nam and the EU but in 2018 Viet Nam entered into a VPA with the EU and rubber was included. The timber legality definitions include specific criteria and indicators for rubberwood - originating from both agricultural and forest land within Vietnam and imported from other countries. For rubberwood and products manufactured from rubber trees that are harvested from any domestic sources entering VNTLAS, it is necessary to present a Timber Product Dossier that demonstrates legal origin. There are separate rules for rubber organisations and households.

For rubberwood export from Laos into Viet Nam, the effectiveness of Laos' TLAS will be essential. Key issues, as described above will be demonstrating the legality of mixed consignments of wood sourced from company plantations and smallholders. With traceability opportunities for Lao rubberwood in Viet Nam will be limited.

China

Almost all rubberwood produced in China is consumed domestically and there are currently no imports from Laos. Significant volumes are imported from other countries such as Thailand. The processors we spoke to in Xishuangbanna, China were not concerned about issues of market driven timber legality or certification, although they indicated that there were rules that must be followed. The Government of the People's Republic of China and the Chinese forest industry have been

[63] https://www.gpsnr.org/
[64] http://www.cccmc.org.cn/docs/2017-11/20171107204714430892.pdf
[65] https://www.panelsfurnitureasia.com/en/news-archive/first-vietnam-sustainable-forest-management-certificates-granted-to-rubber-forests/3674

developing a timber legality framework that they expect to meet international and Chinese market requirements. On December 28, 2019, Chinese legislators revised the country's Forest Law to ban "purchase, process or transport" of illegal logs,[66],[67] however it remains unclear if this will apply to imported wood (Pers comm. Forest Trends).

Thailand

The formal VPA process between the Government of Thailand and the EU started in late 2013. After preparatory technical work, the first official negotiations took place in June 2017. In the process of developing a TLAS, specific issues have been identified for rubber (as well as other planted species) produced in Thailand, associated with regulatory exemptions that make traceability difficult. According to the Heuch et al. (2012) there is no government control over felling of rubber and transport to mills using rubberwood is also not controlled or monitored by government. Thailand's nascent import provisions, which do not yet have a product scope will likely regulate pulp, paper, sawnwood, logs, plywood, veneer, particleboard, and fiberboard. As with other VPA countries Thailand will need to develop proportional checks on business operators to ensure compliance with the provisions and to ensure that the Thai Market is not polluted with illegal timber (Norman and Saunders 2019), and the Lao rubber wood industry (and Government) will need to be able to meet these requirements.

Labour

The promotion of land based investment for commodity crops in Laos has been coupled with expectations of new opportunities for employment and income generation for Lao people –through new, sedentary, farming practices replacing swidden systems, via contract farming arrangements, or via wage or salaried labour, including for Lao migrants. In fact, together with abundant (and cheap land), affordable labour was a selling point to encourage foreign investment in Laos, and despite policies and regulations aimed at ensuring these expectations were met the performance of these investments has been mixed. Many foreign enterprises operating in the natural resource sectors in Laos either bring in foreign labour or hire local workers, but mostly for low-skilled jobs (OECD 2017). Foreign companies cite low work force education, work ethic and restricted regulations as problematic factors for doing business in Lao PDR (OECD 2017).

Large-scale rubber investments have been criticised for the lack of labour opportunities they have provided for Lao people. Baird et al. (2018) explored labour associated with Vietnamese concession-based rubber plantations in Champasak Xekong and Attapeu provinces in the contexts of both the opportunities for those people displaced by the concessions and the role and impacts of immigrant Vietnamese labourers. Noting that that number of foreign workers permitted to work for foreign investment projects is legally limited to 10 per cent of the workforce - a measure intended to increase employment opportunities for Lao citizens (Baird 2010) - Baird and colleagues reported the number of Vietnamese working for plantation concessions to be higher at 17% cent of the people working for Việt-Lào Company in Bachiang District (Vietnam Rubber Magazine 2015 in Baird et al. (2018)). The companies we interviewed reported foreign labourers being at or near 10% of the workforce.

Baird et al (2018) refer to a depressed latex price resulting in the movement of Vietnamese workers off rubber plantations to other sectors. Labour shortages were identified as an issue for most rubber companies in both Northern and Southern Laos we spoke to, due to increased competition between rubber investors (particularly in Southern Laos) and with other sectors generally. Companies were recruiting migrant labourers from elsewhere in Laos or training more local people as a risk management strategy. Migrant labourers, housed in company camps, were preferred by some companies in Sothern Laos because they do not have other local responsibilities and can be more productive; companies in Northern Laos did not report using migrant labourers. In all cases technical capacity was cited as the need to employ foreign workers in highly skilled and managerial tasks.

Our research also revealed conflicts between villagers who had lost land to companies who were employing both foreign and Lao migrant workers, with one company reporting that affected villages

[66] https://news.mongabay.com/2020/03/chinas-revised-forest-law-could-boost-efforts-to-fight-illegal-logging/
[67] https://www.atibt.org/wp-content/uploads/2020/01/China-Forest-Law-Amendment-2020-20191228.pdf

were physically preventing migrant workers taking up employment opportunities. Kenny-Lazar (2012) also examined the transition to wage labour associate the land loss and the comparative advantages with other income sources.

Shi (2008, 2016) and McAllister (2012) describe labour issues faced by companies applying contract farming approaches in Northern Laos. Despite the '2+3' models incorporating labour and land inputs from farmers, both companies and contracted farmers cited issues with respect to labour, and some contracts have reverted to '1+4' arrangement, with land being the residual input (Vongvisouk and Dwyer 2016a, 2016b; Dwyer and Vongvisouk 2017). Companies mentioned to use, that despite the training provided, lack of tapping skill remained an issue and that they were unable to manage their contracts.

The ways in which companies have acquired land for plantations have had implications for those who either leased or lost their land (in the case of concession agreements) and the labour opportunities that arose. Some farmers in our Village 1, who were dispossessed of their land, were initially hired to take care of the trees that were planted. At a rate of 300 LAK/tree/month farmers undertook management tasks such as weeding for 2 years, but they reported to us that they were never paid. Despite asking the District Governor to resolve the issue but were left with no work contract and the company hired other people to care for the trees. Those who leased land to the company received training at the expense of the company if they continued to tap for them.

The '2+3' contract arrangements in Northern Laos have had variable levels of success. The piece-rate wages, through which tappers receive a proportion of the volume (or value of the volume) of latex tapped have failed due in a large part because of price decreases. The volatility of the market has meant that from the perspective of tappers, the wage does not offset the labour input. Companies have stopped coming to collect latex and thus one of the company's 3 inputs ceased - contracts have failed. In their research Vongvisouk and Dwyer (2016a) report that the 'most important responses to falling rubber prices by government officials has been a decision to not enforce minimum ("floor") prices that were 'allegedly written into company contracts'. They also report that responses by growers include waiting for prices to rise (i.e. not tapping); continuing to tap but relying largely or only on household labour; taking collective action to attract (slightly) higher prices; and selling or leasing plantations to wealthier actors. Plantations are going un-tapped because prevalent wage labour or share-cropping schemes make tapping economically unviable and only smallholders who use household labour "can afford" to tap (Vongvisouk and Dwyer 2016a p. ii). In our experience some smallholders have stopped tapping or indicated that with a further price drop they would do so. The ongoing dry spell at the time of our research was affecting all rubber growers - smallholders and company alike. Contract farmers were selling outside of contracts and seeking alternative buyers, in part because 'the companies [with whom they had contracts] were not coming to buy'.

The 'piece rate' wage remains an issue. Companies we spoke to in Northern Laos indicated that they would not pay salaries to tappers because they would not work as hard. Under an arrangement in which 30% of the latex is paid as wages, a tapper can earn between 4M and 10M LAK per month, depending on the latex price, but farmers involved in tapping under contacts reported that the proportion of latex they receive changes every year, has reduced from 50:50 in the first year to 40%, and because they only get paid by latex volume their biggest concern is the price. One company was paying a flat rate – reported by them as 2300 LAK/kg (but villager reported receiving 2000 La/kg).

On Vietnamese concessions in Southern Laos, where salaries were being paid, the average monthly salaries were reported as being between 2.2 M LAK to 4M LAK, with deductions for living expenses of those in labour camps. Tappers are allocated a certain area of rubber plantation to manage and tap (applying the model used in Vietnam) and are paid a fixed salary per month plus a piece rate based on volume of latex harvested. However, few plantation labourers actually had contracts with companies. Rubber theft – tappers selling outside the company - was reported as an issue, blamed in part on the prevalence of non-company and unregistered traders.

Social security payments were viewed as a barrier to contract making. Since 2013, with the making of the Law on Social Security (No. 34/NA), employers have been required contribute to the National Social Security Fund, while for employees, contributions are voluntary. One company we spoke to mentioned that labourers do not want contracts they all want cash payment - "labourers do not have

health and social insurance. They don't want to have their pay deducted for insurance". However, under the Law employers are required to contribute 6% of employees' salary to the social security fund for social security benefits each month, so having fewer contracted employees reduces this business cost. Insured employees are also entitled to benefits such as sick leave.

For those Lao workers within the Chinese-owned processing facility we visited in Northern Laos, teams of 8 were paid 400,000-600,000 LAK per 8-hour day, 6 days per week, for around 10 months of the year (1.2M-1.5M LAK per month). In Southern Laos, the reported average monthly salary of processing factory workers was is 4.2 M LAK/person. In 2018, the monthly minimum wage in Laos was 1.1M LAK.

For independent rubber farmers, working in family groups was viewed positively by those we spoke to – husbands and wives working together and in some cases with children accompany their parents in the plantations. The regular (fortnightly) and relatively high income (when compared to other crops) was seen as beneficial for increasing living conditions, buying essential items such as medicine and supporting children's education but the working conditions involving long hours at night were viewed as negative aspects of producing rubber. Nevertheless, prices and long -term labour availability were areas of concern for them.

Gender and Family

There have been few detailed studies specifically examining issues relating to gender in the context of the rubber sector although several studies have highlighted some roles and impacts on men, women and families involved. Lindeborg's 2012 study of gendered spaces in rubber production in Ban Hat Nyao, Luang Namtha, is perhaps the most comprehensive on the subject, in the context of smallholder systems, with transformations in everyday life for both men and women. She reports both 'good' and 'bad' outcomes from the introduction of rubber. Kusakabe (2015) explored the issue of contract making in land deals in Luang Namtha, to analyse which approach works better for poor women and why. Amongst other issues the research found an increased livelihood burden on women during the early years after rubber planting, with an overall increased workload and reduction in decision-making.

In his studies of Vietnamese rubber investments Baird (2012) identified changing roles associated with land loss to rubber concessions, contributions to farm-based livelihood activities and changes to family dynamics – with smaller children unable to accompany their mothers to the field. Baird also observed other changes to household issues such as increased disposable income at the expense of food production by themselves, with regular access to cash wages being spent by men on whiskey and increasing family conflicts. Portilla (2017) explored the impacts of land concessions on rural youth in Southern Laos, including Vietnamese rubber plantations, noting that women often get paid less than men because they cannot tap as fast and because the retain other household responsibilities. The employment of children for weeding and land cleaning was also reported.

Labour differentiation was identified by McAllister (2015) as reasoning behind women's opposition to rubber concessions in Luang Prabang and noted their inability to present these or make decision about land deals at village meetings. Vongvisouk and Dwyer 2016 note that the use of household labour in smallholder rubber systems may effectively be 'cheaper' than hired labour, but it is not necessarily more efficient, since it can involve degrees of intra-household disparity such as high dependence on women's and children's labour and there can also be significant opportunity costs if, for example, children work rather than going to school.

Conclusions

Our research builds on a large body work related to rubber in Laos that has focussed on land allocation and relations between the Lao State, investors and Lao rubber farmers, the history and international context, and some environmental and social impacts. We have started to fill some gaps related to the broader rubber value chains, focussing on the largely under-researched area of rubberwood, but retaining three other core elements: land, labour, and latex. We trace interactions along the entire rubber value chain, including the role of foreign investors specifically from China and Viet Nam and explore emerging issues associated with timber legality. Our findings and recommendations are both overarching and specific.

Overall, we find that rubber is by far the largest plantation resource by area in Laos, and the while rubber latex sector is established and significant, the rubberwood sector is poorly understood, immature and underdeveloped. Nevertheless, rubberwood is potentially an important sector on its own, with significant economic benefits possible. Due to lack of information and a perception that there is still a long time before rubberwood will enter the market, which we found to be naive, the magnitude of the rubberwood resource is unquantified, and its value is not widely understood by stakeholders in Laos.

There is considerable, and likely growing international market demand for rubberwood but to capture this value within Laos, geographically strategic processing is needed in areas with abundant plantations. While the peak-flow of rubberwood is still a few years away, production has already commenced from the earliest plantings. Investment in plantation inventory, wood product research, capacity building, investment in technology and market development are needed now so that this opportunity is not missed.

Demonstrating the legality of Lao rubberwood will be difficult and this will have consequences for exports. The highly diverse ownership arrangements for rubber plantations and lack of clarity over land and tree ownership, particularly for rubber under contracts and concessions, will pose a challenge if left unaddressed. Lack of regulatory clarity, including in land and production agreements, could also impact benefit sharing when the opportunity for harvesting rubberwood arises. Communications materials are needed to inform rubber growers, wood processors, manufacturers, and the government of the potential value of rubber plantations for rubberwood. Lao rubberwood products will need to be internationally competitive.

We recommend that, if the Government and rubber industry want to have a high-performing, sustainable, and locally beneficial rubber sector for latex and wood, the right policies to support this need to be developed quickly. Considering the rubber sector as a whole, with policies that cover all value chains for rubber latex and rubberwood, as well as rubber bi-products, inter-crops, and labour, will be important. An integrated plan for industry development should be developed, targeting existing rubber growing provinces, strategically engaging with the private sector, and strengthening the role of the newly established Lao Rubber Association a focal point for connecting growers, industry, and the government.

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Appendix 1: List of Interviews

Date	What/who	Interviewees
24th April	Centre for Development and Environment	Smith
29th April	Village Focus International	Smith
30th April	NAFRI Rubber Research Institute	Smith
4th June	Earthwork (TFT)	Smith
4th June	Pro-FLEGT	Smith
5th June	Mekong Region Land Governance	Smith, Lu
5th June	Lao Rubber Association	Smith, Lu, Soukphaxay
5th June	Company J	Smith, Lu, Soukphaxay
5th June	Centre for Development and Environment	Smith, Lu
6th June	International Finance Corporation	Smith, Lu
6th June	NUOL FoF	Smith, Lu, Mienmany
6th June	FAO,	Smith, Lu, Mienmany
7th June	Company D	Smith, Lu,
7th June	MOIC Dept Industry and Handicraft	Smith, Lu, Soukphaxay
9th June	Company A	Smith, Lu, Mienmany
10th June	Luang Prabang POIC	Smith, Lu, Mienmany
10th June	Company B	Smith, Lu, Mienmany
10th June	Rubber Trader, Nambak	Smith, Lu, Mienmany
11th June	Luang Prabang PAFO	Smith, Lu, Mienmany
11th June	Luang Prabang PFS	Smith, Lu, Mienmany
12th June	Naiban, Ban Ber 11, Xieng Ngern District	Smith, Lu, Mienmany
12th June	Household Interviews, Village 1	Smith, Lu, Mienmany
13th June	Household Interviews, Village 1	Smith, Lu, Mienmany
13th June	Company C	Smith, Lu, Mienmany
13th June	Company A	Smith, Lu, Mienmany
13th June	DAFO, Xieng Ngern	Smith, Mienmany
14th June	Wood Processor, Ban Kok Gniew	Smith, Mienmany
14th June	Wood Processor, Ban Kok Gniew	Smith, Lu, Mienmany
14th June	Cher Hong Kong Chinese Furniture	Smith, Lu, Mienmany
14th June	Luang Prabang PPI	Smith, Lu, Mienmany
17th June	Luang Namtha Provincial Forest Section	Smith, Lu, Mienmany, Soukphaxay
17th June	Luang Namtha POIC	Smith, Lu, Mienmany, Soukphaxay
17th June	Village 3	Smith, Lu, Mienmany, Soukphaxay
18th June	Luang Namtha PONRE	Smith, Lu, Mienmany, Soukphaxay
18th June	Village 4	Smith, Lu, Mienmany, Soukphaxay
19th June	Plywood shop Luang Namtha	Smith, Lu, Mienmany, Soukphaxay
19th June	Timber Company Luang Namtha	Smith, Lu, Mienmany, Soukphaxay
20th June	Rubber village Jinhong	Smith, Lu,
21st June	Wood factory Jinhong	Smith, Lu,
21st June	Kunming Tropical Crop Research Centre	Smith, Lu,
1st November	Company F	To
2nd November	Company E	To
2nd November	Company G	To
2nd November	Company H	To
3rd November	Company I	To