

**Riding the boom: Rural households' participation
and livelihood outcomes associated with
teak, banana and cassava crops
in Northern Laos**

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Final Declaration

This thesis is in the form of a conventional thesis comprising seven chapters, addressing the topic of rural household participation and livelihood outcomes associated with three boom crops (teak, banana and cassava) in Northern Laos. Each of the three case studies is presented as a chapter suitable for publication after thesis submission.

The title of this thesis: 'Riding the boom: Rural household participation and livelihood outcomes associated with teak, banana and cassava in Northern Laos' takes inspiration from this research results, which show how the livelihood strategies of rural households respond to crop booms as opportunities that are introduced to their villages.

I hereby declare that this thesis is my original work. I have acknowledged all sources that are used in my thesis. I have not submitted this work for the award of any other degree or diploma at any university.



Soytavanh Mienmany

7 February 2022

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Abstract

Crop booms, characterised by a rapid increase in the extent of a particular crop, have become common in the resource frontiers of Southeast Asia. A succession of Lao Government policies, opening the economy to international markets and facilitating access to land, have fostered a series of crop booms that are transforming rural Laos. This qualitative study draws on conceptual frameworks of rural change, farmer decision-making, and sustainable and diversified livelihoods to explore the external -, village - and household - level factors that influence smallholder household participation in crop booms, and the associated livelihood outcomes and rural changes. It investigated three contrasting boom crops, one in each of three Northern Lao provinces – teak, a long-term wood crop in Luang Prabang; banana, a medium-term food crop in Oudomxay; and cassava, a short-term flex crop in Xayabouly. Around one month of immersive fieldwork was conducted in each of two villages for each crop.

Factors external to the village – government policies, market demand and crop characteristics – played a key role in catalysing each boom. The booms in banana and cassava were primarily market-led, enabled by facilitating policies, whereas teak was initially a policy-led boom in the context of a strong market. The within-village characteristics of land availability and access, and of peer influence, were important in each case. Early adopters of teak were able to increase their land assets through planting teak; this opportunity was not available to more recently-settled households, or those in the next generation. At the household level, land and labour assets were the most important: Households growing teak and cassava generally committed both land and labour; this was also the case in one banana village, but there were no local labour opportunities in the other. Household livelihood strategies capitalised on opportunities; banana and cassava production systems allowed some wealthier households to move out of agriculture and provided employment for poorer households and those with surplus labour. Consequently, most but not all households benefited financially from the crop booms, although those working in banana production were concerned about the health impacts, and neither banana nor cassava production systems appeared sustainable beyond the short term.

These cases support the proposition that conjunctures of factors determine the adoption of boom crops, and the livelihood pathways that follow. In each case, the conjunction of factors enabling each boom has become less favourable over time, for different reasons. Markets for all case study crops remain strong, but regulations governing teak value chains are now disadvantageous for smallholders. Teak remains attractive as a low labour-input ‘green bank’ crop, but policy drivers are no longer as strong, and many households – especially those with

limited land – prefer alternative crops with quicker returns. Policies governing banana plantations have become more restrictive in response to environmental and health concerns, but the crop characteristic of disease susceptibility is also limiting. Cassava productivity is declining due to smallholders' reluctance to make inputs, and regulations to favour domestic processing have deterred some growers, who have shifted to alternative enterprises.

Participation in crop booms exacerbated wealth differentiation in the case study villages and contributed to processes of both de-agrarianisation and re-agrarianisation. Households became 'multifunctional' through participation in a more diverse array of on-farm and off-farm livelihood activities; as expected from other studies, households retained, or in some cases, acquired paddy land, which they saw as essential for food security. This study shows how agricultural and rural development policies can be more inclusive of smallholders, whose interests appear more peripheral than central to policymakers in relation to each case study crop. Policy design and strategies for Lao agricultural and green economic development should consider more specifically the interests and realities of smallholders, including providing opportunities for poorer households to engage with and benefit from the booms through facilitating effective partnerships between government, private sector actors, and smallholders.

List of Abbreviations

ACIAR	Australian Centre for International Agricultural Research
ADB	Asian Development Bank
AEC	ASEAN Economic Community
AQSIQ	The General Administration of Quality Supervision, Inspection and Quarantine of the People's Republic of China
ASEAN	The Association of Southeast Asian Nations
CIAT	International Center for Tropical Agriculture
DAFI	The Lao Department of Agriculture and Industry
DAFO	District Agriculture and Forestry Office
DOA	Department of Agriculture
DOIC	District Office Industrial and Commerce
DOLSW	District Office Labour and Social Welfare
DONRE	District Office Natural Resource and Environment
EWEC	The East–West Economic Corridor
FAO	Food and Agriculture Organization of the United Nations
FDI	Foreign Direct Investments
FGD	Focus Group Discussion
GAP	The Lao Good Agriculture Practices
GATT	The General Agreement on Tariffs and Trade
GDP	Gross Domestic Product
GMS	The Greater Mekong Subregion
GOL	The Government of Lao People's Democratic Republic (Laos)
IFAD	The International Fund for Agricultural Development
IMF	International Monetary Fund
JICA	The Japan International Cooperation Agency
LAK	Lao Kip
Lao PDR	Lao People's Democratic Republic (Laos)
LFAP	Land and Forest Allocation Policy
LPTP	Luang Prabang Teak Program
MAF	Ministry of Agriculture and Forestry
MOJ	Ministry of Justice
MOU	Memorandum of Understanding
MPI	Ministry of Planning and Investment
MRLG	Mekong Region Land Governance

NA	The Lao National Assembly
NES	National Export Strategy
NSEC	The North–South Economic Corridor
NSEDP	National Socio-Economic Development Plan
NUOL	National University of Laos
PAFO	Provincial Agriculture and Forestry Office
PMO	Prime Minister’s Order
PPP	Purchasing Power Parity
SEC	The Southern Economic Corridor
TLUC	Temporary Land Use Certificate
UN	The United Nations
UNDP	The United Nations Development Programme
UNIDROIT	The International Institute for the Unification of Private Law
USAID	The United States Agency for International Development
VALTIP	Value-adding to Lao Plantation Timber Products
WFP	The World Food Programme of the United Nations
WTO	The World Trade Organization

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1 Introduction

People who remained in poverty were those who stuck to the more traditional farming systems ... escaping from poverty was linked to improving the productivity of land and diversifying into commercial crops. (World Bank, 2008, p. 73)

This thesis contributes to the long-standing research on rural transformations from subsistence to commercial agriculture in developing countries (Alexander et al., 2018; Cramb et al., 2009; Rigg, 2006; Rigg et al., 2020). Eighty percent of the world's poorest people live in rural areas, and a large proportion of them depend primarily on agriculture for their livelihood (FAO, 2020a). Agricultural development programs to address poverty reduction emphasise increasing agricultural productivity and shifting from subsistence to agricultural commercialisation (Cervantes-Godoy and Dewbre, 2010; Suttie, 2019; World Bank, 2008). In these contexts, there has been a long debate on how commercial (cash) crops contribute to rural development and poverty reduction, and about the livelihood outcomes of household participation in the production of commercial crops (Cramb et al., 2009; De Koninck, Rigg, and Vandergeest, 2012; Fox and Castella, 2013; Hepp, Bech Bruun, and de Neergaard, 2019; Rigg, 2018; Rigg, Salamanca, and Thompson, 2016).

As a Lao researcher who has worked with local communities and programs in Northern Laos (Lao People's Democratic Republic), my initial PhD plans were broadly concerned with land use change and the livelihoods of Northern upland communities. However, the focus of my PhD topic shifted following the conduct of early fieldwork in the Luang Prabang Province with one of my supervisors, where we observed a plethora of new cash crops, especially banana, cassava, pumpkin and watermelon. These crops were produced for export to neighbouring countries, particularly China. Following discussions with my supervisory panel, and further to undertaking a preliminary literature review, 'boom crops' became the focus of my work (specifically bananas, cassava and teak in Northern Laos), including exploring how and why they emerge in particular geographic locations. As I have prior experience and interest in the choices that households make, and the livelihood outcomes of those choices, my thesis topic developed to consider rural households' decision-making and livelihood trajectories associated with the three boom crops: teak, banana and cassava. In conducting this research, there is a significant body of work from which to draw and build upon from Southeast Asia, notably that of Hall (2011a); Junquera and Grêt-Regamey (2019); Kem (2017); Li (2014) and Mahanty and Milne (2016), and elsewhere, such as Borrás et al. (2016); Shiferaw et al. (2011); Vicol (2019) and Yao, Hertel, and Taheripour (2018).

This chapter provides an overview of Laos and the phenomenon of boom crops, the research questions, and the structure of the thesis.

1.1 Context

Laos

Laos remains one of the poorest nations in Asia with Gross Domestic Product (GDP) per capita of US\$2,630 in 2020 (World Bank, 2021a). In 2019, the national poverty rate was 18%, and was typically higher among agricultural households (World Bank, 2020b). Three-quarters of its population depend upon smallholder farming (ADB, 2018) and two-thirds live in rural areas (WFP, 2021) where poverty is concentrated (World Bank, 2020b).

Historically, lowland Lao farmers cultivated wet rice (Évrard and Baird, 2017), while those in the Lao uplands communities have practised swidden or 'slash-and-burn' agriculture (Évrard and Baird, 2017; Fox et al., 2009), primarily for subsistence, and drawing most labour from within the household or family (Rigg et al., 2016). After the establishment of Laos in 1975, agriculture was collectivised, but this ideology collapsed a few years later (Stuart-Fox, 1980), and households returned to subsistence-oriented, family-based agriculture (Évrard and Baird, 2017).

Over the subsequent decades, both lowland and upland Lao communities and the Lao countryside have undergone considerable changes. In the late 1970s to the 1990s, upland Lao communities were targeted by Lao Government policies and programs which encouraged, and sometimes actively relocated, the population of 'remote' upland areas into permanent settlements in lowland areas, close to roads and other public services, and to adopt sedentary agriculture (Évrard and Baird, 2017; Fox et al., 2009).

In addition, the Lao Government has promoted agricultural commercialisation and intensification as a development strategy, encouraging a shift from subsistence to cash crops to control shifting cultivation, reduce poverty, improve rural livelihoods, create employment, and lift Laos out of those countries listed as 'least developed' (Alexander, Millar, and Lipscombe, 2009; Castella et al., 2013; Ducourtieux, Laffort, and Sacklokham, 2005). Thus, a series of policies since the 1980s have influenced agricultural commercialisation and rural transformation in Laos (World Bank, 2008).

1.2 Boom crops

Crop booms have been defined as those “taking place when there is a rapid increase in a given area in the amount of land devoted to a given crop as a monocrop or near-monocrop, and when that crop involves investment decisions that span multiple growing seasons” (Hall, 2011a, p. 840). Similarly, Mahanty and Milne (2016, p. 180) conceptualise a crop boom as “a critical moment of transformation with accelerated processes of extraction and commodification”.

Over the past century, Southeast Asia has undergone major shifts from predominantly subsistence agriculture to commercialised and modern agricultural technologies (Alexander et al., 2018; Hurni et al., 2017). The drivers of these changes are complex: they include demographic change (Cramb et al., 2009; De Koninck et al., 2012), rapid rises of commodity price in global markets, and policy initiatives that fostered regional economic integration and promoted large-scale investment and development, agricultural intensification and rapid expansion of boom crops (Fox and Castella, 2013; Hall, 2011a; Newby et al., 2019; Vongvisouk et al., 2016). Major recent boom crops for food in Southeast Asia include banana, cassava, coffee, cocoa, maize, and shrimp and for commodities include acacia, eucalypts, oil palm, teak and rubber (Hall, 2011a).

Crop booms are driven mainly by the rapid rise of export rather than domestic market demand (Hall, 2011a), although some are domestically-driven (Belton, Asseldonk, and Bush, 2017; Brannstrom, 2010). The rate of expansion of boom crops varies over time, and also depends on geographical contexts (Hurni et al., 2017) and crop characteristics, such as flexibility of use, and capital and labour requirements (Borras et al., 2016; Hall, 2011a; Li, 2014).

Boom crops in Southeast Asia are often located in ‘frontier’ regions with insecure property relations (Hall, 2011a). This has been the case, for example, in Cambodia, Laos, Myanmar, Thailand and Vietnam, where such lands are considered by national leaders, bureaucrats and investors to be ‘resource frontiers’, with low population densities and resources portrayed as underutilised (Barney, 2009). The investment arrangements and forms of participation in boom crops have varied in Laos: they include ‘concessions’ of state land, contract farming, and independent individual or household investments. While boom crops are often associated with large-scale land acquisition or ‘land grabbing’ (Cramb et al., 2017; Hall, 2011a). Smallholders have also been the agents of these transformations in the frontiers of many countries in Southeast Asia, and their role deserves greater attention (Hall, 2011a, p. 838). Such small-

scale land acquisition has emerged in Northern Laos (Friis and Nielsen, 2016; Santasombat, 2019) and in Northern Myanmar (Hayward et al., 2020).

Investment in boom crops can generate many times more income than planting established crops (Hall, Hirsch, and Li, 2011). For example, the oil palm boom in Southeast Asia has contributed to economic growth, increased incomes, provided employment opportunities, and reduced poverty among both farm and non-farm households (Qaim et al., 2020). However, not all households and communities have benefited to the same extent from this boom (McCarthy, 2010). In addition, a common feature of boom crops is that they experience price fluctuations, sometimes so severe that they ‘bust’, prejudicing the livelihoods of farmers (Hall et al., 2011). As Glassman (2010) observed for development more generally, there are both winners and losers from boom crops.

1.2.1 Boom crops in Laos

The emergence of boom crops in Laos has followed the pattern of many other boom crops in Southeast Asia, driven variously by government policies, market demand and crop characteristics. Since the 1980s, a series of Lao Government policies have sought to limit the practice of shifting cultivation (Castella et al., 2013) under the Land and Forest Allocation Program (Fujita and Phanvilay, 2008); and have progressively ‘opened up’ the economy, shifting towards a market-based economy more integrated with regional and global markets (De Koninck et al., 2012; Hirsch and Scurrah, 2015; Kenney-Lazar, 2012), encouraging private investments in large-scale concessions under the slogan of “turning land into capital” (Dwyer, 2007).

Geographically, Laos neighbours Cambodia, China, Myanmar, Thailand and Vietnam; the rapid increase in crop production has been enabled through investments from China, Thailand and Vietnam, to which most boom crop products are exported (Grimsditch, 2017; Schoenweger and Üllenberg, 2009; Vongvisouk et al., 2016). The main agricultural commodity boom crops have been maize and cassava (Newby et al., 2019; Soukkhamthat and Wong, 2016; Vongvisouk et al., 2016), and more recently bananas, pumpkin and watermelon (Friis and Nielsen, 2016; Friis and Nielsen, 2017; Higashi, 2015; Nolintha, 2018). A range of industrial tree crops (rubber, eucalyptus, acacia and teak) have also boomed (Cramb et al., 2017; Junquera et al., 2020; Schoenweger and Üllenberg, 2009).

The rapid expansion of maize begun in the early 2000s, driven by the export-destination countries, and was viewed by the Lao Government as “meeting policy aims related to green

economic development” (Kallio et al., 2019, p. 185). While cassava is traditionally grown by Lao farmers, it was introduced as a commercial crop in the mid-2000s by Chinese, Thai and Vietnamese investors, only to ‘bust’ after a few years and boom again from 2011 (Newby et al., 2019). The recent boom crops have been driven mainly by Chinese investment in Northern Laos. Cavendish banana production started in 2008 (Friis and Nielsen, 2016; Higashi, 2015; Ling and Xiong, 2017); the short cycle crops of pumpkin and watermelon also started around that time (Friis and Nielsen, 2017; Nolintha, 2018; Santasombat, 2019). Industrial tree boom crops such as rubber (*Hevea brasiliensis*) were first established in small-scale plantations in the 1930s under the French colonial administration (Manivong and Cramb, 2008; Phimmavong et al., 2009), but in the mid-1990s, rubber was promoted by the Department of Agriculture and Industry (DAFI) state company, and Hmong villagers in Northern Laos established rubber smallholdings (Manivong and Cramb, 2008). Rubber became a boom crop in the mid-2000s, driven by Chinese and Vietnamese investors and their markets (Kenney-Lazar, 2012; Manivong and Cramb, 2008; Shi, 2008), and promoted by international cooperation, notably the 2007 Memorandum of Understanding (MOU) between the Chinese and Lao Governments to enhance trade and increase investment in Laos (Kusakabe and Chanthoumphone, 2021). Teak (*Tectona grandis*) grows naturally in Laos, and while the first recorded teak plantation was in 1942 (Midgley, 2007) it was effectively promoted by a Lao Government policy to increase forest cover and promote permanent agriculture for upland communities during the 1980s (Hansen, Sodarak, and Savathvong, 1997). Acacias and eucalypts (various species and hybrids) were introduced in the 1970s through the Lao-Australian Reforestation Project, and subsequently by other projects and investors (Phimmavong et al., 2009).

A number of studies have explored the impacts with land use policies and associated cash crops in Laos on rural households’ livelihoods (Fox and Castella, 2013; Fujita and Phanvilay, 2008; Kallio et al., 2019; Vongvisouk et al., 2016). For example, the maize boom in Northern Laos generated higher household income than subsistence crops (Kallio et al., 2019; Vongvisouk et al., 2014); rubber production has generated high income but created conflicts between households and investors (Baird, 2010; Cramb et al., 2017; Kenney-Lazar, 2012; Manivong and Cramb, 2008; Vongvisouk and Dwyer, 2017); teak plantations have generated relatively low regular income (Smith, Ling, and Boer, 2017c) but are used as a form of household savings (Midgley, Stevens, and Arnold, 2017; Newby, Cramb, and Sakanphet, 2014) or as a ‘green bank’ (Anttila, 2016); bananas have provided high income and job opportunities, but have impacted adversely on people’s health and the environment (Higashi, 2015; Manivong et al., 2016); and cassava has created new livelihood opportunities for many smallholders in Laos (Smith, Newby, and Cramb, 2018a).

In these contexts, this study in Northern Lao focuses on three crops with different characteristics: cassava, a short-term food and commodity crop with a production cycle of 12 months; banana, a medium-term food crop with a typical production cycle of 5 years; and teak, a long-term wood crop with a typical production cycle of c.15 years. For each crop, I investigate the relevant market and policy contexts, how and why rural households participate in the crop boom and the livelihood outcomes of households' participation in that boom. By 'participation,' I mean engaging in the value chain in any way, including as a grower or trader, or by selling labour or leasing land.

1.3 Research questions, frameworks and methods

1.3.1 Research questions

To address the research topic of rural households' decision-making and livelihood trajectories associated with three boom crops, I asked the following specific questions for each crop case study:

1. What factors influence the Northern Lao crop booms?
2. How and why do rural households participate in the teak, banana or cassava booms?
3. What are the livelihood outcomes of households' participation in the booms?

I also consider what learnings can be drawn across the three case studies, and the implications of my results for Lao Government policies relevant to boom crops and rural development.

1.3.2 Research frameworks and methods

The sustainable livelihood framework (Scoones, 1998) and its expression in diversified household livelihood strategies (McCarthy and Obidzinski, 2017; Rigg et al., 2020) provided the primary framework for identifying and assessing livelihood outcomes from household participation in the crop booms. In addition, the farmer decision-making frameworks developed by Meijer et al. (2015); Pannell et al. (2006) and Versteeg, Hansen, and Pouliot (2017) were helpful in understanding household decision-making in adopting teak, and in defining the key external contexts of policies and markets for all crops.

This study adopted a qualitative case study approach (Baxter and Jack, 2008; Robson, 1993) with multiple cases (Yin, 2003). In this study, there are multiple cases (banana, cassava, teak) with multiple levels of analysis (households and villages), which allow exploration of differences within and between cases and at different levels. The case studies focus on the household as the unit of analysis, but some comparisons are made at the village level. Here,

a household is defined as a unit consisting of one or more persons who use joint accommodation and food (Rigg, 2020). A village is defined according to Lao administrative practice, as a government-defined community with a village committee and head, and a formal allocation of land (National Assembly, 2003).

For each boom crop, I identified two representatives, but contrasting, participating villages in Northern Laos – in Luang Prabang Province for teak, Oudomxay Province for bananas, and Xayabouly Province for cassava – in which to conduct my primary field research. I spent an extended period (typically 5 weeks) living in each village, over a total fieldwork period of 12 months. The primary research methods were semi-structured household interviews, focus group discussions, participant observations and informal discussions in the case study village and semi-structured interviews of key informants at the village, district and national levels. I collected some primary and secondary quantitative data and used it to support interpretation of, and triangulate with, the qualitative data. I discuss the conceptual framework and research methods further in Chapter 2.4 and 2.5.

The research methodology was approved by Australian National University's Human Ethics Committee (Protocol No. 2018/680), and I received approval in the form of an official letter to conduct fieldwork from the Lao Government. All participants were asked for consent to participate in the research, and had the right to withdraw at any time (see Appendix 1).

I conducted all interviews in the Lao language, including those with most Khmu people, as they understand and use the Lao language. However, I used interpreters for interviews with two Khmu households in my teak case study villages, who preferred to speak in Khmu. In these cases, the heads of the households were relatively old (50-60 years), with less ability to understand the Lao language than their younger generations. Their adult children assisted me during the interviews.

1.4 Thesis structure and format

The thesis is organised into seven chapters (Figure 1.1), which can be thought of in three parts. The first part comprises this introductory chapter and Chapter 2, which presents a broader literature review and the overall research methodology. The second part comprises the three 'results' chapters (3–6), one for each crop, and Chapter 6, which draws comparisons across the three case study crops. In the third part, in Chapter 7, I present my conclusions and reflections.

Each of the 'results' chapters are presented in a form suitable for publication, and so includes a stand-alone Introduction, Literature Review and Methods section. Chapter 2 is presented in this context. As the papers corresponding to the chapters have not been accepted for publication at the time of submission, the thesis is not submitted in the form of a thesis-by-publication. However, the structure of Chapters 3, 4 and 5 reflect the intent to publish each as a paper.

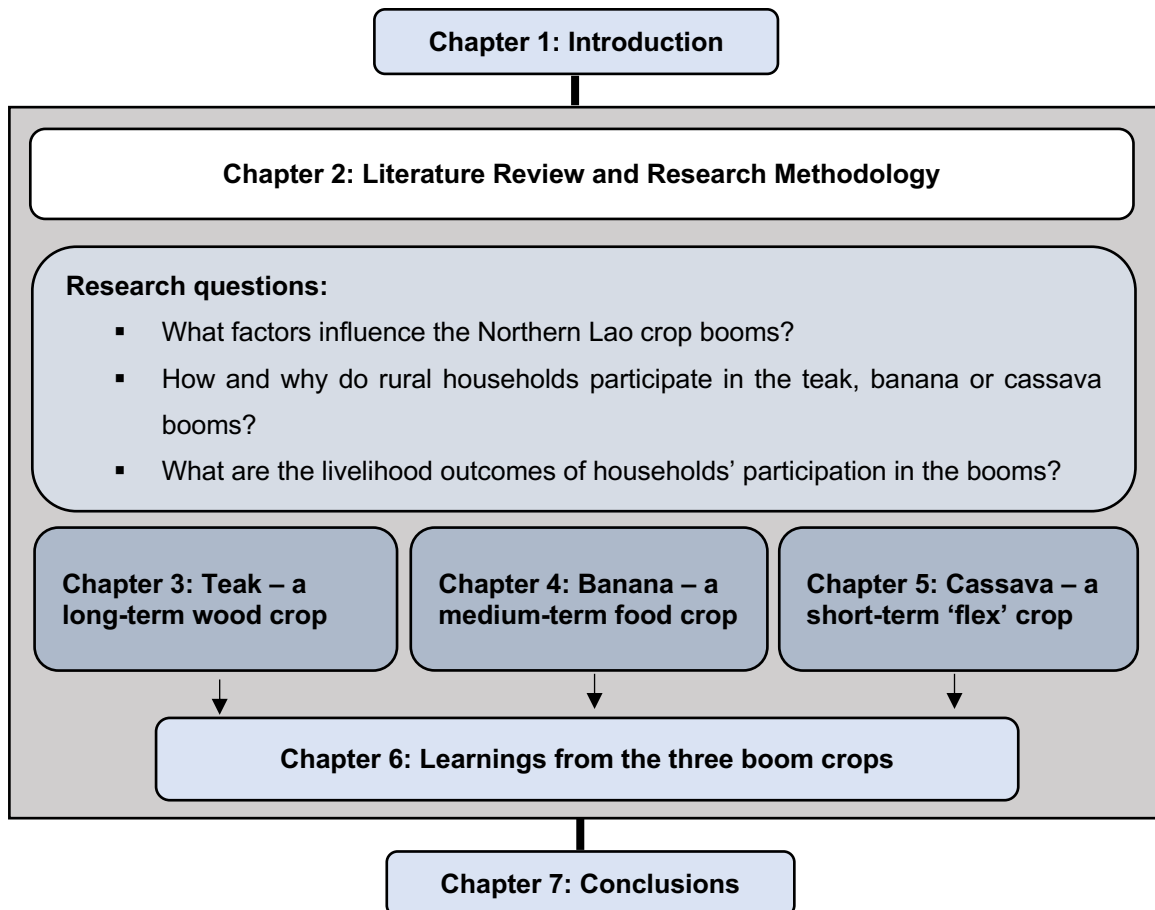


Figure 1.1: Thesis logic diagram illustrating the three main research case studies and other research components.

Source: Adapted from Robins (2008)

2 Literature review, conceptual framework and research methods

Agriculture will remain the key sector for developing rural livelihoods for the foreseeable future and has gradually been shifting from subsistence farming to a more business-oriented sector, driven by strong regional demand. (IFAD, 2018, p. iv)

Subsistence agriculture, described as “farming and associated activities which together form a livelihood strategy where the main output is consumed directly by the households, where there are few if any purchased inputs and where only a minor proportion of output is marketed” (Barnett, 1996, p. 1), was the foundation of Southeast Asian rural livelihoods until the last few decades of the 20th Century (Rigg, 2020). Over the past half-century, Southeast Asia has undergone major shifts from predominantly subsistence agriculture to commercialised and modernised agricultural systems and technologies (Alexander et al., 2018; Cramb et al., 2009; Hurni et al., 2017). Over the same period, Southeast Asia has been viewed as “a region of miraculous growth – a development success story and an exemplar region” (Rigg, 2020, p. 1). A long agricultural commodity boom in the early 21st Century has followed rising demand for energy and food staples associated with widespread economic growth (Baffes and Hanjotis, 2010), and households in developing countries and emerging economies are increasingly participating in global food and agriculture markets; the exports from these countries now make up more than one-third of global trade in food and agriculture (FAO, 2020b). In these contexts, rural households in Southeast Asian countries have shifted from primarily subsistence to more commercially-oriented agricultural production, for both export and domestic markets. However, as Rigg (2018, p. 169–170) notes:

Across rural Asia, households – for the moment at least – often embrace livelihoods that are multi-sited, pluri-active and generationally segmented, reflect logics of subsistence as well as commodity production, and embody production, reproduction and re-distribution.

This chapter reviews the literature relevant to rural change and boom crops in Laos, as context for exploring the participation of Lao rural households in commodity crop production. It also provides background to the research methods used in the case studies.

2.1 Boom crops and rural change

Crop booms have been defined as those “taking place when there is a rapid increase in a given area in the amount of land devoted to a given crop as a monocrop or near-monocrop, and when that crop involves investment decisions that span multiple growing seasons” (Hall, 2011a, p. 840). Mahanty and Milne (2016, p. 180) conceptualised a crop boom as “a critical

moment of transformation with accelerated processes of extraction and commodification. It is a unique time and place where critical elements and relations converge to exert a formative influence on peoples' lives and futures." In Southeast Asian countries, the agriculture commodity production expansion that boom crops represent is taking place mostly at the resource frontier (Barney, 2009; Cramb et al., 2017; Hall, 2011a).

Households that shift from subsistence to commercial production, including in boom crops, may be influenced by complex, dynamic and interrelated factors such as where they live, their socio-economic condition, demographic change, market expansion and contraction, government policies, and changing ecological conditions including due to climate change (Baffes and Haniotis, 2010; Castella, 2012; Cramb et al., 2009; De Koninck et al., 2012; Hall, 2011a; Nghiem, Kono, and Leisz, 2020). The following sections reviews a number of these factors and then explores in more detail how they may shape household livelihood strategies.

2.1.1 Demographic change

Throughout human history and until recently, the majority of the world's population were rural; now, more people live in urban areas. In 2018, 55% of the global population was urban and it was projected that this would rise to 60% by 2030 (UN, 2020). However, 80% of the world's poorest people still live in rural areas and 10% of the global population live in extreme poverty (UN, 2019). Nine percent of the global population go hungry, which is ironic given that they live and work in the areas where food is produced (FAO, 2020a), sometimes in frontier environments.

Demographic change refers to both population growth and decline and is linked to a population's size, age structure and geographic distribution; these are the outcomes of birth, death and in- and out-migration (Bloom and Williamson, 1998; Bongaarts, 2009; Hugo, 2011; Rigg, 2020). Rural households "*respond* to demographic trends (e.g., through intensification) and *contribute* to such trends (e.g., through migration)" (Cramb et al., 2009, p. 324-325, emphasis in original). In Southeast Asia, in- and out-migration has been studied in many contexts: For example, the transmigration scheme in Indonesia where, supported by their government, migration has been encouraged from the densely-populated island of Java to 'outer' islands of Sumatra, Kalimantan, Sulawesi and Papua (Cramb et al., 2009; Darmawan, Klasen, and Nuryartono, 2016); or in Vietnam where, in the 1980s, the government sponsored migration from the lowland to upland areas of the Central Highlands and promoted industrial plantations and cash cropping for poverty reduction (Cramb et al., 2009).

Population growth following in-migration may create land competition between households in local communities, and farmers respond by adapting their livelihood strategies through, for example, tree crops, intensive cropping, off-farm work, and temporary or permanent out-migration (Cramb et al., 2009; Rigg, 2006; Rigg, 2018). Out-migration may catalyse both de-agrarianisation and re-agrarianisation (Kelly, 2011; Vandergeest, 2012): For example, Hebinck (2018, p. 231) describes how rural households in Africa and elsewhere in the Global South migrate to cities as their agricultural activity is increasingly squeezed and challenged by land issues and chaotic markets; these households may send remittances home and, in some cases, (re)engage in agriculture.

In addition, younger generations in rural households may leave their community for education or employment, and may not return, preferring or needing to work at off-farm jobs in town (Cramb et al., 2009). Remittances from these migrants have become an important element of many households' livelihood strategies. Sunam et al. (2021) illustrate how out-migration in Indonesia, Laos and Nepal has contributed to the survival and reproduction of households through remittances from migrant members, which are used to meet rural household consumption needs, rather than accumulating as household assets or being used as investments in farming activities. However, migration also leads to a reduction in the household labour force and the household's capacity to undertake or sustain crop production; households may adapt by changing from subsistence to commercial production and intensifying or dis-intensifying their crop systems. As Hall (2011a) points out, boom crops stimulate migration but migration may also help crops to boom.

2.1.2 Market expansion and integration

Market expansion and integration have driven global rural change, with rural households in Southeast Asia undergoing dramatic change in response to market expansion and increased global connections (Castella, 2012). Commodity crop expansion is influenced by high demand in export markets and growing domestic consumption associated with socio-economic development and increasing urbanisation. In Southeast Asia, commodity crops that have become boom crops are mainly export-oriented (Hall, 2011a); however, domestic markets have also been influential for some crops (Belton et al., 2017).

Hall (2011a) proposed that the most obvious factor shaping and controlling crop booms is the market; however, he also emphasised that not all boom crops are the same, and that demand for them derives from different sources. Global demand for vegetable oil and biofuel are useful examples. Over the past 3 decades there has been a global oil palm boom in response to

market demand for oils, fats and biofuel; in 2018, Indonesia was the world's largest producer of palm oil (Santika et al., 2021). The rise of a global industry and value chain for grain-oilseed-livestock has resulted in an expansion of cash crops such as maize in many parts of the world, including India, China and the USA (Jakobsen, 2020; Shiferaw et al., 2011). Similarly, the soybean boom in South America has been influenced by high demand in Chinese markets (Giraud, 2020). Similar trends have occurred for other crops in other countries, such as maize and cassava production booms in Cambodia (Kong et al., 2019) and more recently in Laos (MRLG, 2021; Newby et al., 2019). 'Flex crops' – those yielding multiple products, such as cassava, maize, soya, oil palm, coconut and sugarcane – are more likely than mono-product crops to boom because they provide value chain actors with more than one market choice; for example, "When sugarcane prices are high, sell sugarcane. When ethanol prices are high, sell ethanol." (Borras et al., 2016, p. 94).

Market expansion in both the Global North and South has similarly driven the global growth of industrial tree plantations, responding to increasing demand for timber, pulp and other biomass products (Midgley et al., 2017; Overbeek, Kröger, and Gerber, 2012). In Southern China, for example, one of the main drivers of the industrial tree plantation boom was a series of socio-economic and market factors both external to and within China; international markets increasingly sought plantation-grown wood (Carle, Duval, and Ashford, 2020) and national policies opened up markets and promoted commercial forestry development in the region (Xu, 2019). Similar factors, including the promotion of local processing industries, influenced the industrial tree plantation boom in Vietnam (Sikor, 2012).

2.1.3 Development policies and programs

For decades, global development programs have emphasised improving agricultural productivity and promoted agricultural commercialisation. For example, in 2008, the *World Development Report* pointed towards a new agriculture agenda focusing on dynamic and efficient agribusiness for agricultural growth, positing that a strong link between agribusiness and smallholders can reduce rural poverty (World Bank, 2008). Subsequently, agricultural development policy in many countries focused on commercialisation, shifted away from subsistence agriculture and focused on modernised and market-oriented production, including for food crops and industrial tree plantations (Rigg, 2020; White et al., 2013; Yaro, Teye, and Torvikey, 2017).

In this context, governments, together with donor agencies, have promoted rural development programs to improve productivity and reduce poverty through crop production. For example,

Indonesia introduced state-agribusiness oil palm plantation schemes (McCarthy, 2010); in India, maize was seen as the “crop of the future” among Indian policymakers and agribusinesses (Jakobsen, 2020, p. 146); Vietnamese households have experienced several crop booms (coconut palm, cacao, pepper and coffee) that were promoted through government policies for agricultural development (Nghiem et al., 2020); and the early stages of the soybean boom in Brazil were driven by public policies, including a land use policy that promoted the occupation of “empty” land to secure national sovereignty and produce more food (Russo Lopes, Bastos Lima, and Reis, 2021, p. 5). Land policies were similarly important in a cacao boom in Southeast Sulawesi, Indonesia, in which the state facilitated clearance and regrowth in former settlements and fields, promoted commodity-oriented production to lowland people, and prohibited swidden agriculture (Kelley, 2018); this parallels policies towards upland communities in Laos (Castella et al., 2013). The shrimp farm boom in Southern Thailand in the 1980s was based on large agribusiness contract farming schemes enabled by state regulations and territorialisation processes (Vandergeest, 2008), including government policy on land entitlement in the eastern Gulf of Thailand (Elwin, Jintana, and Feola, 2020).

Tree crop booms have also been strongly influenced by a range of policies. Smallholder rubber plantations in Southeast Asia benefited from state support and industry investment in rubber research. In Malaysia, for example, rubber smallholder schemes included a subsidy and information through agricultural extension (Cramb et al., 2017); in Thailand, the government has long supported smallholders by providing improved planting material, techniques and credit (Fox and Castella, 2013). In the Solomon Islands, smallholder tree plantations of high-value exotic species like teak were promoted by a government program on forest management (Versteeg et al., 2017), and a similar policy was introduced in Laos (Newby et al., 2012). Since the 1960s, industrial tree plantations of mostly exotic and fast-growing species such as eucalypt, pine and acacia, have typically been promoted by state and cooperate actors (Overbeek et al., 2012) resulting in a significant expansion of planted forests in South America (Brazil, Chile, Argentina and Uruguay), Africa (South Africa, Zimbabwe, Malawi, Madagascar, Kenya, Mali, Morocco, Tunisia and Senegal); and in Asia, mainly in China, India, Indonesia and Malaysia as well as in the Mekong countries of Laos, Vietnam and Thailand (ibid). The case of Southern China illustrates how a state land reform and land control intervention, referred to as ‘from above’, had a significant impact on land use change – from food crops to industrial tree plantation, and then vice versa (e.g., from tree plantation to sugarcane) (Xu, 2019).

Rural transitions in Southeast Asia have emerged as a result of specific laws and regulations in relation to access to resources (Drahmoune, 2013), and their conjuncture with a range of

other factors (Cramb et al., 2017). Specific government policies and regulatory changes to enable market expansion have underpinned these transitions (Hall et al., 2011). For example, the smallholder industrial tree plantation boom in Vietnam was influenced by the Vietnamese government's policy in promoting tree plantation to smallholders via targeted loans together with reforms to the land allocation program, under which smallholders were able to occupy land or apply for land titles (Sikor, 2012); the expansion of oil palm production in Malaysia and Indonesia was influenced and facilitated by governments reducing trade barriers and enabling international investments (Cramb, McCarthy, and Press, 2016). I further describe how similar interventions have influenced rural change in Laos below.

2.1.4 Understanding household livelihoods strategies and outcomes

In the face of the combined dynamics of demographics, markets and government policies, rural households must be able to adapt; their livelihood strategies will vary depending on the households' characteristics and the specific economic, social-political relations and geography in which they live in and with which they engage (Rigg, 2018). Households' responses are likely to depend on their abilities to respond to external shocks, internal stresses, policy changes, and market trends. Conceptualisations such as those proposed by Scoones (1998, 2015) (Figure 2.1) provide a framework for recognising and assessing these dynamic livelihood strategies and outcomes over time.

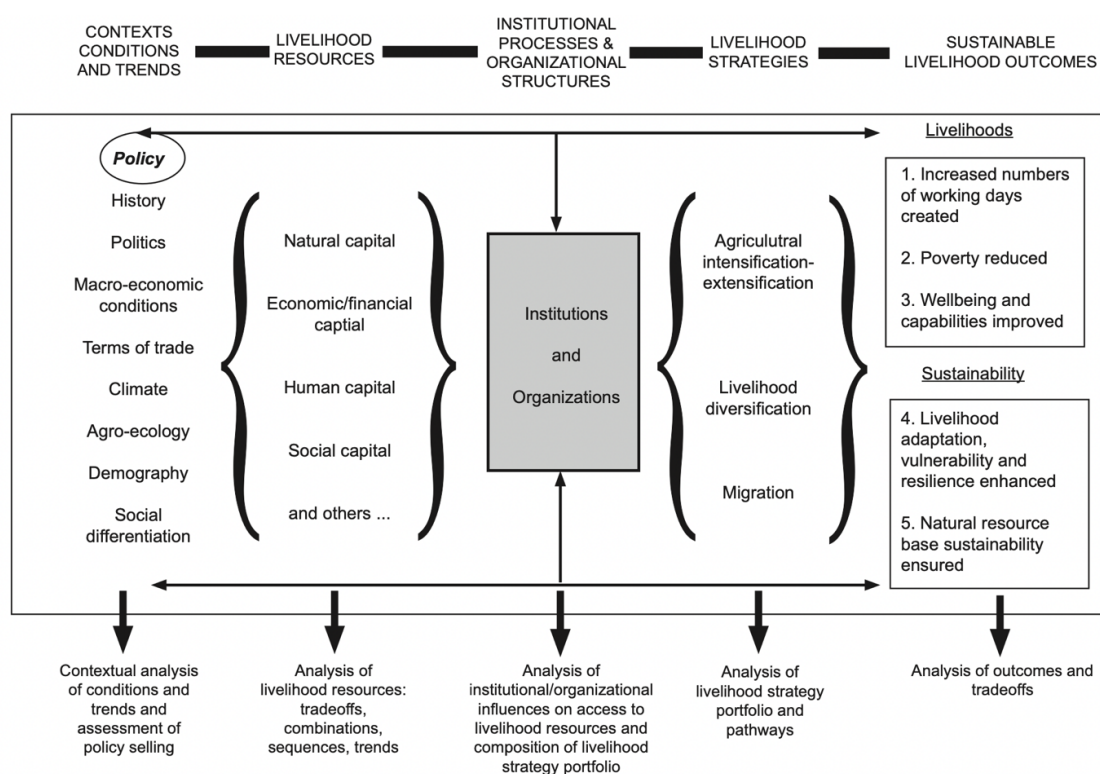


Figure 2.1: Sustainable Livelihoods Framework (SLF) (Scoones, 1998)

A general pattern observed across much of Southeast and South Asia is that of diversification of on-farm and off-farm activities, with better-off households tending to move away from agriculture (Vicol, 2019). Rural change often manifests in a decreasing role and relative importance of agriculture in household livelihood strategies, and the rise of “livelihood complexes” (Rigg et al., 2020, p. 306). For instance, in a study of livelihood change over 2 decades in Northeast Thailand, Rigg (2018, p. 168) found that “[m]ost households were making a living through embracing multi-stranded and multi-sited livelihoods”; while farming was often no longer the most important livelihood activity, it remained important for a variety of reasons, and only a few households completely abandoned agriculture. As Rigg (2020, p. 13) concluded from conversations with rice farmers in Thailand and Vietnam:

[there is] not one reason but several jostling for attention to explain farmers’ continued attachment to their land and to rice farming: a sense that rice land provides security, a fear of what the future might hold, an attachment to place and a connection with the past, a deep-seated desire to grow rice to meet subsistence needs, historical inertia and a feeling of filial obligation. What was not reflected in our conversations, however, was any sense that rice farming provided an occupation and an activity that would, on its own, meet the needs and aspirations of current and future generations.

McCarthy (2019) characterised such patterns of livelihood change as “progressing sideways”. Others, such as Pritchard, Vicol, and Jones (2017), working in Northern India, have identified livelihood pathways in more detail; in their terms, “dropping out, going backwards or muddling through”, “hanging in”, “stepping in/getting ahead” and “stepping out”, according to households’ assets bundles, opportunities and vulnerabilities.

The impacts on households as they transition from subsistence to cash crop production have been varied. Cash crops may provide a higher income for households but may also be detrimental to food security. When the global market price of a commodity crop is high, farmers devote their labour, time and capital to it, and tend to reduce their subsistence production activities (Hall, 2011a). Production of diverse traditional crops may be replaced by modern mono-crops. For example, tens of millions of Africans changed their diet from traditional sorghum and millet to maize, which raised concern over food and nutritional security as maize provides lower vitamin B than other grains such as sorghum or wheat (Shiferaw et al., 2011). As a result of the coffee boom in the North-western Mountain Region of Vietnam, many farmers devoted less land to swidden crops (Nghiem et al., 2020); the soybean boom in Brazil disrupted traditional farming and reduced the native edible species, thereby undermining the local food systems (Russo Lopes et al., 2021). Conversely, farmers in Northern Laos participating in a maize boom never abandoned their rice fields, even when faced with the temptation of highly-priced maize (Kallio et al., 2019); and, in Vietnam, rural households willingly adopted industrial

tree growing as promoted by the state, integrating it with their pre-existing livelihood activities such as subsistence farming for food security and with off-farm activities (Sikor, 2012; Tham, Darr, and Pretzsch, 2020).

Adoption of cash crops frequently exacerbates differences in assets and wealth in rural communities (Cramb et al., 2017; Hett et al., 2020; Junquera et al., 2020; Kenney-Lazar et al., 2018; Nghiem et al., 2020). For example, in Sumatra, Indonesia, the expansion of oil palm plantations has had a significant impact and created “processes of agrarian differentiation”, where households who have the capacity (in terms of land and labour resources) to participate in oil palm production have embraced this new livelihood opportunity and benefited from it but many other households have been disadvantaged (McCarthy, 2010, p. 826). In this case, the terms of smallholder schemes determine who remains in the scheme, who sells their scheme entitlements, and who becomes a provider of cheap labour. If households seek to develop oil palm plots independently, they may face difficulties in accessing capital, planting inputs and market networks, leading to poor production and income. These households thus remain poor, may have to sell their land, and so become landless (McCarthy, 2010).

Similar differentiation from participation in crop booms has been described for the case of potatoes in India (Vicol, 2019), from which better-off households gained greater benefits than poorer households, and invested in other new livelihood activities, particularly off-farm. In a maize boom in Myanmar, better-off households had the capital to purchase chemical fertiliser inputs and to hire labour to maximise their production while poor households were unable to afford these inputs, leading to low levels of production and, in some cases, becoming trapped into debt and selling part or all of their landholding to, and becoming farm labourers for, wealthy households (Woods, 2020). Two examples (amongst others) from Africa illustrate similar outcomes. In Ghana, an increasing demand for farmland for fruit cultivation encouraged many poorer households to lease their land to wealthier households, leading to young households being unable to lease land and so having to sell their labour to wealthy farmers (Yaro et al., 2017). In Zimbabwe, similarly, a tobacco boom transformed rural household livelihoods and created social differentiation; successful households with sufficient resources were able to expand their production and accumulate wealth, while less wealthy households also benefited from the tobacco boom but to a lesser extent, and relied on various livelihood sources, including selling their labour (Scoones et al., 2018).

2.2 Drivers of rural change in Laos

Lao People's Democratic Republic (Laos) has a population of 7.3 million (IMF, 2020) and a GDP per capita of US\$2,630 in 2020 (World Bank, 2021a). The country's economic growth is primarily based on natural resources such as hydropower, mining and timber, while smallholder agriculture is the main source of income and employment for 78% of the population (IFAD, 2018). Although Laos has experienced rapid economic growth in recent decades, and the poverty rate declined from 33.5% in 2003 to 23% in 2013, 18.3% of the population still lived below the poverty line¹ in 2018/2019, and poverty remains higher among ethnic minorities (World Bank, 2020a). More than three-quarters of the Lao population lives in rural areas and depend on agriculture and natural resources for survival (IFAD, 2020).

The global trends in rural change introduced above are also evident in Laos. Prior to independence in 1975, the subsistence production systems of rural upland households in Laos were commonly shifting cultivation with any surplus product sold locally. Housing was typically built from bamboo with a grass roof (see Figure 2.1 picture a), and access to villages was mostly via dirt roads by foot or using motorbikes and/or local transportation (*lod song tiew*). The production landscapes of rural communities were dominated by upland and lowland rice, young and old (15 year) rotation fallows, and primary forests (Hansen et al., 1997; Phimmavong et al., 2009; Yamada, 2018). Since independence and during the early 1980s, under the 1st Five-Year National Socio-Economic Development Plan (1981–1985), agriculture was focused on the promotion of food crop production; tree plantations, particularly teak, were promoted by the government and prioritised by the ministerial and provincial authorities as part of the development strategy for Northern Laos (Hansen et al., 1997). These policies aimed primarily to promote food and plantation wood self-sufficiency, but also contribute to agro-food and wood processing industries for domestic and export markets. Following the introduction of the New Economic Mechanism in 1986, when Laos opened up to the global economy, and the first National Meeting of the Agriculture and Forestry Sector in 1988, Laos started to focus on agricultural development through irrigation, basic agricultural infrastructure, the introduction of more intensive farming systems, and the reduction of shifting cultivation (Castella et al., 2013; Ducourtieux et al., 2005; Fujita, 2010). The primary aim was to transform the rural economy from being subsistence-based to becoming more market-oriented (MAF, 2015a). It was also following this meeting that the government first set targets to restore forest cover, including through investment in plantations.

¹ Defined for Laos as less than US\$1.1/person/day in 2018/2019, equivalent to 2011 Purchasing Power Parity (PPP) US\$2.4/person/day (World Bank, 2020a).

With these shifts, farmers have gradually moved from subsistence to commercial agricultural production and rural landscapes have changed as a result. Rigg (2018, p. 161) notes that “Since the mid-1980s, Laos has gone through a deep process of market reform or ‘transition’, achieving high economic growth rates and rising aggregate incomes”. Subsequently, new commodity crops such as maize, sugarcane, Job’s Tears, cassava and industrial tree plantations (acacia, eucalypt and rubber) have been introduced to farmers together with other development activities such as hydropower dams, mining and infrastructure development projects, and these have transformed many places in rural Laos. As a result, rural Lao villages have also started to change; there is more permanent and robust housing (see Figure 2.2 picture b); better access to communication, primarily through mobile phones; ownership of motorcycles and to a lesser extent pick-up trucks; and more shops in villages. With access to new markets, rural households have been able to diversify their livelihood activities with new on-farm and off-farm activities (Rigg, 2005; Rigg et al., 2020).



Figure 2.2: Picture (a) the most common traditional housing (bamboo wall with a grass roof) in upland communities; (b) new concrete house (next to the old house) after the arrival of cash crop production (bananas). Namox District, Oudomxay Province, Northern Laos

To bring Laos' new market orientation into effect, policies and national development programs have been introduced with specific socio-economic goals. Those policies and plans are described in general here², and those specific to each case study crop are described in Chapters 3, 4 and 5.

The Party Resolution for each 5-year period in Laos directs development in the agriculture and forestry sector. The 2015 Resolution determined that "Agriculture is the first and foremost battlefield. Agriculture and Forestry is also still the fundamental sector in the national socio-economic structure. Shifting from (a) natural economy to commercial production is the major priority of the transition period to socialism of our country"³ (MAF, 2015a, Foreword-1st paragraph). The 5-yearly National Socio-Economic Development Plans developed in this context have been instrumental in driving rural change and have emphasised increased participation in regional and global institutions. In 1997, for example, Laos joined the Association of Southeast Asian Nations (ASEAN), and the politics of the country shifted towards regional integration and development (Évrard and Baird, 2017).

The 5th Five-year National Social Economic Development Plan 2000–2005 (5th NSEDP) (MPI, 2000), and an emerging land policy of 'turning land into capital' (Dwyer, 2007), gradually encouraged increased private investment through large concessions of state land for industrial tree plantations (acacia, eucalyptus, and rubber) (Barney, 2008; Kenney-Lazar, 2012; Phimmavong et al., 2019) and agriculture commodity production. The 6th NSEDP (2006–2010) continued the promotion of agricultural commercialisation, but shifted the focus from large-scale concessions to contract farming due to negative impacts from the former on local people's livelihoods (Fullbrook, 2007) and the environment; contract farming was subsequently promoted more widely by the Lao government as being more beneficial to local people (Schoenweger and Üllenberg, 2009).

These land policies had important and significant impacts on rural Lao people, particularly ethnic minority groups living in the forested uplands and who traditionally practised shifting cultivation. These people and their land management practices were targeted by a series of Lao government policies and programs (Kallio et al., 2019), and were the subject of a major relocation program during the 1980s–1990s (Lestrelin, Castella, and Bourgoin, 2012a) through the Land and Forest Allocation Policy (LFAP) and Village Relocation and Consolidation Strategy. These aimed to merge upland communities with less than 50 households and relocate them close to roads and other public services (Ducourtieux et al., 2005; Fujita and

² In addition to the sources cited, this section draws on: Smith and Alounsavath (2015), Smith et al. (2017c).

³ The translation from Lao to English may not be exact.

Phanvilay, 2008; Lestrelin et al., 2012a). Figure 2.3 shows a Lao Government poster promoting the LFAP (Rigg, 2018), promising a better or new life. In reality, the resettlement program had adverse impacts on some relocated households due to lack of available land, resulting in an inability to meet subsistence needs, increased debt, dependence on markets and ultimately the need to sell their labour to meet basic needs (Baird, 2011; Barney, 2009; Kenney-Lazar, 2012; Rigg, 2018).



Figure 2.3: The route to a new life (the left side shows the current life and the right side the future)

Source: Rigg (2018, p. 162)

Land policies and supporting legislation underwent many iterations between 1992 and 2003, aimed at bringing into effect the idea of 'turning land into capital', one element of which was the generation of land tax (Keith et al., 2006; Soulivanh et al., 2004). As land policies were evolving, so too were those aimed at investment promotion and labour. Initiatives to encourage foreign and domestic investment in land-based agribusiness have passed through many iterations since they were first introduced, reflecting, for example, the shift noted above in the emphasis between concession-based and contract-based farming. At the beginning of the 6th NSEDP in 2007, the Government issued a moratorium on some types of land concession, and in 2009 issued a new Investment Promotion Law and other legislation intended to improve the process through which investors could gain access to land. Three years later, in 2012, a new

concession moratorium was issued in Prime Minister's Order No. 13 (PMO13), initiating a review of investments which continued until 2019 (Smith et al., 2017b). In the intervening period, the Investment Promotion Law was again amended (No. 14/NA, dated 17/11/2016), with the current version aiming to define principles, regulations and monitoring of domestic and foreign investments, to ensure the rights and benefits of each of investors, the state and the people, while contributing to national socio-economic, green and sustainable development (Kallio et al., 2019; NA, 2016).

Along with investment promotion and land reforms, labour has long been recognised as a key element of national socio-economic development. Laos has been a member of the International Labour Organization since 1964. The first Labour Law made in 1990, was revised in 1994, and again in 2006 during the 5th NSEDP as private and foreign investment in Laos increased. Investors were looking for cheap land and labour, and these laws were intended to maximise opportunities for and protect Lao workers. The Labour Law was updated in 2013 (No. 43/NA dated 24/12/2013), and the current version aims to define principles, regulations and measures on administration, monitoring labour skills development, recruitment, and labour protection; and to promote labour skills to meet the goals of the NSEDP and connect labour to region and international (MOJ, NUOL, and JICA, 2018). Under the Law, investors have obligations to promote employment of Lao labourers, especially women and minority ethnic groups, and pay attention to developing specialist skills and transfer technology skills to Lao employees (NA, 2016). The law defines labour as physical and mental energy exerted by human beings for the purposes of work, yielding socio-economic results. The legal workforce age is 14 to 60 years, with youth labour defined as between 12 to 18 years old. Child labour refers to children under the age of 12 years old undertaking economic work, and children are unauthorised to work in dangerous jobs or sectors, work overtime, or undertake hard labour. However, in practice, there are many examples of children under the age of 12 years old who work in what could be considered dangerous or hard jobs, such as banana production (Higashi, 2015; Manivong et al., 2016).

Subsequent NSEDPs have maintained an emphasis on investment in agriculture and the land sector and introduced other important policies. The 7th (2011–2015) and 8th (2016–2020) NSEDPs, for example, emphasised 'green development' and the Government's aim to increase forest cover and promote sustainable development (MPI, 2016). The forest cover targets have been particularly instrumental in sustaining efforts to promote both smallholder (Smith et al., 2017c) and industrial tree plantations (Phimmavong et al., 2009) for poverty reduction through increased household income, and to supply an initially-domestic but increasingly exported-oriented wood processing sector (Maraseni et al., 2018). Green

economic policy is increasingly evident and promoted in the agriculture sector, such as in maize production in Northern Laos (Kallio et al., 2019).

As a consequence of these policies, the forms of investment and rural household participation in agricultural commercialisation in Laos are diverse. They include concession models (Schönweger et al., 2012) including eucalypt and acacia plantations (van der Meer Simo, Kanowski, and Barney, 2020a), which largely exclude smallholders; contract farming, such as for rubber outgrowers (Dwyer and Vongvisouk, 2019; Shi, 2008) and maize cropping (Kallio et al., 2019) and, to a lesser extent, tree plantations; and farmers investing independently, such as in teak (Newby et al., 2014; Smith et al., 2017c).

In Laos agricultural policy and literature, investment models are commonly characterised as 'x+y', where 'x' and 'y' are the number of factors of production contributed by the farmer and investor, respectively (see Castella et al., 2009; Fox and Castella, 2013). For example, under a '2+3' model, farmers provide land and labour, and the investing company provides capital (in the form of seedlings, fertiliser and other equipment), technology (and/or training), and access to markets. Under a '1+4' model, farmers typically provide the land but no other inputs; the company hires labour and provides capital, technology (and/or training), and market access (Fox and Castella, 2013; Fullbrook, 2007; Shi, 2008). Another form of '1+4' household participation in agricultural commercialisation is by farmers selling their labour.

The current Agricultural Development Strategy 2025 and Vision to 2030 (MAF, 2015a) continues Laos' aspirations for agricultural commercialisation and modernisation for "ensuring food security, producing comparative and competitive potential agricultural commodities, developing clean, safe and sustainable agriculture and shift gradually to the modernization of a resilient and productive agriculture economy, linking with rural development contributing to the national economic basis" (MAF, 2015a, p. 1). The Development Strategy of the Crop Sector 2025 and Vision 2030 (MAF, 2015b, p. 2) elaborated on elements of this ambition, namely "crop production by focusing on modernisation, clean, safety, quality, stability, sustainability and commercialisation". The goals continue to focus on transforming subsistence production to modern, commercial agriculture and move further towards large-scale farming. International integration and compliance with the obligations of the World Trade Organisation and ASEAN Economic Community (MAF, 2015a) are also seen as important. The role of smallholder farming and strategies to improve smallholder farming systems are less clear; while the need for research and development to improve smallholder agriculture systems is noted, the potential for smallholders engage in cash crop production as a more inclusive development

pathway than large-scale plantation production (Cramb et al. 2017; Byerlee, 2014) is not explicit. Rather, the Government of Laos has “placed great faith in large agribusiness farms and plantation as the way to ‘modernise’ agriculture” (Byerlee, 2014, p. 589).

As a result of the LFAP and resettlement program described above, and of Lao government policies and growing international market demand for cash crops, rural landscapes in Laos have transformed to become more diverse, with traditional agricultural systems mixed with cash cropping in different cropping systems (rubber, eucalypt, acacia, maize, bananas, cassava, pasture, watermelon, pumpkin) (see Friis et al., 2019; Hurni and Fox, 2018), urban expansion, infrastructure and an increasingly modern logistics network connecting markets. Subsequently, as agricultural production has expanded, some crops have boomed. A common feature of crop booms is their connection to the notion of ‘the frontier’ (Hall, 2011a, p. 840); geographically, Laos’ frontier is proximate to the markets of China, Thailand and Vietnam, which are the export destinations of most of the boom crops now grown in Laos (Grimsditch, 2017; Vongvisouk et al., 2016).

Consequently, crops such as maize (Kallio et al., 2019; Vongvisouk et al., 2016), sugarcane (Supaporn, 2015), rubber (Junquera et al., 2020; Kenney-Lazar, 2012; Manivong and Cramb, 2008), other tree plantations (Smith et al., 2017b) and more recently banana (Friis and Nielsen, 2016; Higashi, 2015) and cassava (Newby et al., 2019; Smith et al., 2018a), now dominate rural landscapes. I describe the ways in which these booms have affected households and changed rural Laos below.

2.2.1 Household livelihoods, outcomes and rural change

In the more general context of development and conservation, there are often both winners and losers (Brockington, Duffy, and Igoe, 2012; Glassman, 2010); with the losers often being rural, indigenous and poor (Ybarra, 2018). This has been the case for rural households in Laos who have shifted from subsistence towards the market-oriented production, including through participation in boom crops. Households who have made the transition have had both positive (by creating wealth, improving infrastructure, and supporting the education of family members) and negative (by losing their land, unfair labour conditions, conflicts and health issues) outcomes, which has generally resulted in increased household differentiation. Studies from Northern Laos by Kallio et al. (2019); Newby et al. (2014) and Vongvisouk et al. (2014) show that cash crops (maize) and tree plantations (teak) foster household differentiation within communities where households who are better-off (i.e., those with more land and capital) are able to benefit from cash cropping, but resource-poor households are unable to benefit to the

same extent, if at all. While better-off households are more likely to engage in off-farm activities and have the capacity to send their children to study in towns or Vientiane Capital, the resource-poor households remain engaged in agricultural activities, albeit some new ones, sell their labour to on-farm and off-farm activities, and educate their children locally. Some better-off households do remain engaged in on-farm activities, but they are more likely to be service providers. Increasingly, members of rural households out-migrate to work in towns or across borders, particularly to Thailand, and some send remittances home. These are mostly used for food and small assets (e.g., motorbikes and smartphones), with only a small proportion used to invest in agriculture or to accumulate wealth (Sunam, Barney, and McCarthy, 2021).

Investment in boom crops can generate many times more income than planting established (traditional) crops (Hall et al., 2011). For example, Lao banana farmers can earn 25% more from leasing their land for banana plantations than cultivating other crops (Manivong et al., 2016). Similarly, crops such as cassava and maize have created new livelihood opportunities for many smallholders in Laos as well as in Southeast Asia more widely (for maize: Kallio et al., 2019; for cassava: Newby et al., 2019; Smith et al., 2018a and Vongvisouk et al., 2016).

However, a common feature of boom crops is that they experience price fluctuations, sometimes so severe that they can ‘bust’. The falling prices of boom crops have destroyed the dreams of many farmers across Southeast Asia (Hall et al., 2011). In Laos, for example, many villagers invested in rubber plantations and benefited while the price was high, but when the price dropped significantly they encountered difficulties, and because most of their land had been converted to rubber they had few alternative production options, and were unable to quickly convert to other crops (Vongvisouk and Dwyer, 2017). Thus, the rubber boom in Laos is a mixed story. Many smallholders have benefited from rubber, but contract farming in Northern Laos and large-scale rubber concessions in Southern Laos have transformed local people’s livelihoods and their landscapes, to the extent that it is contradicting aspects of some Lao policies for enhancing land and food security; some people are poorer and have fewer livelihood options than they had before rubber arrived (Baird, 2010). Agrarian property and social relations of production have been dramatically transformed by rubber as “peasants entered an altered relation to the land as semi-proletarianized wage labourers” (Kenney-Lazar (2012), p. 1032). Baird (2011, p. 10) and Hirsch and Scurrah (2015, p. 15) describe how rubber booms in Laos were “turning land into capital” while “turning people into labour” – and while they report negative effects, these were precisely the outcome that some policies sought to achieve.

Other recent crop booms in Laos have also generated mixed outcomes. Banana production has increased incomes but villagers have also experienced problems with social, health and environmental issues, with many reports of waste run-off, agro-chemicals and rubbish polluting rivers, and conflicts between Chinese or Lao migrant workers and local residents (Finney and Avary, 2020; Friis et al., 2019; Goh and Marshall, 2017; Higashi, 2015; Inkey, 2019; Manivong et al., 2016). Households were concerned that serious cases of ill health could impact their longer-term earning and labour capacity, and exposure to chemicals used in banana production has been reported as having serious impacts on women's reproductive health (FAO, 2018a).

Broadly, rural households in Laos have followed similar livelihood pathways to households in other parts of Southeast Asia. They have adopted cash crops (Ellis, 1998; Rigg, Salamanca, and Parnwell, 2012) and have diversified their livelihood strategies with combinations of on-farm and off-farm activities. While most better-off households have shifted from on-farm to off-farm activities, they continue some subsistence crop production, particularly of rice – a strategy described as “keeping one foot in agriculture” by Pritchard et al. (2017, p. 52), who also describe the situation of rural households in India where one or more members of a household works in agriculture while others engage in non-farm activities as having “one foot sideways”. Similarly, Rigg (2020, p. 9) proposes that “Rural populations, it seems, are becoming semi-proletarianised as they engage with non-farm (e.g., factory) work while also keeping a familial foot on the land”; and McCarthy (2019, p. 4) likewise describes rural households in the outer islands of Indonesia as retaining “one foot in farming”. Kallio et al. (2019) observed this behaviour amongst maize farmers in Northern Laos, who never fully abandon rice cultivation even when maize prices peak. Similarly, while teak smallholders also diversify their livelihoods with tree crops, they maintain other agricultural crop production for both subsistence and market sales (Newby et al., 2012). Households are also seeking livelihood opportunities outside their communities and outside of Laos entirely, as the study by Barney (2012) shows, youth out-migration across the Lao–Thai Mekong border has become a significant factor in agrarian transformation in Laos. This is the process of ‘de-agrarianisation’ that has become the norm of many parts of Southeast Asia regions (ibid). Thus, while rural household livelihood strategies in Laos appear to be continuing on the trajectory of the last few decades in a transition from subsistence to market production, they are, as Rigg (2005, p. 39) describes, becoming “hybrid households and communities”. They are being reshaped by state policies for socio-economic development, access to land, opportunities presented by the promotion of foreign and domestic investment, and the influence of global market power (Castella et al., 2013; Hall, 2011a; Rigg et al., 2016).

Household differentiation

Agriculture development and market expansion typically facilitate some groups in a community to build their wealth, while others may fail to benefit from these opportunities, or become worse-off. Some households 'accumulate from below', viz. generating assets and investments from agricultural production and other local economic activities (Cousins, 2010), while others 'accumulate from above', generating their assets and investments through patronage and other means (Scoones, 2015). As accumulation occurs, so too does differentiation, creating winners and losers depending on a household's ability to extract surplus (Scoones, 2015); thus, "[w]inners and losers do not emerge naturally through the magic of the market, they are selected" (Fox and Castella, 2013, p. 167).

Laos' transition from a subsistence to market-oriented economy since the 1980s has achieved high economic growth rates and rising incomes (Rigg, 2018.), but also differentiation in rural households, where "the poor are those who are not effectively integrated into the market economy" (Bader et al. 2017, p. 2069).

While cash crop booms generally increase households' cash income, they may also lead to greater vulnerabilities as a consequence of several challenges, including price fluctuations and lack of capacity to afford farm input; ultimately, households may fall into debt (Ornetsmüller et al., 2019). This in turn leads to further household differentiation and inequality, as has become evident in the case of smallholder teak growing in Northern Laos, where teak plots are now mostly owned by wealthy households (Newby et al 2014).

Other cash crop booms in Laos, including maize (Kallio et al., 2019; Vongvisouk et al., 2016), rubber (Cramb et al., 2017; Manivong and Cramb, 2008), bananas (Friis and Nielsen, 2016), and cassava (Newby et al., 2019; Smith et al., 2018a), have stimulated small-scale entrepreneurship and socio-economic differentiation; some groups become better-off, while others 'tread water', and others become worse-off, including losing their land. In general, differentiation emerges "not only along the axis of class but also of gender, age and ethnicity"; each of these dimensions influences changes in people's livelihood over time (Scoones, 2015, p. 79). For example, the introduction of rubber concession in Southern Laos has contributed to increasing poverty among poor households, especially in ethnic minority groups living in upland areas (Baird, 2011).

Looking more broadly at livelihood transitions from subsistence to market-oriented, Bernstein (2002) argued that the long-term outcome of agriculture commercialization is the polarization

of the countryside between capitalist farmers and landless labourers. This has happened in some cases in Laos, where the resettlement programs of the Lao Government that moved people from remote upland areas to lowland areas has often harmed some households (Rigg, 2018); this is because they have insufficient land for subsistence and become indebted, and so need to engage in non-farm labouring to meet their basic needs.

2.3 Farmer adoption decision-making

Farmers are not simply passive bystanders in the process of rural transformation. They proactively make decisions, and many scholars and development practitioners have explored the reasons behind farmers' decision-making in adopting agricultural innovation and changing production systems (Hermans et al., 2021; Mzoughi, 2011; Ornetsmüller, Castella, and Verburg, 2018; Rose and Morris, 2018). There is a broad range of literature addressing theories and definitions of adoption decision-making. Adoption can be defined as "the degree of use of new technology in long-run equilibrium when the farmer has full information about the new technology and its potential" (Feder, Just, and Zilberman, 1985, p. 256); or "as the integration of new technology into existing practice and it is usually preceded by a period of 'trying' and some degree of adaptation" Loevinsohn (2013, p. 3). There has also been a long-standing interest and research in farmer decision-making processes. The theory of *the expected utility* of Daniel Bernoulli (Schoemaker, 1982 cited in Meijer et al., 2015), for example, describes decision-making around 'risky' and 'uncertain' choices as a result of the comparison of the expected utility values of outcomes to maximise profit. Rogers (1995) theory of *diffusion of innovation* refers to the process of members of communities receiving information and adopting innovation over time, while Ajzen (1991) explored the relationship between human attitudes and their underlying beliefs, so-called theories of *reasoned action* and *planned behaviour*.

Farmer decision-making is dynamic, multidimensional and contextual (Hermans et al., 2021). To understand the complexities of farmer decision-making, researchers have developed various approaches for identifying and defining the factors that influence this, with some classifying them as 'external' and 'internal' (Kong et al., 2021; Meijer et al., 2015; Versteeg et al., 2017) and others exploring an more diverse and integrated range of perspectives and factors (Cramb et al., 2017; Pannell et al., 2006). Meijer et al. (2015), for example, classify influencing variable as *extrinsic* and *intrinsic*. The extrinsic variables are: (a) characteristics of the farmer (e.g., personal characteristics, socio-economic, personality, social networks, status and familiarity with technology); (b) market expansion; and (c) government policies. The intrinsic variables are knowledge, perceptions and attitudes. They also identify intervening

variables such as communication and extension. The framework of Pannell et al. (2006) illustrates that farmers have various goals for their farming systems which depend on individual circumstances and personal preferences, and may include economic, social and environmental outcomes, which influence decision-making processes.

A number of studies have explored the factors that influence and are in turn influenced by crop boom–bust cycles, and how these cycles have structured farmer livelihoods and reshaped agrarian societies, including in the Mekong Region (Friis et al., 2019; Hall, 2011a; Kong et al., 2021). Market factors, particularly price, play a significant role in farmers' crop adoption decisions, as Hall (2011a) points out in the context of the crop booms in Southeast Asia; but uncertain market prospects may also discourage farmers from continuing to investment in crops, particularly those with a long return time such as teak (Smith et al., 2017c), eucalypt and acacia (Xu, 2019), unless other factors are influential. Cramb et al. (2017) investigated the reasons that households in Sarawak, Malaysia decided to participate in smallholder oil palm plantations, and found that this was primarily due to governments, plantation companies, traders or farmer organisations providing them inputs (credit, seedlings and fertiliser). Alexander et al. (2018) reported that rice farmers in Southern Laos make decisions about adopting a development project-promoted rice cultivation technology based on their farm characteristics and their goal of profit maximisation.

Similarly, the life cycle of the household and its members also plays an important part in farmer decision-making, because households comprise members of different ages, which in turn influences the area of land which can be farmed and the nature of agricultural activities (Perz and Walker, 2002); and because the household operates as a nexus of social relations and activities (Rigg et al., 2020). For example, in rice farming in Thailand, Rigg et al. (2020, p. 320) emphasised that “the ageing farming heads of household often drew on the labour of children and grandchildren, and decision-making on the farm was rarely linked to a single decision-maker”. The household life cycle also influences households' decision-making in relation to investments. For example, one of the reasons the smallholders in Northern Laos adopted teak was to have a ‘green bank’ when they retire (Anttila, 2016); in contrast, younger households tend to invest in activities with faster returns (Perz and Walker, 2002), such as rubber (Smith et al. 2020).

In addition, several studies in Northern Laos have found that policies and extension influence farmer's decisions to plant teak (Newby et al., 2014; Smith et al., 2017b); but that farmers

remain unwilling to adopt new management practices by thinning out some trees, even through this would produce higher-quality timber (Pachas et al., 2019).

Gender in Lao agriculture

The Lao Constitution confers equal socio-economic and political rights on women and men, and Laos' Family Law states that men and women have equal rights in all aspects (GOL, 1990). However, men and women typically have different roles and responsibilities in the household (Ducourtieux et al., 2005.); and gendered roles in rural Laos are similar to those elsewhere in Southeast Asia (Akter et al., 2017), with women playing an essential role and contributing to every part of agricultural production (FAO, 2018a). In Laos, labour allocation between men and women in agricultural household varies with ethnic groups, socio-cultural norms, geographic location and resources (FAO, 2018a). Women are mainly responsible for taking care of the family and contributing labour in agriculture; men are responsible for heavy work in livelihood activities. Generally, women's work is considered 'lighter' and men's as 'heavier' (FAO, 2018a, p. 19) – nothing that 'light' work may still be physically arduous.

The roles of women and men in agricultural households in Laos may also be differentiated in other respects. The head of the household is typically a man, who may also be the critical agricultural production decision-maker. Particularly ethnic minority groups, women tend to have less power in negotiations than men (FAO, 2018). Women's roles are still considered secondary and subordinate to those of men (Douangphachanh et al., 2021), and men continue to earn more status from farming and hence assign greater intrinsic value to traditional farming practices (Moglia et al., 2020). Nevertheless, a number of studies report that household decision making in Laos is usually discussed between the couple and is generally considered a 'joint' decision (FAO, 2018a; Ornetsmüller et al., 2018; Weeratunge et al., 2016).

2.4 Research framework

In this research, I draw on a number of different frameworks and adapt these during the stages of research design and fieldwork. I describe each below.

Sustainable Livelihoods Framework

Scoones (2015, p. 34) described how "livelihoods are complex, multidimensional, temporally and spatially varied and socially differentiated [and] they are affected by multiple factors". The Sustainable Livelihoods Framework (SLF) offers a means to understand farmers' livelihood strategies in the context of crop booms. The SLF is a tool to improve our understanding of

livelihoods, particularly the livelihoods of the poor (DfID, 1999); it is relevant in this study because the Lao Government's policies aim to achieve poverty alleviation through agricultural development. The SLF identifies five core asset categories of capital on which livelihoods are built (Figure 2.4).

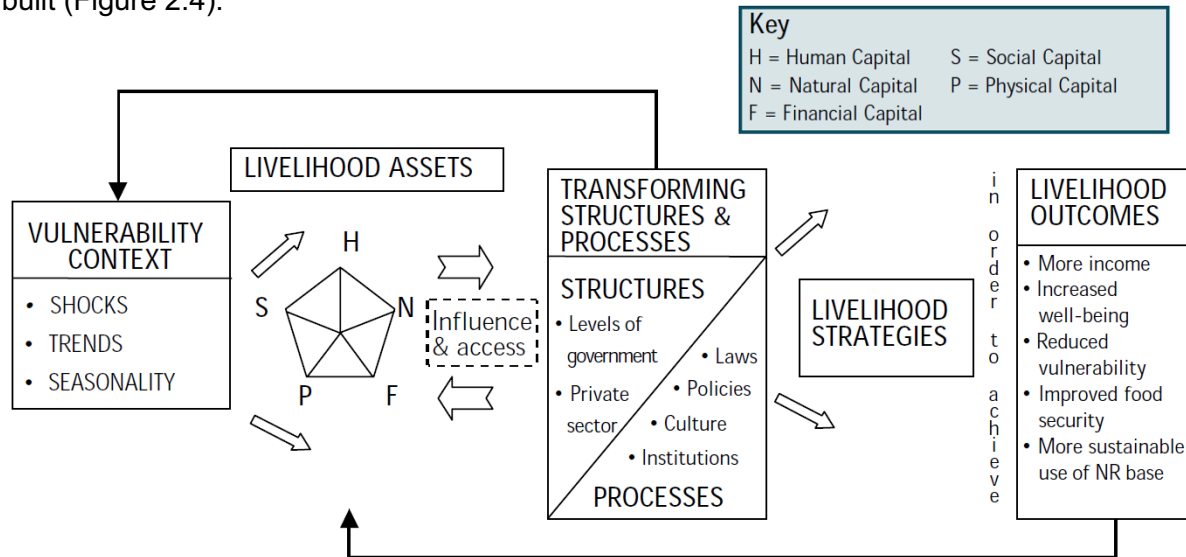


Figure 2.4: Sustainable Livelihood Framework (SLF) (DfID, 1999)

The asset pentagon, comprising physical, human, social, natural and financial capital, lies at the core of the SLF. Each of these capitals is defined below, following and paraphrased from DfID (1999):

- Physical capital comprises the basic infrastructure and producer goods needed to support livelihoods. The physical assets can generate multiple benefits.
- Human capital refers to the skills, knowledge, ability to labour and good health which enable people to pursue different livelihood strategies and achieve their livelihood objectives. In some cases, people with ill-health or lack of education encounter poverty, and thus overcoming these conditions may be one of their primary livelihood objectives.
- Social capital describes the social resources upon which people draw in pursuit of their livelihood objectives. These developed through networks and connectedness, either vertical (patron/clients) or horizontal (between individuals with shared interests), memberships of more formalised groups, and relationships of trust and exchange that facilitate co-operation. However, social capital can be used in negative ways: people excluded from powerful groups (e.g. landless women with few skills), and networks

may be based upon strictly hierarchical relationships that limit mobility and prevents people from escaping from poverty (DfID, 1999).

- Natural capital describes the natural resource stocks (e.g., forests, land, clean air, fisheries, water, coastal resources) upon which people rely. The SLF focus on people acknowledges the importance of the structures and processes of land allocation systems in determining how natural capital is used and the value it creates.
- Financial capital is the financial resources, including cash, bank savings, jewellery, access loans, wages, and remittances that people use to support their livelihood objectives.

These capitals are interconnected - for example, if farmers have secure access to land (natural capital), they may also benefit from access to financial capital in the form of direct and indirect productive activities. For example, households may plant teak or rent their land to others for banana plantations (DfID, 1999, Newby et al., 2012, Satomi, 2015). Similarly, in many rural areas, livestock may generate social capital for the owner while at the same time being used as productive physical capital. For example, where cows and buffalos are used as animal tractors, and livestock remains as natural capital in itself and livestock is considered as household savings, which can be defined as financial capital.

The SLF also incorporates a vulnerability context that frames the external environment in which people live, because people's livelihoods and the broader availability of assets are fundamentally affected by critical trends, shocks and stresses. Critical trends may include population and migration, resource conflict, national and international economic forces, politics and policies, and technologies. Shocks include human shocks (e.g. illness and accidents), natural shocks (e.g. floods, droughts and earthquake), economic shocks (prices change, boom and bust cycle and job losses), conflict (e.g. war and violent), and crop and livestock health shocks (e.g. diseases and viruses) (DfID, 1999). Stresses include natural resource degradation, loss of agriculture production, urbanisation, demographic changes, climate change, political instability and economic decline (DfID, 2011).

The SLF also seeks to recognise that people follow livelihood strategies to achieve their goals, recognising that this is a dynamic process over time, and one in which people combine activities to meet their needs (DfID, 1999). Many authors have argued that resilient livelihood strategies should seek to promote choice, opportunity and diversity (Alexander et al., 2009, Martin and Lorenzen, 2016, Tran and James, 2017, Bhandari, 2013). For example, farmers in

Laos adopted boom crops such as banana, rubber and teak because diversifying their farming activities, and deriving more incomes from a wider range of sources, was consistent with their livelihood strategies (Newby et al., 2014, Manivong et al., 2016). In the SLF context, how these goals are achieved is represented in terms of livelihood outcomes, which are the achievements or outputs of livelihood strategies. Livelihood outcomes are important because they help to understand the outputs of the current configuration of factors within the livelihood framework.

One of the challenges of using the SLF is that the five asset “capitals are neither comparable nor easily measurable” (Scoones, 2015, p. 39). Therefore, I used the SLF concept as a guiding conceptual framework through which to interpret households’ participation and livelihood outcomes associated with crop booms (Figure 2.3). I focused primarily on three livelihood assets as indicators of livelihood outcomes: financial capital (household annual net income), natural capital (household land ownership), and physical capital (house condition, transportation and livestock). I did not focus in detail on human or social capital, as these are not easily measurable (Scoones, 2015, p. 39).

Integration of related frameworks

De Vos et al. (2021, p. 48) explain that “there is no single path, ... researchers may rely on multiple methods, theories and frameworks, combined and integrated in different ways”. This applied to my research where I adapted my research framework (Figure 2.5) from those proposed by other researchers working on related topics (Cramb et al., 2017; McCarthy and Obidzinski, 2017; Meijer et al., 2015; Pannell et al., 2006; Rigg, 2020; Scoones, 1998; Versteeg et al., 2017).

The framework that emerged for my research is shown in Figure 2.5. Based on the literature above, I classified the factors that influenced crop booms and household decision-making into three levels:

- Factors external to village: market and policy contexts, and crop characteristics.
- Factors within village: village characteristics, peer effects and opinion leaders.
- Factors within households: household characteristics, knowledge and livelihood strategies.

The first of these factors informs Research Question 1:

- What factors influence the Northern Lao crop booms?

Elements of all factors inform Research Question 2:

- How and why do rural households participate in the teak, banana or cassava booms?

The Sustainable Livelihoods Framework (Scoones, 1998; Scoones, 2015; Serrat, 2017) was the basis of informing Research Question 3:

- What are the livelihood outcomes of households' participation in the booms?

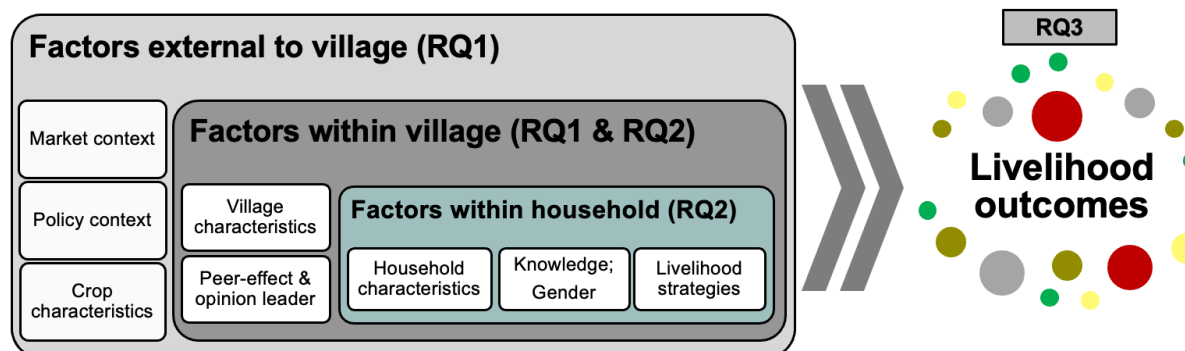


Figure 2.5: Factors that influence farmers' decision-making about boom crops

Source: Adapted from Cramb et al. (2017); McCarthy and Obidzinski (2017); Meijer et al. (2015); Pannell et al. (2006); Rigg (2020); Scoones (1998); Versteeg et al. (2017)

2.5 Research approach

The methodological approach adopted in this research is that of qualitative case study. A qualitative case study approach uses a variety of data sources to facilitate exploration of a phenomenon within its context (Baxter and Jack, 2008). It is “a strategy for doing research which involves an empirical investigation of a particular contemporary phenomenon within its real life context using multiple sources of evidence” (Robson, 1993, p. 150). According to Baxter and Jack (2008, p. 545; citing Yin, 2003) “a case study design should be considered when: (a) the focus of the study is to answer “how” and “why” questions; (b) you cannot manipulate the behaviour of those involved in the study; (c) you want to cover contextual conditions because you believe they are relevant to the phenomenon under study; or (d) the boundaries are not clear between the phenomenon and context”.

A multiple case study approach is used in this research because it enables the researcher to explore differences within and between cases and allows comparisons of these (Yin, 2003). Similarly, George and Bennett (2005, p. 83) described that multiple case studies “allow for several different types of comparisons ... [o]ne case may be most similar to another and both may be least similar to a third case” (p. 83). Also, a multiple case study examines several cases “to understand the similarities and differences between the cases” (Baxter and Jack, 2008, p. 550). Therefore, in the research for this thesis, three case studies were identified in the uplands of Northern Laos, which is the focal region. Of northern Laos's seven provinces,

the three selected provinces (Luang Prabang, Oudomxay and Xayabouly) share a border with neighbouring countries (China, Thailand, and Vietnam); these countries are key investors and export destinations for smallholder boom crops (Grimsditch, 2017).

Table 2.1: Selected case study areas and their crop characteristics

	Teak	Banana	Cassava
Province	Luang Prabang	Oudomxay	Xayabouly
District	Xieng Nguen; Ngoi	Houn; Namo	Paklai; Kenthao
Crop characteristics	A long-term wood crop: >15-year cycle	A medium-term food crop: 5-year contract	An annual flex crop
Farming system	Independent smallholder	Land lease to investor	Independent smallholder
No. selected villages	2	2	2
No. of households interviewed	62	62	62
Dates of fieldwork	June–Sep 2018	Jan–May 2019	Feb–April 2019

In each of the three case studies, I focused on the household as the unit of analysis for decision-making and livelihood outcomes. In many developing countries, the decision-making process on economic matters is less of a question for individual household members, but it is a process where household members negotiate on a joint strategy (Agergaard, 1999). Households are defined as “identifiable groupings based on some form of kinship relations within which people live” (Agergaard, 1999, p. 101), with joint ownership, production, consumption and reproduction (Crehan, 1992). A household can also be defined as a unit consisting of one or more persons who use joint accommodation and food (Rigg, 2020). Definitions of households vary because households do so many different things (Wood, 2020). Nevertheless, households are accepted as important units of analysis in several distinct fields of research, e.g., demographic, economic, social, cultural and nutritional research (Wood, 2020).

This research applied “mixed methods” (Shackleton et al., 2021, p. 109), emphasising qualitative approaches but also drawing on quantitative methods, to understand complex and dynamic situations of households’ participation in crop booms in the in the case study villages. For example, “how do people use resources for livelihoods?” (Creswell and Clark, 2011, p. 109-110). I selected six villages in total (two villages per crop, see Table 2.1) with consideration of the following criteria:

- level of uptake of the focal boom crop (at least 25% of the farming population)
- household wealth (poor, lower, middle and upper categories; see Appendices 2.1, 2.2 and 2.3)
- village population size (small to moderate)
- distance to border with neighbouring country (nearby to distant)
- infrastructure to support market chain (little to advanced), and
- willingness to participate in the research (based on advice from local government officers and other informants).

Wealth class is often used in research in Laos (Martin and Lorenzen, 2016; Tran and James, 2017) and elsewhere (Scoones, 2015), as a proxy for a range of household characteristics. Wealth ranking is a “sophisticated field-based approach”, developed as “a simple way to generate discussion about differential patterns of wealth in a community (Scoones, 2015, p. 27). I used a wealth ranking approach as the basis for sampling households, and to understand how household participation in crop booms and associated livelihood outcomes related to wealth. I used the Focus Group Discussions (described below) in each case study village to explore local understandings of wealth and wealth classification. Participants in these discussions defined wealth mainly in terms of material assets such as income, land ownership, house condition, and goods such as tractors or motorbikes.

2.5.1 Research methods

Village selection

I identified the potential villages based on discussions and consultations with government and other stakeholders such as Luang Prabang Teak Program (LPTP) and the Australian Centre for International Agricultural Research (ACIAR) project, the International Centre for Tropical Agriculture (CIAT) for cassava, and consultation with the Mekong Watch Organisation regarding banana plantations. The details are presented in each of Chapters 3, 4 and 5.

Document review

Prior to primary data collection, and subsequently as necessary, I reviewed and analysed policy documents relevant to boom crops at the different levels of government: central, provincial and district. I accessed these documents online and through the Lao Government offices. These documents include land use policy, Five-Year National Socio-Economic Development Plans (NSEDPP), related laws and regulations (e.g., Investment Promotion Law, Labour Law and Land Law) and moratoriums on export crops and logs, and banana expansion and Agriculture Development Strategy and Vision. Furthermore, I also reviewed the documents related to market trends and secondary data on household or community

characteristics. These document reviews strengthened my understanding of the policy context of farmers' adoption, decision-making and of drivers facilitating the boom crops.

Fieldwork: case study villages

I conducted fieldwork in 2018 and 2019 (teak in June–Sep 2018, banana in Jan–May 2019, and cassava in Feb–April 2019). In each village, my field research started with a transect walk to observe the village landscape. This was followed by semi-structured interviews with farmers and other key actors and focus group discussions. I describe each below. The overall guide to fieldwork is presented as Appendix 3.

Transect walk to observe the village landscape

Starting the study by observing the village landscapes helped me understand the biophysical environment and the diversity of agricultural uses. The transect walk was conducted with the assistance of local villagers, and provided basic background information for interviewing farmers and conducting focus group discussions. Such observation is necessary in order to understand how the environment is used and transformed by local societies (Barral et al., 2012). The aim of the village landscape observation was to describe the farmers' biophysical environment, identify the units that make up the landscape, and describe the way in which farmers manage their land resources for agriculture activities.

In-depth semi-structured interviews

In-depth interviews provide qualitative data through extensive individual interviews which can be structured with a set of questions, or semi-structured with guiding questions, or unstructured (Shackleton et al., 2021). This study was based on in-depth semi-structured interviews with guiding questions, with a sample of smallholder households (men and women from the household together, depending on their availability) to:

- explore the drivers influencing their decision-making to adopt or not adopt a boom crop
- identify their perception of the associated risks and rewards at the time of their decision
- understand how those risks and rewards were bore out in practice following adoption or non-adoption, and
- how their livelihoods have changed over time.

This research gives particular attention to identifying the sources of information and advice that influenced household decision-making processes, as well as determining the extent to which farmers' *ex-ante* perceptions differ markedly from those *ex-post* (respectively, prior to and following adoption or non-adoption). This research also investigates the perspectives of

other key actors, including government policymakers and extension officers, those in respective market chains, and other researchers. Throughout the research period, I met with and attended meetings of relevant local and research organisations (Australian Centre for International Agricultural Research (ACIAR),), International Center for Tropical Agriculture (CIAT), Luang Prabang Teak Program (LPTP), Lao National Agriculture and Forestry Research Institute (NAFRI), National University of Laos (NUoL), and Provincial and District Office of Agriculture and Forestry (PAFO and DAFO)) that dealt with relevant policies and activities, and their implementation. The guides for these interviews are presented in Appendices 4, 5 and 6.

In addition, living in the village provided the opportunity to conduct an informal semi-structured interview several times by interacting with households, and/or participating in their various agriculture activities. This helped to enrich my understanding of household decision-making and their everyday livelihood dynamic and strategies. Conversations and informal interviews are opportunities to gather data and insights from stakeholders, and everyday conversations can build trust and participants might feel more comfortable and willing to share valuable data (Shackleton et al., 2021).

Focus group discussion

Focus Group Discussion (FGD) provides a way to collect information from a small group facilitated by the researcher; it is often combined with participatory approach (Shackleton et al., 2021). FGD is frequently used as a qualitative approach to gain an in-depth understanding of social issues and the link between people's perception and their livelihood situations, which is critical to decision-making in adopting particular techniques (O.Nyumba et al., 2018). It also helped me understand households' perceptions, which is relevant to establishing how and why households respond to boom crops.

In the focus group discussion, I used participatory mapping, "a map-making process that attempts to make visible the association between and local communities by using the commonly understood and recognised language of cartography" (Corbett, 2009, p. 6), to engage with households and to understand community history and dynamics, the land uses and village layout and infrastructure (e.g., roads, rivers, location of temple, school, market, residential areas and village hall) of the case study villages. The FGDs also helped me to identify criteria to classify the household wealth categories (poor, lower, middle and upper), as used in other studies (Martin and Lorenzen, 2016; Tran and James, 2017). The guide for FGDs is presented as Appendix 7.

Data recording and analysis

Data collection in the field was conducted mainly in the Lao language. However, in my teak case study (Village 2), I had a Khmu-speaking assistant helping me interpret some parts of the interviews with two Khmu households. Household semi-structured interviews were written on A0 paper during the interview, so households were able to see what wrote. I found that households were more likely to engage in discussions if they could see that what they said was written down. I then transcribed and translated the interviews into English in Excel spreadsheet files.

Wealth classification

The concept of wealth classification has been used in other studies in Laos (Martin and Lorenzen, 2016; Newby et al., 2014; Tran and James, 2017; Van Der Meer Simo et al., 2019). In this research, wealth classification is used similarly, as a means of sampling across the range of wealth found in a community and to explore whether household livelihood outcomes are associated with wealth, as discussed in 2.1. The process that I followed in investigating wealth class in each case study village is described below:

- The concept of wealth classification was first discussed in each of the men's and women's FGD, to help me understand how local households defined wealth in their communities. These discussions revealed that wealth is defined by livelihood assets, principally income, housing condition, vehicle and livestock and land ownership, and household occupation;
- After completing the FGDs, I discussed wealth classification with the Village Committee, explaining and summarising what I found from the FGDs. I asked the committee to provide me with a list of potential households in each category, based on perceived wealth class and their participation or non-participation in the boom crop;
- Once I received the initial list of potential households, I began the interviews with a few households based on the list, then I applied a snowball technique by asking the interviewees if they know other households who had a similar form of participation in the crop boom and a similar set of assets. I completed my survey in each village on this basis; overall, 41% of my interviewees were those nominated by the Village Committee, and 59% were those identified by snowball sampling (Table 2.2);

- Household interviews were conducted with either couples jointly (48%), or with only one member of the couple (women, 30%; men, 23%). Participation depended on household members' availability and circumstances (e.g. in some families, one of the couple was absent from the village or had died).

Table 2.2: Origin of households sampled (Village Committee list or snowball) and the number of household interviews with couples or spouses individually

Samples	Household list from the Village Committee			Snowball Sampling			Total
	Couple	Husband	Wife	Couple	Husband	Wife	
Teak							
V1	9	5	3	10	4	1	32
V2	9	4	1	9	5	2	30
Banana							
V1	5	6	1	9	5	5	31
V2	3	0	7	12	2	7	31
Cassava							
V1	4	2	5	9	3	8	31
V2	3	5	5	7	1	10	31
Sub-total		77			109		
Total							186

After I had completed my fieldwork, I assigned households to wealth classes as the first step of data analysis. I classified household wealth into four categories (upper, middle, lower and poor) by using a scoring system to combine related variables representing households' livelihood assets, based on those identified in the FGDs: 'physical capital' - house condition, and transportation and livestock assets; 'financial capital' - household annual net income; and 'natural capital' - household land ownership. Each of these assets was given a score on a scale applying to that village. I did not include households' occupation in the wealth classification as human or social capital is not easily measurable (Scoones, 2015).

The banana case study was the first I analysed; I used a 7 point scale (the highest score is 7 and the lowest is 1), other than for transportation (5 point scale). On the basis of experience with analysis of this case study, I adjusted the scoring system for all variables in the teak and cassava case studies to a 5 point scale (see Appendices 2.1, 2.2 and 2.3). After assigning the score for each class of assets, I then classified individual household's wealth class based on the average score of the three asset classes.

I then compared the wealth classification from my analysis with that originally suggested by the Village Committee. Classifications differed in around 10% of cases. For these cases, I

discussed the classification with the Village Committees in phone calls and assigned the wealth classes for those households based on that triangulation.

Resulting themes and quotations

The categories of the results were based on the major themes that emerged from interviews and discussion e.g., the coding of reasons for adopting/non-adopting cash crops. I drew from my field notes and annotated notes to identify the quotes presented in the results chapters.

Quotations are commonly used in qualitative studies (Eldh et al., 2020), and the quotations bring content to life (White et al., 2014). Thus, in my research, I used quotations from the interviews with households and key informants for this purpose. In each case study, the quotations were coded by village, household sequential number, the household wealth categories, and the interview date. For example, '*V1-20, Middle wealth category, July 2018*' where V1-20 is the Village No.1 and survey household No. 20.

The analysis of household livelihood outcomes for each boom crop is presented in the individual chapters (Chapter 3, 4 and 5).

2.6 Conduct of case studies

The case studies were conducted in sequence (Table 2.1), with the first (teak) consciously as a pilot. After the teak fieldwork, I returned to ANU, analysed my results, and reflected on the focus and conduct of the fieldwork. As a result, the fieldwork for the banana and cassava case studies focused more on exploring livelihood outcomes than was the case for teak, where I had focused on livelihood strategies. The results of each case study are described in the following three chapters.

3 Rural households' decision-making about growing teak in Luang Prabang Province, Northern Laos

3.1 Introduction

Teak (*Tectona grandis*) is an important, commercially valuable tropical hardwood that commands a high price internationally. Its timber is durable, strong, beautiful and easy to work and is commonly used to produce furniture, housing materials, crafts, ships and many other products. Its natural distribution is in seasonally-dry areas of India, Myanmar, Thailand and Laos (Midgley et al., 2015; Roshetko et al., 2013) and its ecological distribution covers the semi-arid to moist lowland below 1,000 metres above sea level (Hansen et al., 1997). The demand for teak has been high for centuries and as a result it has also been grown in plantations, beginning in India in the 1840s, in Myanmar in 1856 and Indonesia in 1880 (Pandey and Brown, 2000). In Laos, the first recorded teak plantations were in 1942 (Midgley et al., 2007) and more recently – as elsewhere in Africa, the Americas and Asia – teak growing has been adopted by smallholder farmers in Laos, in both farm-scale monoculture plantations and in agroforestry systems (Midgley et al., 2007; Roshetko et al., 2013).

Teak is well suited to the environmental conditions in Northern Laos (Hansen et al., 1997). The history of teak planting in Laos can be divided into three main periods: the years before independence in 1975, those between 1976–1988 when a centrally planned economy was adopted and the government took ownership of all land, and from 1988 when the economic liberalisation took effect (Hansen et al., 1997, p. 3). The first farmer-owned teak plantations in Northern Laos were established around 1950, in a few areas along the Mekong River around Luang Prabang city. Villages along rivers were targeted by the Lao Government because these were permanent settlements of mostly Lao-Tai⁴ (a main ethnic group in Laos) and receptive to teak adoption; later, teak was adopted by non Lao-Tai, particularly the Khmu ethnic group (Hansen et al., 1997).

Following independence, from the early 1980s, teak was promoted by the government and prioritised by the ministerial and provincial authorities as part of the development strategy for Northern Laos (Hansen et al., 1997) and after the First Forestry Conference in 1989 which committed to restore forest cover from 47% to 70%, including through tree plantation establishment by industrial enterprises or households (Silviconsult, 1990). Hansen et al. (1997) suggested that the rapid expansion of teak in the Northern Laos, particularly in Luang

⁴ There are 49 ethnic groups in Laos. The main groups are Lao, Khmu and Hmong.

Prabang Province, was facilitated by political and socio-economic changes, particularly the depletion of wood supply from natural forests which were an important source of government revenue (Phimmavong et al., 2009), land tenure reforms including LFAPs that allocated land for planting trees for timber or fruit, and agricultural extension including the provision of seedlings and training.

The area of teak in Laos is unclear, although different attempts have been made to estimate it. Estimates are challenging due to the continual process of planting and harvesting, and the scattered nature of many small plots, which are often 1 hectare or less. According to FAO (2001), the total area of teak planted in Laos in 2000 was 14,000 ha. Midgley et al. (2007) subsequently reported a similar estimate of 15,000 ha, and a much greater area of up to 40,000 ha in 2015 (Midgley et al., 2015). The Department of Forestry (DOF) reported almost 50,000 ha nationwide in 2019 (DOF unpublished data). In Luang Prabang Province, the main teak-growing Province, the estimated area in 2007 was 12,000 ha (Midgley et al., 2007), 20,000 ha in 2014 (Dieters et al., 2014) and 26,000 ha in 2015 (Midgley et al., 2015). In 2016, 15,342 ha was mapped in by an ACIAR project using high resolution satellite imagery (Boer and Seneanachack, 2016); this was updated in 2018 with a mapped area of 18,200 ha (Boer, 2019).

Teak plantations have been identified by government and researchers as a potentially valuable component of upland farming systems in Northern Laos. Teak growing can help households move from a subsistence swidden system to a more commercial agricultural system, often practicing both as “hybrid households” (Rigg et al., 2020), and allowing them to transition out of poverty (Newby et al., 2014). As households gained private access to land, became self-sufficient in rice production and gained income from off-farm employment, they were able to invest in teak and other tree-growing activities (Arvola et al., 2018; Dieters et al., 2014; Newby et al., 2012), as a long-term security ‘green bank’ strategy for livelihood (Anttila, 2016, p. 7). Similar research on households’ participation, adoption decision-making and the contribution of teak to households’ livelihoods has been completed in other countries, including Indonesia (Kallio, Kanninen, and Krisnawati, 2012; Roshetko and Perdana, 2017; Roshetko et al., 2013), Vietnam (Sikor and Baggio, 2014), the Solomon Islands (Versteeg et al., 2017), and Ghana (Djagbletey and Adu-Bredu, 2007). A number of studies have also advanced our understanding of teak plantations and their role in livelihoods and the forest transition in Laos (e.g. Ling et al., 2018; Newby et al., 2014; Newby et al., 2012; Smith et al., 2017c).

Research on the factors that influence farmers' decision-making about planting teak found that this was influenced by government policy on land and forest allocation, emerging teak markets, the decline of natural wood and restriction to access natural forest, and that farmers use teak plantations as collateral to obtain credit (Arvola, Anttila, and Hogarth, 2018; Hansen et al., 1997; Newby et al., 2012). Newby et al. (2014, p. 44) observed that "teak planting has been more extensive among households with a long history of settlement, where the household head is older and better educated, where household members have off-farm sources of income, and where the household has access to paddy land and it thus more likely to be self-sufficient in rice".

Land use and agricultural development in Northern Laos continue to undergo significant change, with high levels of international investment in export crops (Ducourtieux et al., 2005; Vongvisouk et al., 2016), and associated crop booms (Friis and Nielsen, 2016). These changes are likely to impact on farmers' decisions on long-term crops like teak. This research adds to the existing body of literature to investigate the reasons for household adoption of teak in contemporary Northern Laos and explore this in the context of crop booms. It draws on field research in two case study villages in Luang Prabang Province to explore the following research questions: How and why do rural households decide to plant teak for the first time, not planting and withdrawing? To begin, the paper provides an overview of a household adoption decision-making framework; it then describes the study area, case study villages and the research methods. I present my findings from the research and discuss in the context of contemporary rural Laos. I conclude by providing suggestions for improving policies for sustainable smallholder tree growing in Laos.

3.2 Household adoption decision-making

In the Global South over the past few decades, agricultural systems have steadily transitioned from subsistence to more commercialised and intensified systems. Scholars and development practitioners have explored the reasons behind farmers' decisions to adopt new crops and technologies, and to innovate in ways that have enabled this transition. Adoption is defined in different ways by various authors. For example, Feder et al. (1985, p. 256) define adoption as "the degree of use of a new technology in long-run equilibrium when the farmer has full information about the new technology and its potential". Loevinsohn et al. (2013, p. 3) define it as "the integration of a new technology into existing practice; usually preceded by a period of 'trying' and some degree of adaptation". Pannell et al. (2006) discuss how the adoption decisions of farmers depend on their expectations of what will allow them to better achieve their goals. Individual farmer's goals might be different, depending on their situation and

personal preferences, and may include economic, social and environmental circumstances and outcomes (ibid). In addition, knowledge, attitudes and perceptions in relation to the benefits and challenges of agricultural technologies play key roles in farmers' adoption decisions (Meijer et al., 2015). In Northern Laos, there has been some research into adoption of crops by farmers, for example, (Lestrelin et al., 2012b) explored farmers' decisions to adopt maize through a direct seeding mulch-based cropping system following soil degradation and with extension support and (Junquera et al., 2020) examined rubber farmers' decisions to plant rubber, noting the influence of relatives and peers. Their research focused on the farmer as the unit of decision-making, through which primary control over a crop or plot of land was based on the decision of an individual.

No single theory for analysing decision-making can provide a full picture of the adoption process (Meijer et al., 2015). In rural Laos, decisions are also made by the *household*, defined as a social unit consisting one or more family members with joint accommodation and food (Rigg, 2020). Households' decisions about whether to adopt technology and innovate are also complex and influenced by multiple factors, and there is little detailed research on household decision-making associated with growing teak in Laos. Understanding how households make decisions on the use of their land is useful for developing agricultural and land use policy and for and for understanding crop market chains (Junquera et al., 2020; Ornetsmüller et al., 2018; Roberts, 2011), in this case, for teak.

This study focuses on decision-making in relation to planting and continuing to grow teak, using the household as the main unit of analysis. It draws on models developed and discussed by Meijer et al. (2015), Pannell et al. (2006) and Versteeg et al. (2017) who commonly identify factors external and internal to the household, which they characterise in broadly similar (but not identical) terms. Figure 3.1 presents the model that best represents the factors relevant to this case study, following that presented by Versteeg et al. (2017) for their study of teak growers in the Solomon Islands, and also drawing from Meijer et al. (2015) and Pannell et al. (2006).

This model identifies three levels of factors relevant to household decision-making:

1. Factors operating external to the village: government policies, agricultural extension, markets and infrastructure, and crop characteristics.
2. Factors operating within the village: village characteristics, peer-effect and opinion leaders, and market chain networks.

3. Factors operating within the household: household characteristics, knowledge of tree planting, attitude to a long-term investment, secure land tenure, and livelihood strategies.

In practice, as discussed below, these levels interact.

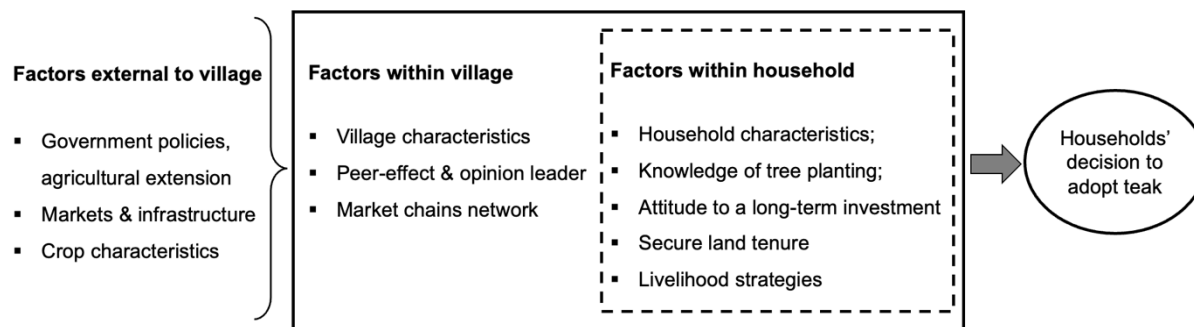


Figure 3.1: Factors that influence farmers' decision-making.

Source: Adapted from Versteeg et al. (2017), Meijer et al. (2015) and Pannell et al. (2006)

In addition, the Sustainable Livelihoods Framework described in Chapter 2 was used to help understand factors that influence farmers' decision-making. For example, the 'peer-effect and opinion leader' and 'market chain network' are considered as social capital in the SLF. However, I did not seek to analyse social capital more fully. To have done so would have required lengthier anthropological or ethnographic fieldwork, which was outside the scope of and time available for my fieldwork. Other researchers have applied these approaches in studies of rural communities in Laos (see Barney, 2009, High, 2014 and Kenney-Lazar, 2020).

3.2.1 Factors external to the village

A number of external factors can drive crop booms and adoption. The major factors are growing demand from commodity markets, and rapid increases in prices (Kenney-Lazar et al., 2018); improved seed varieties and technologies, and access to knowledge and information and biological or ecological crop characteristics (Hall, 2011a); and direct and indirect support from government policies (Hall, 2011a; Kenney-Lazar et al., 2018; Manivong et al., 2016; Nevins and Peluso, 2008; Newby et al., 2012; Vongvisouk et al., 2016). This section focuses on three main external factors driving the adoption and boom of teak in Northern Laos, focusing on Luang Prabang Province: policies, markets, and crop characteristics.

Government policies

A series of national policies related to forest, land and economic development have influenced teak planting in Laos. In the 1980s, the National Socio-Economic Development Plans, broader land use policies, and the National Forest Action Plan were the most significant (Hansen et al., 1997), while global trends in tree plantations and emerging markets were also important (Smith et al., 2017c).

The LFAP, which was established and implemented in early 1990s (Ducourtieux et al., 2005; Fujita, 2010), was aimed at increasing land tenure security to enable farmers to invest in their land, and to encourage village communities to protect the forest environment (Ducourtieux et al., 2005; Thongmanivong et al., 2009). Further forest and land policies were progressively codified by series of laws⁵ including a Prime Ministerial Decree in 1992 (99/PM) which stated that “the land belongs to all Lao people, represented by the government. Lao citizens have the right to own and use land, pass it on in the form of inheritance, to offer, rent, sell or buy rights of land ownership and use” (Ducourtieux et al., 2005, p. 505). A system of land allocation set out in the 1997 Land Law (No. 01/97), was implemented in accordance with a local allocation plan and assigned a maximum area of land per household based on the number of working age adults in a family and the financial capacity of each household for production. The maximum area of land allocation was 22 ha per active worker⁶ for agriculture production (Ducourtieux et al., 2005), intended to provide the basis for upgrading a family’s living conditions (Newby et al., 2012). In addition, land allocation included rights to up to 3 ha of degraded forest land for orchard or tree plantation establishment, including for teak, (Smith et al., 2017c). This linked to the Forest Law of 1996 which gave specific land use rights to people who planted trees. Tree planters had the right to a “Temporary Land Use Certificate’ (TLUC) which could be bequeathed but not sold, leased or used as collateral (Bouthavong et al., 2016; USAID, 2013). TLUCs could be converted to permanent land use rights over time, but without a clear mechanism for doing this in the Land Law, in practice most households informally exchanged or transferred their certificates (USAID, 2013) or obtained no formal rights at all. If households did not use the land as agreed, after 3 years the land could be returned to the village committee for redistribution to other households (Ducourtieux et al., 2005).

⁵ Law on private property (27/6/1990), Lao PDR constitution (14/8/1991), decree by Prime Minister on land (99/PM 19/12/1992), on property tax (50/PM/ 13/3/1993), on villages organisations and administration (102/PM 7/7/1993), on use of forests and forest land (169/PM 3/11/1993) on land allocation for reforestation and forest preservation (186/PM 12/10/1994).

⁶ The 22 ha comprised upland rice = 1 ha, pasture = 15 ha, cash crops = 3 ha and orchards = 3 ha.

Tree planting was initially promoted by land tax exemptions under which land used for plantations with stocking of more than 1,100 stems/ha was exempt from land tax after 3 years, if registered (ACIAR, 2017; Smith et al., 2017c). Extension supported and free planting material catalysed early enthusiasm for planting teak. However, implementation was inconsistent; most households did not register their plantations or obtain TLUCs, provinces and districts applied the land tax exemption differently (Ling et al., 2014; Smith, 2014), and few households gained permanent land use rights. Those who did were influential, educated, well connected villagers and with knowledge of this policy, who proactively accumulated land and by planting teak; some later sold their teak plots to others, within or outside the villages, leading to the situation in which many teak growers in Luang Prabang Province are now absentee landowners (Newby et al., 2012). The Lao Government progressively introduced further policies and legislation to promote tree planting by individuals, households and other entities, such as the Prime Minister's Decree No. 96, dated 11 June 2003 on Plantation Promotion Investment and Environmental Protection (GOL, 2003), to supply timber to the emerging wood domestic processing sector and other new markets.

While the 1997 Land Law (amended in 2003 and 2019) and Forestry Law 1996 (amended in 2005, 2007 and 2019) provided a framework which sought to encourage farmers to cultivate permanent crops, including tree plantations and eliminate shifting cultivation (Castella et al., 2013), the Village Relocation and Consolidation Strategy (*kan taohom* in Lao) which commenced in 1989, sought to merge villages and small upland communities with less than 50 households (MAF, 2008). Linked to the land allocation program, this strategy aimed to allocate forest and agricultural land for village use, contain and reduce shifting cultivation and stabilise agricultural practice by "arranging permanent occupations" (MAF, 2008, p. 6). During the 1990s, the Lao Government introduced a focal site approach under the National Rural Development Program, which encouraged the merging of 1,200 villages and provided state services such as infrastructure, health care, education and agriculture extension to the new sites (Evrard and Goudineau, 2004). More recently, in 2004, an order was issued by the Central Committee of the Lao People's Revolutionary Party setting the lower population limit at 500 residents for lowland villages and 200 residents for upland villages (Baird & Shoemaker, 2007). When they were relocated, many households 'booked' (secured informal tenure rights over) the land (a process known locally as *jub jong*), and those who relocated early had more chances to permanently 'book' the land by planting teak or other crops.

Another set of policies that have influenced teak growing are those that sought to regulate exploitation of natural forests. As Laos became a resource frontier for China, Thailand and Vietnam (Lestrelin et al., 2013), wood product exports from natural forests between 1990 and

1999 were 26 and 77% (average 53%) of annual wood harvest (World Bank, 2001 cited in Lestrelin et al., 2013). A series of national moratoriums or bans on forest harvesting and roundwood exports were introduced, beginning in 1988 just before the first National Forestry Conference and culminating in 2016 with the Lao Prime Minister's Order No. 15 on *Enhancing Strictness on the Management and Inspection of Timber Exploitation, Timber Movement and Timber Business*, dated 13 May 2016 (PMO15) (GOL, 2016). Embedded within these bans, which were primarily aimed at curbing illegal logging and deforestation in natural forests, were policies promoting plantation establishment, by farmers and also by companies through concessions on state land (Lu and Smith, forthcoming). While effective in accelerating investment in industrial scale plantations, results were mixed, including lower than anticipated productivity and adverse social and environmental outcomes (Baird, 2019; Kenney-Lazar, 2012; Smith et al., 2017c); this resulted in the introduction of a moratorium on some plantations in 2007 and again in 2012 (Smith et al., 2017b).

Markets and infrastructure

Generally in Laos, market drivers for agriculture development are strongly linked to policy reforms, access to resources frontiers, and market connections with China, Vietnam and Thailand (Grimsditch, 2017). In 1986, the Lao Government's economic and development reforms, called the New Economic Management Mechanism (*Chintanakaan mai* or "New thinking") (Yamada, 2018), encouraged the expansion of agricultural markets (Kenney-Lazar, 2012) and integration with regional and global markets. New opportunities for participation by farmers, households and the private sector were facilitated by policy and regulatory changes promoting farmer investment or contract farming with companies, which could also enter into arrangements with the government for larger-scale land concessions. In response to greater access to markets, farmers started to reduce their subsistence production in favour of cash cropping (Cramb et al., 2009).

During the early 1990s, new laws on the promotion of foreign investment created an enabling environment for new markets and commercial crops; tree plantations were promoted in this context (Campbell, Knowles, and Sayasenh, 2012; Schoenweger and Üllenberg, 2009). A network of new roads in Northern Laos was developed and improved as part of the Greater

Mekong Subregion's Economic Corridor⁷ supported by the Asian Development Bank (Thongmanivong et al., 2009; Wiemer, 2009).

In 2008, the North Plan⁸ (2008–2020) developed by the Government of Yunnan Province facilitated Chinese investment in Northern Laos (Tan, 2015 cited in Smith et al., 2020). As a result, many rural farmers in this region adopted cash crop production and converted their upland swidden and fallow forests into commercial agricultural lands (Thongmanivong and Fujita, 2006). With improved market access and the added policy incentives, teak became an attractive option for many farmers, particularly those in Northern Laos with the opportunity to access Chinese markets by trading directly at the border (Smith et al., 2018c). For the last 2 decades, Laos has been a member of ASEAN, and became a member of World Trade Organization (WTO) in early 2013 and of the ASEAN Economic Community (AEC) in 2015; each of these connected Laos more strongly to regional and the global markets (UNDP, 2015). In conjunction, the Lao Government also has adopted a National Export Strategy (NES) to attract large-scale Foreign Direct Investments (FDI) in agriculture, forestry and other sectors that bring new technologies and market access (Anttila, 2016).

Teak is recognised as a high-value hardwood and a premium timber in global timber markets, and its physical and aesthetic qualities have given it a worldwide reputation as the “king of woods” (Midgley et al., 2015. p. 13). In 2010, Kollert and Kleine (2017) estimated the global area of natural teak in India, Laos, Myanmar and Thailand combined was 29 million ha and planted teak was 4.35 to 6.89 million ha, of which more than 80% was in Asia, 10% in Africa and 6% in tropical America and the Caribbean. Estimates of global teak volume vary, with the most recent available data on planted teak in 2010 at around 30 million m³ (Midgley et al., 2015). Kollert and Kleine (2017) reported that in 2010, 2–2.5 million m³ of teak roundwood was harvested from both natural and planted forests, supplied mainly by India and Indonesia. Thailand, India, Vietnam and China were the main countries manufacturing teak products (Raiyani, 2013). The average of global annual trade of teak roundwood between 2005 and 2014 was more than 1 million m³, valued at US\$487 million per year and representing about 3% of the value of the global timber trade (Kollert and Kleine, 2017).

⁷ The Greater Mekong Sub-region (GMS) corridor system established since 1998, consists of three main corridors involving multiple routes. These are designated the North-South Economic Corridor (NSEC), the East-West Economic Corridor (EWEC), and the Southern Economic Corridor (SEC). All three corridors are oriented toward seaports. For landlocked Laos and China's Yunnan Province, this provides valuable access to world markets.

⁸ Planning for Industrial Economic Development and Cooperation in Northern Part of Lao People's Democratic Republic was a technical assistance project of the Chinese Government, comprising a Comprehensive Plan and four special plans (Construction of Infrastructure; Development of Industries and Handicraft Industries; Industrial Development of Agriculture and Forestry; Trade, Investment and Foreign Cooperation).

While small on the scale of global wood production, teak continues to hold special status in global timber markets (Midgley et al., 2015), and global demand is expected to continue to grow (Kollert and Kleine, 2017). In Laos, where most teak sold is plantation grown, and harvesting natural teak is prohibited, the volume harvested per annum has increased steadily from 7,000 m³ 2006 (Midgley et al., 2015); 20,000 m³ in 2010 (Sawathvong, 2010 cited in Midgley et al., 2015) to around 30,000 m³ in 2020 (Soulignamat, 2020). This reflects the maturing of the resource since the peak planting period in the 1990s to early 2000s. Boer (2019) reported the total merchantable volume of teak in Luang Prabang Province was estimated at over 570,000 m³ across the 18,200 ha of mapped plantation. However, the teak plantation resource was dominated by smaller size trees, and tree quality was found to be generally poor with only 43% of tree volume as 'good quality' merchantable logs. This is due to the resource comprising mostly small-scale plantations, sourced from unknown seedstock, and managed by many owners with little silvicultural experience.

Teak price varies depending on log size (diameter, 'd') and location of purchase. In 2014, data from the LPTP showed Grade A round logs sold along the roadside in Luang Prabang for US\$74/m³ (12–14cm d), US\$104/m³ (15–17 cm d), US\$125/m³ (17–20 cm d), US\$170/m³ (21–25 cm d) log and US\$227/m³ (26–30 cm d) (Soulignamat, 2020). In 2017 the delivered price of 8–16 cm d logs to a small processing enterprise/trader was US\$34/m³ – US\$68/m³, US\$80/m³ for 12–15 cm d logs, US\$193/m³ for 16–19 cm logs, and for logs larger than 20 cm, US\$215/m³ (Smith et al., 2018c). These prices are low compared to the average domestic market price at the log yard in Asia, which is US\$149/ m³ for small-sized logs, US\$282/m³ for medium-sized logs and US\$448/ m³ for large-sized logs (Midgley et al., 2015). The value of plantation-grown teak is also low compared to the unit price of natural teak logs, which from Myanmar, for example, was US\$615/m³ in 2005 and reached a peak of US\$1,000/m³ in 2014, and for plantation teak was from US\$300/m³ to US\$430/m³ in the same period (Kollert and Kleine, 2017). Teak round log exports, from either planted or natural forests, are currently prohibited under Lao government policy (PMO15). Only planted teak wood can be exported after processing.

Crop characteristics

As noted by Hall (2011a), the production characteristics of crops are one of the factors that facilitate (or prevent) them becoming a boom crop. As described above, the government identified teak as potential crop for livelihood improvement in upland farming systems in Northern Laos because the policy on land was to increase forest cover, eliminate shifting cultivation practice mainly by upland communities, and promote permanent agriculture. Also,

in the Northern region of Laos, particularly Luang Prabang Province, the climate, elevation and terrain are suitable for teak (Hansen et al., 1997). As teak grows naturally in the area and is suited to growing in plantations, the Lao Government promoted teak as a native species because it is fast-growing compared to other native hardwood species (ibid). Teak is a long-rotation crop which can be interplanted with other species in agroforestry systems. Moreover, teak propagation is easy and relatively cheap for local nurseries. Teak produces wood that is familiar to markets and popular for wood products for local use. In Luang Prabang, teak has become 'iconic' and teak furniture is used widely in the hospitality sector.

Lao farmers are attracted to teak by the perception that it requires low levels of management and labour input after the first 3 years. These perceptions were influenced by the extension program in the early promotion era in the 1980s–1990s. This is similar to the situation in Indonesia, where farmers have seen teak as a labour-saving crop which allows them to allocate their family labour to off-farm employment (Roshetko et al., 2013). However, the lack of management inputs means that farmers often leave trees to grow without undertaking silvicultural practices such as pruning and thinning (Dieters et al., 2014; Race and Wettenhall, 2016). As a result, teak production and wood quality may be sub-optimal or not as anticipated; income from teak could be substantially improved if better management was undertaken (Newby et al., 2014).

3.2.2 Factors within village level

Village characteristics

Village characteristics such as geographic location, settlement date and accessibility influence farmers' decision-making in adopting crops. Improved rural infrastructure has long been a priority for rural development and poverty reduction, both generally (Kelly, 2011) and in Laos (Rigg, 2006). Land availability and its suitability, in terms of distance to a road or river, are two significant factors influencing households' decisions about land use. Generally, households preferred to plant teak close to roads or rivers to allow easy future transportation of wood (Hansen et al., 1997), and so the availability of such land in villages was important. Households in upland villages in Northern Laos who were resettled before and during the LFAP had opportunities to gain access to the best land by planting teak, while those resettled later, or young couples subsequently seeking land, were excluded from this opportunity to secure land (Newby et al., 2012; Hansen et al., 1997). Sikor and Baggio (2014) reported similar land allocation and reform programs in Vietnam around the same time.

Peer-effect and opinion leaders

Networks, knowledge and information are essential external factors in adoption, management and market access. Social network or peer effects strongly influence households' decisions about what to plant. Mwangi and Kariuki (2015) point out that farmers within a social group learn from each other about the benefits and usage of a new technology and new agriculture practices. Mignouna et al. (2011) illustrate how farmers belonging to a social group enhance social capital within that group, allowing trust and exchange of ideas and information, all of which influence their adoption decision-making. 'Following others' was found to be an important factor in rubber adoption in Northern Laos (Junquera et al., 2020; Smith et al., 2020) and bananas in Northern Laos (Friis and Nielsen, 2016). However, 'following others' depends on households' capabilities wherein mostly better-off households with greater skills, knowledge and capital have the advantage while the resource-poor households may not have confidence, assets, and capital to engage or experiment (Race and Wettenhall, 2016).

In the case of teak in Laos, many farmers have been motivated to adopt it because they have seen their neighbours securing access to land and generating income from selling teak, thereby funding education for their family members, buying a motorbike or building or improving their homes (Newby et al., 2014). Extension information was important in the early years of teak policies (Dieters et al., 2014; Hansen et al., 1997; Midgley et al., 2007), as were networks of growers, and these remain important. Smith et al. (2017c) and Ling et al. (2018) found that farmers in Luang Prabang Province who belonged to teak grower groups tended to adopt management techniques and register their plantations. Networks determined by family relations or cultural identity may also provide access to markets; Smith et al. (2018c) found a preference amongst teak traders to buy teak from growers either within their local area or who were members of the same ethnic group.

Market chain networks

Market chains, also known as value chains, are "interactive, collaborative systems that create and deliver products valued by consumers" (Collins et al., 2015, p.1), in this case linking small-scale farmers to market opportunities (Race and Wettenhall, 2016). The main actors in smallholder tree market chains are individual tree growers and tree grower households, group of growers, market brokers or traders, timber depots and processing industries (Race and Wettenhall, 2016) and in some cases in Laos, government agencies (Ling et al., 2018; Smith et al., 2017c).

Most teak growers in Laos operate outside the formal sector (Smith et al., 2017c). They mostly sell standing trees or round logs through 'middlemen' (traders), as they find it difficult to participate in a complex system requiring permits for harvesting and sales (Ling et al., 2018). Middlemen, who are often farmers themselves, either from within or outside the community, play an important role in market chains for teak in Northern Laos (Midgley et al., 2015) and Indonesia (Race and Stewart, 2016,) acacia in Vietnam (Sikor, 2012), and trees from private forests in Nepal (Nuberg, Shrestha, and Bartlett, 2019). With more power and stronger connections in tree market chains than smallholders, who are typically in a weaker bargaining position (Arvola et al., 2019), traders are often the "price maker" and are frequently demonised by some areas of government, viewed as "value grabbing" rather than "value adding" (Smith et al., 2018c. p. 42). Nevertheless, traders play an important role in undertaking administrative requirements for wood transactions thereby alleviating this burden for farmers (Smith et al., 2018c), and share market and other information.

Smallholders generally, however, lack knowledge of market prices, demand and quality requirements, which leads to a cycle of under-investment in tree growing. Better knowledge of market chains could allow farmers to make more informed decisions about participation in markets for forest products (Race and Stewart, 2016). Improved market chain relations "are expected to yield tangible benefits in terms of economic performance", and so this has become a strategy for poverty reduction employed by many development agencies (Donovan et al., 2015, p. 3). Farmer-managed teak plots also often suffer from poor plantation management in site preparation, lack of improved germplasm, poor pruning and thinning, all of which constrain the wood quality and quantity (Dieters et al., 2014; Race and Stewart, 2016).

3.2.3 Factors within the household

Household characteristics

Characteristics of households refer to personal characteristics such as gender, age, marital status, household size, labour, socio-economic characteristics (including income and assets), education, personality (self-confidence and independence), and position, access to and participation in social networks (Meijer et al., 2015). These characteristics in teak farmers in Laos have not been extensively researched. Newby et al. (2012) illustrated those certain characteristics of teak-growing households in Northern Laos enabled early access to the 'best land' after policies promoting tree growing were introduced; these were better-off households with off-farm income, access to paddy land, more education, and a longer history of settlement. Ethnicity was also important, with early adopters being mostly Lao-Tai households

(Hansen et al., 1997; Newby et al., 2012; Roger et al., 1995; Smith et al., 2016). Teak slowly expanded into the uplands settled by non Lao-Tai ethnic groups, particularly people of the Khmu ethnic group (Hansen et al., 1997, p. 4). Ethnicity was also found to important in the coffee boom in Son La, Vietnam, in which Tai people were dominant in the village, and then assisted less wealthy households to participate (Nghiem et al., 2020).

Knowledge and attitude to a long-term investment

Adoption decision-making is also driven by internal factors such as knowledge, perceptions and attitudes, which are interrelated with external factors. Farmers' perceptions about agricultural innovations are also very closely related to their knowledge of those innovations: "Whereas knowledge refers to factual information and understanding of how the new technologies work and what they can achieve, perceptions relate to the view farmers hold about them based on their felt needs and prior experiences" (Meijer et al., 2015, p. 44). Attitudes come from knowledge and perceptions; a positive attitude towards an agricultural innovation creates a likelihood of adoption. In contrast, a negative attitude will reduce the probability of adoption (Meijer et al., 2015). Farmers adopt new technologies, innovations or new concepts based on both their knowledge and the learning processes (Pannell et al., 2006). For example, Le, Tran, and Thanh Pham (2021) reported that knowledge of households about silviculture and investment capital influenced their participation in tree growing in Vietnam. Similarly, Djagbletey and Adu-Bredu (2007) found that farmers in Ghana adopted teak when influenced by knowledge and information from social networks. In Tanzania, Kulindwa (2016) found that households with better knowledge about the short and long-term benefits of having trees are more likely to adopt tree planting and benefit from government policies and extension. Without the knowledge and information from agriculture extension or observations of trial and error by their neighbours, farmers may not adopt a new agriculture practice.

Secure land tenure and livelihood strategy

Without security of land tenure, households are unlikely to be willing to invest in tree growing; thus, security of land tenure is generally identified as a necessary pre-requisite for households to adopt tree growing (Addis, Amara, and Biru, 2020; Boulay, Tacconi, and Kanowski, 2012; Byron, 2001). In Northern Laos, where land tenure was insecure, adopting teak became a mechanism to address this; households used tree planting to gain to gain temporary land use rights under the LFAP (Hansen et al., 1997; Newby et al., 2012). Similarly, Sikor (2012) and Sikor and Baggio (2014) found that during the nationwide program of land allocation in the

1980s–1990s in Vietnam, smallholder tree growers secured their land tenure, formalised through a 'Red-Book land certificate', through tree growing. In Laos, however, the opportunity and means to transform temporary land rights to permanent tenure ('Golden Certificates') have been limited, in part because of the high transaction cost to register, and because the land administration system in Laos is largely paper-based, allowing only limited access to records (Smith, 2016 and World Bank, 2021b).

Smallholder tree growing is a common strategy for rural development and poverty reduction in the Global South (Gilmour, 2016). Households in Laos and elsewhere in Southeast Asia have incorporated tree growing into their livelihood strategies for survival or to build their wealth (Newby et al., 2014; Rigg, 2006; Rigg et al., 2018; McCarthy, 2010); each of these studies explored factors that influenced farmers' decision-making in agricultural adoption. Newby et al. (2014) illustrate that households in Northern Laos adopted teak as process of capital accumulation, a long-term increase in their wealth and income, and to diversify cropping systems. Similarly, van der Meer Simo, Kanowski, and Barney (2020b) found that rural households in Central Laos adopted agroforestry as a livelihood strategy that offered them financial advantage, access to land, and to secure land rights. Cramb et al. (2017, p. 950) found that adopting oil palm plantations had become a genuine 'livelihood strategy' for households in Sarawak, Malaysia. Roder et al. (1995) and Hansen et al. (1997) found that farmers in upland communities in northern Laos started planting teak to produce cash income or for use in construction, but farmers also considered teak as an asset delivering a long-term return and providing security for their family, as household savings which they sell teak in times of household financial stress (Midgley et al., 2012).

However, there are a few studies that examine how crop adoption decisions are made at the household level in Laos. This chapter explores how and why rural households in Northern Laos made decisions about teak adoption. By adapting the theoretical frameworks drawn from Versteeg et al. (2017), Meijer et al. (2015) and Pannell et al. (2006), it defines the factors favouring teak adoption at three different levels and explores three variables that influenced household decision-making.

3.3 Research methodology and study areas

A qualitative case study approach was used to define and understand household adoption decision-making in teak and the livelihood strategies associated with households' participation in the teak boom, drawing from models of farmer adoption decision-making (Meijer et al., 2015; Pannell et al., 2006; Versteeg et al., 2017), the sustainable livelihood framework (Scoones,

1998), and an understanding of the diversification of household livelihood strategies (McCarthy and Obidzinski, 2017; Rigg et al., 2020).

I conducted my field research in Luang Prabang Province, Northern Laos, which I selected due to the known large area of planted teak and its geographic proximity to export markets – China and Thailand. The province itself is a popular tourist destination in which teak products have been in high demand for hotel and restaurant furniture. I selected two districts at different distances from Luang Prabang city; the first, Xieng Ngeun District, is close to the city, while Ngoi District is more remote. I selected two case study villages, one in each District, from a pool of eight potential sample villages which were identified from the ACIAR project *Enhancing Value Chains for Plantation Grown Wood in Lao PDR* (VALTIP2) project records, discussions with staff from the LPTP and the Provincial Agriculture Forest Office (PAFO). The criteria used to identify potential case study villages were the level of uptake of the teak (at least 20% of the farming population), farmer wealth (a range of low to high), village population size (small to moderate), access to infrastructure and markets, and the village's willingness to participate in the research.

3.3.1 Field research methods

I collected primary data during fieldwork conducted for a period of one month in each village between June and August 2018. I collected supplementary and contextual information about actors, markets and policy during participation in value-chain studies for teak under the ACIAR project *Advancing enhanced wood manufacturing industries in Laos and Australia* (VALTIP3) in December 2017 and for rubber in June 2019. My role in the VALTIP3 Project was as a research assistant to collect data, liaise with project partners, and communicate with relevant Lao Government and agency officials and businesses. I also participate in project training and meetings.

I used multiple methods for data collection: focus group discussions, household interviews, formal and informal discussions, field observations, and reviews of relevant secondary sources. I describe each stage of data collection below and summarise it in Table 3.1. FGDs were conducted separately for men and women in each village (10–15 participants each) to ensure that women's perspectives were heard independently of men. FGDs began with a participatory mapping exercise where participants drew the main land uses in the village since Lao independence in 1975, and the present land use. This mapping was used as a tool to understand village landscapes and village land use choices. FGDs also served the purpose of initial meetings with c. 30 members of each village, and were also used to identify the

characteristics defining four household wealth classes in the village, following similar approaches in related studies in Laos (Martin and Lorenzen, 2016; Newby et al., 2012; Van Der Meer Simo, Kanowski, and Barney, 2019).

I selected a sample of around 20% of village households, representing the sample size possible within the time available, for interviews at the household level. Two strategies were used to identify households: a discussion with the village officials (Village Head and Committee), and snowball sampling. Firstly, village officials were asked to assign households to the household wealth classes identified in the FGD, and whether these households cultivated teak. I selected households at random from this list. Secondly, though I used purposive snowball sampling to ensure that at least five households were sampled in each wealth class, each interviewed household was asked if they knew other households who met the criteria.

I held formal discussions with government and research officers (7) at district, provincial and central levels to explore relevant policies, agency roles, and officers' perspectives on teak plantation, and on current and future agricultural development plans. I conducted informal discussions opportunistically, often at food stalls or shops. I also held informal discussions with members of the village committee, village elders, host families and other villagers. I used these discussions to triangulate information from other sources. I undertook field observations throughout the fieldwork, to observe livelihood activities and daily life, land uses, villagers' access to information, and environmental issues.

Table 3.1: Field research methods and foci

Research method	Number	Themes covered
Focus Group Discussion (semi-structured; average duration 3 hours)	4 groups (2 per village) (10–15 participants each; male and female separately)	Village history; village participatory mapping; evolution of main crops; wealth classification; teak establishment in the villages; cropping calendar and the role of men and women in labour contributions.
Household interviews (semi-structured; average duration 1.5 hours)	62 households (Village 1: 32 households; Village 2: 30 households)	Household composition (age, gender, formal education); income sources; expenditure; livelihoods assets –detailed in land use parcels; reasons for adopting teak; livelihood situations and activities; social connections; shocks and future plans.
Formal discussions (semi-structured; average duration 1.5 hours)	2 District government officers, 2 Central government officers, 3 research institutes	Roles of their organisation related to teak boom; perceptions of and future plans for teak and agriculture development.
Informal discussions (ad hoc)	Opportunistic; at least 10 village members in each village	Village history, land use and allocation; perception of participation in teak boom; challenges of teak cultivation; previous debt from maize; future livelihood plans.
Participant observation (integrated with other activities)	Many village members	Livelihood activities; land use; positive and negative changes.

3.4 Results

3.4.1 Case study villages

The demographic and land use characteristics of the two case study villages are presented in Table 3.2. The number of households in Village 1 was 255 and in Village 2 was 154; 32 households were interviewed in Village 1 (13%) and 30 households in Village 2 (20%). The majority ethnic group in both villages is Khmu (86% and 79%, respectively).

Table 3.2: Case study villages and households

	Village 1 (Xieng Nguen District)	Village 2 (Ngoi District)
Village location: distance from		
District town (km)	20	80
Luang Prabang city (km)	50	100
Village population		
Total number of people	1,381	1115
Proportion of women	50%	40%
Ethnic groups		
Khmu	86%	80%
Hmong	10%	-
Tai-Lao	4%	20%
Total number of households	255	154
Household size (adults and children)	median: 5 range: 3–6	median: 5 range: 2–7
Number of family labour >12 yrs old	median: 4 range: 2–6	median: 4 range: 2–6
Number of children <12 yrs old	median: 1 range: 0–3	median: 0.5 range: 0–4
Number of households surveyed	32 (13%)	30 (20%)
Village land use		
Total land area (ha)	1,200	2,000
Forest area (Protected) (ha)	6	20
Teak plantation area (ha)	70	120
Number of participating households	50 (22%)	95 (66%)
Number of these households interviewed	19 (60%)	21 (70%)
Rubber plantation areas (ha)		
Number of participating households	100 (45%)	8 (5%)
Number of these households interviewed	19 (60%)	3 (10%)
Paddy land (ha)	35	20
Number of participating households	38 (17%)	25 (16%)
Number of these households interviewed	13 (34%)	8 (32%)
Other agricultural land (Job's Tears, maize, pasture, fallows) (ha)	790	1,800

Figures 3.2 and 3.3 show the proximity of Xieng Nguen District and Ngoi District to Luang Prabang City. Village 1, in Xieng Nguen District is located about 50 km to the south of Luang Prabang city. The village lies along the river and main road between Lung Prabang Province to Xayabouly Province. It is an asphalt road which was completed in the past decade. Communication to this village and other villagers along the River was often cut off by heavy rain during the monsoon, with floods occurring every 2–3 years. The main transportation from the village to the city is by *Song tiew* (a local transportation), bus from Luang Prabang to Xayabouly and motorbike. The location of Village 2, in Ngoi District, is about 100 km to the northeast of Luang Prabang City. The village lies along the river on which a hydropower development project has operated since the end of 2015. Before the dam was constructed, the village had no road, and boat was only the main transportation for this village to commute to other villages. The village is isolated from the city; the closest major market is about 60 km away, and a local market operates every 10 days.

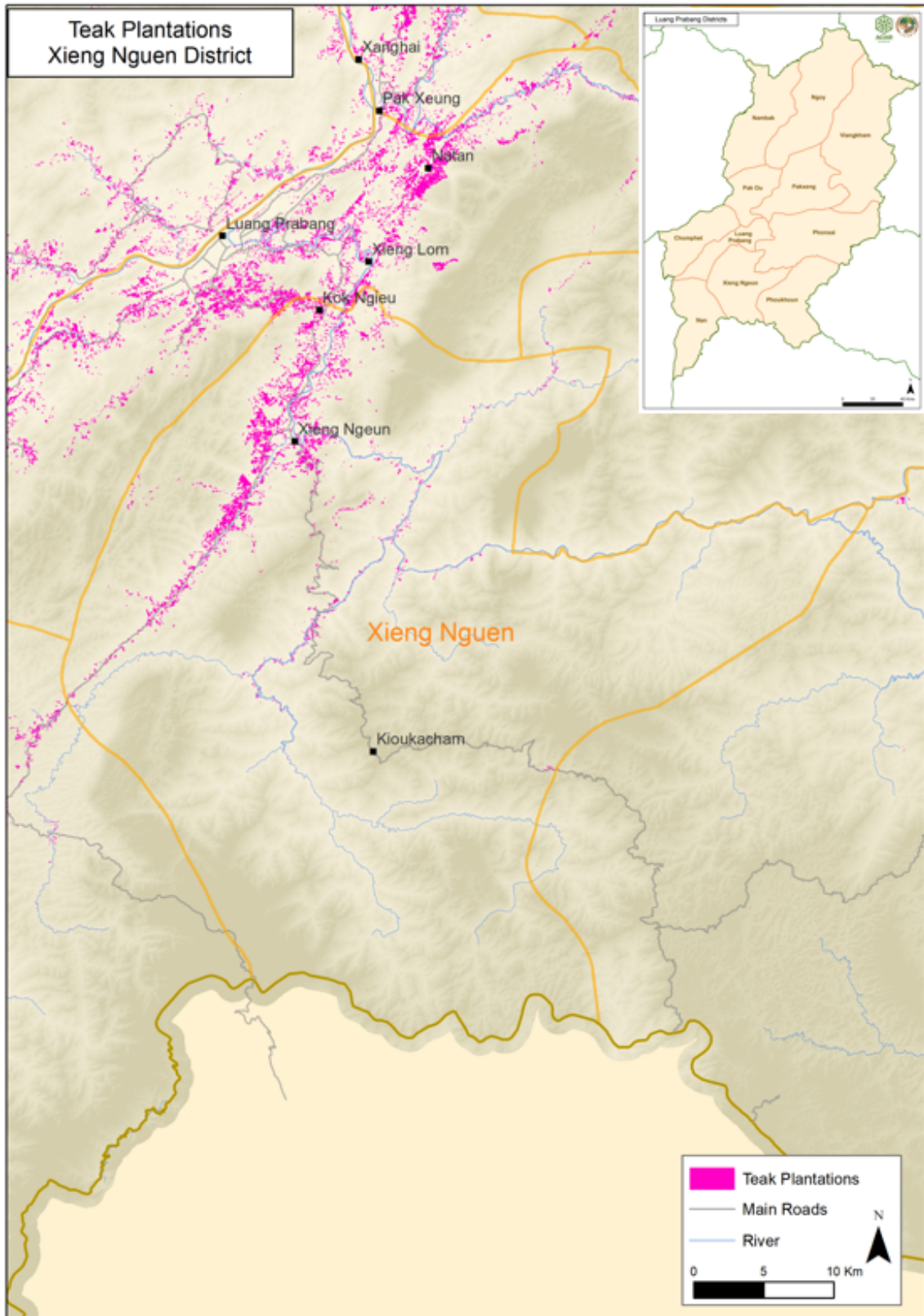


Figure 3.2: Location of Xieng Nguen District, showing density of Teak

Source: ACIAR VALTIP3 Project

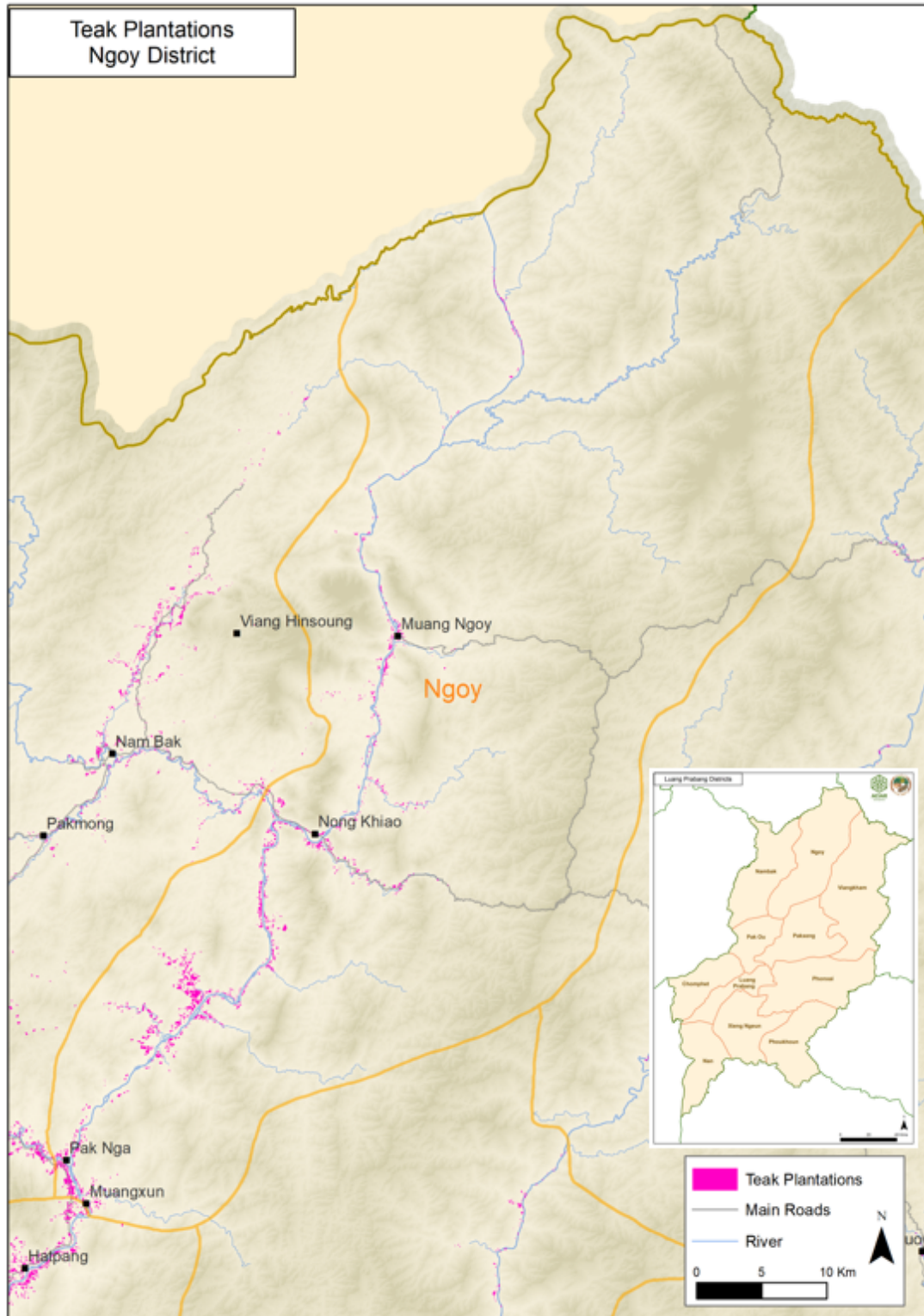


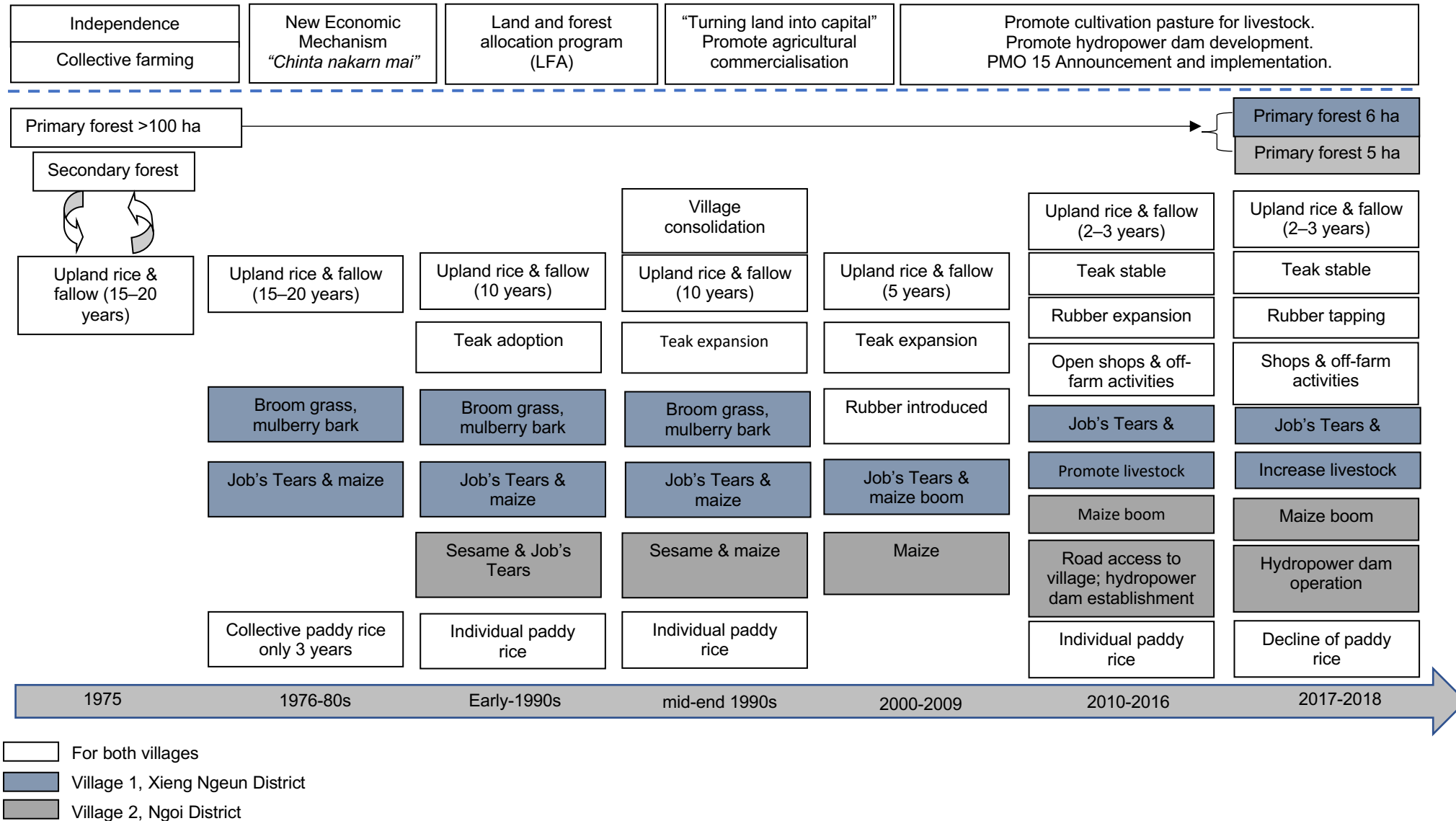
Figure 3.3: Location of Ngoi District, showing density of Teak

Source: ACIAR VALTIP3 Project

History of teak adoption

An overview of the history of adoption of teak and the other main crops in each village since the establishment of the Lao PDR in 1975 is provided in Figure 3.4. When the two villages were settled more than 100 years ago, livelihoods were based predominantly on subsistence farming, mainly of upland rice. After Lao independence, collective rice cultivation was introduced nationally, but was practised for only a few years before this policy was abandoned (Stuart-Fox, 1980). Subsequently, some households cultivated paddy rice individually, and upland rice for both for household use and sale of surpluses. In the mid-1980s, Job's Tears, maize, broom grasses, sesame and mulberry bark were introduced in Village 1, while in Village 2 these crops were adopted in the early 1990s. In the mid-to-late 1990s, both villages were involved in village consolidation under the LFAP of the Lao Government. Each village was consolidated from four remote villages by the Lao Government, which placed the new villages into the resettlement zones – along the highway for Village 1, and along the Ou River, a tributary of the Mekong River, for Village 2. Teak was introduced in this period by the District Agriculture and Forest Office (DAFO). In the late 2008, rubber was introduced to both villages, following the rubber boom in many parts of Laos (Smith et al., 2020). Some young household members, mostly from Village 1, migrated to work in Luang Prabang city, particularly in restaurants and in the hotel sector; those from Village 2 primarily migrated to Thailand. Paddy and upland rice are subsistence crops for both villages, with Job's Tears, maize and natural rubber latex being the main cash crops. Absentee teak owners are present in each of the two case study villages, particularly in Village 1, in which more than 50% of teak in the village is owned by outsiders; in Village 2, approximately 30% has absentee owners (Fieldnotes FGD, July 2018). Due to Village 1 being located close to Luang Prabang City and along the highway, many people from the city purchased teak in this village and nearby villages. In contrast, the location of Village 2 is more isolated, and the absentee owners are more likely to be relatives of the households in the village.

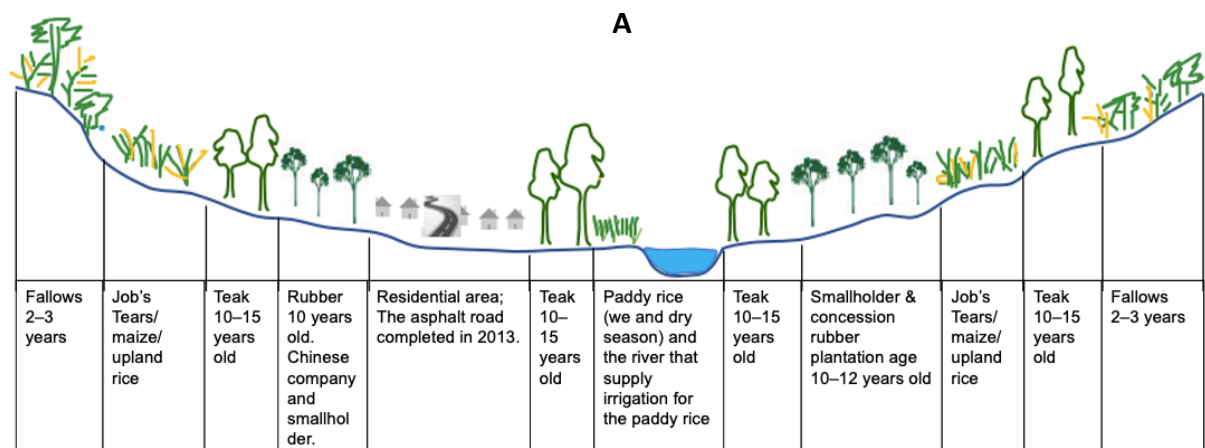
Figure 3.4: Timeline illustrating changes in land use and agricultural systems in the two case study villages since 1975



Village landscape

Village transects (Figure 3.5) were drawn from west to east of each village to illustrate the ways in which farmers use the land. Farmers reside in lowland areas close to the road and the river, while the forest and old fallows are located further from the village. Both villages have a river which provides water for sanitation, fishing and irrigation for paddy fields, as well as transport for teak logs (historical in both villages). Paddy rice is planted in the flatter areas and close to the river and settled areas; the rivers play a key role in supplying water for paddy fields during the dry season. Village 1 has irrigation channels and can grow rice for two seasons, while village 2 makes use of the river to cultivate vegetables on the paddy fields during the dry season. The river in village 2 also supplies for pico-hydropower involving small generators which produces electricity for household use (Vicente and Bludszuweit, 2012).

Most farmers prefer to plant teak and rubber close to the road, river and settled areas. Upland rice and other cash crop like Job's Tears and maize are cultivated further from the village and road. Upland rice, maize and Job's Tears are cultivated on 2–3 year rotations (young fallow). Old fallow areas of more than 6 years are located further from the village (2–3 hours walk). Since the initiation of the Land and Forest Allocation Program in the early 1990s, villagers are not allowed to clear more forested areas, and so cropping systems have shorter rotations. Village protected areas are located in the very steep slopes and far from the villages. Village 1 has retained a communal land for livestock pasture (cattle and buffalo) while village 2 has no communal pastureland. As a result, in Village 1, more households own large livestock than in village 2 where a village rule requires households who want to raise cows or buffalo to fence pasture areas to avoid damaging other crops, which is costly.



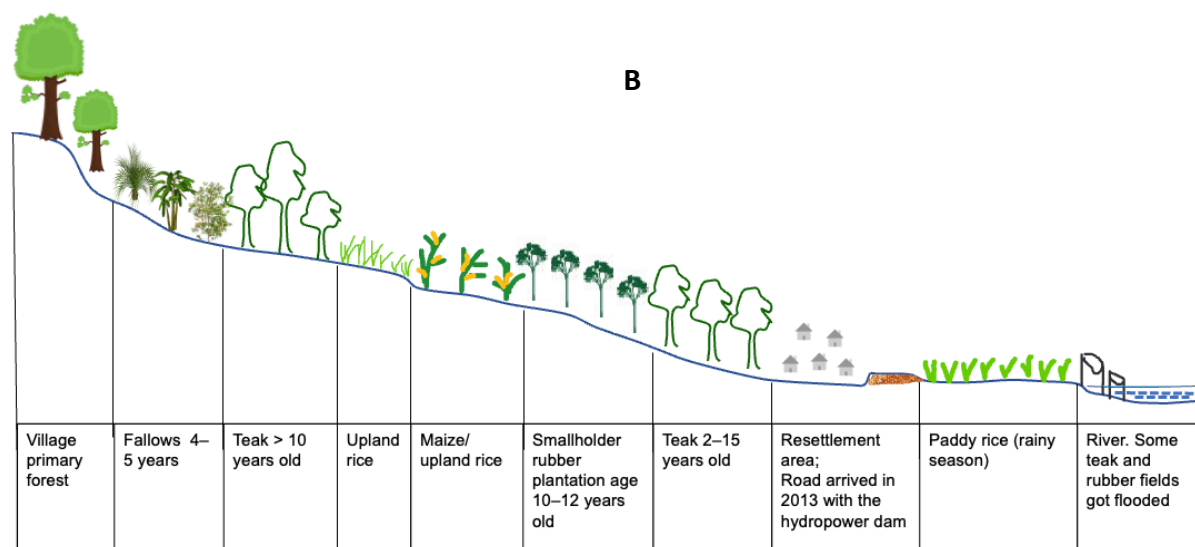


Figure 3.5: Transects of Village 1 (A) and Village 2 (B)

3.4.2 Teak markets

Teak growers in both villages are highly dependent upon teak traders for market access. In Village 1, which is close to Luang Prabang and several sawmills, a single trader has a monopoly over price and sales, whereas in Village 2, which is further from Luang Prabang, three traders are able to access teak (see Figure 3.6). The trader in Village 1 is a former government officer who played an important role in the district and uses his power to prevent other traders from buying teak in the area. The wood is sold to two sawmills, one is in Xieng Ngeun District and other in Luang Prabang City; both sawmills produce furniture to supply the domestic and export markets. In Village 2, the three main traders are from nearby villages; teak prices vary between these traders, but not significantly. Which trader the farmers sell to depends on their personal connection and contact phone numbers; farmers find it easy to sell teak by just calling the traders who inspect the teak plot, select the best quality trees, and settle the price with little room for negotiation. These traders sell teak logs to a sawmill in Nambak District (approximately 50 km from the village), that also supplies the domestic and export markets.

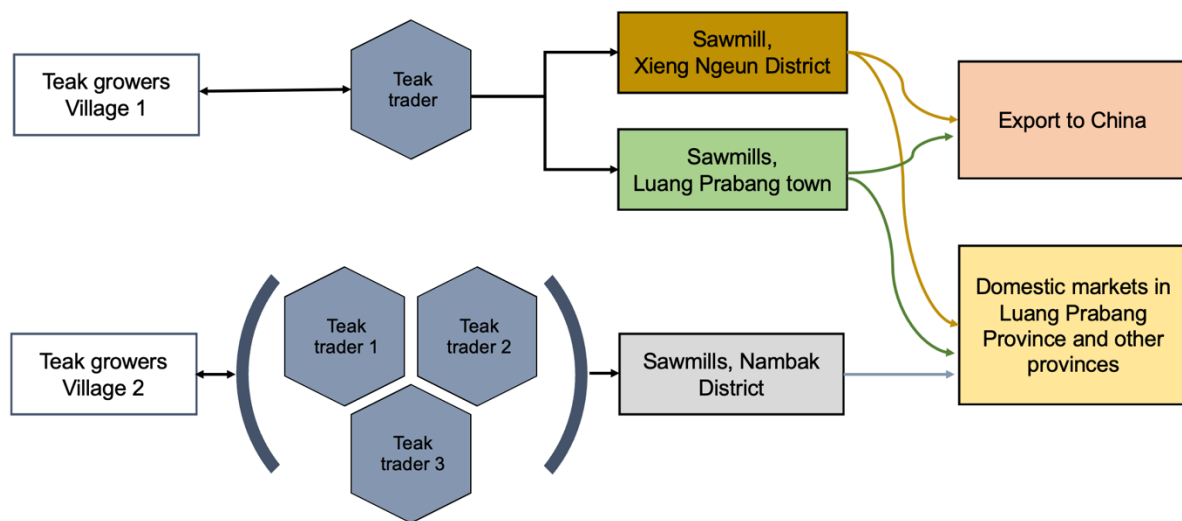


Figure 3.6: Teak market chains in two case study villages

3.4.3 Characteristics of households of different wealth categories

Four household wealth categories – upper, middle, lower and poor – were defined in the two case study villages, following similar approaches in related studies in Laos (Martin and Lorenzen, 2016; Newby et al., 2012; Van Der Meer Simo et al., 2019) and using information from the FGDs. Wealth categories are used to distinguish between households of different socio-economic status (Martin and Lorenzen, 2016), with different levels of assets. Household wealth categories are characterised here based on their physical, financial and natural capital, triangulated by discussion in FGDs and with each Village Committee. These capitals are interconnected and form the basis for household livelihoods. The annual net income is computed from the survey households, which the households self-estimate their income and expenses. Some households have less cash income than their expenses because they borrow money from other households, which means they are indebted. The characteristics of household wealth categories of both villages are described in Table 3.3, with details presented in Appendix 2.1.

Table 3.3: Characteristics of household wealth categories of the case study villages

Assets/wealth	Upper (N= 12)	Middle (N= 27)	Lower (N=17)	Poor (N=6)
Physical capital				
House condition	Usually own a traditional wooden house with concreted ground floor or concrete house	A traditional wooden house with concreted ground floor or wooden house with open ground floor	A traditional wooden house with open ground floor or bamboo house (except in Village 2 with a compensation house from the hydropower dam)	Only bamboo house (except in Village 2 with a compensation house from the hydropower dam)
Transportation	Own 2 or more vehicles and/or tractor/ truck and have more than 2 motorbikes	Own a vehicle and/or tractor/ truck and 1–2 motorbikes and a boat (only Village 2)	Own 1–2 motorbikes and a boat (only Village 2)	Rarely own a motorbike and boat
Livestock	Medium – high rate of owning large livestock (cow, buffalo), goat, pig and poultry	Medium – low rate of owning large livestock (cow, buffalo), high rate of goat, pig and poultry	Low rate of owning large livestock (cow, buffalo), medium rate of goat, pig and poultry	Very small number of poultry
Financial capital Household annual net income (US\$)				
Village 1				
Median	4,500	3,200	2,500	408
Range	1,400–16,000	1,300–5,700	85–5,600	In debt–1,700
Village 2				
Median	3,284	1,246	610	328
Range	680–6,500	400–2,250	99–1,000	527–520
Natural capital Household land ownership (ha)				
Village 1				
Median	5.00	4.74	5.00	1.00
Range	4.00–8.70	2.00–8.40	2.00–6.50	1.00–2.00
Village 2				
Median	13.30	7.00	5.40	3.00
Range	4.00–25.50	0.50–9.50	2.50–7.20	1.00–5.50

Note: For more details see Appendix 2.1

3.4.4 Households' participation in teak growing

The timing of household adoption of teak in both villages was classified into one of three periods: 'early adopters', during the 1990s; 'intermediate adopters', between 2000–2010; and 'late adopters', between 2011–2018. In both villages, the majority of households who planted teak are 'early adopters'; these are mostly older families with the age of the household head of more than 55 years old. The age of households in the 'intermediate adopters' varies between the two villages; Village 1 is a combination of older and younger families with the age range from 30 to 60 years old, while in Village 2 the majority are around 40 years old. The 'late adopters' in Village 1 are mainly younger families in their 30s, while in Village 2 they are older families (50 and 60 years old). Some households have planted teak in multiple periods; these are classified based on the first year in which they planted teak. Households who have never planted teak, either because they were unable or did not wish to, are categorised as 'non-adopters'; and 'withdrawing' describes households who adopted teak and then withdrew either by selling land with standing trees or selling teak logs and converting the land to other purposes. Of the total 62 households surveyed, 40 were teak adopters, 4 had withdrawn, and 22 had never adopted teak.

To understand how these households made their decision about teak adoption, key influencing variables were explored:

- household wealth, which focuses on land resources allocated for teak
- reasons for adopting teak
- reasons for not adopting teak or withdrawing.

Teak and wealth

Almost two-thirds (65%, N=40) of the total surveyed households across two villages adopted teak (N= 19 for Village 1 and N= 21 for Village 2), and all wealth categories other than poor households were represented. The majority of adopter households (50%, N=20) were 'intermediate adopters', while around a third (30%, N=12) were 'early adopters', and the remaining fifth were 'late adopters'. The four households who had withdrawn were from middle, lower and poor wealth categories. There were no upper wealth category households among the 22 non-adopters, but all other wealth categories were represented (Table 3.4).

Table 3.4: Household participation in teak plantation by wealth categories and adoption time periods in two villages.

Wealth classes/ time period	Adopter						Non-Adopter		Total
	Early (1990s)		Intermediate (2000–2010)		Late (2011–2018)		V1	V 2	
	V1	V 2	V1	V 2	V1	V 2			
Upper	2	4	1	3	2	-	-	-	12
Middle	2	2	3	8	1	-	8	3	27
Lower	2	-	3	2	3	2	2	3	17
Poor	-	-	-	-	-	-	3	3	6
Sub-total	6	6	7	13	6	2	13	9	
	12		20		8				
Total	40						22		62

Table 3.5 and Figures 3.7 and 3.8 show household average total land and teak land ownership for the four household wealth categories in each village; Figures 3.9 and 3.10 show the relationship between teak land and total land ownership of households. Both total land holdings and the area planted with teak increase progressively with wealth class; both were greater in Village 2 than Village 1 for all wealth categories.

The average total landholding of teak adopters in Village 1 is 5.57 ha (range 1.00 ha to 8.70 ha) and in Village 2 is 9.37 ha (range from 0.50 to 30 ha). The largest landholding in Village 2 (30 ha) was triple that in Village 1. Similarly, the largest teak landholding in Village 2 (11 ha) was double that in Village 1. The average teak landholding in Village 1 is 1.88 ha (range from 0.20 to 5.20 ha) and 3.45 ha in Village 2 (range from 1.00 ha to 11 ha). Generally, the landholding of teak-adopting households is higher than that of non-adopting households, in both villages. On average, households in both villages allocated more than a third (34% and 37%, Village 1 and Village 2 respectively) of their total land for teak. The proportion of land that households allocated for teak progressively increased with wealth in both villages, except in Village 2 where the proportions for upper and middle wealth classes were similar.

Table 3.5: Average total land and teak landholding by wealth categories of adopters and non-adopters in the two villages.

Wealth classes / landholdings	Adopters [N=40]				Non-adopters [N=22]	
	Avg. total land (ha)		Avg. teak land (ha) and % of total land		Avg. total land (ha)	
	V1	V2	V1	V2	V1	V2
Upper	5.72	14.66	2.68 (47)	5.96 (41)	-	-
Middle	6.67	7.30	2.03 (31)	3.15 (43)	3.41	4.57
Lower	4.31	6.15	0.94 (22)	1.25 (20)	5.35	3.57
Poor		-	-	-	1.33	3.17
Overall average (ha)	5.57	9.37	1.88 (34)	3.45 (37)	3.37	3.77

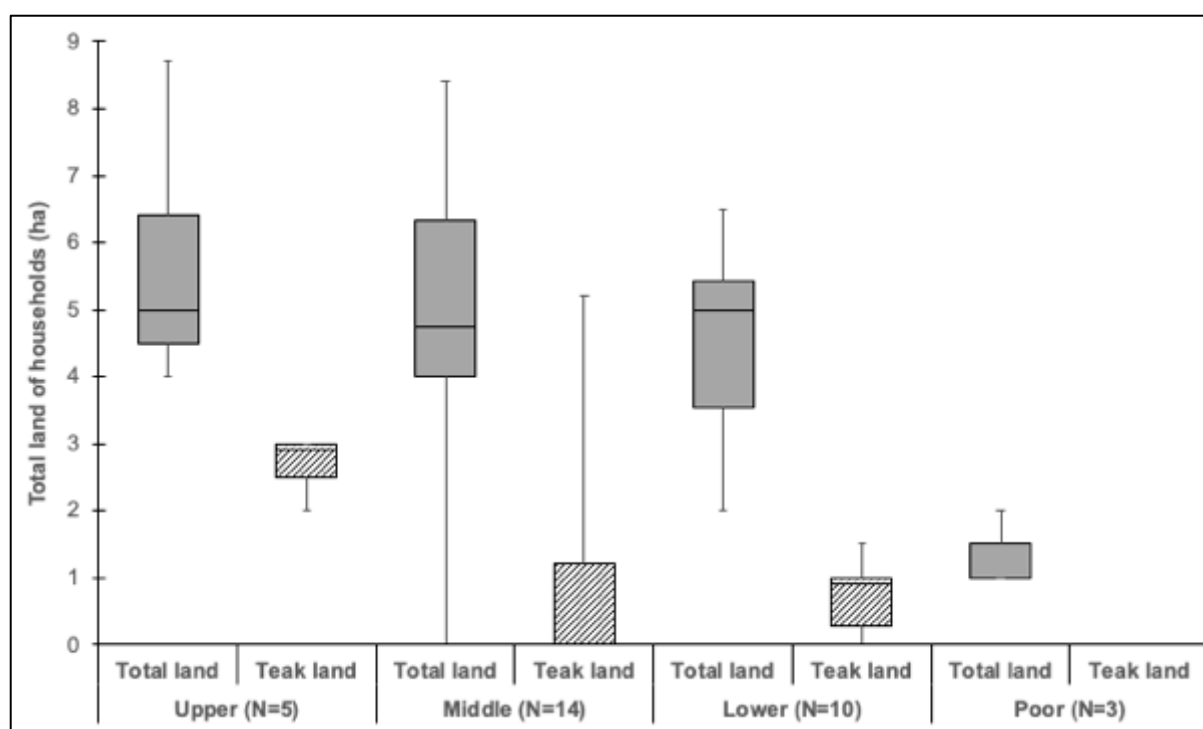


Figure 3.7: Household average total landholding and land planted to teak by wealth class, Village 1

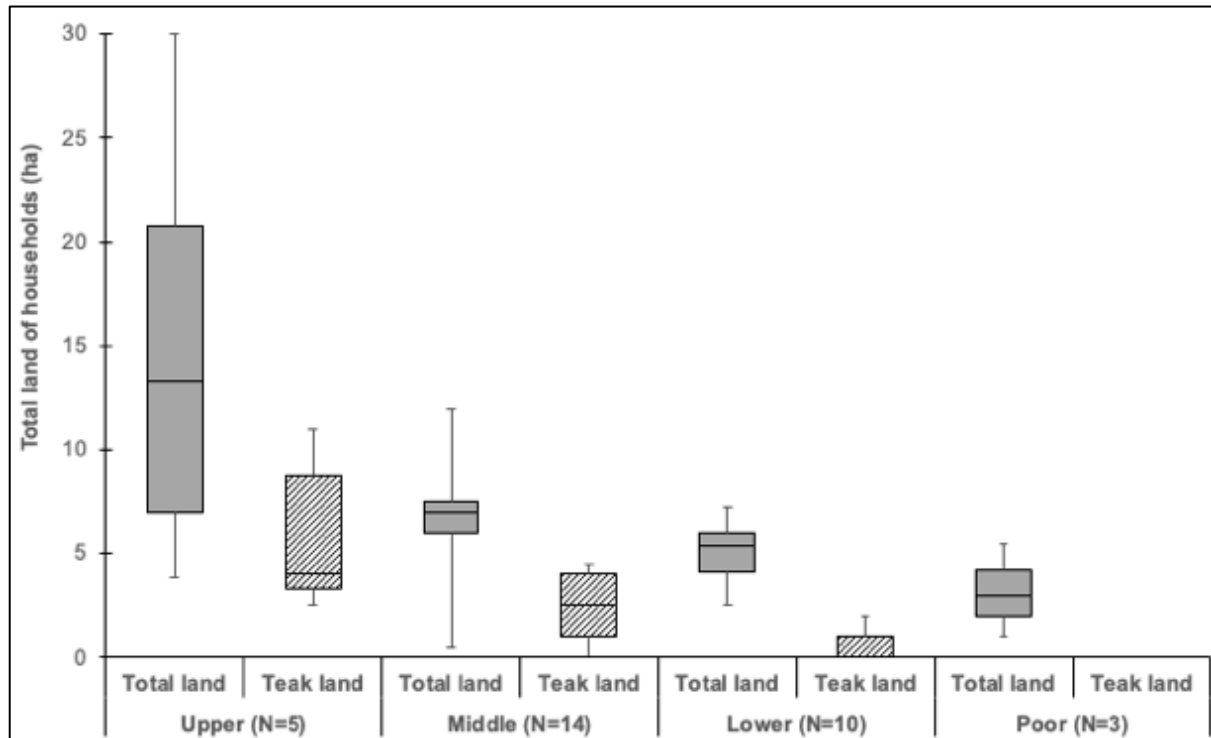


Figure 3.8: Household average total landholding and land planted to teak by wealth class, Village 2

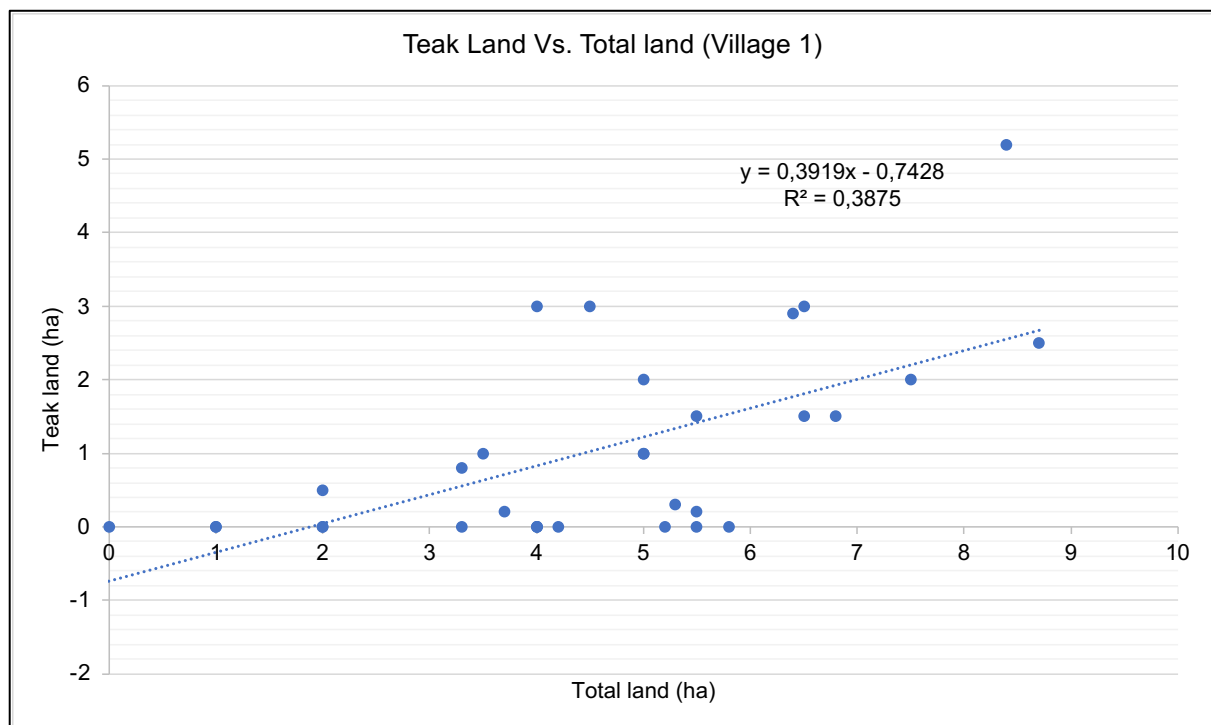


Figure 3.9: Relationship between household average total landholding and land planted to teak, Village 1

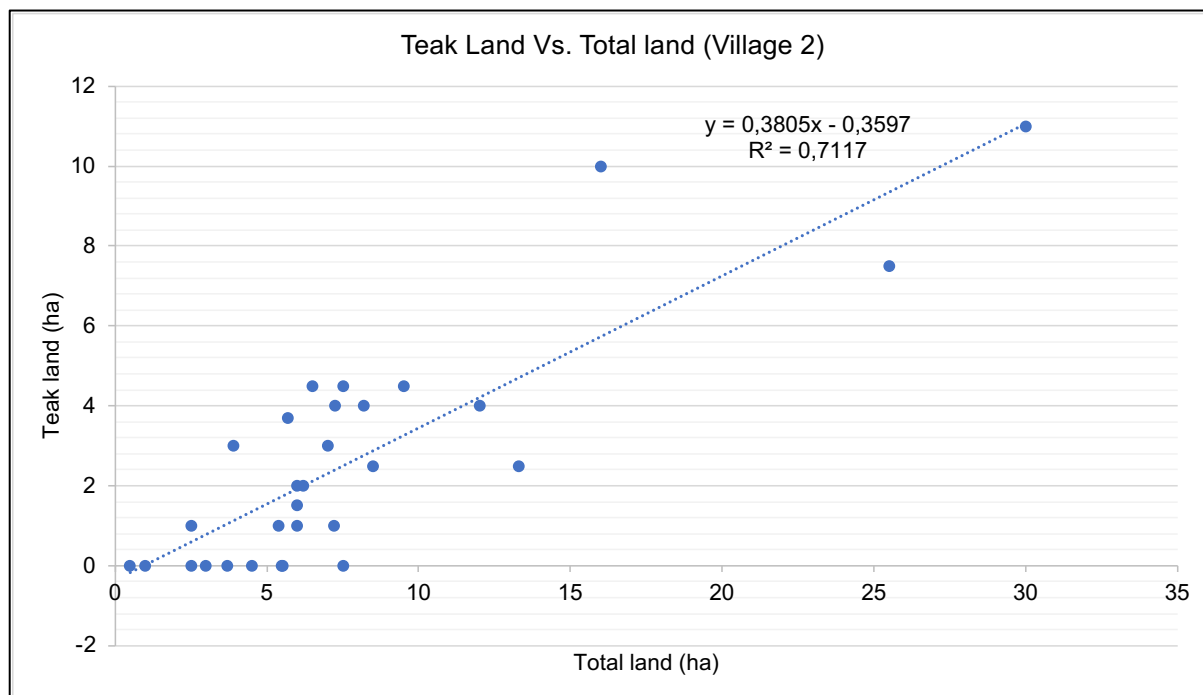


Figure 3.10: Relationship between household average total landholding and land planted to teak, Village 2

Access to land is a central to households' capability to adopt teak, as evidenced by resource-poor household inability to adopt teak into their livelihood activities. Most wealthier households owned larger areas of teak than other groups.

Reasons for adopting teak

The reasons households gave for their decision to adopt teak are presented in diminishing order of frequency across both villages in Figure 3.11, and in Figures 3.12 and 3.13 for Villages 1 and 2 respectively. There were some differences in the ranking of responses between villages, but the reasons were largely consistent. Across both villages, the most common reason for adopting teak was 'following others', given by almost two-thirds (63%) of teak adopters interviewed. Common responses were "I followed others because I saw my neighbours planted it and when they sold teak, they got a lot of money, so I want to do the same". Some of these households also identified the influence of respected elders with knowledge and experience in growing teak, particularly in Village 2:

"I followed other people in the village. When planting teak we don't need to work more in the upland rice because I'm an official staff, so I don't have much time to spend in the field. I found that teak is for long term and require less labour input. I know about teak from the elderly person in the village. No one from DAFO came to promote and provide info about teak. The district officers come to the village only for land tax collection". (V2-1, upper wealth class, August 2018).



Figure 3.11: Reasons that households decided to adopt teak across two villages

The second most common reason for teak adoption was “DAFO promotion (free seedlings and training)”, and “long-term investment”, each given by more than one-third (35%) of all adopters. DAFO promotion was the most common reason given by the early and intermediate adopters in both villages:

“I start planting teak because of DAFO’s advice, they said that teak a long-term return benefit for family and now there are not many available native forests, so it is better we plant teak” (V1-11, lower wealth class, July 2018).

“I’m a driver in this area, at that time, the DAFO staff hired me many times to transport teak seedlings to this village. They keep telling me that teak is good for a long-term and told me to plant it if I have land” (V1-1, upper wealth class, July 2018).

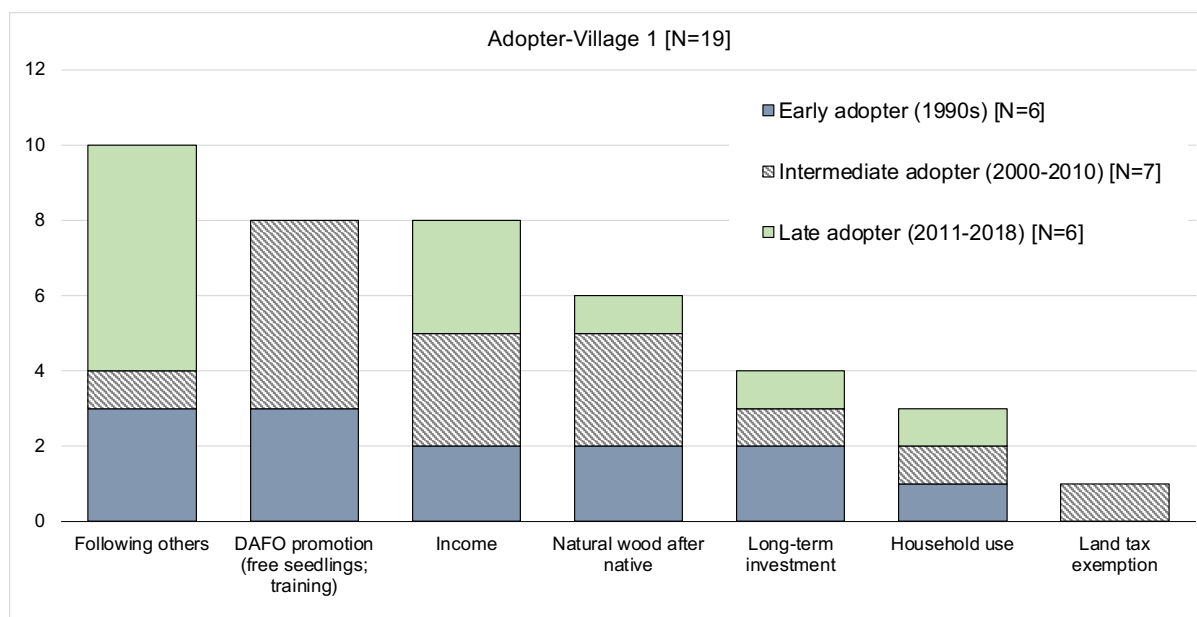


Figure 3.12: Households' reasons to adopt teak in Village 1

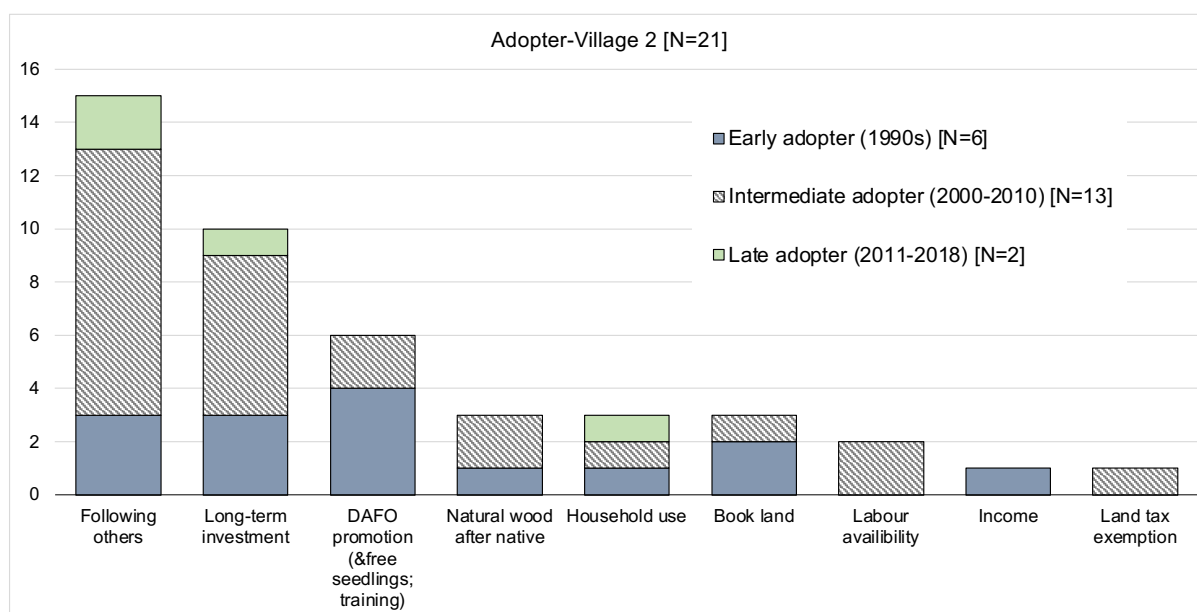


Figure 3.13: Households' reasons to adopt teak in Village 2

There is a relationship between 'DAFO promotion' and 'following others', as one household mentioned that:

"I was working as government office at district level and the Luang Prabang Governor told me to plant teak because teak is good for our future. After I planted teak, I told my relatives and other neighbours to plant teak and many of them followed my advice" (V2-5, upper wealth class, August 2018).

The reasons for “long-term investment” were described by households as planting teak for their children, as one of the household’s assets, or as a ‘green bank’ (Anttila, 2016). Generally, households only sell teak when they need money for essential needs such as to support their children’s education, weddings, funerals and expense for health services.

“Teak is for a long-term benefit and when I’m old I can sell it; I do not have to worry that I will disturb my children’s money”. (V1-9, lower wealth class, July 2018).

A related reason linked to the long-term perspective was the concern households expressed that they would be unable to find or access wood from now-protected natural forests⁹:

“I planted teak because in the future there is not many natural timbers, so teak is an alternative wood and high price. We can use it to build our house and sell it when we need money” (V1-10, middle wealth class, July 2018).

Households generally did not consider themselves as commercial tree growers; “income” was, overall, less important than long-term investment. Households, particularly early and intermediate adopters, often mentioned that they did not know about teak prices and markets when they first start planting teak.

Three households amongst early and intermediate adopters mentioned that they adopted teak because they wanted to secure rights over land (“book land”) and two households mentioned that they wanted to benefit from the land tax exemption offered under the Land and Forest Allocation program during the 1990s¹⁰.

“If we plant teak, we can pay land tax cheaper than fallow land. For example, land tax for teak plot is 30,000 LAK [US\$3.40]/plot/year and for fallow is 40,000 LAK [US\$4.50]/plot/year and if we have many old fallow lands, it is expensive to pay land tax every year. So, I just planted teak in my land” (V1-1, upper wealth class, July 2018).

“We planted teak because we want to jup jong din [book land] and land tax is cheap when our land has teak” (V1-2, upper wealth class, July 2018).

⁹ There are different zones and restrictions in the protected forest. All activities are prohibited in the totally protected forest zone. The controlled use zone is the forest land area which the state allocates for villages, inside and adjacent to conservation forest, to manage and protect the forest and biodiversity and receive appropriate benefits; households are able to collect NTFP for household consumption, and harvesting natural wood is only permitted for communal use such as to build the village meeting hall, temple and school (Revised Forest Law, Lao National Assembly, 2019).

¹⁰ Note that land taxes levied varied between districts; there was also variation in implementation.

“Land tax for teak plot is cheaper than fallow land, with teak is 40,000 LAK [US\$4.50]/plot/year and fallow land is 60,000 LAK [US\$6.80]/plot/year” (V2-6, upper wealth class, August 2018).

In addition, a few households advised that they adopted teak because their perception was that growing teak was easy to plant and required less labour than other crops:

“I am a primary school teacher; I don’t have much time to work in the field. Planting teak is good for me as it requires to manage when the teak was young-the first 2-3 years after planting. After that I just leave them there” (V2-1, upper wealth class, August 2018)

Reasons for not adopting teak and for withdrawing

Across the two villages, 35% (N=22) of surveyed households did not adopt teak; the six most common reasons for not doing so (only four reasons were suggested in Village 2) are presented in Figures 3.12 across both villages, and in and in Figures 3.13 and 3.14 for Villages 1 and 2 respectively. The most common reason was “land location”, with half of these households explaining that, while they had available land, it was too inaccessible. Households in both villages expressed this constraint in similar terms:

“Our land is too far from road and river, if we plant teak, no one wants to buy, but if they [traders] buy they will give us very low price”. (V1-20, Middle wealth class, July 2018).



Figure 3.14: Reasons that households decided not to adopt teak across two villages

The second most common reason for non-adoption of teak was “land availability”; slightly over one-third of the non-adopters (36%, N=8) were in lower and poor wealth categories, who had little to no available land, or whose available land was also too inaccessible. Their livelihood

strategy was to use their land for shorter-cycle crops (rice, maize and Job's Tears) for their immediate needs, rather than give up their land for a long-term crop like teak. This was also linked to the third reason why the households did not adopt teak, namely, "wait too long to get return" and "relatively old to invest in teak".

"Our family has only 3 plots of land, 1st plot for upland rice, 2nd plot for maize/Job's Tears and 3rd is fallow for rotation with upland rice/maize. Each year we have to borrow one plot of land for rotation either for upland rice or for maize. How can we adopt teak and if we adopted teak, we have to wait for more than 15 years to get return. It is difficult for us to manage our land" (V1-25, middle wealth class, July 2018).

"Our family did not adopt teak because we saw other people planting it and wait for at least 15 years to get the return, teak still small and when they sell it, they get very low price. I adopted rubber in 2008 and now I am happy with it. I start to tap it since last year. We got money every fortnight and our son can work both fields-own rubber and Chinese rubber" (V1-24, middle wealth class, July 2018).

"We do not have enough land and also suitable land which is close to village where we can cultivate other cash crops like maize and teak. What we can do is to cultivate rice in order to supply food for our family" (V2-28, poor wealth class, August 2018).

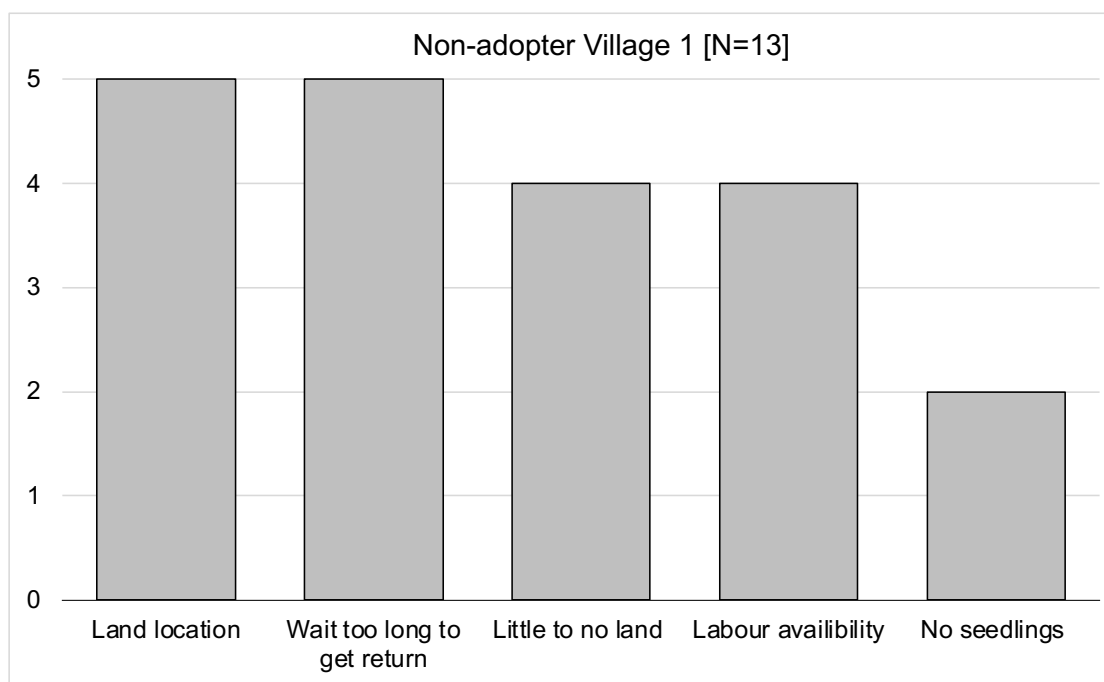


Figure 3.15: The reasons households do not adopt teak in Village 1

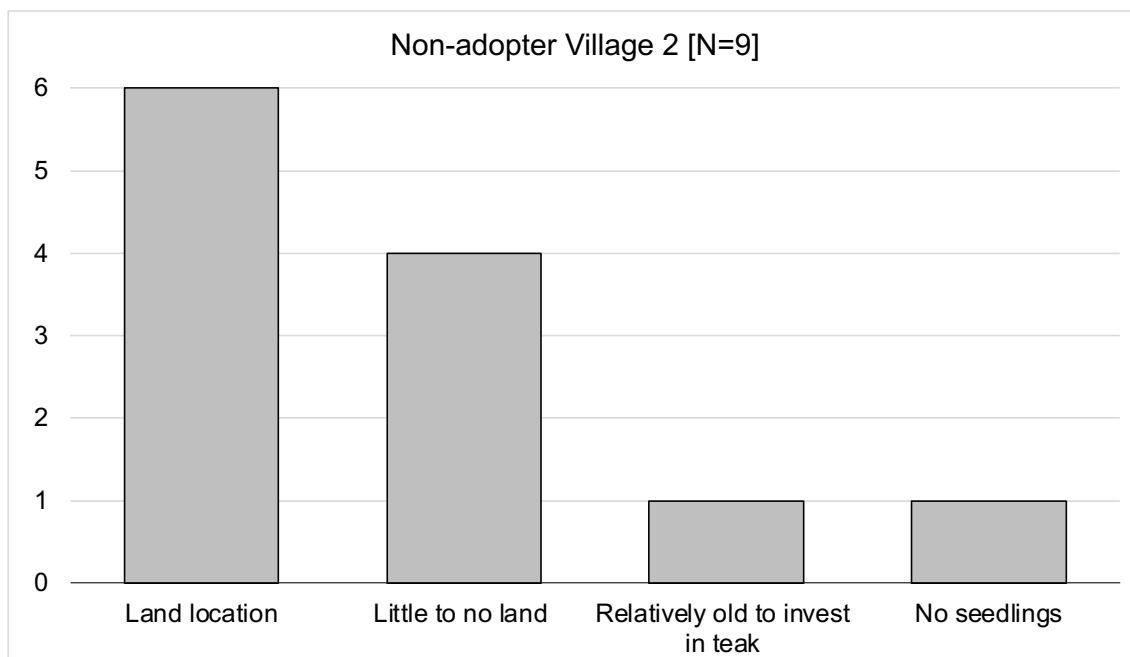


Figure 3.16: The reasons households do not adopt teak in Village 2

Lesser-ranked reasons that households did not adopt teak were “labour availability” and “no seedlings”. The labour issue was mentioned by a household headed by a widow, who does not have an able-bodied adult male in their family. After the free distribution of teak seedlings ended in 1994 (Hansen et al., 1997), seedlings were not affordable for many lower and poor wealth class households. Although the households surveyed did not mention it, informal discussions with villagers suggested that the perceptions of peers or neighbours that it is too long to wait for returns from teak also influenced households’ decisions not to adopt teak, but instead invest in rubber plantations.

In addition to the above reasons, fieldwork interviews with five households in Village 1 revealed that their view of teak as “a long-term investment but [with] very little return” was due to their experience of receiving a poor price for their teak, and their perception that they should receive a better price. This was due, at least in part, to the presence of a monopoly trader (see section 3.4.2 Teak markets), whose anti-competitive behaviour discourages households from adopting or continuing to grow teak. However, in my research, I did not explore teak prices in detail, but I did observe the effect of ‘lack of choice of traders’ on the attitude of teak growers to the crop in general. For example, households expressed their feelings when they sell teak:

“My teak trees are over 20 years, the traders gave me only 35,000 LAK/trees [US\$4/tree]. I should get better prices. I asked him to give a better price but he refused but I have no choice. There is only one trader in our village and I need money urgently” (V1-15, lower wealth class, July 2018).

“People in this village are not confident enough to call to other teak traders because the trader who buys teak in our village has a power. He does not allow other traders to buy teak in these areas [nearby villages]. He is a former government officer” (V1-2, upper wealth class, July 2018).

Monopoly traders have also emerged in other commodities elsewhere in Laos. For example, Smith et al. (2020) found that some rubber companies are advocating for the Lao Government to block independent traders who are providing alternative markets for smallholder to sell their latex. Monopoly traders are not new in the agriculture sector in Laos. Over a decade ago Foppes and Wanneng (2007) reported that Non-Timber Forest Products markets in Northern and Central Laos operated under a monopoly system in which traders received a quota from the Lao Government. A monopoly trader system was also found in black-charcoal markets in Central Laos in which, due to restricted buyer competition, households were offered low farm-gate prices (Barney, 2016).

Some households who withdrew from teak did so because of limited land availability, consequent to the household being late settlers in the village, with less opportunity to access land. When they first settled, these households received three plots of land, and they converted standing teak to other cash crops with a shorter-term return. For example, some households in Village 1 converted teak plots to rubber plantation (supplementary fieldwork with ACIAR project, June 2019; Smith et al., 2020). Another reason was because of the ‘green bank’ (Anttila, 2016) role of teak, in providing cash for emergencies for many households in both villages. While some households were able to replant teak after harvesting for an emergency, others sold both their teak and their land, or withdrew from teak because they no longer had sufficient cash or labour resources, either because of family health issues or because other crops or job opportunities provide a faster return than teak:

“My family adopted teak in 2003 and when my husband [was] falling sick and later pass[ed] away, I need[ed] to sell my teak plot in order to take him to hospital. I did not replant teak again because I don’t have enough labour - my new husband works as a mining worker in another province. Now, I rely on the remittance from my husband” (V1-19, poor wealth class, July 2018).

The factors influencing households’ adoption decisions are summarised in Table 3.6. Households have seen teak as a long-term investment with both positive and adverse impacts for their livelihoods, depending to some extent on households’ capabilities. The general positive view about teak is as a ‘saving’ or ‘green bank’ for households, whereas the negative view is that teak ‘takes too long to get a return’ and/or ‘gets only a little return’. The restricted market and depressed price had become a major disincentive in Village 1, with households in

Village 1 unwilling to grow new teak, and some planning to convert their teak plots to other shorter-cycle crops which may provide them with a faster return. This contrasts with Village 2, which has a stronger teak market network than Village 1; this has encouraged households to keep their existing teak and also grow more teak.

3.5 Discussion

This study explores how and why rural Lao households participate in teak growing. Through the lens of boom crops, it provides useful insights into both households' decision-making about planting teak and policy and market contexts, and how these drivers manifest for teak smallholders in the case study areas. The discussion of these issues is presented in terms of the three categories of factors identified in Figure 3.1 that influence households' decision-making: those external to the village, within the village, and within the household. The discussion draws from the summary of the most significant, presented in Table 3.6.

3.5.1 Factors external to the village level

Policies

The establishment of teak plantations in Northern Laos was influenced primarily by the Lao Government's policies on LFAP and promotion of tree planting during the 1980s–1990s; these policies sought to increase forest cover by substituting timber harvested from natural forests with wood from tree plantations (Smith et al., 2017a), and by targeting replacement of traditional swidden practices in the uplands (Castella et al., 2013; Fox et al., 2009; Hansen et al., 1997; Vongkhamchanh and Van der Heide, 1989) with permanent cropping. Results confirm that these policies were influential, with more than a third (35%) of teak adopters attributing their decision to teak promotion programs (Figure 3.9 and Table 3.6). While the majority of the households mentioned “following others” as one of their reasons for adopting teak, it is clear that policy drivers were particularly important for the early adopters. The role of DAFO officers influencing their peers was also significant; in some cases, government officers adopted teak and then advocated others to follow.

Disentangling the direct influence of policies and other supporting factors is difficult, particularly where strong slogans have been used. Households may, for example, cite “forest cover” as a reason for adopting teak but other factors may actually be more influential. These may be incentives for adoption such as receiving land use rights, land tax exemptions, free seedlings or extension advice, or disincentives for continuing existing practices, such as shifting cultivation.

Table 3.6: Summary of interpretations from literature review and research findings of factors that influenced households' decision-making about teak adoption

Factors	Adopters	Non-adopters	
Factors external to village level	Government policies		
	Land and Forest Allocation program Village consolidation Plantation promotion Land tax exemption	These policies were strong drivers of initial establishment by early adopters in both villages in the 1990s period.	
	Markets & infrastructure		
	At the start, teak market price did not play a key role for households to adopt teak. Domestic and export markets for teak remain steady.	Competitive prices and trader choices are now a key factor in adoption decisions in both villages.	
	Crop characteristics		
	Crop cycle and management system.	Fast-growing relative to most other high-value natural timber species; easy to propagate, grows fast in early years and tolerant to fire; ability to intercropping.	
Factors within-village level	Village characteristics		
	Land availability Road accessibility	Land location within a short distance to roads and sufficient land availability for households to diversify their livelihood activities.	
	Peer-effect		
	Respected elders with knowledge and experience in growing teak.	The later adoption decisions were more influenced by peers, in terms of 'following others'.	The perception of peers that it is 'too long to invest in teak'.
	Market chain network		
A single trader (monopoly) A multiple trader	Households have less to no power to negotiate the teak price.	Low prices discourage household to adopt teak.	
Factors within household level	Household characteristics		
	Wealth categories, age education background, occupation, level of networking and access to information.	All wealth categories, some of them are well-educated, have more land and off-farm income, have social network within village and outsiders.	Middle, lower and poor wealth categories who have little to no land and prioritise other cash crops that have faster returns.
	Knowledge & attitude		
Households' perception of expected costs and benefits of teak and attitude to a long-term investment.	Households have seen teak as an asset or 'a green bank'; benefit from incentives in private land tenure and land tax exemption.	Even though teak is a secure asset for household, they prefer to take short-term return crops (maize, Job's Tears, rubber).	

The results for teak in Laos are consistent with the global pattern of state support for tree plantations (Scott, 1998; Szulecka, Pretzsch, and Secco, 2014). In Laos and elsewhere in Southeast Asia, this has been connected to the promotion of tree plantations as an alternative land use to traditional swidden agricultural systems (Castella et al., 2013; Ducourtieux et al., 2005). One of the surveyed households mentioned that: “*we planted teak because pak-lat [the party-government] do not allow us to slash and burn, they promoted tree planting*” (Fieldwork notes, 2018). This is similar to policies in neighbouring countries: in Thailand during the 1990s, the Royal Forestry Department promoted eucalypt plantation by providing incentives (free seedlings, fertiliser and soft loans) to smallholders (Barney, 2004; Pousajja, 1996) and in Vietnam, the government promoted a tree plantation development scheme of eucalypts and acacias to improve people’s livelihoods through a forest and land allocation program (Sikor, 2012; Smith et al., 2017a). Further from Laos, policies on land use influenced tree growing in Sarawak, Malaysia, where the government blocked the expansion of swidden and instead reserved land for logging and plantation establishment (Fox et al., 2009); and in Ghana, Africa, where teak plantations were implemented under the national forest plantation development program to conserve natural forests and sustain timber production (Narh, 2019).

The Prime Minister’s Order (PMO15) on Enhancing Strictness on the Management and Inspection of Timber Exploitation, Timber Movement and Timber Business which banned the export of all unprocessed wood, included teak and other plantation species and had immediate impacts on markets and prices for teak growers who exported logs directly to markets in neighbouring countries (Smith et al., 2018c). While these moratoriums were not aimed at farmer-grown teak, they nevertheless sent strong negative signals to the plantation and wood processing sectors. This resulted in a review of all processing enterprises, closing many micro-scale and small factories operating illegally (Smith et al., 2020) which affected smallholder teak growers for whom these were a key market (Fieldwork notes, 2018). As a naturally occurring species in Laos, teak remains constrained by the new log export rules, which are likely to become more limiting as the government implements its Timber Legality Assurance System under the Lao-European Union Voluntary Partnership Agreement (Riddy et al., forthcoming). Forest certification represents an even bigger hurdle for smallholders (Ling et al., 2017); both legality verification and certification impose a ‘duty of care’ from company and traders to demonstrate teak products are sourced legally (Midgley et al., 2015). Most smallholder teak plantations remain unregistered; as registration is a legal requirement, they will thus be unable to supply export markets and will be limited to informal and lower value-domestic markets or to the limited product scope available to teak wood processors under PMO15 (Smith et al., 2018c).

Although legislation states that households who plant and register their trees are entitled to land tax exemptions, implementation varies and teak smallholders in the two case study villages continue to pay land tax for their teak plots. However, this does not seem to have affected the overall level of teak planting, which remains stable (Boer, 2019), suggesting that this policy measure may actually be ineffective (Smith et al., 2017c), despite this incentive being retained in the newly reformed Forestry Law (No 64/NA 2019) and supporting policies. Under the new Forestry Law, and in conjunction with other reforms (Smith, 2021), the Lao Government is increasingly regulating and enforcing taxation of income, including from forestry businesses. Plantation growing is classified as a forestry business and where timber is to be sold for commercial purposes, income will be taxed. Smith et al. (2018c) pointed out that taxes in teak value chains “remain a significant and often unclear and inconsistently applied financial constraint” and encourage participation in the informal sector (p.38). Teak-growing households are captured in this regulatory change¹¹, which is still under development, and it remains to be seen how it will be implemented and enforced, or what the impacts will be.

Markets

In Laos over the past 2 decades, rural households have shifted progressively from a subsistence to a market-based and export-oriented economy, led by market ‘pull’ mediated by a series of Lao Government policies (De Koninck et al., 2012; Hirsch and Scurrah, 2015; Kenney-Lazar, 2012). Consequently, Laos has experienced a number of export-oriented crop booms driven mainly by markets (cassava, bananas, maize, rubber and sugarcane). While policy drivers were initially influential in motivating the adoption of teak, the strongly-growing demand for industrial wood in Asia has meant that market signals for both large- and small-scale tree growing in Laos have also been positive and significant (Midgley et al., 2017; Midgley et al., 2015; Smith et al., 2018c). However, policy responses to the adverse outcomes of the rush for land, prompted largely by other boom crops, created negative market signals which inhibited plantation investments generally and constrained export wood markets. This has been evident in other plantation tree crops (Smith et al., 2020) and also for teak: the rush to plant teak in the 1990s–2000s has slowed with only modest increases in planted area in recent years (Boer, 2019).

¹¹ See for example the Chapter on Forestry Business in the Forest and the new Income Tax Law No. 67/NA, dated 18 June 2019.

Direct market demand for teak wood was not viewed by households in the two case study villages as an important factor in adoption decision-making. Initially, most households had little market information and later perceptions of the adequacy and competitiveness of prices for teak became a factor in some decisions about whether to continue growing it or to switch to other crops. As described in section 3.3, teak markets in the two villages differ markedly; those in Village 1 are controlled by a single trader, while households in Village 2 have a choice of traders. This market situation has a significant impact on households' adoption decision-making: in Village 1, there are no households willing to grow more teak, and some of those who have adopted now plan to cut teak to grow other crops such as rubber, bananas or convert to pasture; in contrast, in Village 2, households are both keeping existing and planting more teak.

Crop characteristics

“The crop’s biological and ecological characteristics” are an important factor underpinning crop booms in Southeast Asia (Hall, 2011a, p. 853). A number of characteristics of teak as a crop are relevant to its adoption in the case study villages. Teak is easy to propagate and fast-growing when compared to most other high-value natural timber species (Hansen et al., 1997). Free seedlings were provided by the Lao Government during the plantation promotion program during 1980s to early 2000s, and this facilitated both its promotion and adoption. The 15–20-year period required for teak to mature and be available to generate income (Arvola et al. 2018; Midgley et al., 2007; Newby et al., 2012; Smith et al., 2017) makes it an attractive investment option in certain circumstances, as discussed above; this was one of the main reasons households reported for adopting teak. The characteristics of teak, as a long-lived tree with wood that appreciates in value over time, mean that growers can choose to hold onto their trees until they choose to harvest, with no imperative to harvest because of decline in product quality, as occurs with most agricultural crops. Other studies have shown that teak has contributed to a “livelihood transition” from subsistence-oriented swidden agriculture to more market-oriented farming systems for some farmers (Newby et al., 2012). Farmers who adopted teak have done so to enhance their assets and to increase their future income because, as a long-rotation crop, they have to wait for at least 15 years for a return. Smith et al. (2017c) found that selling teak wood represents only a very small proportion (7%) of annual household income, suggesting there are other factors influencing decisions. In contrast, in neighbouring Myanmar, commercial considerations and the desire to enhance overall profitability from the land were foremost in farmers’ decision to adopt teak (Nair and Souvannavong, 2000).

The Lao Government's teak promotion program was important in informing households of teak as a high-value and durable timber, which can be used by households for house and furniture construction instead of wood from native forests. With appropriate management, teak also yields useful secondary products; households use young teak branches from pruning and thinning for fuelwood and fencing, also reported for Laos by Hansen et al. (1997) and Midgley et al. (2017), and by Roshetko et al. (2013) for Indonesia. Another advantageous characteristic of teak is its suitability for intercropping, which is commonly practised by households in the study area with upland swidden crops (rice, maize and Job's Tears) co-located during the first 1–3 years of the plantation. This generates food and/or income for households and provides weed control for the young teak. These results are consistent with those of other studies of teak in Northern Laos by Arvola et al. (2018), Dieters et al. (2014), Newby et al. (2012) and Pachas et al. (2019); and in Java, Indonesia, where Khasanah et al. (2015) reported maize intercropping with teak for the first 5 years of teak growing.

Generally, households in both villages viewed teak as easy to grow and a low labour crop, which is similar to findings in neighbouring Thailand, where cassava farmers shifted to eucalypt plantations because of their short rotation (5–7 years), capacity to grow in the poor soil condition after repeated cassava crops, and low labour inputs (Boulay et al., 2012). However, research results, such as those reported by Dieters et al. (2014) for Northern Laos, show that in order to maximise the value of teak, it requires thinning and pruning, which demand more time and labour than households typically commit. The perception of teak as a low labour input crop means that farmers are not realising the maximum income they could derive from their investment in terms of wood quality and volume, and they receive a lower price than perhaps anticipated. This in turn impacts the opinions of others about whether or not to adopt teak, as was evident in that of non-adopters that teak growers 'wait too long to get a return', and that the return is far less than households expected due to low wood quality.

3.5.2 Factors within the village level

Village characteristics

Key 'village characteristic' factors were the availability of suitable land and security of land tenure. These results show that teak adoption started with households who already owned and/or had access to suitable land that was not required for other crops, and subsequently by those who used teak planting to secure land tenure by 'booking' it, as the LFAP and the Village Relocation and Consolidation Strategy allowed. This is consistent with other studies in Laos (Arvola et al., 2018; Hansen et al., 1997; Newby et al., 2012; Roder, Keoboualapha, and

Manivanh, 1995; Smith et al., 2017c), and elsewhere, for example, eucalypts in Thailand (Puntasen, Siriprachai, and Punyasavatsut (1992), eucalypts and acacias in Vietnam (Sikor (2012), and teak in Ghana, where (Narh, 2019, p. 51) reported that farmers “use teak as a political tool to secure their right to land” and “to protect their land rights against forcible acquisition by state authorities”. Security of tenure has long been recognised as one of the ‘keys’ to smallholder tree growing (Byron, 2001), but these results show that in some cases tree growing can also facilitate, rather than just be dependent on, such tenure security.

This strategy was not, however, available to all; late adopters in both case study villages did not have land available for growing teak because it had already been ‘booked’ by others, or was allocated, occupied by villagers, or zoned for conservation. Similarly, elsewhere in Northern Laos, early settlers had opportunity to access the most fertile fields in upland and lowland areas while the new settlers missed out on this opportunity (Castella et al., 2013). In Central Laos, farmers who had access to more land during the land booking period (“prior *chap chong claims*”) had better opportunity to adopt agroforestry (van der Meer Simo et al. (2020b, p. 1940). In Thailand, Boulay et al. (2012) reported that an opportunity for farmers to secure land through eucalypt planting was possible for the early settlers during the mid-1990s, but no longer possible by the time of their study. However, land tenure security for teak smallholders has changed over time, as many teak smallholders in the village sold or transferred their teak and land to outsiders (Newby et al., 2012 and FGD, 2018). Thus, this teak land was taken out from the village’s land pool, which reduced the village’s capacity to manage land allocation in the broader community interest (e.g. for newlyweds).

A second important village characteristic was that of accessibility to markets and government services. Hansen et al. (1997) pointed out that, at that time, the distribution of teak in Luang Prabang Province was limited by the availability of transportation and that 95% of teak plantations were established along roads and rivers. Updated data on teak coverage in this province by also found that the majority of teak remains planted along roads and rivers (Boer, 2019). Infrastructure, principally road access, condition and distance to Luang Prabang town differed significantly between the two case study villages; Village 1 being relatively close to the town via a highway-quality asphalt road, while access from Village 2 is further from Luang Prabang city and relies on boats and, until recently, dirt roads and transport of teak wood along the river. However, farmers in Village 2 continue to adopt teak, indicating greater availability of land compared to Village 1, as well as other factors discussed above.

Village characteristics also affect how households received information and agricultural extension: Village 1 received teak information and had more interaction with DAFO staff than

households in Village 2. As a result, households in Village 2 have higher proportion of households 'following others' in their village than in Village 1. This is discussed further below.

Peer effects and opinion leaders; 'following others'

'Following others' was the main reason (63% of respondents) for teak adoption for households across the two villages (53% and 71% for Villages 1 and 2, respectively) and particularly important for the middle and late adopters (see Figure 3.9). Peer effects have also been reported to be important in adoption of other crops in Laos. Friis and Nielsen (2016, p. 126) found that one of the main reasons that households decided to lease their land to foreign companies for banana plantations in Northern Laos was because they wanted to "follow the society's development". Similarly, Junquera et al. (2020) and Smith et al. (2020) found that following others was a significant factor in adoption of rubber plantations in Northern Laos, during and after periods of rapid expansion, but – similarly to these results for teak – not in the early stages of adoption.

In both villages, the influence of respected and, mostly wealthier, elders with knowledge and experience in growing teak was important in the dissemination of information and in influencing other households to adopt teak. These informal leaders disseminated information, provided by government and through extension, first to their relatives creating an 'elder effect', and later the information spreads to others in the village through 'peer effects'. Indeed later-adopting households reported that they obtained knowledge mostly from their peers, rarely receiving information about teak from agriculture extension. Arvola et al. (2019) reported similarly for tree growers in Tanzania, with most farmers obtaining knowledge of tree growing and plantation management from their families or other villagers, and very few from agricultural extension agents.

Market chain networks

While the overall market for teak has been relatively stable in Northern Laos (Midgley et al., 2015; Smith et al., 2018c), it is expressed differently in the two case study villages, primarily due to the different roles of teak traders in each. Traders play a critical role in connecting tree growers to markets in Laos and Southeast Asia more widely (Midgley et al., 2015), as Nuberg et al. (2019) reported for Nepal, and Sikor (2012) found for Vietnam, where locally-based traders predominate.

The two villages offer contrasting examples of the roles that traders can play that influence households' decision-making on planting teak. In Village 1, where one trader monopolises the

market and controls prices, and farmers are no longer adopting teak in part because they believe they are not receiving an adequate or fair price for the wood. This contrasts to Village 2, where a number of traders operate, leading to greater, although still marginal, price competition; households have more choice of to whom to sell their teak, and perceptions of inadequate or unfair prices do not constrain decisions to reinvest in teak growing. Teak price negotiations appear rare in the two villages; rather, traders set the price, as reported by Arvola et al. (2018) and Smith et al. (2018c). While some households are able to refuse an offer from traders by delaying a sale, this action may be possible only for households who are not in urgent need of money.

Traders also play an important role in household adoption of teak as well as market interaction (Smith et al., 2018c) and in helping farmers navigate regulatory hurdles. Households received little, if any, information and support from government agencies in relation to teak markets and prices; when asked how they knew about teak prices, all households responded, “from traders and their peers” (Fieldwork notes, 2018).

Efforts have been made to strengthen farmer’s capacity, negotiation power and assist in market access, including through the formation of growers’ groups, enterprises and forest certification. The donor-supported LPTP, has been supporting the teak sector in Luang Prabang since 2008 and has been engaged in a sustained effort to address some of the hurdles. Teak grower groups and enterprises have been established, but have not been effective due to lack of trust among members, the administrative costs (in time and money) in registering groups and enterprises and irregular teak supply (Ling et al., 2018). Furthermore, the complex requirements in plantation registration and sales processes and in meeting certification standards has meant that benefits of complying or participating did not outweigh the cost (Smith et al., 2017c). Grower groups’ experiences in trying to access to export markets have been inhibited by powerful domestic wood processors and strict export product standards introduced since PMO15 (Smith et al., 2018c).

3.5.3 Factors at household level

Household characteristics and wealth

Household wealth was a major driver of participation in teak growing; wealthier households – those with more land and land suitable for teak growing, and those that had higher incomes, including through off-farm activities or employed as service providers – were found to be more likely to adopt teak. This result is consistent with those of other studies in Northern Laos

(Arvola et al., 2018; Dieters et al., 2014; Newby et al., 2014). Similar results have been reported elsewhere. Boulay et al. (2012) found that Thai households with suitable and available land are more likely than others to adopt eucalypt tree farming, and Sikor and Baggio (2014) found that better-off households in Vietnam are more likely to grow trees and invest in plantations than poor households.

Households with unsuitable land – typically a long distance from roads – or who were landless were unable to adopt teak, even though they expressed a desire to do so. This corresponds with earlier research (Newby et al., 2014). In contrast, non-adopters who had suitable land opted to plant rubber or other crops that gave a faster return than teak, and some teak-growing households were also ‘withdrawing’ to take up these opportunities, a situation also reported by Smith et al (2020) in relation to a transition from teak to rubber, also in Xieng Ngern District. As noted in the Introduction, other shorter rotation crops can offer profitable alternatives for farmers. Switching between crops is not uncommon amongst farming households; in Luang Namtha Province, households are converting rubber to bananas by leasing land to banana companies (Vongvisouk and Dwyer, 2017) and to other production options such as cattle. For teak, which is a crop with a long rotation, the decision to ‘withdraw’ or ‘withdraw early’ has important implications for those households which adopted it as a household savings strategy or ‘green bank’, and for the sector generally.

Young household heads are now less likely to adopt teak than older people, as evident in the small number of surveyed households in the ‘late adopter’ category. This was variously due to limited land availability, competition from other attractive crops (rubber, maize, Job’s Tears) and off-farm activities (open shops and food stall), with young family members migrating to work in Luang Prabang town. Most older household heads explained that they had planted teak for their children, and a few mentioned that they are now too old to adopt teak and will leave the next land use decision to their children. This is consistent with a study by Perz and Walker (2002) who found that stages of household life cycle may influence land use decisions, and that younger households are more likely to focus on faster returns from their investments.

Knowledge of teak

Most early adopters and some intermediate adopters received information on teak planting from DAFO’s extension services, and most of those who adopted subsequently learned from their peers. The most common statement from teak households was “teak is easy to grow, I just look [for direction/knowledge] at other people’s plots” (Fieldwork notes, July–August 2018). Informal discussions with households also found that some households did not even

ask their neighbours how to plant teak; rather, they simply observed. Most teak adopters reported a perception that teak only needed intensive labour inputs during the first 3 years after planting; another common perception was planting many trees provides greater log volume; some households planted at 1m x 1m spacing and were hesitant to cut out small teak trees because they believe that all trees would continue growing. However, these practices are in contrast to the recommendations of early extension advice and more recent research (Dieters et al., 2014; Newby et al., 2014) that optimal teak planting spacing should be 3m x 3m. Both wider initial spacing and more intensive management involving pruning and thinning would lead to better wood log quality and prices, and higher income overall (Dieters et al., 2014; Newby et al., 2014). A study of household perception of tree investments, particularly of labour in Java, Indonesia, also found that most smallholders fail to realise the potential of the silviculture required to meet market specifications (Irawanti et al., 2014) and a better net return for households. Boer (2019) found that overall teak plantations in Luang Prabang province are dominated by smaller size trees with generally poor tree quality. In many cases of teak plantings in Laos, it is now too late to undertake management that will significantly increase wood volume.

Livelihood strategies

Livelihood strategies of teak households in the case study villages are similar to those of most rural households elsewhere in Laos, in which households diversify their livelihoods to the extent possible and affordable. Depending on individual circumstances and opportunities, these strategies typically comprise food crops for subsistence and sale, tree growing, livestock rearing, and on-farm and off-farm labour or service provision. This is the case for smallholder tree growers in many countries. For example, in Java, Indonesia, small-scale forestry is commonly seen as an integrated component of family farms (Irawanti et al., 2014). In Tanzania, farmers adopted tree growing as a tool for their livelihood diversification (Arvola et al., 2019).

As Rigg (2006) noted, rural households in Laos have diversified their livelihoods both for survival and to build wealth, resulting in what Rigg et al. (2020) describe for neighbouring Northeast Thailand as a “hybrid household”, where most households were multifunctional and drawing income from a range of on-farm and off-farm activities. This is a widespread phenomenon, both in relation to tree growing and more generally. For example, households in Thailand adopted eucalypts to diversify their income (Boulay et al., 2012). McCarthy (2019, p. 4) and Pritchard et al. (2017, p. 52) reported strategies adopted by rural households in Indonesia and India, respectively, that were characterised by moving ‘sideways’ to off-farm

activities, while retaining those on-farm. They suggest that, in many cases, households are just moving sideways, or treading water, in a stalled agrarian transition, in which they continue to have certain vulnerabilities including problems accessing nutritious food.

Some households in both villages value the 'long-term investment' dimension of teak growing, but teak adoption in the two case study villages is diverging, for the reasons discussed in preceding sections. In Village 1, teak planting has ceased, and the village landscape is now characterised by mature teak and rubber, young rubber, short cycle crops (Job's Tears and maize) and paddy rice. In Village 2, around 20 households are establishing new teak plantations, and the village landscape is characterised by young teak (1–2 years old) close to roads, maize and mature rubber, upland rice and small areas of paddy rice. Although Village 1 has a good road access to markets, the presence of a monopoly trader and other alternative crops means that households are no longer interested in growing teak. In contrast, in Village 2, access is poorer, by dirt road and by river, but households continue growing teak because they feel that they receive a fair teak price with more competition amongst teak traders.

The majority of households in both villages would now prefer to plant rubber than teak because of shorter time for returns, and because rubber provides a fortnightly return 8–10 years after planting, if tapped regularly (Smith et al., 2020). However, some households also mentioned that investing in rubber requires high inputs, and that households need to have secure income while waiting for the rubber to mature; some households were unable to afford to do so. These households preferred to cultivate annual crops like maize, rice and Job's Tears. This result is consistent with those reported by Maraseni et al. (2018) for smallholder teak in Xayabouly Province, and by Arvola et al. (2018) for Luang Prabang Province, that farmers are interested in and planned to convert their teak plots and labour to more productive land uses that provide more regular returns, such as high-demand tropical fruit crops.

Overall, my results suggest that households that own teak are wealthier than those that do not. This finding is consistent with other work on teak smallholders in Laos, which found that initial household wealth was an enabling factor for wealth accumulation, including for the case of here teak households who had planted but not yet harvested teak compared to those households that never planted teak. Similarly, households that had planted and harvested some trees tended to have greater wealth than households that had planted but not yet harvested any trees. More generally, teak-owning households are typically relatively wealthy, have a higher education level, and a better position in public service employment (see Newby et al., 2012 and Cramb et al., 2017).

3.6 Conclusions

This study explores smallholder households' participation in teak plantations in Luang Prabang Province, Northern Laos, using a conceptual model (Figure 3.1) representing factors that influence households' decision-making in planting teak, not planting and withdrawing in the context of their livelihood strategies. I adapted this model from those developed by Meijer et al. (2015); Pannell et al. (2006) and Versteeg et al. (2017) and integrated a livelihood strategy by Scoones (1998). The model incorporates factors at three levels – external to the village, within the village, and within the household – and I found it to be helpful to understand the role of factors at each level, and the interactions between different levels, in influencing households' decision-making for participation in teak growing.

Some of the findings of this study are consistent with the results of previous research on teak in Laos and in similar situations elsewhere. Generally, the Lao Government's policy of promoting tree plantations through DAFO was an important factor in initiating adoption of teak during the early and intermediate adoption periods; market factors were not the primary driver of households' adoption initially. The role of teak as a long-term 'green bank' investment and in securing land tenure were also important adoption factors. Individual households in the case study villages, particularly the later teak adopters, made their decision to adopt teak based on knowledge and information that they received from their neighbours, who had previously followed the example of opinion leaders. As in the adoption of other boom crops in Laos (e.g., bananas and rubber), 'following others' became the main driver of teak adoption in both villages. Adoption helped households diversify their livelihood and manage their land and labour. Although information from extension agents about managing teak was disseminated to the case study villages, most households saw teak as a low input crop and decided not to invest their labour in teak management, despite the financial returns from doing so.

In both villages, teak adoption was led by the wealthier households; none of the poorest households engaged in teak growing. The lack of sufficient or suitable land, and the relatively long time until harvest, were the most important reasons for non-adoption. While teak plays an important role as a 'green bank' for emergencies, some households were unable or chose not to return to teak growing subsequent to harvesting for this purpose. More attractive shorter-cycle crops, such as maize, Job's Tears and bananas, became more attractive options for households.

While previous Lao Government policies encouraged and influenced households' participation in teak growing, current policies and regulations that apply collaterally to smallholder teak have

largely negative impacts on adoption. While global and domestic teak markets remain strong, and local market chains are active in Luang Prabang Province, the contrasting situation between the two case study villages illustrates the importance of competitive local markets. The monopoly on trade in Village 1 has discouraged continuing adoption, whereas greater market options encourage households in Village 2 to continue to plant teak.

These results demonstrate the importance, and interaction over time, of each of policies, markets and peer learning in teak adoption. They suggest that Lao Government policies and regulations should aim to better facilitate trade in smallholder-grown teak, foster local market chains which enable farmers' and traders' access to legal markets and promote extension to growers; simplified regulations and administration processes, including scale-appropriate certification procedures (Arvola et al., 2018; Smith et al., 2017c), have been identified as essential to expansion of farmers' opportunities (Smith et al., 2017c). In addition to fostering strong markets and market chains that in turn foster adoption, encouraging households to manage teak more intensively would improve timber quality for the Lao wood processing industry and returns to households. However, this may be difficult to realise if farmers continue to value teak as a crop that is 'easy to grow and requiring less labour' and do not see themselves as commercial tree growers. A middle ground needs to be found in the contrasting attitudes of Lao Government, as seen in policy that treats teak growing as income-earning and commercial, and farmers who see teak growing as a bank rather than a primary income source. Without a clearer policy on the place of smallholders in plantation policy, what constitutes 'commercial plantations' and how or whether new business and tax policies apply to smallholders, there is a risk that the long-standing smallholder teak boom, which is already at risk from other commodity crops, will bust.

4 Household participation and livelihood outcomes associated with export banana farming in Northern Laos

4.1. Introduction

Laos remains one of the poorest nations in Asia with GDP per capita of US\$2,630 in 2020 (World Bank, 2021a). More than three-quarters of the Lao population live in rural areas and depend upon smallholder agriculture (ADB, 2018; IFAD, 2020). A smallholder is usually a farm with area of less than 2 hectares (ha) (Alexander et al., 2017; Rigg, 2020), complemented by customary access to ‘forest’ lands (Ducourtieux et al., 2005). Historically, many farmers in the Lao uplands have practised swidden agriculture (Fox et al., 2009), combining production for subsistence and for sale, and drawing most labour from within the household or family (Rigg et al., 2016). Since the 1980s, a series of Lao Government policies has sought to limit this practice (Castella et al., 2013), and have progressively ‘opened up’ the economy (Lienhard et al., 2019), shifting towards a market-based economy more integrated with regional and global markets (De Koninck et al., 2012; Hirsch and Scurrah, 2015; Kenney-Lazar, 2012), pursuing a national goal of socio-economic development including through the Land Law in 2003, and the of ‘turning land into capital’ (Dwyer, 2007). Consequently, over the past 2 decades, Laos has experienced a number of export-oriented crop booms, including for cassava (Smith et al., 2018a; Soukhamthath and Wong, 2016), maize (Kallio et al., 2019), sugarcane (Jalilian, 2013; Supaporn, 2015; Sylvester, 2018), rubber (Kenney-Lazar et al., 2018; Lu, 2017; Manivong and Cramb, 2008) and – most recently –bananas (Friis and Nielsen, 2016; Higashi, 2015; Vongvisouk and Dwyer, 2017). In 2019, the value of the principal Lao export crops was US\$198 million for bananas, US\$129 million for cassava, US\$105 million for rubber and US\$34 million for maize (Vientiane Times, 2020a; Xinhua, 2020).

These crop booms have been financed in part by investment from neighbouring countries – particularly China, Thailand and Vietnam (Grimsditch, 2017) – under Laos’ Investment Promotion Law in 2004¹² (Campbell et al., 2012), capitalising on relatively fertile soils and cheap land and labour (Manivong et al., 2016). Investment and migration from China has been particularly important in the North, following industrial cooperation between Yunnan Province and the Northern provinces of Laos (Luang Namtha and Oudomxay) (Tan, 2015), China’s

¹² This Law facilitated and encouraged private investments e.g., granting investment permits, especially land acquisition fees (land tax exemption up to 10 years). The exemption and reduction have applied in other taxes and fees on exports.

Going Out policy (Tan, 2015) and the *North Plan*¹³ (Northern Laos Industrial Economic Development and Cooperation Planning Preparation Group, 2008). Chinese agricultural investments concentrated in Northern Laos (Bociaga, 2020; Grimsditch, 2017; Kenney-Lazar et al., 2018; Woodman, 2011), where companies progressively built on their experience, with rubber, maize, and sugarcane (Tan, 2015) subsequently facilitating investment in bananas (Kingkhambang, 2012).

A Cavendish banana (*Musa acuminata*, in the Cavendish Subgroup; *Kuay Hom* in Lao language) boom has been underway for the last decade, concentrated mostly in the northern provinces which are geographically proximate to China, the export destination, although more recently the boom has spread southwards (Finney and Avary, 2020), through to the border with Cambodia (Santasombat, 2019). The boom was driven by a conjunction of circumstances: growing demand for fresh fruit in China (Friis and Nielsen, 2016; Manivong et al., 2016); land degradation and Panama disease (*Fusarium wilt*) associated with banana production in China (Friis and Nielsen, 2016; Ordonez et al., 2015); a Chinese ban on bananas from the Philippines, hitherto its largest source, consequent to the dispute between China and the Philippines over the South China Sea (NIKKEI, 2019; Santasombat, 2019); and the fall of rubber prices in 2012, which catalysed the conversion of rubber plantations to other crops, especially bananas (Vongvisouk and Dwyer, 2017). The total area of Cavendish bananas, primarily in northern Lao provinces (Phongsaly, Luang Namtha, Bokeo, Oudomxay, Xaybouly), peaked in 2016–2017 at 26,177 ha, involving a total of 117 companies (Vientiane Times, 2019). By 2018, these figures had dropped to 20,408 ha and 90 companies (Vientiane Times, 2019), reflecting the impacts of national and provincial moratoriums on banana growing (Khotpanya and Lipes, 2019) and of the emergence of Panama disease (de Lapeyre, Tixier, and Risède, 2017).

A key feature of the Lao banana boom is the mode of land acquisition. Companies have secured access to land for banana production through entering into contract arrangements with rural households (Friis and Nielsen, 2016; Kallio et al., 2019; Vongvisouk et al., 2014), rather than by large-scale land acquisition through government land concessions (Hall, 2011a) that characterised much of the Lao rubber boom and that for acacia and eucalyptus plantations (Barney, 2008; Kenney-Lazar, 2012; Phimmavong et al., 2019; van der Meer Simo et al.,

¹³ *Planning for Industrial Economic Development and Cooperation in Northern Part of Lao People's Democratic Republic* (referred to as "North Plan" hereinafter) is a 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).

2020a). Banana contracts were arranged between investor companies and participating households, with land brokers, village leaders, and other local authorities playing various intermediary roles, as distinct from other crops, for example, for maize (Kallio et al., 2019), and rubber (Smith et al., 2020). Contracts between investors and households were typically for land leases, and generally used migrant Lao or Chinese labour (Ling and Xiong, 2017). Several studies (Friis and Nielsen, 2016; Higashi, 2015; Ling and Xiong, 2017; Manivong et al., 2016; Sylvester, 2018) have explored the impacts of the banana boom on rural households in Laos, reporting positive impacts through increased household income, more employment and improved local infrastructure and negative impacts on health, the environment, and foregone opportunities for other crops. This chapter complements these studies to explore in more detail households' reasons for and ways of participating in banana production, and the livelihood outcomes that follow. It also considers the implications for agricultural and rural development policy in Laos. The study draws on field research in two case study villages in Northern Laos to investigate the following research questions:

- How and why do households participate in the banana boom?
- What are the livelihood outcomes of households' participation in the boom?
- What are implications for relevant agricultural and rural development policies?

The first of these questions incorporates the first and second research questions of the thesis as a whole, and the second question to the third of the thesis research questions.

4.1.1 Models and actors in crop boom investments in Laos

Investment arrangements and levels and forms of household participation in commodity crops in Laos have varied: they include concession models (Hall, 2011a), which focused on state land and which largely exclude households; contract farming, such as for rubber outgrowers (Dwyer and Vongvisouk, 2019; Smith et al., 2020) and maize cropping (Kallio et al., 2019); and farmers investing independently, such as for teak (Newby et al., 2014). Investment models in Laos are commonly characterised as 'x+y', where 'x' and 'y' are the number of factors of production contributed by the farmer and investor, respectively (see Castella et al., 2009; Fox and Castella, 2013). For example, under a '2+3' model, farmers provide land and labour, and the investing company provides capital (in the form of seedlings, fertiliser and other equipment), technology (and/or training), and access to markets. Under a '1+4' model, farmers typically provide land but no other inputs; the company hires labour, and provides capital, technology (and/or training), and market access (Fox and Castella, 2013; Fullbrook, 2007; Shi, 2008).

Chinese companies have been the only investors in Cavendish banana production in Northern Laos (de Lapeyre et al., 2017; Higashi, 2015), initially following both the '2+3' and '1+4' contract farming models. Companies have subsequently preferred and switched to the '1+4' model, in which they have greater control over production (Higashi, 2015) which both helps them to meet the export and import requirements of Laos and China¹⁴ and manage labour requirements. Because wage labour costs are relatively low, and labour mobility is quite high, in Laos, this model is more profitable for companies than the '2+3' model (Shi, 2008).

Both the '2+3' and '1+4' models are predicated on banana companies leasing land owned by households, through written agreements between the company and each household, with the approval of the Village Head or local notary office (Friis and Nielsen, 2016). Leases are typically for 10 years, with a review at 5 years when terms can be renegotiated; the land rental is paid annually. Land restoration at the end of lease is expected by the landowner to be the responsibility of the company. Depending on the nature of the contracts this may not be formalised in writing (Friis and Nielsen, 2016), and is often not realised in practice. In some cases, companies have paid compensation to farmers after terminating contracts before the end of the agreed lease term (Higashi, 2015). Under the '2+3' model, farmers who work as plantation managers receive a lump sum payment at the end of each season, based on the weight of bananas harvested on their land. Compared with land rental contracts, agreements for seasonal and day labour work may be written or verbal (Friis and Nielsen, 2016; Higashi, 2015; Ling and Xiong, 2017).

Contract farming in Laos has had mixed results, with a range of factors implicated in success or failure (Fullbrook, 2011), in part because of the relatively weak culture of contract-making in Laos. These mixed outcomes were reflected in earlier experiences in contract farming of rubber plantations in Northern Laos (Shi, 2008), and there are ongoing labour issues in contract-based rubber production (Smith et al., 2020). In these contexts, companies are more able to take advantage of workers, for example, a young Lao worker was beaten and maltreated in a Chinese banana plantation in North-western Laos in a dispute over working hours and violations of the working contract (Eckert and Avary, 2020). Similar issues have been reported in contract farming elsewhere, for example by UNIDROIT (2015, p. 6): "Labour issues are likely to have sensitive implications, especially when the local regulatory framework is weak and does not provide adequate protection to the producer or the community".

¹⁴ The Government of Laos and China signed an MOU on phytosanitary requirements for the export of bananas from Laos to China in 2013. E.g., bananas shall be immature within 10–11 weeks, bananas shall come from orchards and packinghouses registered by MAF, take comprehensive measurement of control plants diseases and insect pests under the supervision and guidelines of MAF.

Conversely, contract workers may choose to break their contracts, although they may be disadvantaged by doing so.

4.1.2 The Cavendish banana production system in Laos

Cavendish bananas require a tropical climate, fertile soil and good water availability (NAFRI, 2016). They are grown in Northern Laos for export to China (de Lapeyre et al., 2017; NAFRI, 2016), rather than for domestic consumption. The crop cycle for Cavendish bananas in Laos is between five to seven growing seasons (Friis and Nielsen, 2016; NAFRI, 2016), with one season lasting 7–10 months (Ling, 2015). In combination, with 7–10 months required for preparing, establishing and managing the plantation and 2–4 months spent harvesting bananas, those farmers who engage in banana production have limited time to engage in other livelihood activities (Fieldnotes, May 2019). Some 1,700–2,000 stems/ha are established, with fruit production of 25 kg/stem/season (34 tonnes/ ha) (Ling, 2015).

Cavendish bananas require intensive management, comprising watering (1 time/week), fertilising (3 times/season), weeding (1st season – 3 times; 2nd season – 2 times; and following season – 1 time) and pest control (12 times/season) (NAFRI, 2016); and extensive chemical use. Together, some 40 applications of fertilisers, herbicides and insecticides are required each season, comprising an estimated 105–140 different chemicals (Farquhar, 2012; NAFRI, 2016).

Banana harvesting season in Northern Laos is November to March. Harvesting is organised by banana companies with hired labour cutting, carrying, washing, packing and loading bananas into trucks. Packing is usually set up by the road next to a plantation field; each 30 tonne truck transports some 2,000 boxes (Farquhar, 2012), to the border crossing and on to distribution in China.

4.1.3 Market context

The growing demand for fresh fruit in China (Friis and Nielsen, 2016; Manivong et al., 2016), coupled with land degradation and Panama disease associated with banana production in China, pushed Chinese investors towards Laos (Friis and Nielsen, 2016; Ordonez et al., 2015). Additionally, the dispute between China and the Philippines over the South China Sea has influenced the banana boom in Laos because China is the largest importer of bananas from the Philippines (NIKKEI, 2019) and has banned the import of bananas from the Philippines (Santasombat, 2019). Another significant factor that influenced the shift to banana production was the fall of rubber prices in 2012; as a result, there was a conjunction of interest

between Chinese investors and many rubber growers in Northern Laos, in converting rubber plantations to other crops, especially bananas (Vongvisouk and Dwyer, 2017), although, some banana companies built on and diversified their existing agricultural investments (rubber, maize and vegetables) by adding bananas to their business. According to research by Kingkhambang (2012) on the impact of Chinese investment on agriculture export in Northern Laos, banana companies may have contract farming in one or more type of agricultural products at the same time in different locations.

4.1.4 Policy context

The series of strategies and policies that have influenced commodity crop production generally are described in the Literature review (Chapter 2). This section provides details on policy related specifically to the banana boom.

Land

Land laws and policies provided opportunities for companies and households (HH) to gain access to and use and invest in land. The Land Law of 2003 allowed for HHs to be granted land for cultivation (3 ha per labour unit per household) and then lease that land to companies, and for the state to grant leases or concessions over state land to investors. Both faced implementation challenges. Of particular relevance to banana production, the formal arrangements for leasing HH land to companies were neither clear nor followed – HHs were leasing land to which they did not have formal land use rights (they may have been using the lease to strengthen their claims to land) and weak contracting procedures were overlooked. Contracts had to be registered, although many were not, and they were not always honoured. As Higashi (2015) reported, this had implications for how the banana investment models played out in practice; farmers expressed disappointment in the 2+3 contract model used because investors in Oudomxay province did not return to buy the crops farmers had produced. For those participating under the '1+4' model some companies initially paid only half the lease fee, some left without paying the full rent, and when the contracts ended some villagers had difficulty converting land back to paddy because companies did not provide/include the land recovery fees.

Issues were raised at the National Land Conference in 2007, leading to new instructions on the implementation of the Land Law, procedures for land adjudication and legal transactions relating to land, and for the making of contracts, through the Law on Contract and Tort. However, the Resolution to the Land Conference (No. 06/PMO) still promoted contract farming

under the '2+3' model and emphasised the importance of certifying permanent land use rights in response to policies related to turning land into capital assets.

Opportunities for land concessions attracted many investors, but the Prime Minister pointed out that this form of investment created 'many problems regarding land management' (Fullbrook, 2007) and the research by Schönweger et al. (2012) reported conflicts between investors and villages over land during late 2000. The Resolution to the Land Conference in 2007 identified concerns with the granting of concessions and placed a temporary ban on the approval of new concessions greater than 100 ha in size to better regulate land grants made under province and district administration (Prime Minister's Office, 2007). While concessions were not widely taken up for banana investments, this ban and a subsequent moratorium on some concessions in 2012 (PMO13) heightening interest in contract farming as means of sustaining investment programs. It was also in PMO13 that the Government instructed investment projects in the agricultural sector to focus on clean sustainable agriculture production, hinting at the environmental issues that were emerging from projects already underway.

Labour

The 2+3 contract model is dependent upon households providing labour as well as land, and the approach was expected to provide more opportunities for rural employment than wage labour. Providing for employment, including through sedentary agriculture has been an important component of several socio-economic development strategies in Laos, and early on the Government set in place provisions to maximise opportunities for Lao people. A Labour Law (No. 02/NA) was first made in 1994 (and revised in 2006 and 2013) and sets out basic employment conditions, the making of contracts, restrictions foreign workers, special rights for women, workers safety and dispute resolution. Laws on the Protection of Children, the Rights of Women, Trade Unions and Social Security have also been made. The Investment Promotion Law also includes measures to prioritise employment of Lao citizens but gave foreign companies the right to employ foreign personnel when necessary if labour or skills are not available in Laos. Research indicates, however, that compliance with labour contracts under 2+3 contract farming has been highly variable both by companies and workers (see for bananas Friis & Nielsen, 2016; Higashi, 2015 and Ling & Xiong, 2017, and for rubber Smith et al 2020). Health and safety impacts of chemicals on labourers were widely reported (see below) and concerns about child labour raised (Ling and Xiong, 2017). An increasing number of labour disputes in the sector resulted in the making of a Decree on Labour Dispute

Resolution No. 76/GOL in 2018 and the Government is now developing a National Rural Employment Strategy.

Environmental and social issues

Public concern about the environmental and health impacts of banana projects have been significant, however policies specifically aimed at addressing these have been slow to emerge and take effect. Researchers (Higashi, 2015; Knowles, 2015; Ling and Xiong, 2017; Manivong et al., 2015) and the media (Dubus, 2016; Finney and Khotpanya, 2018; Inkey, 2019) reported the overuse of chemicals in banana plantations, with adverse impacts on labourers, and several cases of fish deaths had been reported to the Lao National Assembly or Governors' Offices (Ling and Xiong, 2017). Health and environmental problems specifically from Chinese-owned bananas were raised in media reports, including, for example, that six Lao farm workers died from exposure to pesticide and herbicide during the period 2012–2015 (Khotpanya and Lipes, 2019).

In response, in part to public concerns, and following an investigation of affected areas, the Prime Minister issued a Notification (No. 830/PMO) in 2014, which ordered the six northern provinces (Phongsaly, Luang Namtha, Bokeo, Oudomxay, Luang Prabang, and Xayabouly) to ban the planting of bananas in paddy fields, which they did, implementing provincial instructions accordingly. However, in some cases (in Bokeo and Luang Namtha Provinces) the ban was enforced not only to existing banana plantations in paddy fields but also to some new companies which were about to invest in banana plantations in other areas. The banana ban was interpreted differently between central and provincial levels and in some reports, the ban was interpreted as a nationwide ban (Goh and Marshall, 2017; Khotpanya and Lipes, 2019). Subsequently, investment in new banana plantations in northern Laos decreased and investment began to shift to the south.

However, the local authorities of Oudomxay province found the banana ban difficult to implement because some of the contracts were made directly between local villagers and companies without government involvement, expressing concern that, if the companies were forced to leave, villagers might not receive the land rental due. The PAFO recommended that relevant bodies should conduct a study to identify detailed measures so that businesses could be shut in an appropriate way.

Exports and Good Agriculture Practices

As an export crop, bananas have been subject to tight production and import restrictions from China, but less rigid controls on the Lao side. On 26 September 2013, the Governments of Laos and China signed a 2-year MOU on phytosanitary requirements for the export of banana from Laos to China. Only immature fruit (10–11 weeks after flowering), produced in orchards and packinghouses registered by MAF and applying necessary biosecurity controls (MAF, 2013) and approved by the General Administration of Quality Supervision, Inspection and Quarantine (AQSIQ) of China could be exported. In 2014, the Department of Agriculture (DOA) developed an instruction on crop plantation and packinghouses for export to China (No. 077/DOA, dated 13 June 2014) This instruction was revised in 2016 (No. 116/DOA, dated 16 June 2016).

The outbreak of Panama disease, which likely spread from China (Ordonez et al., 2015) into Northern Laos (Bokeo and Luang Namtha) was first reported in 2017 (Chittarath et al., 2018). At the end of January 2018, the AQSIQ of China issued an announcement regarding the import plants to Laos. Subsequently China and Laos signed a protocol that delineates inspection and quarantine requirements for Lao banana exports. This is the first time export standards have been established between the two countries since Laotian bananas were allowed to enter China through general trade in 2013. In addition, MAF issued Decision No. 0827/MAF (dated 05 April 2018) on enhancing monitoring and managing Panama disease; and its Plant Protection Centre, supported by FAO, developed guidelines for diagnosing Panama disease and its management in Laos, and disseminated the information via posters, television, newspapers and social media (FAO, 2019).

Efforts to develop standards for Good Agriculture Practices (GAP), consistent with ASEAN requirements started in 2011, but implementation was poor. Issues continued to be identified and raised (Finney and Avary, 2020; Whong and Avary, 2020) and in response in 2016, the DOA developed a Lao Good Agricultural Production standard (Lao GAP) specifically for banana production focusing on produce quality management standards and safety to reduce/solve the environmental and health issues of workers as well as for local communities. Its implementation has been limited.

Current policy dynamic of the boom

At the time of this research the policy environment for banana investments was very dynamic. The government was taking action to address concerns arising from land investment more broadly, and concession in particular, and affected banana investors and households as well.

Acting on a Resolution of the central committee of the Lao Revolutionary People's Party on the Enhancement of Land Management and Development in New Period (No. 026) and following a Quality of Investment Review in 2018 (Hett et al., 2020), the Prime Minister issued Order No. 09 (PMO 09) on the enhancement of governance in the use of concession lands for industrial tree plantation and other crops across. The order specifically instructed MAF to investigate Cavendish banana investments and set up a system to reinforce compliance with the Lao GAP for banana production. In response MAF and MPI developed implementation instructions. MAF issued Instruction No. 1758/MAF (Dated 30/07/2018) which specifies that the investment projects which were legally approved are allowed to continue but must be, monitored, inspected and registered but those operating illegally or that do not operate in accordance with laws and regulations must undertake appropriate measures to comply. Ministry of Planning and Investment also issued an Instruction No.0457/MPI, dated 27/02/2019 on Investment Approval and Land Management Mechanism for Leasing or Concession to Cultivate Crops requiring investors in commercial crops to undertake a technical-economic feasibility study and social and environmental impact assessments. It also specifies requirement on deposits for leases and concession, the labour promotion and the use of chemicals that cause health and environmental problems.

By the end of 2018 and into 2019, the banana boom in Northern Laos was beginning to 'bust', and companies began to move their investments to other provinces in Central and Southern Laos (Khotpanya and Lipes, 2019), to where Panama disease has yet to spread, provincial governments have not yet imposed prohibitions on the use of land for production, and the impacts on land of past production social and environmental are yet to be experienced.

4.2. Methods and case studies

A qualitative case study approach was adopted to address the research questions, with field research located in Oudomxay Province, one of the three Northern Lao provinces bordering China. This geographic proximity and good road access to China through the Boten border crossing fostered banana development in Oudomxay; 800 ha were established by 2010 and 6,300 ha by 2016, declining to 4,900 ha by 2019 (Higashi, 2015; PAFO, 2019). Case study villages were selected through preliminary discussions with provincial agricultural department staff who identified 11 candidate villages, from which two were subsequently selected for fieldwork, based on the following criteria: a high concentration of banana plantations; evidence of livelihood and land use changes associated with banana production; different arrangements for access to land; a range of household wealth categories; a small to moderate-sized

population, to allow a reasonable level of sampling in the time available for fieldwork; and the village's willingness to participate in the research.

4.2.1 Field research methods

I conducted fieldwork over 3 weeks in each village in May and June 2019, with local field assistants present for 1 week in each location. I describe each stage of data collection below and summarise it in Table 4.1.

Table 4.1: Field research methods and foci

Research method	Number	Themes covered
Focus group discussion (semi-structured; average duration 3 hours)	4 groups (2 per village) (10–15 participants each; male and female separately)	Village history; village participatory mapping; evolution of main crops; wealth classification; banana establishment in the villages; cropping calendar and the role of men and women in labour contributions.
Household interviews (semi-structured; average duration 1.5 hours)	62 households (31 households per village)	Household composition; income sources; expenditure; livelihoods assets-detailed in land use parcels (e.g. use prior to lease for banana production); reasons for adopting bananas; livelihood situations and activities; social connections; shocks and future plans.
Formal discussions (semi-structured; average duration 2 hours)	2 Central government officers 2 Provincial government officers 4 District government officers	Roles of the government agency related to the banana boom; contract arrangements; perceptions of and future plans for agriculture development.
Informal discussions (ad hoc)	Opportunistic; at least 10 village members in each village	Village history, land use options/preference and allocation; perception of participation in the banana boom; lease negotiations and arrangements; shocks and health problems; future livelihood plans.
Participant observation (integrated with other activities)	Many village members	Livelihood activities; land use options; positive (e.g. (new concrete houses) and negative changes (e.g. waste run-off and polluting of rivers in both villages; health problems).

I used multiple methods for data collection: focus group discussions, household interviews, formal and informal discussions, field observations, and reviews of relevant secondary sources.

I used FGDs as an initial step, to meet with approximately 30 households in each village. I conducted separate FGDs for men and women in each village (10–15 participants each) to ensure that women’s perspectives were heard independently of men. Amongst the outcomes of FGDs were identification of the characteristics defining four household wealth categories in the village, following similar approaches in related studies in Laos (Martin and Lorenzen, 2016; Newby et al., 2012; Van Der Meer Simo et al., 2019). Wealth categories are used to distinguish between households of different socio-economic status (Martin and Lorenzen, 2016), with different levels of assets. Household wealth categories were based on their physical, financial, and land assets, triangulated by discussion in FGDs and with each Village Committee (see Table 4.2).

I selected a sample of around 20% of village households, representing the sample size possible within the time available for interviews. I used two strategies to identify households: a discussion with the village officials (Village Head and Committee), and snowball sampling (Noy, 2008). Firstly, I asked village officials to assign households to the household wealth categories identified in the FGD, and whether these households participated in banana production. I selected households at random from this list. Secondly, I used snowball sampling, by asking the interviewed households to identify other households who met the criteria, to ensure that at least five households were sampled in each wealth category.

I held formal discussions with government officers in the national Department of Agriculture and of Policy and Legal Affairs (one each), and Provincial and District Agriculture and Forestry Offices (two and four, respectively), to explore relevant policies, agency roles, and officers’ perspectives on banana production and on current and future agricultural development plans. I conducted informal discussions opportunistically, often at food stalls or shops where people gathered, and with members of the Village Committee, village elders, host families, other villagers, and staff of one banana company. I used these discussions to triangulate information from other sources.

Banana companies were not interviewed because the initial research fieldwork design did not expect to cover the perspective of the companies. However, after the fieldwork in Oudomxay Province, I had an opportunity to join the ACIAR rubber value chains project to interview a Chinese company that invested in rubber and bananas in Luang Prabang Province, Northern Laos. Thus, I have received some information from the investor’s perspective and about the new regulations on banana investment in Laos.

Table 4.2: Characteristics of household wealth categories of the case study villages

Assets/wealth category	Upper (N=16)	Middle (N=23)	Lower (N=11)	Poor (N=12)
Physical capital:				
House condition	Usually own a traditional wooden house with concreted ground floor or concrete house	A traditional wooden house with concreted ground floor or wooden house with open ground floor	A traditional wooden house with open ground floor or bamboo house	A bamboo house only
Transportation	Generally own two or more vehicles and/or large tractor/truck	Generally own a vehicle and/or truck	Generally own a hand tractor and/or 1–2 motorbikes	Rarely own a motorbike
Livestock	Generally own large livestock (cow, buffalo); and goats, pigs and poultry	Some own large livestock (cow, buffalo); generally own goats, pigs and poultry	A few own large livestock (cow, buffalo); generally own goats, pigs and poultry	Most own a very small number of poultry
Financial capital: Household annual net income (US\$)				
Village 1				
Median	12,000	4,700	1,500	1,700
Range	4,400–25,000	1,400–10,400	550–4,000	1,200–1,700
Village 2				
Median	6,600	2,800	1,480	45
Range	3,200–135,000	490–6,600	In debt–3,100	In debt–3,200
Natural capital: Household land ownership (ha)				
Village 1				
Median	6.80	4.70	1.95	1.40
Range	2.30–14.00	0.80–8.40	0.20–7.60	0.20–1.50
Village 2				
Median	13.15	4.60	3.20	0.60
Range	3.40–42.60	2.15–7.55	2.10–7.60	0–3.08

Note: For more details, see Appendix 2.2

I undertook field observations throughout the fieldwork, to observe livelihood activities and daily life, land uses, villagers' access to information, and environmental issues.

4.2.2 Case study villages

The demographic and land use characteristics of the two case study villages are presented in Table 4.3. The number of households in Village 1 was 160 and in Village 2 was 144; 31 households were interviewed in each (19% and 22%, respectively). The villages were ethnically different, with all households in Village 1 Khmu, and most (77%) in Village 2 Tai-Lao. In village 2, only 13% of the population were Khmu who had been settled there in 2002 by the government as part of an army posting. The total State-assigned land area of each village differed substantially; Village 1 had almost three times the land area of Village 2, and this was reflected in the much greater area of land available for crops other than paddy rice and bananas. Each village landscape comprised six major land uses: paddy (wet) rice, maize, bananas, rubber and teak plantations, and upland (dry) rice. During the dry season, some lowland plots otherwise used for paddy or maize are rented out to Chinese businesses for pumpkin and watermelon production under a '1+4' contract. In recent years, farmers in both villages experienced periods of extended drought and rat infestations, which impacted adversely on both maize and rice harvests.

The areas of banana plantation and level of participation in banana production were comparable but were significantly different as a proportion of village land: in Village 1—362 ha (31% of village land) were under banana cultivation, with 90% of households leasing land for bananas; while in Village 2—315 ha (75% of village land) was under banana cultivation, with 82% of households leasing land for bananas. Paddy rice was an important food security asset for villagers (Village 1—25 ha in total, 84% of households; Village 2—43 ha in total, 76% of households; per household area ranged from 0.20–2.80 ha), and no household in either village leased their paddy land for banana production. Twenty percent of households interviewed in Village 1 (N=6) cultivated upland rice, with the average land area of 1.5 ha per household (range 0.5–2.0 ha); in Village 2, only one interviewed household still cultivated upland rice.

Table 4.3: Key characteristics of case study villages

	Village 1 (Namo District)	Village 2 (Houn District)
Village location: distance from		
Xay city (Provincial capital) (km)	50	120
Boten (Laos–China border) (km)	50	200
Village population		
Total number of people	874	673
Proportion of women	48%	55%
Ethnic groups	<i>Khmu</i> ; (100%)	Tai-Lue; 87% <i>Khmu</i> ; 13%
Total number of households	160	144
Household size (adults and children)	median: 5 range: 2–11	median: 5 range: 2–7
Number of adults: M >14 yrs old; F >16 yrs old	median: 3 range: 2–9	median: 3 range: 2–6
Number of children: M <14 yrs old; F <16 yrs old	median: 2 range: 0–5	median: 1 range: 0–3
Number of households surveyed	31 (19%)	31 (22%)
Village land use		
Total land area (ha)	1,170	422
Forest area (Protected)	70	4
Banana plantation area (ha)	362	315
Number of participating households	144 (90%)	119 (82%)
Number of these households interviewed	19 (13%)	26 (22%)
Paddy land (ha)	25	43
Number of participating households	135 (84%)	110 (76%)
Number of these households interviewed	27 (87%)	21 (68%)
Other agricultural land, including maize/upland rice/fallow and pasture (ha)	655	55

Source: Fieldwork, May 2019

The village (*'ban'*) is the lowest subnational administrative level in Laos (Kuroiwa, 2012). As in all Lao villages, a Village Head (*'nai ban'*) and Village Committee (*'kha na ban'*; 2–3 members) are elected by villagers from amongst government-approved candidates and serve for a 4-year term. The primary role of Village Head is as an intermediary between the village and the district government; one Committee member has responsibility for each of agriculture, economic affairs and security, and all have responsibility for coordination between villagers and the Village Head.

The characteristics of each village and history of adoption of Cavendish banana plantations are summarised below.

Village 1

Village 1 is located in Namo District, 50 km from the Laos–China border (Figure 4.1). The village was a focal site of resettlement of Khmu people in the mid-to-late 1990s who were compulsorily relocated from nearby villages under the Lao Government's Land and Forest Allocation program (Ducourtieux et al., 2005). Infrastructure is limited; the road in the residential area was asphalted only in 2019; the road to Namo town remains dirt, and there is only limited access to ground well drinking water and indoor sanitation. Housing is mostly wooden, with an open ground floor, and bamboo top floor; about ten houses have recently been upgraded to concrete or brick. The village has three food stalls and no market, so villagers have to travel c. 15 km to Namo town for basic supplies.

Paddy rice and swidden agriculture (mostly upland rice) provided the subsistence food needs of most households before the arrival of cash crops in 2005, initially maize and subsequently Job's Tears (*Coix lacryma-jobi*). Rubber was introduced to the village in 2006 and cardamom in 2016. In 2010, two Chinese companies (A and B) arrived in the village. Company A arrived shortly before Company B, which enabled it to gain access to the majority of land (322 ha) now cultivated for bananas; Company B leased the remaining suitable land (40 ha). These two companies are independent of each other. Negotiations were for land leases only (viz. 1+4 model), with lease prices set for an initial 5-year contract period (2011–2015) of US\$268–US\$340/ ha/year, depending on land types (e.g., lowland plots with access to water received a higher price than upland). At this time, the Village Head and Committee did not have prior experience of or information about leasing land for banana production, including about lease prices or how these were established elsewhere. The negotiated price was based on household returns from maize or rice cultivation.

Subsequent negotiations between the companies and a new Village Head and Committee, facilitated by district government staff (DAFO and DONRE), resulted in all households agreeing to continue leases for the following 5-year term (2016–2020). This time, the lease re-negotiations between companies and villagers were conducted individually. The new lease prices ranged from US\$268 to US\$1,133 /ha/ year, with the variation reflecting primarily the differences in land suitability and access to water (lowland average US\$753, range: US\$445–\$1,133; upland average US\$400, range US\$268–\$531).

Forty-two percent of those who leased land were also contracted to manage banana plantations, on their own or others' land, in return for an annual end-of-season lump sum payment based on weight of fruit harvested. For these 'plantation managers', companies made a separate fortnightly subsistence payment (c. US\$57) and deducted this from the end-of-season payment. Companies required a household to have at least two able-bodied adults, including a man, to be contracted to manage 3,000–5,000 trees. The companies also agreed to preferentially hire local labour for plantation work and seasonal tasks such as harvesting, washing and packing fruit. Women are only allowed to work as a 'co-manager', 'co-supervisor' or seasonal labourer. Thus, contractual arrangements under the second contract period represented a 2+3 model for those who took on the role of plantation managers.

Village 2

Village 2 is located in Houn District, the first in Oudomxay Province to which Cavendish bananas were introduced in 2009, and which now has extensive banana plantations. The village is located on the highway, approximately 200 km from the Laos–China border. Houn town, approximately 20 km away, is the nearest centre from which goods and services can be purchased. Although the village has no permanent market, traders from other villages sell food along the main road each morning. The village is semi-urban with reasonable infrastructure (e.g., asphalt road, access to well-based drinking water and indoor sanitation); however, some households rely on the adjacent river for bathing and washing clothes, as well as fishing. Housing is mostly traditional Lao wooden houses with a concreted ground floor; about 20% of houses are concrete or brick. The village was first settled more than 100 years ago, but residents moved to Xayabouly and Luang Prabang Provinces during the civil war and returned after independence was declared in 1975. Prior to the introduction of bananas, land use and livelihoods comprised upland and lowland rice cultivation; maize, which has been cultivated as a cash crop over the last 2 decades, and is still grown on land not occupied by bananas; tree plantations (teak in the 1990s and rubber from 2008); agriculture enterprises (grain

traders and tractor hire services); and non-farm enterprises (shopkeeping, restaurants, and weaving).

Banana companies approached the village repeatedly from 2010, but as the price of maize and levels of production were high, farmers were not interested in leasing land to the companies. This changed in 2015, as maize production and the price had started to decline; and two Chinese companies, Company A (as for Village 1) and Company C leased 37 ha and 315 ha, respectively. These two companies are also independent of each other.

Company A, assisted by a land broker from outside the village, first approached the Village Head and Committee with an initial offer for a land lease payment of US\$906/ ha/ year in 2010, but no contract was agreed until 2015. The Village Head and Committee negotiated on behalf of the village; they were well-informed from friends and relatives about banana leases and negotiation outcomes elsewhere. The land lease price was finally settled at US\$1,246/ ha/ year for all households, following iterative consultations with the Village Committee and the broader village community. These contracts for 37 ha were subsequently cancelled in 2017 due to flooding and Panama disease (see de Lapeyre et al., 2017), and the land was returned to its owners. Company C also leased land at the same price, commencing in 2015; but did not start operations until late 2018.

With the exit of Company A, lease prices under the contracts of Company C were reduced by 10 percent (US\$1,133/ ha/ year from 15 March 2018), following company-initiated negotiations with the Village Head and Committee. This revised lease price for all land types was accepted on the basis of: (a) the nearly-three year gap between the commencement of lease payments and on ground operations, during which time some villagers had cultivated maize on the land under contract; (b) the revised lease price was higher than the return from maize or rice cultivation (except for those households with land and labour able to achieve two rotations of maize per year); and (c) no other villages in the district received more than US\$1,133/ ha/ year for banana production at that time. Company C did not offer local villagers labour contracts; instead, it hired Chinese and Lao migrant labourers. Thus, contractual arrangements in Village 2 represented a 1+4 model. Villagers were happy with this model because they had a range of more attractive alternative livelihood options (e.g., tractor drivers, house construction, open shops, mobile food sellers, weaving), as well as concerns about the potential for exposure to chemicals used in banana production. However, there is less agricultural land available in this village compared to Village 1, so if households preferred to continue in agricultural activities, they have no options.

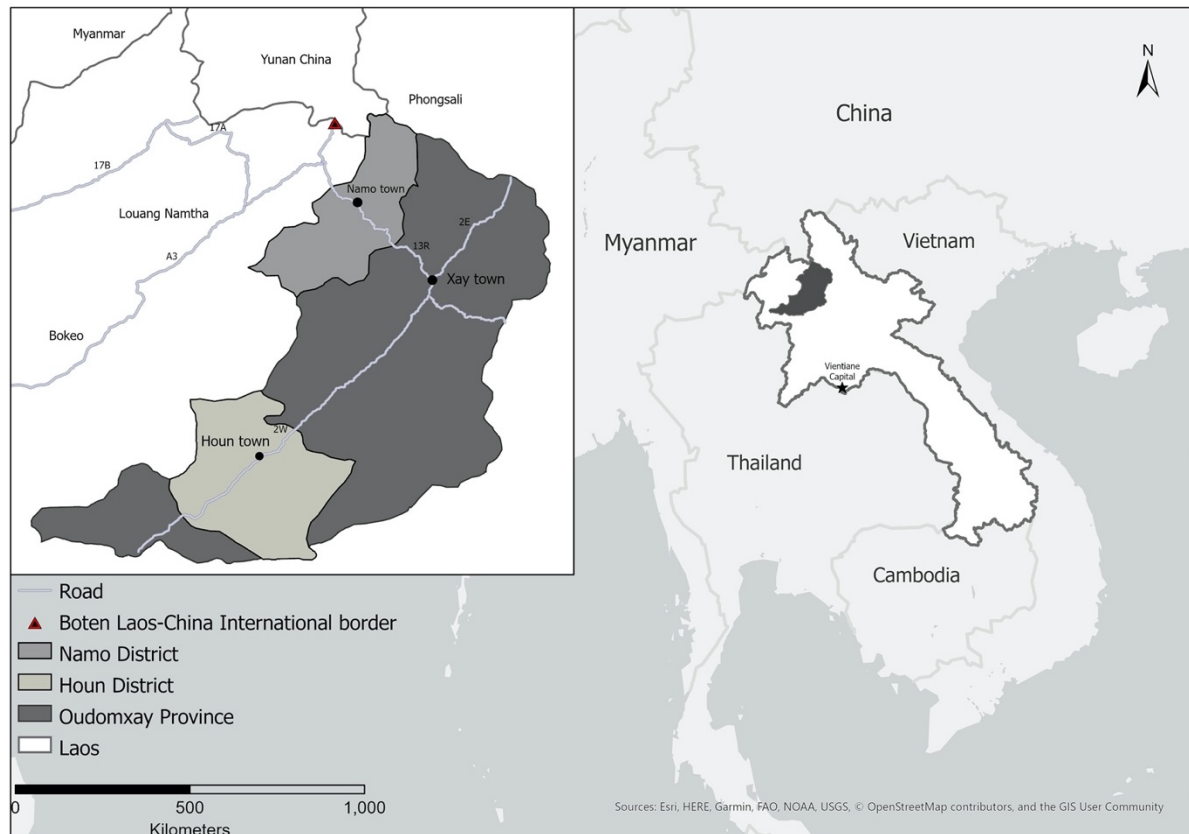


Figure 4.1: Location of the two case study villages in Namo and Houn Districts, Oudomxay Province, Northern Laos

To understand how and why the households engage in the banana boom, in the next section I define a typology of household participation in banana production in the case study villages.

4.3. Results

4.3.1 Typology of household participation

A number of researchers (e.g. Cousins, 2010 and Hall, 2011b) have developed typologies to help interpret and characterise the complexity and diversity typical of smallholder circumstances and behaviours. For example, Cousins (2010) developed a typology to facilitate understanding of how class relations were expressed in agriculture in South Africa. Hall (2011b) used a typology to make sense of the diversity of deals in ‘land grabbing’, also in South Africa, and found this approach was useful in understanding these processes. Similarly, Sikor (2011) classified three household typologies (‘Survival-focused’, ‘Surplus oriented’, ‘Investment-oriented’ households) to illustrate the range of practices associated with investment in and financing of household tree plantations in Vietnam. I developed a typology of household participation in banana production (Table 4.4). The typology is based on the two factors of production that households contribute, land and labour. I assigned each interviewed

household (N = 62) to one of five categories based on the typology. Four household types – Leased, Committed, Thwarted and Laboured – were represented in Village 1 and two – Leased and Excluded – in Village 2:

1. 'Leased' (N=29) households, in both villages, leased land for banana production without contributing any household labour (viz. '1+4' model);
2. 'Committed' (N=16) households, in Village 1 in the second 5-year contract period, leased their land for banana production and contributed household labour as plantation managers¹⁵ (viz. '2+3' model) and/or daily or seasonal¹⁶ labourers, or – in one household – as a plantation supervisor and land broker;
3. 'Thwarted' (N=9) households in Village 1 sought to lease their land for banana production but were not able to because the land was ineligible for banana production due to regulatory constraints (e.g., zoning, lack of a legal land certificate, moratorium on banana production), or not meeting company requirements (e.g., land location, water availability). In the second contract period, these households were able to sell their labour if they wished;
4. 'Excluded' (N=5) households, in Village 2, had no land to lease and were not able to sell their labour;
5. 'Laboured' (N=3) households in Village 1 had no land to lease but were able to sell their labour as plantation managers and/or daily or seasonal labourers.

I use this typology and the wealth classes described in 4.3.1 as the basis of discussing livelihood outcomes following the adoption of banana production in each village, and the similarities and differences between villages.

¹⁵ The role of 'plantation manager' involves either verbal or written contracts between companies and households, who are contracted for a cycle of employment is 7–10 months annually.

¹⁶ Daily labourers and seasonal labourers are not contracted. These labourers work on specific tasks that are not included in the plantation management contract.

Table 4.4: Typology of household participation in banana production based on land and labour contributions

Category	Land Ownership	Labour				HH Type	Households sampled	
		HH land		Non-HH land			Village 1	Village 2
		Manager	Hired Labour	Manager	Hired Labour			
Land No Labour	√	X	X	X	X	Leased	3	26
Land Labour	√	(√)	(√)	(√)	(√)	Committed	16	-
No Land Labour	X	X	X	√	(√)	Thwarted	9	-
No Land No Labour	X	X	X	X	X	Excluded	-	5
No land Labour	-	-	-	√	(√)	Labourled	3	-
Total households sampled							31	31

Notes: '√' – 'yes' to land and/or labour; 'X' – 'no' to land and/or labour; '(√)' – may or may not contribute labour; '-' – not applicable

4.3.2 Livelihood activities associated with household participation in the banana boom

The majority of households in both case study villages derived income from banana production through leasing land (73% of households interviewed), although c. 13% of these were pressured into doing so by the Village Head, Committee and peers. In Village 1, the land broker is from the village and from a family considered as a village elders; he is a member of the Village Committee, and the family is seen to be the most prosperous in the village. Traditionally, community members respect and seldom oppose village elders and leaders. Consequently, once the village leaders agreed to lease land to banana companies, other village members followed, mostly voluntarily but sometimes reluctantly.

Many households described how they followed the village leadership and their neighbours' decisions, because they did not want to be different or be excluded from the community. A typical example was:

“We are an elderly household with a significant role in the village, and many people respect us. Therefore, we do not want to say ‘No’ to the banana company because we do not want to be a bad model for my community.” (V2-13, leased, upper wealth category, April 2019).

However, in some cases, village leaders pressured households to join; for example, a household explained that:

“The Village Head said to me that if I do not lease my land to the banana company, I will take you to jail.” (V1-17, committed, middle wealth category, May 2019).

The majority of the remaining 27% of households were willing to lease land but were ‘thwarted’ (14% of households interviewed) or landless (13% of households interviewed). In Village 1 in the second 5-year contract period, most households (90% of those interviewed) also derived income from employment in banana growing or processing, as plantation managers or daily or seasonal labourers. This work had not been available to them in the first contract period and was not available to households in Village 2. Typical payment rates for these roles are summarised in Table 4.5.

Table 4.5: Payment rates for labour participation in banana production, Village 1

Household participation	Task	Payment
Plantation manager + co-manager	Manage banana plantation, typically of 3,000–5,000 trees. Tasks include weeding, fertilising, applying pesticides and other agro-chemicals, and other plantation maintenance under company supervision.	US\$3,400–5,600/season
Daily labourer	Work in the nursery, and in planting, weeding, fertilising and spraying herbicides under direction of a plantation manager and/or co-manager.	US\$8–14/ day /person
Seasonal labourer	Washing and packing (men and women)	US\$8–11 /day /person;
	Portage (mostly men).	US\$17–28 /day /person

Household livelihood activities at the time of fieldwork (2019) in each village, according to the typology presented in Table 4.4 and household wealth category (upper, middle, lower, poor), are summarised in Figures 4.2, 4.3 and 4.4, and discussed below. For Village 1, I discuss both banana plantation labour participation and other livelihood activities; for Village 2, I discuss only other livelihood activities, as no banana plantation labour opportunities were available.

From the observation during the fieldwork, income from leasing the land for banana production enable households to setting up other livelihood activities. In each case, I describe changes in respondents' activities since the introduction of bananas, and their future plans as reported during the fieldwork.

Village 1

Labour participation

In Village 1 in the second 5-year contract period, 28 households (90% of those interviewed) were working in banana production, about half as either plantation managers (N=13) or daily or seasonal labourers (N=14). One Lao person was a salaried banana plantation supervisor and land broker, which is the most sought-after and well-paid role associated with banana production. This person had built on their existing higher wealth, higher educational attainment, Chinese language skills (they have learned from working with Chinese companies for years before being assigned as banana plantation supervisor), and social connections at district government level, including with the Governor, to be appointed to that position.

Despite the relative abundance of land in this village, some households from each wealth category were working as plantation managers and/or seasonal labourers, reflecting the income from banana labouring is more lucrative than other options¹⁷. Households who leased land for bananas had the greatest opportunity to work as plantation managers on their own land, provided the households had an able-bodied male adult to undertake this role. In contrast, households who were not able to lease land had to wait for opportunities arising from other households being unable to, or deciding not to, manage bananas on their own land; or rely on daily and/or seasonal labouring work. Labourers had to fall within the age range specified by the companies (men 14–55 years, women 16–50 years), which excluded older members of households and children. The arrangements for working as a plantation manager or a daily labourer were made by the banana supervisor and land broker:

“If villagers want to manage bananas, they have to talk to the banana supervisor and land broker... and [they] need to be quick.” (V1-22: thwarted, poor wealth category, May 2019).

¹⁷ A household-managed banana plantation received approximately US\$2,300–3,000/ha/season while to cultivate maize they received approximately US\$700–1,000/ha/season (if there is no drought and rat infestation).

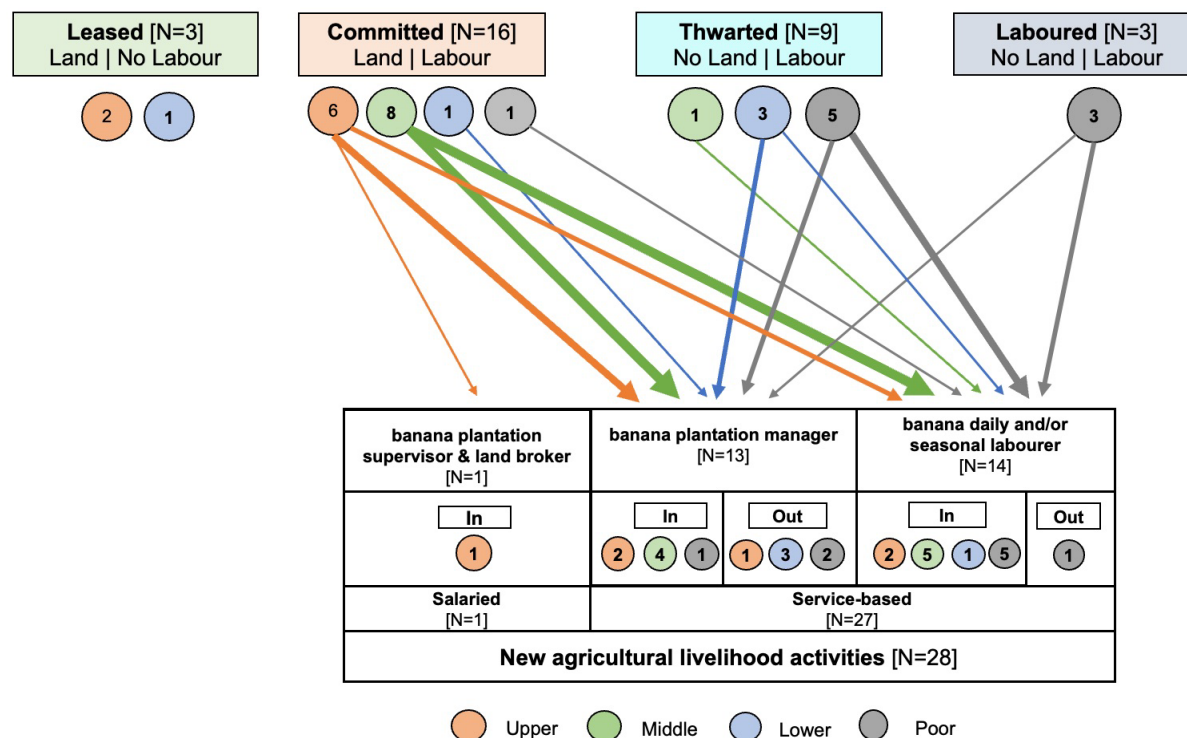


Figure 4.2: Labour commitments to banana production in Village 1, according to household type and wealth category, and household intention to continue or not with these labour inputs.

Notes:

“In” – plan to continue with labour inputs; “Out” – plan not to continue with labour inputs.

The size of the arrow indicates the relative number of households.

“I wanted to manage banana production, but it was already full [there were no positions available] ... so we just work as daily labourers.” (V1-31, thwarted, poor wealth category, May 2019)

Figure 4.2 shows the labour participation of surveyed households in banana production, according to the household typology and wealth categories; and households’ future intention to continue or withdraw their labour from banana production.

The community’s reasons for requiring local labour opportunities as a condition of contract renegotiation were explained by some respondents:

“If we don’t manage bananas then we won’t have enough income to buy food for our family.” (V1-17, committed, middle wealth category, May 2019).

“There are no other choices to do in our village since we cannot get more benefits from cultivating maize [because of drought and rat infestation], the only thing we can do is work in banana plantation” (V1-13, committed, poor wealth category, May 2019).

These reasons are reflected in households' adaptation of the use of their labour and of their livelihood strategies; given the low productivity of maize and rice, working on the banana plantation provides better income than other options.

Other, wealthier, households reported that the banana plantations provided additional discretionary income opportunities for their household members:

"Only my youngest daughter works in the banana plantation [as a seasonal labourer]. She goes there only on weekends when she doesn't have school classes." (V1-09, committed, upper wealth category, May 2019)

"I go there [to the banana plantation] only when I have time. When I feel tired, I just don't go." (V1-28, committed, middle wealth category, May 2019)

This contrasts with the situation of resource-poor households, who have no other options. One household explained:

"I don't know what to other than selling my labour for banana production, since there are no other opportunities in this village. If I want to work in the city, I'm not skilled labour." (V1-22, thwarted, poor wealth category, May 2019)

However, some respondents in poorer wealth categories reflected on the income-generating opportunities from their participation in banana production:

"We have never earned this much in our life; we planned to build a new house and buy paddy land." (V1-21, thwarted, poor wealth category, May 2019)

Nevertheless, a quarter of the surveyed households (N=7) currently contributing labour to banana production intended to withdraw their labour inputs in the coming years (2020 and 2021). One such household explained:

"Bananas are hard work and non-stop. We feel very tired and unwell. We want to stop and do something else, but don't know what yet... We've earned more income, but we feel so tired and there are too many chemicals used in the banana plantation." (V2-24, thwarted, lower wealth category, May 2019).

In summary, the best opportunities for earning income from labour fell to able-bodied households who had land they could lease for banana production. For the majority of households surveyed, selling labour for banana production was a necessity; for some wealthier households, participation in seasonal labour provided discretionary opportunities for generating additional income. Their choice in committing that labour contrasts with the lack of

choice for poor households, who have no other options. Households which contributed labour to banana production generally increased their income, in some cases substantially. While some households had decided to withdraw for health or wellbeing reasons, the majority planned to continue working in banana production: either because they felt they had no choice, or because this was their best income-generating option.

Other livelihood activities

The primary livelihood activities not related to banana production of the 31 households interviewed in Village 1 are summarised in Figure 4.3. Four-fifths of households (81%, N=25) have continued with their pre-existing livelihood activities, of which less than 10% (N=2) were non-agricultural. Amongst agricultural livelihoods, around four-fifths were engaged directly in agriculture (non-service-based; N=19), and the remainder in service-based activities (N=4). Only 19% (N = 6) of households, all of whom were among the higher (upper and middle) wealth categories, had started new livelihood activities; all of these were non-agricultural enterprises.

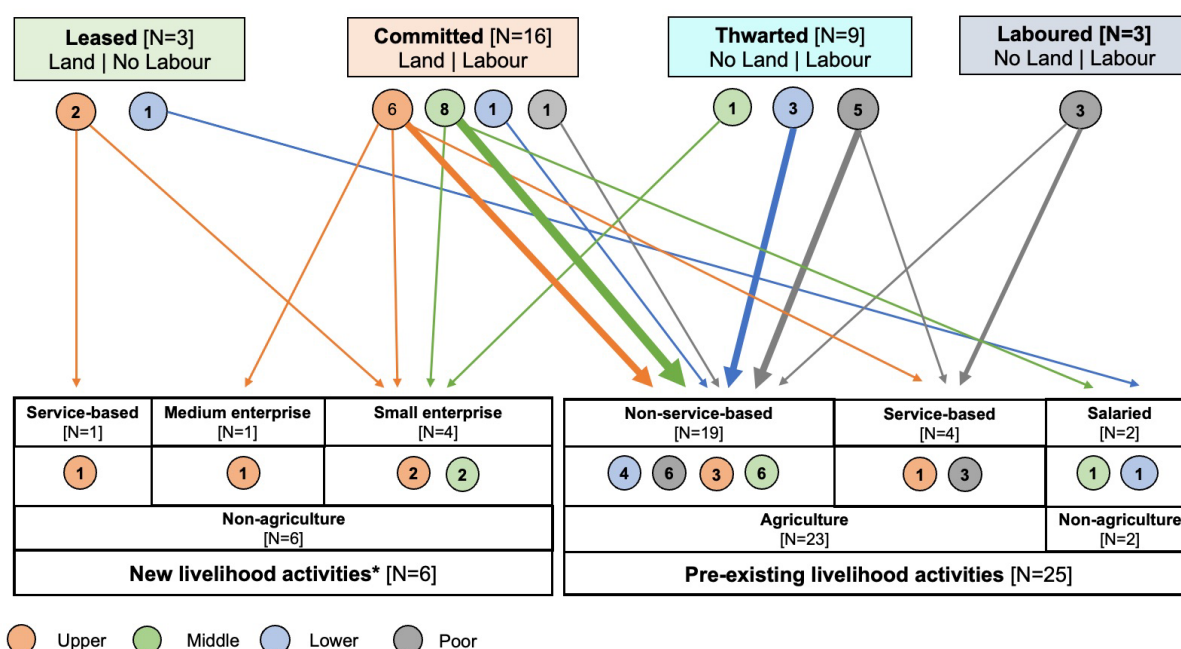


Figure 4.3: Non-banana, production-related primary livelihood activities according to household type and wealth category in Village 1, since the commencement of banana production

Notes:

- ^ Household livelihood activities also included livestock &/or rubber with food production
- * In addition to income from banana-related livelihood activities (Figure 4.2), all 'new livelihood activities' were the households' primary source of income. The size of the arrow indicates the relative number of households.

These outcomes reflect both the limited time available to the majority of households that are providing labour for banana production, and the relatively limited markets for other activities in Village 1.

Village 2

Figure 4.4 summarises the primary livelihood activities of the 31 households interviewed in Village 2, according to household category and wealth category. The primary livelihood activities of over half of the households surveyed (55%, N=17) are pre-existing agricultural (N=9) and non-agricultural (N=8) enterprises. All five Excluded households have continued with pre-existing livelihood activities, which suggests – as in Village 1 – that their exclusion from leasing land has limited their income, and associated opportunities for pursuing new livelihood activities.

The remaining households surveyed (45%, N=14) have started new livelihood activities since the advent of the banana industry in the village in 2015. Most of these (71%, N=10) were small (N=8) or medium (N=2) non-agricultural enterprises. The remaining 30% were service-based agricultural enterprises (N=4). In all but two cases, the new livelihood activities had become the households' primary source of income, other than banana lease fees. The two exceptions were both small enterprises (a contract weaver and a tailor), whose primary incomes remained pre-existing livelihood activities (respectively, maize production and a small fixed food stall). Upper and middle wealth class households dominated service-based and medium enterprise activities.

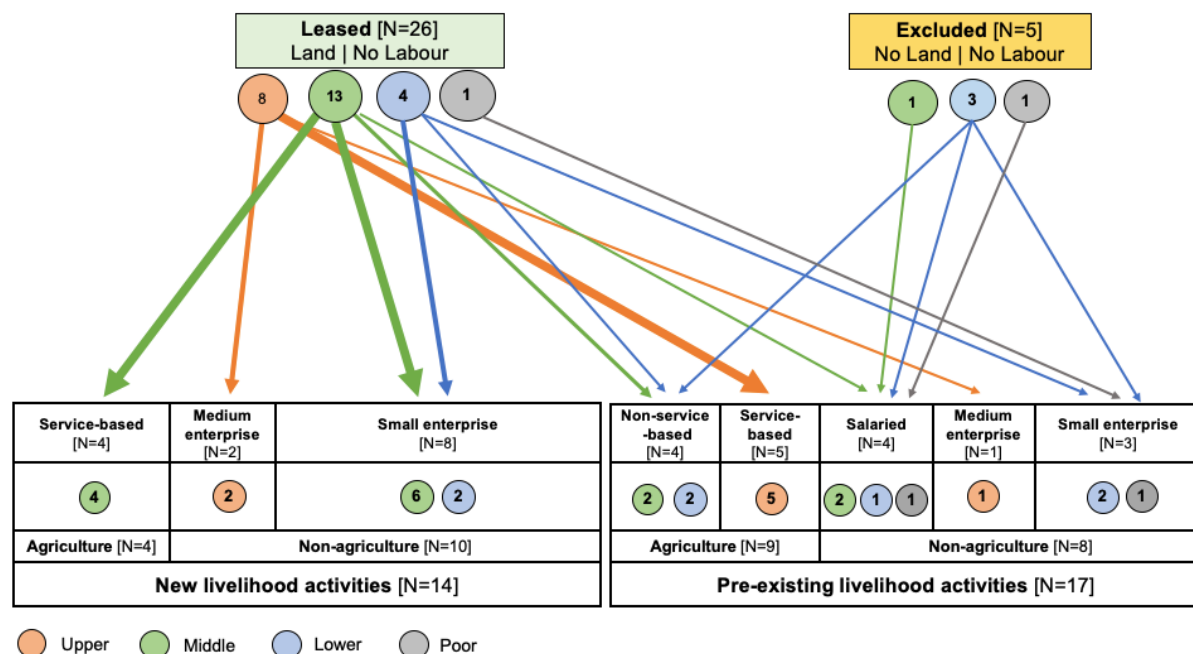


Figure 4.4: Primary livelihood activities in Village 2 according to household type and wealth category since the commencement of banana production.

Note: The size of the arrow indicates the number of households.

Many households felt that leasing land to banana production brought an opportunity for them to shift away from agriculture:

“Life is much better now since we leased our land [3 ha] to banana company. We don’t have to work hard in the field. We are relatively old now; I have more time to rest, and my wife just do [contract] weaving.” (V2-02, leased, middle wealth category, May 2019).

“I’m glad that my land is in a zone that the banana company want to lease. I’m a widow and have a disabled daughter, so if I still cultivate maize, our life still in difficult situation. Now we are happy. I just do a little bit of sewing and [non-contract] weaving when I can to get an extra income apart from the land lease fee.” (V2-05, leased, lower wealth category, May 2019).

“We now don’t cultivate any other crops except paddy rice. We focus on our business [maize truck transport-service]. We plan to buy another truck and my wife will open a small shop at home.” (V2-18, leased, middle wealth category, May 2019).

Despite recognising these benefits, some households would have preferred to continue cultivating maize:

“We still prefer to cultivate maize because we can cultivate it for two seasons each year, which gave us more than the land lease to the banana company. However, it is different because now [leasing land for banana production]

we do not have to work in the field.” (V2-23, leased, middle wealth category, May 2019).

Similarly, those households who benefited from trading and providing tractor services for maize cultivation explained the impacts of the shift to banana production on them:

“Leasing land for banana production is good because we don’t have to farm, but our business (tractor service) is affected because we have to go far and spend more time away searching for clients in other villages and also increase our input cost like fuel.” (V2-13, leased, upper wealth category, May 2019).

“Since the arrival of banana production, not many people cultivate maize in this village. My husband is away for 2-3 months to provide tractor service in other villages. So, I stay here with my children. life is different now.” (V2-17, leased, upper wealth category, May 2019).

Overall, most households in Village 2 now base their livelihood activities on non-agricultural activities, in part because there is little available agricultural land in the village (Table 4.3), and in part because the village location is relatively favourable for these activities. These households have used the income from leasing land for banana production to invest in their new livelihood activities.

Common trends

Households generally invested the capital received from land leases in a range of new livelihood activities, although more did so in Village 2 (45%) than Village 1 (19%). This reflected a conjunction of factors: households in Village 2 had less other land available for agriculture, more non-agricultural options because of its highway-side location, and more available time because of the absence of labour commitment to banana production. Conversely, in Village 1, its more remote location and (now) reliance on local labour for banana production, meant both that there were limited market options for new activities and that most available labour in most households was already committed to banana production and/or other agricultural production. The majority of new livelihood activities in both villages are non-agricultural, and the few that are agricultural are service-based, with some depending on either banana or maize production. Eighty percent of households have retained paddy rice cultivation as a core household subsistence agricultural activity; in Village 1, 20% also continue upland rice cultivation.

All but two of the 20 households across both villages that invested in new livelihood activities were from upper or medium wealth categories, underlining the relative advantage these households enjoyed in further improving their livelihoods.

4.3.3 Livelihood outcomes

The livelihood outcomes from participation in banana production varied between villages. Generally, households were positive about the income generation from bananas, but some experienced negative impacts on their health and as a consequence of environmental impacts.

Positive outcomes

The immediate consequences of banana production for many households' livelihoods appear to have generally been positive, with increased incomes and new livelihood opportunities for those able to benefit from leasing land and/or selling their labour.

Village 1

The majority of households 58% (N=18) participated in banana production, through leasing land and/or contributing labour, and expressed positive comments about the outcomes. They received a higher income than from cultivating maize, and the income from bananas contributed to improving their livelihoods. These improved livelihoods are evident in, for example, the increased number of new concrete houses and vehicles in the period since the banana boom began. Typical comments were:

"I like to manage banana plantations because we've earned more income and we were able to build a new house." (V1-14, committed, lower wealth category, May 2019).

"After leasing land for banana company, we opened food stall in our village. We do not have to farm; staying in the shade is our and also other people's preference" (V1-2, committed, upper wealth category, May 2019).

Village 2

At the time of fieldwork, 73% (N=19) of households who had leased land for banana production commented positively on the outcome, of receiving income from leasing their land without contributing any labour. Their attitude was typified by the paraphrased sentiment expressed by many villagers, that *"leasing land for banana production is earning money without working."* The income from leasing land for banana production, and the time freed up by households not working in the field, facilitated household investment in other activities. For example, respondents who had shifted away from agriculture to new livelihood activities as their primary income source expressed satisfaction with this transition:

“If the Chinese company had not come to lease our land, we would still be working hard in the field and could not open a big restaurant like this. Our life is much better now compared to in the past.” (V2-06, leased, upper wealth category, May 2019).

“We don’t want to rent land from other people to cultivate maize [after leasing land to the banana company] because we don’t want to work under the sun in the field.” (V2-21, leased, lower wealth category, May 2019).

Some households also remained open to earning additional income through new service-based livelihood opportunities, rather than farming directly:

“We were just resting at home [not cultivating maize] and relying on income from the lease, but when a Chinese company in another province asked my husband to be a tractor driver for them, we didn’t hesitate to take up the opportunity, as now we have more income.” (V2-11, leased, middle wealth category, May 2019).

Adverse impacts

The adverse impacts of banana production vary between the two villages, reflecting differences in labour contributions: Village 1 households contribute labour for banana production while Village 2 households do not. As a result, households in Village 1 are concerned about their health, while lifestyle changes are a concern for households in Village 2. However, the environmental problems of water pollution, waste, and pest infestations are adverse impacts experienced by both villages.

Village 1

Households in this village expressed concern for their health, relating to their labour for banana production. As noted in the previous section, seven households (25% of household participation in banana production) planned to withdraw their labour as a result. Similarly, three-quarters of the women plantation co-managers commented that they were concerned about the impacts of the continual heavy work and use of chemicals on their health and that of their families. A female plantation ‘co-manager’ explained:

“We’ve earned more income, but we feel so tired and there are too many chemicals used in the banana plantation.” (V1-15, committed, middle wealth category, May 2019)

Also, a fifth of those who worked as daily and seasonal labourers expressed concern about their health exposure to the chemicals used in banana production. Those who worked only as seasonal labourers, mostly from upper and middle wealth households, explained that they

work primarily during the harvesting season, and can choose not to work if they are not feeling well and their income situation allows.

Village 2

'Leasing land without working' leads some households in the village to spend their time and income in leisure activities, particularly drinking alcohol. It was common during fieldwork to see groups of people 'hanging out' together drinking. One household observed:

"When people do not work in their farm [after leasing their land for bananas] they have more time to hang out and drinking together." (Informal discussion, Village 2, April–May 2019)

Environmental problems in both villages

Since the commencement of banana production in the two villages, both waste run-off and rubbish have polluted rivers. These have negative impacts to health as well as the environment, as many villagers and migrant workers rely on the river for bathing, washing clothes, fishing and, for some, sourcing drinking water.

"We are still fishing in the river even though it is dirty, but we have no choice." (V1-17, committed, middle wealth category, May 2019)

"There are lots of plastics run-off in our river and it has a bad smell, but we still taking a bath there because recently we have limit access to water tap due to extended droughts." (V2-26, leased, middle wealth category, May 2019).

In some cases, households are having to access clean water and aquatic food (fish, greens) from more distant sources, which requires more time and effort.

Pest infestations

There was a widespread belief that rat populations had increased due to banana plantations, with major impacts on rice and remaining maize harvests. Some households reported losses of more than 50%. Subsequently, many farmers decided not to continue cultivating maize or rice, other than for household consumption:

"Stop [ped] trading maize because not many people cultivate it [since the advent of the banana industry] and because of maize yield decline due to rat encroachment from neighbouring banana plantations." (V1-01, leased, upper wealth category, May 2019).

“In the past [about 10 years ago], we had rat infestation, but it was not so serious, and we didn’t lose so many yields [maize and rice] because everyone was cultivated the same crops. But now only few people cultivated maize and rice. So, if only us cultivate maize/rice, the rat will eat only our crops.” (V2-23, leased, middle wealth category, May 2019).

4.3.4 Outcomes for women in both villages

Household participation in banana production enabled new non-agricultural livelihood opportunities for women (Village 1: grocery shop, fixed food stall; Village 2: contract weaving, home-based tailoring, restaurant, mobile food sales), in addition to the pre-existing non-agricultural livelihoods (Village 1: teacher; Village 2: teacher, restaurant, non-contract weaving). These new livelihoods mostly became the primary employment of these women. In addition to income, the more sheltered and less physical nature of these activities was perceived by the women interviewed as particularly attractive.

Eighty-three percent of women (16 years old or over) in households interviewed in Village 1 contributed their labour for banana production; one as a plantation co-supervisor, 33% as both plantation co-managers and seasonal labourers, 18% as both daily labourers and seasonal labourers, and 48% as only seasonal labourers. Other than the plantation co-supervisor, all these women, across all wealth classes, engaged in the seasonal work of banana washing and packing. In the case of higher-wealth households, this seasonal work was viewed as additional income; whereas for lower wealth households, the work substituted for or added to their heavier daily labour work in the field. Women working as daily field labourers were all from lower and poor wealth households.

Most women in Village 2 had shifted to non-agricultural activities; they explained that they were happy to escape from heavy agricultural labour, and to have more time for their family and to socialise with others in their community.

4.4. Discussion

The results of this case study research of household participation in the banana boom in two villages of Oudomxay Province, Northern Laos, illustrate how factors and issues reported for boom crops elsewhere in Southeast Asia and Laos have manifested in these contexts. As with other boom crops, banana production was appealing to more than half the households (58% and 73% of households in Village 1 and 2 respectively) in comparison to alternatives; other land use options for generating income in these village contexts were relatively limited, in part because of the depletion of soil nutrients by successive cycles of growing the previous boom

crop, maize. Ironically, limited crop choices and markets were identified similarly as key drivers of the maize boom in Northern Laos (Viau, Keophosay, and Castella, 2011; Vongvisouk et al., 2014). Kallio et al. (2019) and Wong, Darachanthara, and Soukhamthat (2014) also noted that intensive maize cultivation has led to declines in soil quality and crop productivity. This phenomenon was raised by households in the case study villages, who reported several years of falling maize and rice production; the depleted condition of their land was cited by several households as a reason for leasing it out for banana production, as Higashi (2015) similarly reported for other locations in Oudomxay Province. Cavendish banana production requires extensive fertiliser and herbicide applications (Goh and Marshall, 2017), as well as irrigation. These inputs are, as one of the local agricultural officers observed, too expensive for Lao farmers. Therefore, leasing land depleted of nutrients by the previous maize cropping boom to banana companies is a rational choice for farmers. These results illustrate how the impacts of one boom crop may facilitate the adoption of a subsequent boom crop, with potentially compounding consequences for local people and their land use options.

There are contrasts as well as similarities in the forms of engagement and livelihood outcomes in the two case study villages. This chapter discusses the results below, in response to each of the research questions: the forms of participation in banana production and associated livelihood outcomes; and the household livelihood strategies emerging as a result of this boom crop. Finally, this chapter discusses the policy issues and its implications.

4.4.1 Forms of participation in banana production and associated livelihood outcomes

As with many other boom crops in Southeast Asia (Euler et al., 2016; Mahanty and Milne, 2016; Rigg et al., 2016) and Laos (Kallio et al., 2019; Kenney-Lazar et al., 2018; Vongvisouk et al., 2016), participation in export banana production has increased the income of households able to participate through leasing land; and, in the case of Village 1 in the second contract period, various forms of employment (Friis and Nielsen, 2016; Higashi, 2015).

The income-generating opportunities from banana production have changed the ways in which almost all households in Village 1, and about half of those in Village 2, derive their livelihoods, compared to that prior to banana plantations. In Village 1, most households now rely on wage labour in banana plantations; only seven households, mostly the better-off, have the capacity to rely solely on other livelihood activities; and households who have sold much of their labour for banana production have limited capacity both time and land resource to grow other crops or engage in other livelihood activities.

The lower wealth and poor households in Village 1 now depend on selling their labour for banana production, as their sole or primary source of income, as has been the case in other boom crops in Laos, particularly rubber (Baird, 2011; Hirsch and Scurrah, 2015; Kenney-Lazar, 2012). Although, as Higashi (2015) reported, households desire salaried employment, rather than piecework jobs undertaking heavy labour in the field, there are very few such opportunities in banana production available to local people. The job opportunities as plantation managers, daily labourers and seasonal labourers help poor households, particularly the landless, to build up their wealth and so their food security, as Cramb et al. (2017) noted for rubber plantations in Northern Laos and Obidzinski et al. (2012) for oil palm plantations in Indonesia.

In Village 2, in contrast, most households now have livelihoods based on land rental fees and a new range of off-farm activities that have been facilitated by better infrastructure access and Laos' modernising rural economy. In Village 2, 60% of households have transitioned to livelihoods based on non-agricultural activities, reflecting these circumstances. For these, and for a smaller number in Village 1, the financial returns to households from their participation in banana production have enabled their investment of either or both capital and labour in new, primarily non-agricultural, livelihood activities. This mirrors a similar shift following a maize boom in Huaphan Province, Northern Laos (Vongvisouk et al., 2016), where increased household income from maize led to investments in trade, commerce and off-farm occupations; and corresponds to Rigg's (2005, 2006) observations for Laos more generally. Likewise, Belton et al. (2017) reported households investing in non-farm activities and shifting away from agriculture in the context of a farmed fish boom in Bangladesh.

The shift to non-agricultural activities was more pronounced for wealthier households in both villages. This result aligns with Rigg's (2005) observations that wealthier households in rural Lao communities were involved in more non-farm activities than poor households; and that non-farm activities were replacing agriculture land as 'key markers' of wealth and poverty in Northeast Thailand (Rigg, 2018). Similarly, Vicol (2019) reported mostly middle- to better-off households investing in new non-agricultural activities in the case of a potato boom in India; and McCarthy (2019) found that better-off households in Aceh, Indonesia, shifted into non-farm activities or middle-class occupations.

4.4.2 Livelihood security

All but two of the poorest households in both villages maintain some element of household subsistence, by keeping some parcels of land for paddy and/or upland rice for home

consumption, as other studies have also reported. Kallio et al. (2019) found that most maize farmers in Northern Laos had not completely abandoned upland rice, and Thanichanon et al. (2018) reported that farmers in Xayabouly Province, Northern Laos, keep some part of their land to cultivate rice as a livelihood strategy to meet their minimum consumption needs and minimise risks. Likewise, in Central Laos, Singh (2020) found that most households in Savannakhet Province retained some upland rice production despite increased cash cropping. Retaining at least staple rice production capacity provides households with a minimum level of food security, including under circumstances where the banana boom ends, as has begun to happen in some parts of Laos (Goh and Marshall, 2017; Ward, 2019).

Households in both villages adopted livelihood diversification strategies that combined on-farm and off-farm activities. These results concur with Pritchard et al.'s (2017) characterisation of farm households in India as moving 'one foot sideways', as they become increasingly engaged in non-farm livelihood activities; and with McCarthy (2019) depiction of farmers in Indonesia's Northwest Sumatra as shifting 'sideways' out of agriculture, but keeping one foot in it.

Many of the Lao households able to participate in the banana boom are also becoming the 'hybrid households' described by Rigg et al. (2020) in Northeast Thailand, where most farm households were multifunctional, combining activities to secure their livelihoods with (often precarious) non-farm work; and with the diversification of livelihood portfolios reported by McCarthy and Obidzinski (2017) for East Kalimantan, Indonesia, based on a combination of swidden cultivation, wage labour in oil palm plantations, and other activities for food security and cash income. The multifunctionality of farm household livelihood strategies is common globally; it has been described in Asia, Latin America and Europe (van der Ploeg, 2010). My findings reiterate those of earlier studies, that rural households in Laos "escape poverty through creative engagement with non-farm activities" (Rigg, 2005, p. 186), and are adapting and pursuing diversification for survival as development proceeds (Rigg et al., 2012). However, not all households can become 'hybrid households', particularly those that are resource-poor. These households mostly rely upon the single livelihood option of selling their labour to survive and/or to build their wealth.

4.4.3 Gender, health, environment and sustainability

While in most households, decisions about participation in banana leases or labour are made jointly by husband and wife, the roles in which men and women participate in banana production are gendered. In particular, contracts for plantation management are preferentially

made with men, even though they may require women to work in conjunction with them as co-managers. In the case of a female-headed household, securing such a contract depends upon having an able-bodied male labourer in the household, such as an adult son or son-in-law. Some women therefore felt reliant on men if they wished to work as a plantation manager if their households lacked able-bodied male labour, as noted in other contexts in Laos (FAO 2018a). In contrast, women can independently work as seasonal labourers and receive payment directly, and some women perceived this as an opportunity to earn additional income independently from men, also noted by the World Bank (2016) for agricultural commercialisation, particularly export crops, in Laos.

Those women who now work in small enterprises expressed their satisfaction with being able to work at home and take care of their family members, while their husband either also stayed at home or invested their labour and household capital in other activities. Women in both villages would prefer more sheltered and less heavy physical activities, rather than continuing as farmers. Many women in Village 1, who are currently working in banana production because they have no other labour options, have plans to exit from this work when they have accumulated sufficient wealth, and shift to non-agricultural activities as has already happened in Village 2.

Both male and female banana labourers felt that this presented a dilemma: While earning a relatively high income from selling their labour for banana production, they suffered physically and mentally from continuous heavy duties and exposure to chemicals. As well as immediate health impacts, families were concerned that serious cases of ill health could impact their longer-term earning and labour capacity and exposure to chemicals used in banana production has been reported as having serious impacts on women's reproductive health (FAO, 2018a).

Reports of health issues associated with banana production are widespread in Laos (Finney and Khotpanya, 2018; Vientiane Times, 2019). Similarly, Baird's (2010) study of the rubber boom in Southern Laos reported that labourers in rubber plantations had various health problems due to their exposure to herbicides or other chemicals. Since the commencement of banana production in Laos, there have been many reports (Finney and Avary, 2020; Goh and Marshall, 2017; Inkey, 2019) about waste run-off and rubbish polluting rivers; this has negative impacts to health as well as the environment. These issues from banana production were also observed in my case study villages.

These issues suggest that the current banana production model in Laos is not sustainable, in terms of human and environmental health, and this will likely be exacerbated with spread of Panama disease in Laos, which began to impact on established Cavendish banana plantations in 2017 (de Lapeyre et al., 2017). Because plantations cannot be re-established on sites infected with Panama disease, by late 2018, banana companies were moving their investments to other provinces in the central and southern regions (Khotpanya and Lipes, 2019). The banana boom in Northern Laos was beginning to ‘bust’. Although the Lao Government has begun implementing the Lao GAP policy (MAF, 2016) and other regulations for banana production (MPI, 2019; PMO, 2019), it remains to be seen if these measures will sustain Cavendish banana production in Northern Laos, address environmental and human health concerns and curtail the spread of disease in new areas.

4.4.4 Policy issues and implications

As the Northern Lao banana boom progressed, three general sets of issues emerged for the Lao Government: the absence of government oversight – at district, provincial or national levels – of contracts and associated land use transformations; the environmental and health impacts of banana production; and the forms of and terms of contracts, including power and information imbalances in negotiations between companies and villagers, and gender bias. Each of these were evident in the case studies, and we discuss Lao Government responses below.

In relation to contractual agreements, the first response from government as the banana boom proceeded was simply to register contracts and plantation areas. District and Provincial officers began to inspect newly-established plantations, and ordered banana companies to register their investment at the Provincial Office of Planning and Investment (NAFRI, 2016). The registration involved companies advising the District Office of Agriculture and Forestry and of Natural Resources and Environment, which conducted a field inspection, and other provincial agencies (Finance, Industry and Commerce, Natural Resources and Environment).

Subsequently, environmental and health issues due to the extensive chemical use in banana production (Grimsditch, 2017; Khotpanya and Lipes, 2019) led to high-profile national media reports and discussions in the Lao National Assembly from 2014 (Knowles, 2015; Ling and Xiong, 2017; NERI, 2015). In 2014, the Lao Government announced a moratorium on banana plantation expansion on paddy land in six Northern provinces, including Oudomxay (Prime Minister’s Office, 2014). In neighbouring Bokeo and Luang Namtha Provinces, in which banana expansion had been greatest, and health and environment problems most evident,

the Provincial Governors announced a ban on further banana expansion for all land use types. In Oudomxay Province, where the case study villages were located, the ban was applied only to paddy land (I-01, Interviewed informant, May 2019).

In 2016, the government released a Lao Good Agricultural Production Standard (Lao GAP) specifically for banana production, intended to address environmental issues such as soil and water contamination and health issues of both workers and local communities (MAF, 2016). However, implementation was limited, and environment and health issues from banana production continue to be the subject of media reports (Finney and Avary, 2020; Whong and Avary, 2020). District government officers remain concerned about these issues; one observed that:

“Our governments still lack experience in planning and managing health and environment problems. We are working with DONRE and District Office Labour and Social Welfare (DOLSW) to solve the problems.” (I-03, Interviewed informant, May 2019).

Campbell et al. (2012) suggested that contract farming provided the best opportunities for Lao farmers to benefit from agribusiness investments, and the Lao Government’s Investment Promotion Policy for agribusiness promotes the ‘2+3’ model of contract farming to ‘ensure local level benefit’ (Schoenweger and Üllenberg, 2009, p. 16). Similarly, the Agricultural Development Strategy 2011–2020 (MAF, 2010) identifies a key role for contract farming. However, there is still no policy framework or guidelines for implementation; as a result, contract farming models have a mixed track record in Lao PDR (FAO, 2013, p. 14).

Fullbrook (2014) suggested that better information for Lao farmers was necessary to empower them in contract bargaining, and that DAFO staff could facilitate negotiation processes; similarly, Bartlett (2013) suggested that a greater commitment from local authorities is needed in improving agricultural extension activities. This is what occurred in contract renegotiation in Village 1, with DAFO and DONRE involvement leading to substantially better contract terms and labour opportunities for households. The improved outcome in this case, catalysed by a new and better-informed Village Head and Committee, was mirrored in Village 2, where a better-informed leadership and community benefited from their and others’ prior experience. In Village 2, the lease contract explicitly mentions that land restoration after the end of banana production is the responsibility of the investors.

Contracts for banana plantation management were usually jointly agreed within households, but then made preferentially with men, even though they may require women to work in conjunction with men. In the case of a female-headed household, securing such a contract

will depend upon having an able-bodied male labourer, such as an adult son or son-in-law, in the household. FAO (2011) reported similarly that women are largely excluded from contract farming arrangements. Women can, however, work as daily and seasonal labourers without male approval, and receive payment directly.

By the end of 2018, the banana boom in Northern Laos was beginning to ‘bust’, factors converged and companies started moving their investments to other provinces in the central and southern regions (Khotpanya and Lipes, 2019). In 2019, the Prime Minister’s Order No. 09 (Prime Minister’s Office, 2019) was issued on *The enhancement of governance in the use of concession lands for industrial tree plantation and other crops*. Under this Order, many issues remained unresolved, with MAF required to investigate Cavendish banana investments under both concession and lease arrangements and establish a system to reinforce compliance with the Lao GAP for banana production.

Significantly, policy responses have so far failed to systematically address the issues associated with contracting between companies and households. This is particularly important for bananas. With the movement further to the south of Laos, the current contracting arrangements may be replicated because it is preferred by companies and because the government continues to view it as a model that benefits local communities. However, this research suggests otherwise. Without detailed guidance on contract farming, strategies for sustainable agriculture such as the Agricultural Development Strategy (ADS) 2011–2020, are unlikely to be effective. These limitations need to be addressed by the Lao Government if new and existing banana investments are to deliver the benefits expected for participating households, communities and companies, and without adverse environmental and health impacts. As the history of agribusiness development in Laos illustrates, different levels of government are not necessarily well-coordinated (Lu and Schönweger, 2019); and, as Creak and Barney (2018, p. 697) discuss, there are “limitations in the Lao government’s technical and institutional capacity to administer and develop the country”.

4.5. Conclusions

The participation of households in the banana boom in Northern Laos, through leasing land and contributing labour, has impacted on household livelihoods and livelihood trajectories in a range of ways and mirror those of many other boom crops in Southeast Asia. Participation in banana production has brought opportunities and income to many in the communities who have participated, but mostly favouring households who had already accumulated wealth. In many cases, this was largely from the preceding boom crop, maize, and the economic

differentiation between villages and households evident at the start of the banana boom was amplified as a result of it. For example, those households in Village 1 who leased their land and contributed their labour to manage banana production built new concrete houses and bought new vehicles, while the less wealthy households who participate only by selling their labour have not been able to improve their assets correspondingly. In Village 2, the better-off households invested their capital and labour in non-agricultural activities such as opening shops and restaurants, while the less-wealthy households largely chose to have a rest, and some women became contract weavers.

While household livelihoods in Village 2 largely shifted to non-agricultural activities, the initially unfavourable contract terms and the more limited income opportunities in Village 1 meant that the majority of households had become labourers in banana production, from which they feel they have benefited and earned a higher income than would otherwise be the case. In these respects, the banana boom in Village 1 somewhat emulated that of the rubber boom in Southern Laos, where Kenney-Lazar (2012) described the dramatically-transformed agrarian property and social relations of production as one in which “peasants entered an altered relation to the land as semi-proletarianized wage labourers” (p.1032). Similarly, Baird (2011) and Hirsch and Scurrah (2015) described how rubber booms in Laos were ‘turning land into capital while turning people to labour’. In contrast to these transformations under rubber concessions, farmers participating in banana investments have been able to retain their land use rights, gain some forms of labour or employment and – in the case of the more fortunately located and governed Village 2 – banana contracts have allowed most households to move to non-agricultural livelihoods, which they now prefer. Households observed that when the banana company moves elsewhere, some of them may return to use their land growing crops for which there is market demand; others may not return to farming, but lease their land to households who have little or no land; and more young people may migrate from their village seeking job opportunities in towns, or education, and may not return home.

Even though working in banana production provided a relatively attractive income to those households with adequate labour resources, the use of chemicals and heavy nature of the work adversely affected many household members’ health, and the commitment of this banana labouring in the future. The short-term benefits to households through increased income from land rental and, in some cases, labour, may be offset by longer-term impacts, including on people’s health and the environment. These issues, and the arrival and spread of Panama disease, call into question the sustainability of current models of banana production, and signal the likely end of the banana boom, at least in the North. In Village 1, where banana land leases were to expire in 2020, this is already evident; local authorities

(DAFO) are no longer promoting bananas, but rather encouraging farmers to participate in the next Chinese-led investment in sugarcane and horticulture (mango and pomelo) production, under the Government-preferred 2+3 contract farming model. More recently, the Government is turning areas of Namong District, including Village 1, into a Special Socio-Economic Zone (SEZ) (Vaenkeo, 2020). This is another manifestation of the approach of “Turning land into capital while turning people into labour” (Baird 2011, p. 10 and Hirsch and Scurrah, 2015, p. 15), although villagers only know of this project as an ‘electronic assembly factory’ (Fieldnotes, May 2019, and phone call with Village Committee, March 2021). In Village 2, where banana land leases run until 2025, households remain concerned that they may find it is difficult to return to agriculture, after moving to other livelihood activities. If, as is likely, banana production does not continue and alternative leasing opportunities do not emerge, the opportunities for households in Village 2 are most likely leasing land to households in a nearby villages for cropping – probably maize, which farmers can generally afford, assuming the residual impacts on soil fertility from past maize cultivation has not been exacerbated by banana production. In both villages, households were concerned about the legacy impacts of banana production on soil quality and the costs of land restoration, also noted by Friis and Nielsen (2016), Higashi (2015) and Manivong et al. (2016) elsewhere in Northern Laos.

As in those cases, the results of these case studies suggest mixed outcomes for local livelihoods, with short-term household income benefits tempered by health and environmental costs, and the boom – like others before it – lasting only while production and markets can be sustained. It seems that the households in my case study villages will continue to need to develop and adapt livelihood strategies that can both benefit from and ride out the boom–bust cycle of crops like bananas.

5 Household participation and livelihood outcomes associated with the Northern Lao cassava boom

5.1 Introduction

In the past, the Lao government has promoted agricultural commercialisation as a strategy to reduce poverty and improve rural livelihoods (Alexander et al., 2009; Ducourtieux et al., 2005). Laos is a lower-income country (Kallio et al., 2019) and one of the poorest in Asia with GDP per capita of US\$2,630 in 2020 (World Bank, 2021a). Three-quarters of its population depend upon agriculture (ADB, 2018) and two-thirds live in rural areas (WFP, 2020). Traditionally, upland communities in Laos have practised shifting cultivation for subsistence and sale of the surplus (Fox et al., 2009). During 1980s and 1990s, a series of policies under the New Economic Mechanism opened up the economy and intensified trade with neighbouring countries (Bird and Hill, 2010) The 5th Five-year National Social Economic Development Plan 2000–2005 (5th NSEDP) (MPI, 2000), and a LFAP (Fujita and Phanvilay, 2008) of ‘turning land into capital’ (Dwyer, 2007), encouraged private investments in large concession for industrial tree plantations (acacia, eucalyptus, and rubber) (Barney, 2008; Kenney-Lazar, 2012; Phimmavong et al., 2019; van der Meer Simo et al., 2020a). The 6th NSEDP (2006–2010) continued the promotion of agricultural commercialisation, but shifted the focus from large-scale concessions to contract farming due to negative impacts of the former to local people’s livelihood (Fullbrook, 2007), and contract farming was emphasised/promoted by the Lao government to benefit the local people (Schoenweger and Üllenberg, 2009). As a result of these policies, a series of cash crops have boomed in Laos, primarily bananas (Friis and Nielsen, 2016; Higashi, 2015; Vongvisouk and Dwyer, 2017), cassava (Smith et al., 2018a; Soukhamthat and Wong, 2016), maize (Kallio et al 2019), rubber (Kenney-Lazar et al., 2018; Lu, 2017; Manivong and Cramb, 2008) and sugarcane (Jalilian, 2013; Supaporn, 2015; Sylvester, 2018). Crop booms have been defined as those “taking place when there is a rapid increase in a given area in the amount of land devoted to a given crop as a monocrop or near-monocrop, and when that crop involves investment decision that spans multiple growing seasons” (Hall, 2011a, p. 840). In the Lao case, the rapid increase in production has been enabled through investments from neighbouring countries – China, Thailand and Vietnam (Grimsditch, 2017).

Cassava (*Manihot esculenta*) is a perennial shrub that produces a starchy root. It is grown largely in the tropics and sub-tropics, is tolerant to dry soil conditions and cultivated with low inputs, often by resource-poor farmers in marginal lands; it has a wide variety of uses as a food crop, as livestock feed, for starch production, and for biofuels (Cramb et al., 2017;

Delaquis, de Haan, and Wyckhuys, 2018; Howeler, 2014; Smith et al., 2018a). Cassava is traditionally grown in Laos as a subsistence crop for human consumption and for livestock feed; it is one of the main sources of calories for many ethnic groups, especially those living in remote mountain areas, where this practice continues (CIAT, 2015). Cassava commercialisation has expanded in Laos over the last 15 years, and it is now one of the principal Lao export crops, valued in 2019 at US\$129 million, in comparison to \$198 million for bananas, \$105 million for rubber and \$34 million for maize (Vientiane Times, 2020a; Xinhua, 2020). In the first 4 months of 2020, the value of cassava exports to Thailand and Vietnam increased significantly, to US\$140 million (a 300% increase from 2019), excluding starch exports to China (Newby, 2020).

The area of cassava in Laos expanded more than tenfold between 2005 and 2019, from 6,755 ha to 101,200 ha (MAF, 2020), although this is still relatively small compared to many other countries in the region: Thailand has 1.4 million ha, Indonesia 697,000 ha, Vietnam 513,000 ha, Cambodia 272,000 ha, and Myanmar 31,278 ha (FAO, 2018b). This expansion was due to the high demand for raw cassava for bioethanol fuel production in China, Thailand and Vietnam (Newby, Le Thuy, and Smith, 2017) as well as demand for flour production in domestic markets (Soukhamthat and Wong, 2016). Also, like many other cash crops in Laos, cassava expansions were facilitated by a series of policies from the Lao Government: Investment Promotion Law, land use policy (particularly under the slogan of ‘turning land into capital’) and the 5th, 6th and 7th Five-year National Socio-Economic Development Plan. Cassava is grown in Laos under concession and contract farming arrangements, and independently by smallholders (Cramb et al., 2017; Hett et al., 2015). The main investors are China, Thailand and Vietnam, with 14 cassava starch and dry chip processing factories nationally (Manivong, Newby, and Smith, 2017).

Smallholder adoption of cassava as a cash crop in Laos has generally been on land on which a previous boom crop (maize, coffee, Job’s Tears or ‘*Coix lacryma-jobi*’) was cultivated. For example, successive seasons of hybrid maize monocropping has resulted in loss of soil nutrition, soil erosion, weed infestation and loss of production (Kallio et al., 2019; Ornetsmüller et al., 2018; Thanichanon et al., 2018). Recently, decreased coffee prices have resulted in many coffee growers in Southern Laos converting their coffee crops to cassava (Vientiane Time, 2020), and in farmers converting their cabbage fields to cassava (Lao Farmer Network, 2020). Conversely, some former maize and cassava cropping areas in Northern Laos have been converted to grazing in response to higher demand and prices for beef (Ornetsmüller et al., 2018; Phouyyavong, Tomita, and Yokoyama, 2019).

The cassava boom has created new livelihood opportunities for many smallholders in Southeast Asia (Smith et al., 2018a). However, crop booms also present challenges to farmers and policymakers alike: Some farmers are able to diversify their livelihood activities, particularly by adopting less labour-intensive activities; others may ‘crash downwards’ when the boom ends (Hall, 2011a) or yields decline (Howeler, 2014; Manivong et al., 2018), and sink into debt (Vandergeest, 2008); others are not able, or choose not, to participate. A common challenge is for the private sector, government and development agencies to work together and with farmers to develop and adopt technology, improve crop production system, and enhance value-chain dynamics (Howeler, 2014; Manivong et al., 2017; Smith et al., 2018a). Studies by Manivong et al. (2017); Manivong et al. (2018) and Soukhamthat and Wong (2016) have explored the characteristics of smallholder cassava farmers, and their perceptions of cassava, and cassava production systems and value chains. However, there have been few studies of the livelihood outcomes associated with the cassava boom in Laos. This study draws on field research in two case study villages in Northern Laos to explore the market and policy contexts of the Northern Lao cassava boom, forms of households’ participation in the boom and associated livelihood outcomes, and the policy intervention and implications.

5.1.1 Global cassava markets

Global demand for cassava has increased rapidly due to demand for starch-based products in the food processing, animal feed, textiles, chemical and pharmaceutical industries (Smith et al., 2018a). The global cassava market is influenced not only by change in supply and demand for the intermediate products (cassava chips and starch) themselves, but also by changes in the supply and demand of a range of competing substitutes, namely, other forms of carbohydrate for processing into animal feed or ethanol, such as maize, sorghum, potato, wheat, sugarcane, molasses, as well as the traditional energy sources of oil and gas (Howeler, 2014; Newby et al., 2017).

Southeast Asian cassava markets operate in this global context (O’Connor, 2013), and are substantially shaped by trade policies. In the 1970s, global markets for cassava industrial expanded greatly because the European Common Agricultural Policy aimed to provide stable and remunerative incomes to European farmers by keeping the domestic price of grains above global prices. However, the expansion of livestock herds there led livestock feed companies to start to bring in substitutes where importation of cassava chips for animal feed emerged (Newby, 2016). The Southeast Asian cassava boom began in Thailand, which greatly benefited from these policies (Byerlee, 2014; Newby, 2016), and then spread to Vietnam and

Indonesia (Cramb et al., 2017). However, since 2000, with trade reform under the General Agreement on Tariffs and Trade (GATT) and WTO, the demand for cassava chips and pellets in Europe almost completely disappeared, and cassava markets reoriented towards East Asia (Newby, 2016). Chinese markets drove cassava demand for use in stock feed, starch and biofuel, and Thailand and Vietnam became the most significant regional producers and developed their own processing capacity (Cramb et al., 2017; Mahanty and Milne, 2016). The approximate export value of cassava from Mekong region countries is now Cambodia US\$13 million (Vireak, 2020), Laos US\$129 million, Thailand US\$2.8 billion (Arunmas, 2019), and Vietnam US\$1.2 billion (Nguyen and Trang, 2019). Since 2016, prices of cassava chips and starch throughout mainland Southeast Asia have been depressed by a Chinese policy removing a floor price for maize (Newby et al., 2017).

The growing demand for cassava and the limited opportunity for further expansion in the major producing countries of Indonesia, Thailand and Vietnam have driven a cassava boom in Cambodia, Laos and Myanmar (Cramb et al., 2017). In each of these countries, the boom was driven by access to cheap land and labour, combined with high commodity prices (Byerlee, 2014; Mahanty and Milne, 2016).

5.1.2 Cassava production systems in Laos

Amongst the hundreds of cassava varieties grown worldwide, these can be largely classified as either being 'sweet' or 'bitter'. Both types are grown in Southeast Asia: 'sweet' is a traditional type grown in some areas as an intercrop and consumed directly due to the low cyanide content, while the 'bitter' varieties have been bred to have high yield and starch content with the eating quality not an important trait. These are used for processed products and is typically grown as a monocrop (Smith et al., 2018b). There is no cassava breeding program in Laos, so all bitter cassava types originate from China, Thailand and Vietnam (Malik et al., 2020). Cassava is an annual crop, reaching maturity 8–12 months after planting. Cassava production varies with soil nutrition and planting variety, and production is commonly 12–47 tonne/ha in Laos (Malik et al., 2020; Manivong et al., 2018).

When Lao farmers begun to adopt cassava as a cash crop, planting materials (stem cuttings) were mainly sourced from investors, traders or factories, and later from friends and neighbours, and relatives both within and outside local communities. After the first season, farmers typically replant with cassava stems from their own fields. Herbicide application and manual weeding occur approximately two times/season. Planting and weeding may draw on hired labour, as well as or instead of household labour, at a rate of US\$4.7–US\$5.4/day. Most

farmers do not apply fertiliser due to the additional input cost, and limited access to information about returns and to fertilisers, and a relative abundance of land from use. Most Lao cassava cropping is rainfed. Generally, farmers in Northern Laos rotate cassava, maize, beans and upland rice. However, as returns from cassava have continued to be higher than the other crops, farmers have shifted to continuous cropping of cassava. In such cases, without fertiliser use, cassava yields decline, perhaps by up 60% over four years (Howeler, 2014). Intercropping of 'bitter' cassava is not common in Laos, although there are recent demonstration trails of intercropping and fertilisers (Smith et al., 2018b). Intercropping is not seen as an attractive option for most smallholders due to the added labour requirements.

Harvesting cassava requires significant labour input, typically from within households and from local and outside hired labour. A farming couple can harvest up to 1.5 tonnes/day; hired labour is paid based on the weight of cassava root, at US\$13–US\$16/tonne. Cassava is sold either as fresh root or dried chips, either directly to starch factories and/or to small- or larger- scale local chip processors. Fresh root needs to be delivered within 24 hours of harvesting, and dried chips within 48 hours. The conversion rate from fresh root to dried chips is c. 40–50% of the total fresh root volume.

Average cassava prices in the case study area during 2018–2019 were, for fresh root US\$62/tonne (range US\$54–US\$68/tonne) and for dried chips US\$175/tonne (range US\$159–US\$190/tonne) (Fieldnotes, February–April 2019).

A number of diseases which affect cassava yields and starch content have already spread through Laos (such as 'cassava witches broom') or are established in the neighbouring countries of Cambodia, China, Thailand and Vietnam and are currently spreading in Laos (such as 'cassava mosaic disease') (Newby, 2020).

5.2 Methods and case studies

I have taken a qualitative case study approach to define and understand livelihood outcomes from farmer participation in the cassava boom, drawing on the sustainable livelihood framework (Scoones, 1998) and the diversification of household livelihood strategies (McCarthy and Obidzinski, 2017; Rigg et al., 2020). I conducted field research in Xayabouly Province, bordering Thailand; This was one of the first provinces involved in the Land and Forest Allocation process, completed in 1996 (Ducourtieux et al., 2005). Geographic proximity and good road access to Thailand have fostered a rapid evolution in farming practices, with a major shift to annual cash crops (Job's Tears, maize, peanuts, red beans, and most recently

cassava), mainly in the south of the province (Boten and Kenthao Districts). In 2013, Xayabouly was the third-ranked province for cassava production in Laos, after Vientiane and Bolikhamxay, and became the first-ranked in 2019. I selected two districts in the province with contrasting markets. In Paklai District, a Chinese-owned cassava starch factory was established in 2012; most fresh roots are now supplied to this factory (Manivong et al., 2018). In Kenthao District, cassava was originally exported to Thailand as both fresh roots and dry chips; Export of the former has been banned since 2019 under a notification from the Provincial Governor of Xayabouly Province to District Governor of Kenthao (No. 03, dated 10/01/2019), to promote domestic food processing. Farmers in Kenthao primarily sell their fresh roots to small-medium and large dry chip processors, which then export to Thailand. However, some traders sell fresh roots to the factory in Paklai District.

Preliminary discussions with the DAFO and the International Center for Tropical Agriculture (CIAT) identified five candidate villages, from which two were subsequently selected for fieldwork, based on the following criteria: a high concentration of cassava plantations, evidence of livelihood and land use changes associated with the cassava boom, a range of household wealth classes, a small- to moderate-sized population and the community's willingness to participate in the research.

5.2.1 Field research methods

I spent 3 weeks in each village between February and April 2019, with a local field assistant present for the last week in the second village. I used multiple methods for data collection: focus group discussions, household interviews, formal and informal discussions, field observations, and reviews of relevant secondary sources. I describe each stage of data collection below and summarise it in Table 5.1.

FGDs were conducted separately for men and women in each village (10–15 participants each) to ensure that women's perspectives were heard independently of men. FGDs began with a participatory mapping exercise where participants drew main land uses since Lao independence in 1975 to the present. I used this mapping as a tool to understand village landscapes and farmers' and communities' land use choices. FGDs also served the purpose of initial meetings with around 30 members of each village and were also used to identify the characteristics defining four household wealth classes (see Table 5.2), following similar approaches in related studies in Laos (Martin and Lorenzen, 2016; Newby et al., 2012; Van Der Meer Simo et al., 2019).

I selected a sample of around 10% of village households (N=31 each village) for interviews at the household level. I used two strategies to identify households: a discussion with the village officials (Village Head and Committee), and snowball sampling. Firstly, I asked village officials to assign households to the household wealth classes, and whether these households cultivated cassava. I selected households at random from this list. Secondly, I used snowball sampling, by asking the interviewed households if they knew other households who met the criteria, to ensure that at least five households were sampled in each wealth class.

I also held formal discussions with government officers (four) in District Agriculture and Forestry Offices to explore relevant policies, agency roles, and officers' perspectives of cassava production, and on current and future agricultural development plans. I conducted informal discussions opportunistically, often at food stalls or shops and houses where people gathered; these were mostly older (50–60 years) men and women who were staying at home to look after their grandchildren and/or taking a break from farming activities. I also held informal discussions with members of the village committee, village elders, host families and other villagers. I used these discussions to triangulate information from other sources. In addition, during preliminary fieldwork I joined an International Center for Tropical Agriculture (CIAT) research team to interview a manager of the starch factory and some of their workers in Paklai District, and three cassava dried chips processors in Kenthao District. I undertook field observations throughout the fieldwork, to observe livelihood activities and daily life, land uses, villagers' access to information, and environmental issues.

Table 5.1: Field research methods and foci

Research method	Number	Themes covered
Focus Group Discussion (semi-structured; average duration 3 hours)	groups (2 per village) (10–15 participants each; male and female separately)	Village history; village participatory mapping; evolution of main crops; wealth classification; cassava establishment in the villages; cropping calendar and the role of men and women in labour contributions.
Household interviews (semi-structured; average duration 1.5 hours)	62 households (31 households per village)	Household composition; income sources; expenditure; livelihoods assets-detailed in land use parcels; reasons for adopting cassava; livelihood situations and activities; social connections; shocks and future plans.
Formal discussions (semi-structured; average duration 1.5 hours)	4 District government officers	Roles of the government agency related to cassava boom; contract arrangements; perceptions of and future plans for agriculture development.
Joint interview/fieldwork with CIAT team	1 starch factory 3 dried chip processors	Supply chains of the cassava production.
Informal discussions (ad hoc)	Opportunistic; at least 10 villager members in each village and 5 cassava collectors	Village history, land use options/preference and allocation; perception of participation in cassava boom; challenges of cassava cultivation; previous debt from maize; future livelihood plans.
Participant observation (integrated with other activities)	Many village members	Livelihood activities; land use options; positive (e.g., new vehicles) and negative (e.g., cassava disease) changes.

Table 5.2: Characteristics of household wealth categories of the case study villages

Assets/wealth category	Upper (N=11)	Middle (N=19)	Lower (N=25)	Poor (N=7)
Physical capital:				
House condition	Usually own a traditional wooden house with concreted ground floor or concrete house	A traditional wooden house with concreted ground floor or wooden house with open ground floor	A traditional wooden house with open ground floor or bamboo house	A bamboo house only
Transportation	Generally own two or more vehicles and/or large tractor/truck	Generally own a vehicle and/or truck	Generally own a hand tractor and/or 1–2 motorbikes	Rarely own a motorbike
Livestock	Generally own large livestock (cow, buffalo); pigs and poultry	Some own large livestock (cow, buffalo); pigs and poultry	A few own large livestock (cow, buffalo); pigs and poultry	Most own a very small number of poultry
Financial capital: Household annual net income (US\$)				
Village 1				
Median	8,300	4,800	3,500	300
Range	6,000–21,000	1,500–7,000	1,200–6,000	160–500
Village 2				
Median	30,000	4,000	600	27
Range	19,000–35,000	3,000–6,000	In debt–4,900	In debt–70
Natural capital: Household land ownership (ha)				
Village 1				
Median	11.36	5.96	2.10	0.50
Range	3.67–17.34	1.70–11.00	0–5.85	0–1.50
Village 2				
Median	18.60	12.57	5.25	0.88
Range	8.00–35.00	5.10–27.70	0–13.50	0.50–1.20

Note: For more details see Appendix 2.3

5.2.2 Case study villages

Table 5.3 presents demographic and land use characteristics of the two case study villages. The number of households in Village 1 was 257 and in Village 2 was 405; 31 household were interviewed in each (12% and 8%, respectively). Both villages are ethnically Tai-Lao, but the land area allocated to each village differed substantially; Village 1 had two-thirds more land than Village 2.

Table 5.3: Key characteristics of case study villages

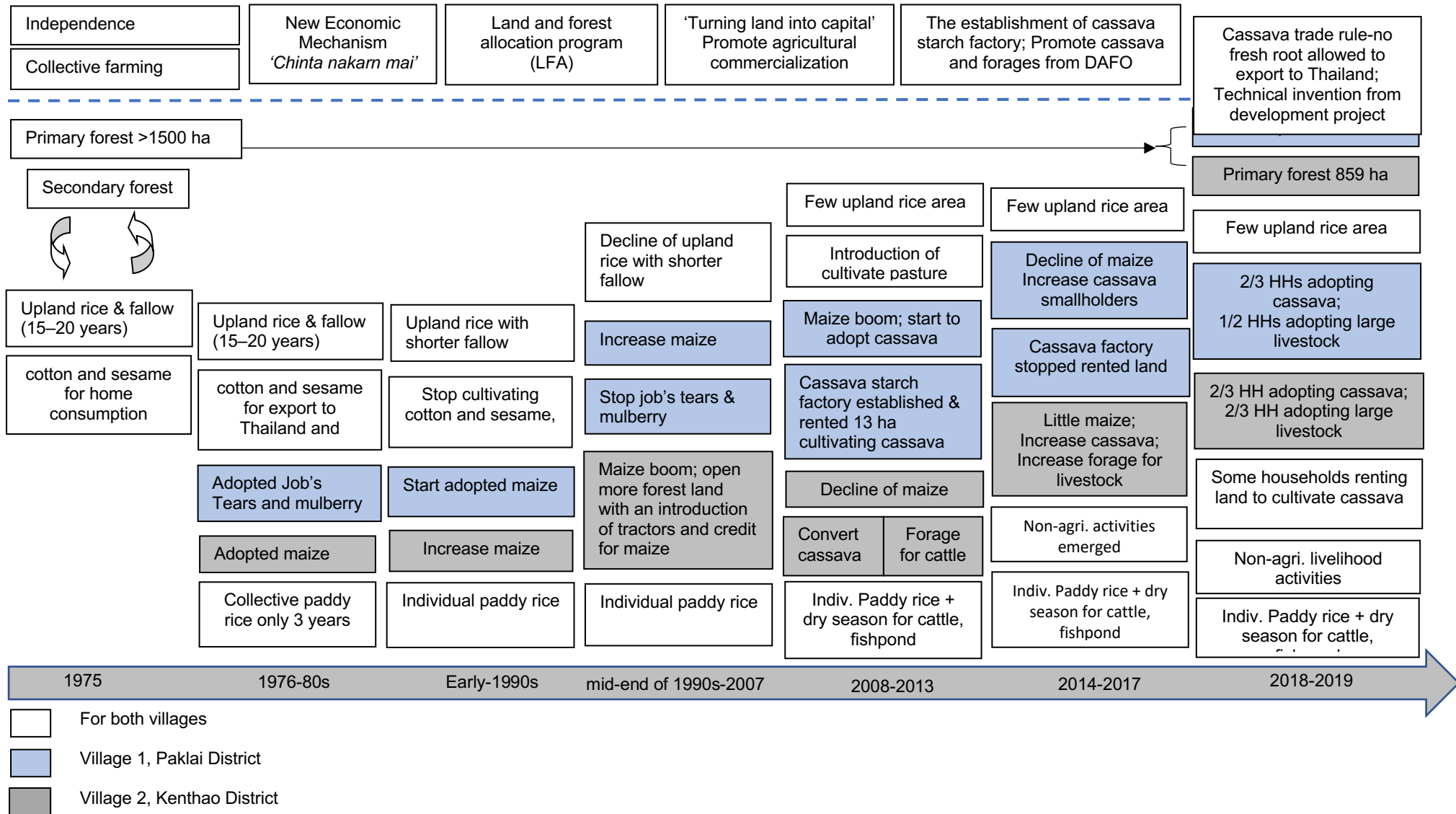
	Village 1 (Paklai District)	Village 2 (Kenthao District)
Village location: distance from		
Starch factory (km)	15	90
Nam Hueang (Laos–Thailand border) (km)	85	15
Village population		
Total number of people	1,194	2,055
Proportion of women	47%	51%
Ethnic groups	Tai-Lao	Tai-Lao
Total number of households	255	405
Household size (adults and children)	median: 4 range: 2–10	median: 4 range: 2–8
Number of family labour >12 yrs old	median: 3 range: 2–8	median: 4 range: 2–6
Number of children <12 yrs old	median: 1 range: 0–2	median: 1 range: 0–3
Number of households surveyed	31 (12%)	31 (8%)
Village land use		
Total land area (ha)	6,869	4,243
Forest area (Protected) (ha)	650	859
cassava plantation area (ha)	896	451
Number of participating households	255 (99%)	267 (66%)
Number of these households interviewed	29 (94%)	18 (58%)
Paddy land (ha)	103	374
Number of participating households	168 (66%)	365 (90%)
Number of these households interviewed	23 (74%)	23 (74%)
Other agricultural land (maize, pasture, orchard, teak, rubber) (ha)	5,219	2,396

Source: Fieldnotes, Feb–April 2019

The characteristics of each village and history of adoption of cassava are summarised below. Changes in land use and agricultural systems in the two villages since Lao independence in 1975 (Figure 5.1) provide the context for cassava adoption. When the two villages were settled more than 100 years ago; livelihoods were based predominantly on subsistence farming, mainly of upland rice. After Lao independence, collective rice cultivation was introduced nationally, but was practised for only a few years before this policy was abandoned (Stuart-Fox, 1980). Subsequently, some households cultivated paddy rice individually, and cotton and sesame for both for household use and sale of surpluses. Job's Tears and paper mulberry bark were introduced by Thai traders, and became the main cash crops in the 1980s; subsequently, commercial maize was introduced similarly, and became a boom crop from the late 1990s to around 2010 (Fieldnotes, Feb 2019).

Paddy rice remains a subsistence food for most households in both villages; only few households now practice upland rice cultivation. Large livestock (buffalo and cattle) were traditionally raised in natural pasture and/or fallow swidden land, but the introduction of cash crops over the last 2 decades has forced households to fence their livestock to avoid damage to crops. As a result, many villagers sold their livestock, and few households owned many livestock over the last decade.

Figure 5.1: Timeline illustrating changes in land use and agricultural systems in the two case study villages since 1975



After the first c 5–10 years, maize production progressively declined, as a consequence of successive seasons of maize cropping without crop rotation or fallow. In 2009, the Lao Government, through both the Kenthao and Paklai DAFO, collaborated in a development project promoting pasture cultivation for cattle, by providing free seeds and advice to villagers. Adoption varied between the two villages, as discussed below. The promotion of cattle rearing was also influenced by the issues with selling maize as the Thai Government protected their maize farmers and prohibited import of maize from Cambodia, Laos and Myanmar in 2010 and since then has started imposing seasonal import maize from these countries (Pupphavesa et al., 2016) causing prices of maize to fall.

Cassava was introduced to both villages in 2012, with the establishment of a cassava starch factory by a Chinese company in Nam Xong Village, Paklai District. The factory distributed free planting cassava materials (cassava stakes) to households who expressed interest in participating in cassava production through a village leader and DAFO. The establishment of the cassava factory reflected a combination of the Laos Government policy (6th and 7th NSEDPs) of promoting foreign investment and agricultural commercialisation (MPI, 2006) and the high global market demand of the cassava production (Newby et al., 2019).

Households were open to adopting cassava because maize production was becoming increasingly unattractive; Productivity was declining while the costs of inputs increasing as well as labour requirements for weeding. Nevertheless, households reported that cultivating cassava was preferable to maize in terms of requisite weather conditions and lower investment costs – because they can use stakes from previous seasons for planting and flexibility of managing labour for harvesting – because roots can be left in the soil for up to two years before harvesting.

Since 2016, the International Center for Tropical Agriculture (CIAT) has been collaborating with DAFO in Paklai and Kenthao to improve cassava cropping systems, through fertiliser trials, intercropping demonstration plots, variety selection, and pest and disease control; better connections between farmers, research extension services and industry actors; and understanding of the dynamics of cassava value chains locally, and in Laos and Cambodia (Newby et al., 2019).

Village 1

Village 1 is located in Paklai District, approximately 85 km from the Laos–Thailand border and 15 km from a cassava starch factory at Nam Xong Village (5 km from Paklai town) (see Figure

5.2 and Table 5.2). The road from Paklai town is asphalt up to a point 2 kms from the village. Most households have wells in their houses for water and access to drinking water and sanitation are reasonable. The village lies to the west of the Mekong River, which many villagers use for bathing, clothes washing, collecting riverweed, fishing and manual gold mining. Housing is mostly basic/semi-permanent (traditional Lao wooden house with open ground floor, which might be concreted when additional resources become available). The village has five food stalls and no market, so villagers have to travel to Paklai town for basic supplies.

Cassava initially started in 2013 with only 15 households of 250 in the village at that time adopting cassava. In the following year, another 45 households adopted cassava. Between 2014–2016, the cassava price was volatile and declined; the number of adopting households also declined, leading the cassava factory to rent 13 ha of land for 2 years to cultivate their own cassava. However, since 2017, the price of cassava fresh root has progressively increased, as has adoption; in 2019, 255 households (99% of village households) grow cassava.

A development project promoting pasture for livestock was introduced to the village in 2008, but fewer than 10 villagers adopted this system; now, c. 20% of village households cultivate pasture for livestock. Adoption of pasture for livestock is relatively low because villagers still have other agricultural lands available, and the soil quality for cultivation of maize and other cash crops remain good; and the cost of making fence for livestock is high. The Agricultural Development Plan developed by DAFO for Paklai District prioritised commercial crops, particularly maize and cassava, rather than livestock rearing.

Village 2

Village 2 is located in Kenthao District, approximately 15 km from the Laos–Thailand border and 90 km from the starch factory in Paklai District. There is no market in the village; Kenthao town, where villagers purchase goods and services, is approximately 10 km away (see Figure 5.2 and Table 5.2). However, some villagers cross the border into Thailand to purchase food and goods. The road between the village to Kenthao town and the border is asphalt, but the road inside the village remains dirt. The village has reasonable infrastructure: most households have their own wells, access to drinking water and sanitation; housing is similar to Village 1.

The pattern of cassava adoption was similar to that of Village 1, with the introduction of free planting stakes by the starch factory in 2012. Around 100 of c 400 households adopted at the time, but – as in Village 1 – adoption declined after 2 years due to the low price of cassava. Subsequently, many villagers converted their cassava fields to grazing. With the subsequent increase in cassava prices, 270 households (66% of the total households) now cultivate cassava, and some households have converted their pasture to cassava. Large livestock rearing has become one of the main agricultural livelihood activities in Village 2, with 271 (67%) of households cultivating pasture for large livestock.

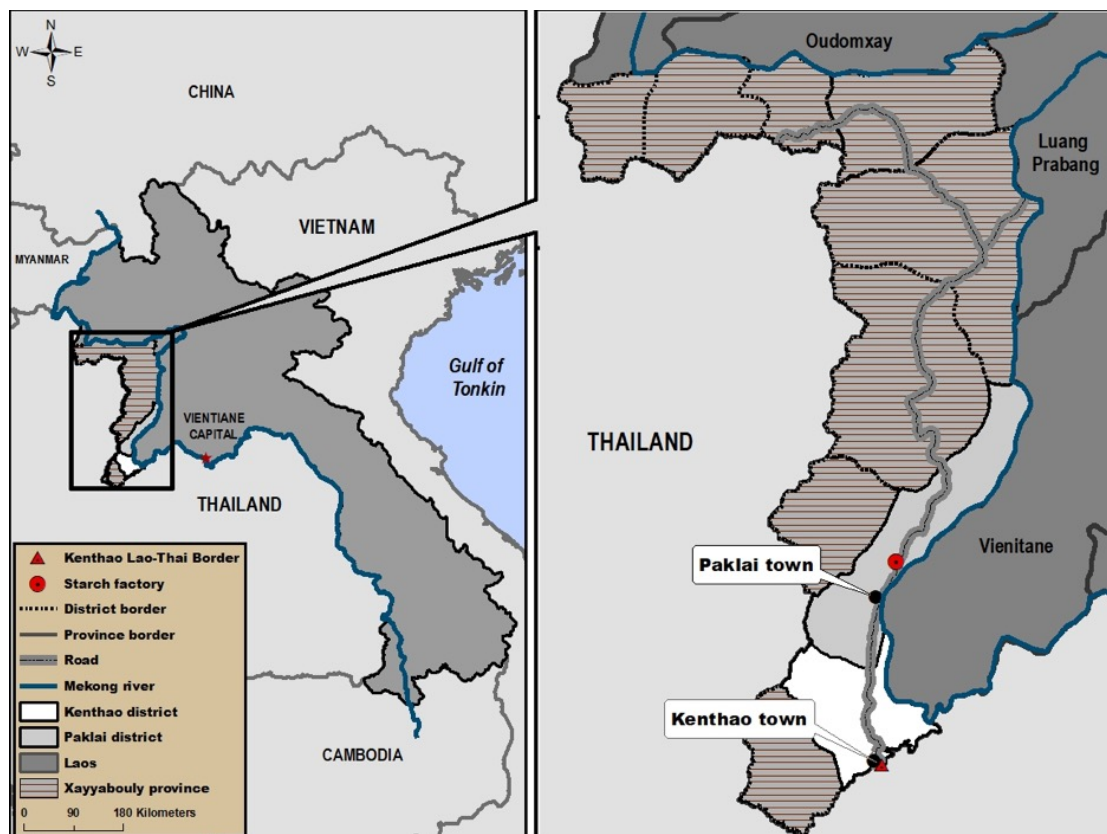


Figure 5.2: Location of the two case study villages in Paklai and Kenthao Districts, Xayabouly Province, Northern Laos.

5.2.3 Cassava prices and market chains

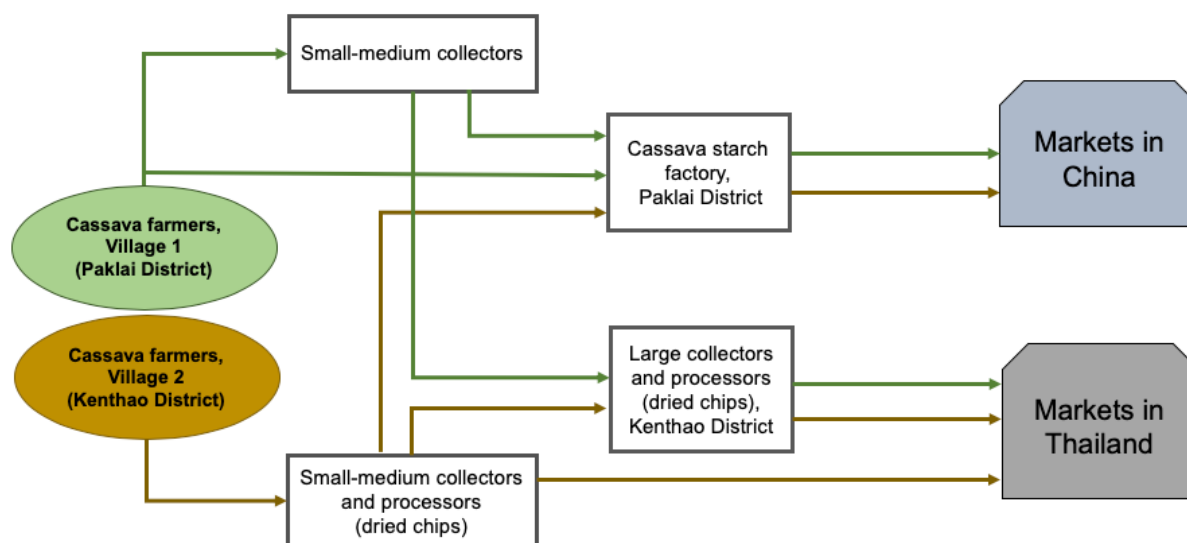


Figure 5.3: Cassava supply chains in Village 1 and Village 2 prior to January 2019

Until January 2019, there were two main cassava market chains (Figure 5.3): to the starch factory in Paklai District, which is then exported to China; and the export of fresh root and dried chips to Thailand via Kenthao District. Most growers in Village 1 sold cassava fresh roots directly to the cassava factory in the same (Paklai) District; a few growers sold cassava fresh roots to small and medium collectors in within the village. These collectors would sell to the factory, or – when it stopped processing – they would transport the fresh roots for sale to large processors in Kenthao District, for subsequent export to Thailand. In Village 2, most growers sold cassava fresh root to small and medium collectors/processors; the former would then sell to the latter, who would export directly to Thailand. However, some small collectors in Kenthao also sold cassava fresh roots to the starch factory in Paklai District.

In January 2019, the Governor of Xayabouly Province introduced a trade rule banning export of cassava fresh roots to Thailand. The reasons for this were promoting domestic job opportunities in the food processing sector (Governor of Xayabouly Province, 2019) and responding to demands from the starch factory in Paklai District for sufficient cassava fresh roots supply to meet their maximum processing capacity throughout the harvesting season (Fieldnotes, February 2019). Consequently, all cassava exports to China, Thailand or Vietnam are now either processed starch or dried chips.

5.3 Results

5.3.1 Typology of household participation in cassava production

I assigned households surveyed to one of the four wealth classes described in Section 5.2.1 (Table 5.2). I developed a typology of household participation in cassava production based on the two key factors of household production, land and labour (see Table 5.4). I allocated the 62 households interviewed across the two villages to five categories based on the typology:

1. 'Land | Labour' (N=29) households, who cultivate cassava on their land with household and non-household labour. In Village 1 (N=20), upper, middle and lower wealth class households are represented, while in Village 2 (N=9), only middle and lower wealth class households are represented. There are no poor households in in this category.
2. 'Land + Renting | Labour' (N=3) households, present only in Village 1 with middle and lower wealth classes, who cultivate cassava on their land and on land rented from other households in the village, using both household and non-household labour.
3. 'Renting Land | Labour' (N=5) households, in Village 1 (N=3), of middle and lower wealth class, rent land to cultivate cassava using household and, in some cases, hired non-household labour.
4. 'No Land | Labour' (N=11) households do not cultivate cassava but sell their labour as daily labourers or service providers. In Village 1 (N=3), the lower and poor wealth class households work as daily labourers. In Village 2 (N=8), the upper and middle wealth class households are service providers (tractor hire and cassava processing), while the lower and poor wealth class are daily labourers.
5. 'No Land | No Labour' (N=14) households do not participate in cassava production. In Village 1 (N=2), these are only lower and poor wealth class households; in Village 2 (N=12), all wealth classes are represented.

Table 5.4: Typology of household participation in cassava production based on land and labour contributions, and wealth class representation in each category.

Category	Land ownership for cassava		Labour		Households sampled								Total	
	Own	Rent	Household	Non-household	Village 1				Village 2					
					U	M	L	P	U	M	L	P		
Land Labour	√	X	√	√	7	10	3			3	6			29
Renting Labour	√	√	√	√		2	1							3
Renting Land Labour	X	√	√	(√)		1	2				2			5
No Land Labour	X	X	√	X				1	2	1	1	2	4	11
No Land No Labour	X	X	X	X				1	1	3	2	7	0	14
Total households by wealth class					7	13	8	3		4	6	17	4	62
Total households sampled per village					31				31					

Notes: '√' – 'yes' to land and/or labour; 'X' – 'no' to land and/or labour; '(√)' – may or may not contribute labour. 'U' – Upper wealth class; 'M' – Middle wealth class; 'L' – Lower wealth class; 'P' – Poor wealth class.

5.3.2 Livelihood outcomes since the arrival of cassava production

I defined livelihood activities into five categories: cassava-related, established non-cassava agriculture (i.e., those which preceded cassava and still continues), new non-cassava agriculture (i.e., those initiated since the introduction of cassava), established non-agriculture, and new non-agriculture with 31 sub-activities (see Table 5.5).

Table 5.5: Livelihood activities and number of households participating in each activity in both villages

Livelihood activities	Sub-activities	Vil. 1	Vil. 2
Cassava-related	Grower	26	11
	Daily labour	7	9
	Small processor (dried chips)	2	1
	Medium processor (dried chips)		1
	Tractor hire service	3	2
Sub-total		38	23
Established non-cassava agriculture	Paddy	23	23
	Upland rice		1
	Maize	11	1
	Job's tears	5	
	Red beans		4
	Teak	4	5
	Tamarind		4
	Eels (collected)	2	
	Large livestock	5	2
	Rice miller	4	1
	Butcher		1
	Daily labour	7	10
	Tractor hire service	1	2
Sub-total		63	54
New non-cassava agriculture	Teak	1	
	Large livestock	8	19
	Eels (collected)	1	
	Fishpond	2	8
	Livestock broker	1	1
	Tractor hire service	2	
Sub-total		15	28
Established non-agriculture	primary school teacher, village-committee	2	
	Shop; mobile food seller	2	
	Local transport service	2	
	Building const.; furniture worker	3	1
	Motorbike repair shop	1	
	Knife maker	2	
Sub-total		12	1
New non-agriculture	Shop; mobile food seller	2	2
	Fixed food stall		1
	Petrol station		1
	Building material supplier		1
	Ice factory and/or beer supplier	1	1
	Local transport service	1	
Sub-total		4	6

Note: Households can engage in multiple sub-activities which results in the numbers in the table being larger than the total number of households surveyed in each village.

Around 95% of households in Village 1 and 60% in Village 2, across all wealth classes, participated in cassava production in some way – as cassava growers, daily labourers, tractor hire services, collectors, or small and medium processors of dried chips. Their cassava-related

activities are part of a portfolio of livelihood activities. Figures 5.4 and 5.5 show the average proportion of household livelihood activities represented by each of five categories of activity listed in Table 5.5 for each household wealth category in each village. While the general patterns were similar across both villages, new non-cassava agriculture and new non-agricultural activities were more important in Village 2. Figures 5.6 and 5.7 show the average number of each of the five categories of household livelihood activities since the introduction of cassava, for each wealth class in each village. Figures 5.8 and 5.9 show the income across livelihood categories, average of total household income for each wealth category, and the median income by livelihood activities across wealth classes. Upper and middle wealth class households are involved in the highest number of livelihood activities and also earned more than other groups. No respondents from the poor wealth class were involved in either category of new activity.

Cassava-related household livelihood activities

In Village 1, 95% (N=29) of total surveyed households participated in cassava production, compared to only 60% (N=19) Village 2. The poorest households in both villages participated only by selling their labour on a daily basis; this represented between 40–50% of their total livelihood activities. In both villages, the proportion of household livelihood activity associated with cassava production decreases progressively with wealth class (Figures 5.4 and 5.5), so that only around a quarter of livelihood activities of the wealthiest households in Village 1 and less than a tenth of those in Village 2 are cassava related.

Cassava-related income increases progressively with wealth category in both villages. The median income from cassava is the second most important income source after 'new non-agricultural activities' for households in both villages, representing a third (34%) for Village 1 and one-fifth (22%) for Village 2.

The range of incomes from cassava-related activities is very high, as the upper wealth class households generate very high incomes compared with other wealth classes. There are also striking differences between Villages 1 and 2, which are likely to be explained by greater access to processing technology and markets in Village 2. Here, cassava growers can supply a medium-sized processor (fresh root and dried chips) and export to Thailand, while those in Village 1 sell directly to a cassava starch factory. In some cases, particularly when the cassava fresh root price is low, households produce cassava chips themselves and sell to small and medium processors.

The households who participated in cassava production were positive about their livelihood changes since the introduction of cassava, earning more income than from maize cultivation.

Respondents explained that:

“Life is much better now. It is already three years that we do not [have] debts because of cassava. We are satisfied with our decision in adopting cassava. If we cultivated cassava long time ago, we would not have had to sell our paddy land to pay back our debts.” (V1-21, lower wealth category, March 2019).

“When we were cultivating maize [before the arrival of cassava], we were in debt because maize production declined, the input costs such as ploughing soil, seeds and herbicides increased, we could not pay back the input costs. Now we do not have debt because of cassava.” (V2-23, lower wealth category, February 2019).

“We used to have more than ten households who could not pay back the loans that they took from us during maize cultivation, but now most of them have paid us back since they adopted cassava, they earned more money. We are happy that we get our money back.” (V2-04, middle wealth category, February 2019).

The median income from ‘new non-cassava agriculture’ is the most important income source for households in both villages, as many households have invested their savings in large livestock and tractor hire services. The proportion of their total income from new non-cassava agriculture is around 40% in both villages. The savings invested in non-agricultural activities originated from surpluses generated in the previous maize and the current cassava crop booms; these provided households with necessary capital to invest in non-agricultural ventures which can later form important sources of income.

Other livelihood activities

Generally, all household wealth classes in both villages are engaged in ‘established non-cassava agricultural activities’ (Figures 5.4, 5.5, 5.6 and 5.7 and Table 5.5). In both villages, the pattern and levels of household engagement in ‘established non-cassava agriculture’ across wealth classes was comparable, although a higher proportion of poor households in Village 2 were engaged in these activities. Nevertheless, the median income from these activities is the third (Village 1) or lowest (Village 2) income source across the five categories.

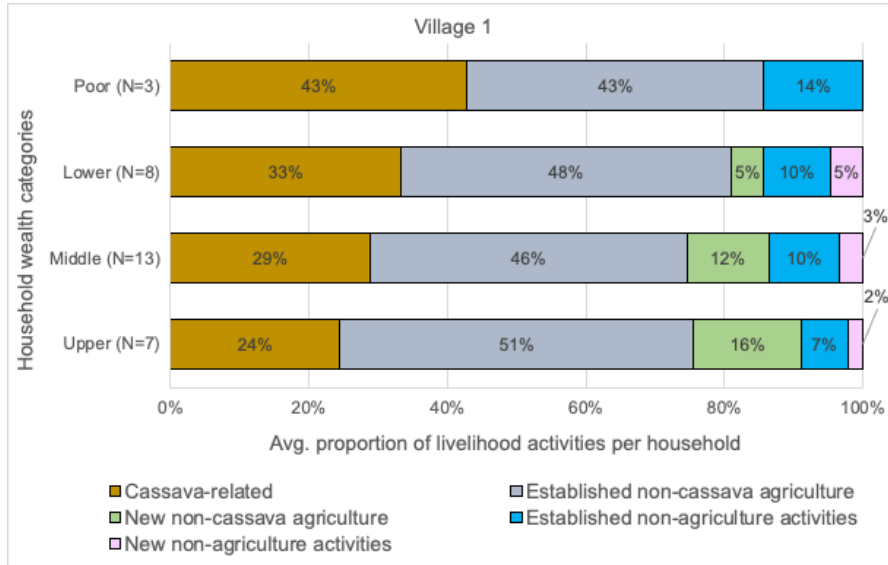


Figure 5.4: Proportions of five categories of household livelihood activities by wealth class in Village 1

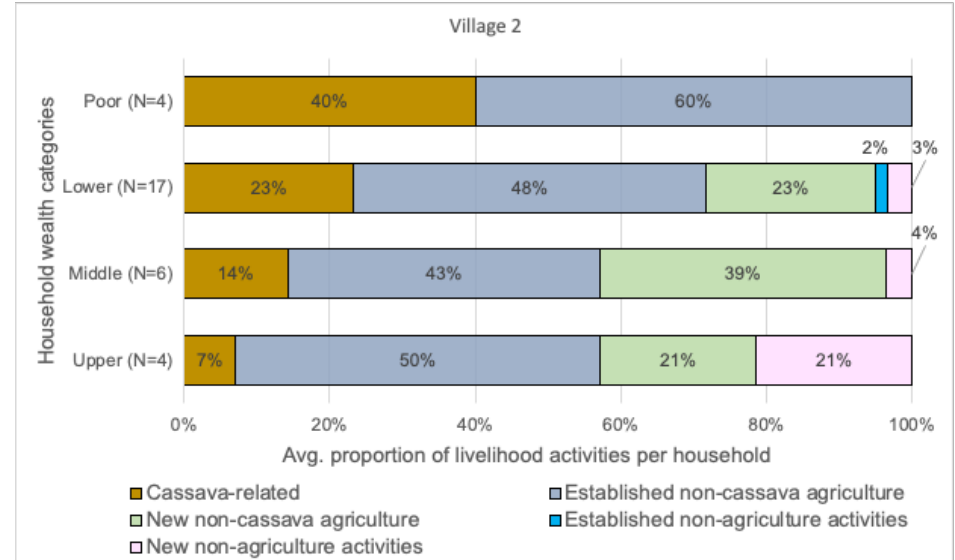


Figure 5.5: Proportions of five categories of household livelihood activities by wealth class in Village 2

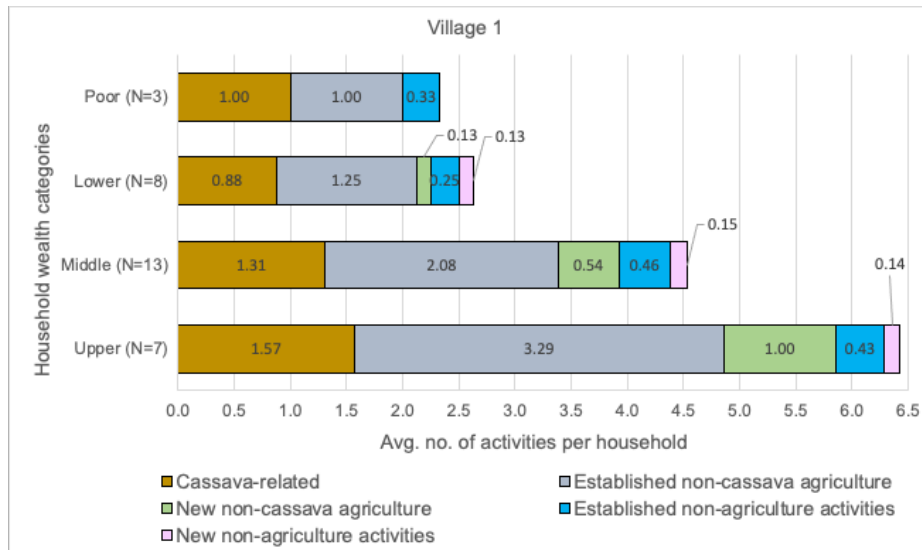


Figure 5.6: Average number of livelihood activities in each of five categories by wealth class in Village 1

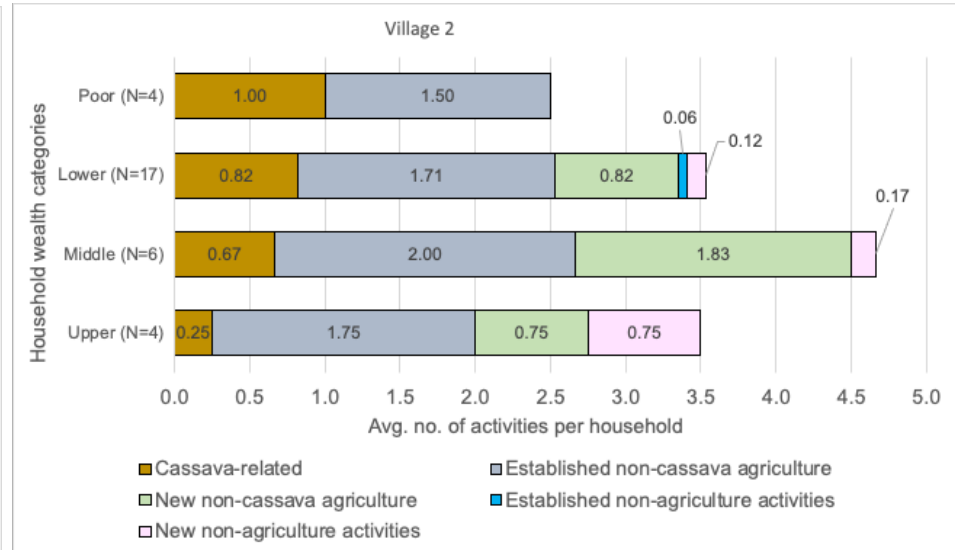


Figure 5.7: Average number of livelihood activities in each of five categories by wealth class in Village 2

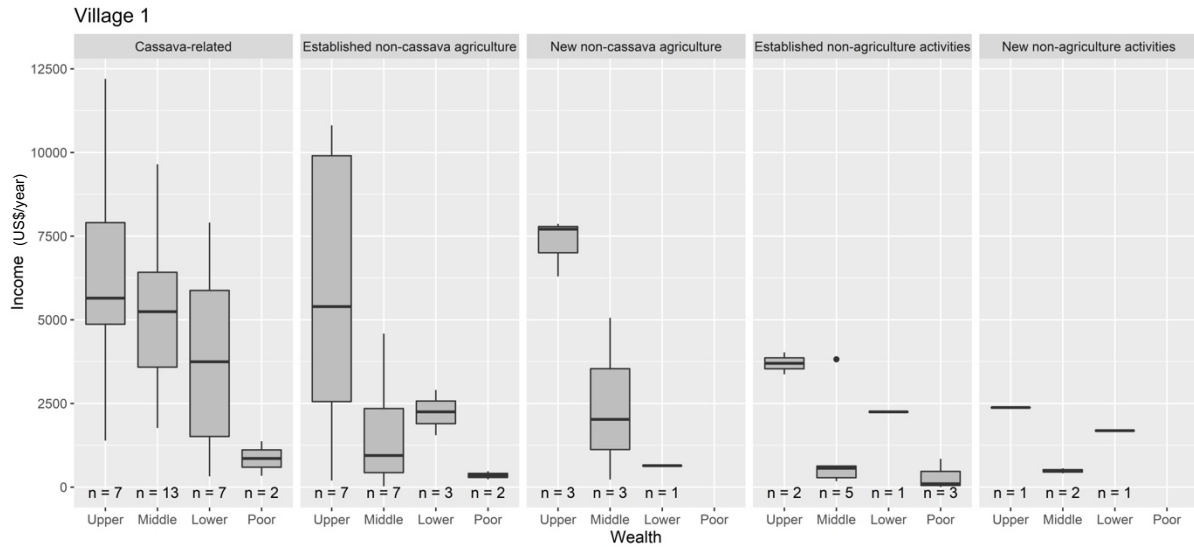


Figure 5.8: Average and range of household income from each of five livelihood categories by wealth class, and average total income of each wealth class, in Village 1

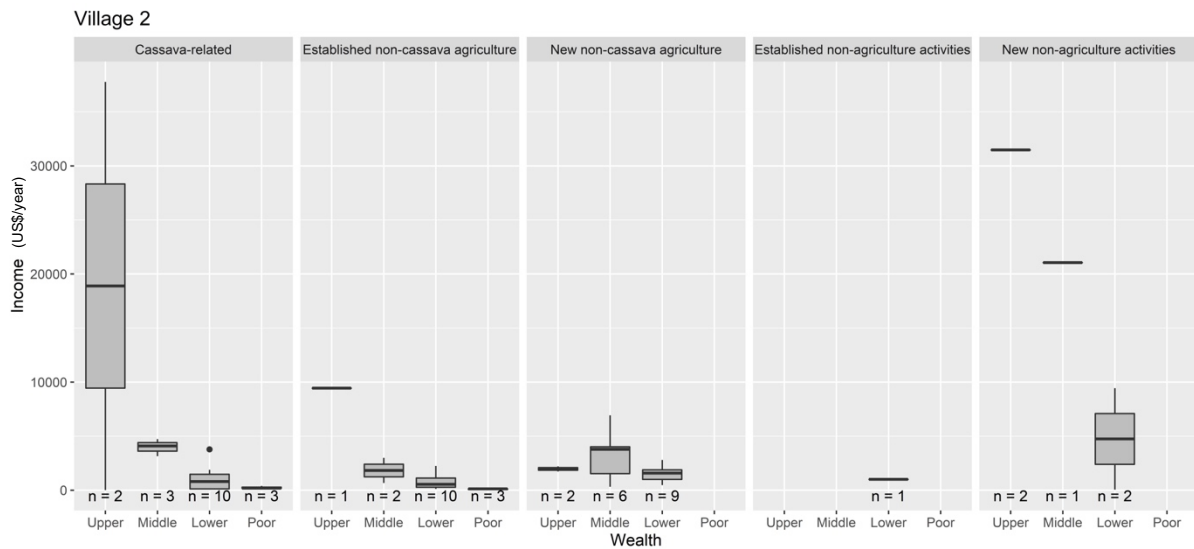


Figure 5.9: Average and range of household income from each of five livelihood categories by wealth class, and average total income of each wealth class, in Village 2

In Village 1, only lower, middle and upper wealth class households are involved in either agricultural or non-agricultural new activities. Within each activity, income generated is generally positively associated with wealth class, as would be expected given how wealth classes were defined. The median income across all wealth classes for cassava-related activities is comparable to that for new non-cassava agriculture. Income disparity is greater in Village 2, where a small group of households generate very high incomes from both cassava-related and new non-agricultural activities.

'New non-cassava agricultural activities', particularly large livestock rearing and tractor hire service (see Table 5.5), emerged in both villages, but not for the poorest households, and more strongly in Village 2. They represented approximately equivalent proportions of the livelihood activities of middle and upper wealth categories in Village 1, and of lower and upper wealth classes in Village 2; they were relatively more important for the middle wealth categories in Village 2.

'Established non-agricultural activities' were part of livelihood portfolios mainly in Village 1, where they progressively decreased with wealth class. Poor wealth category households are able to engage in this category only by selling their labour. In Village 2, only one household in the sample surveyed earned income from this category. The median income from of this activity is less than 10% (6% village 1 and 4% Village 2) of total income, because only a few households invested in non-agricultural activities before the arrival of cassava.

The proportion of 'new non-agricultural activities' was similar (< 5%) for lower and middle wealth classes in both villages, and for the wealthiest class in Village 1; in contrast, these comprised c. 20% of the wealthiest households' livelihood portfolio in Village 2. These activities were diverse, comprising both small enterprises (shop, fixed and mobile food stalls, ice factory and local transport service) that emerged mainly in Village 1, and medium enterprises (petrol station, building material supplier, ice factory and beer supplier) in Village 2. The medium enterprises were found only in Village 2 because of the proximity of the village to the Lao–Thailand border, and the village is on the highway from the border to another district.

5.3.3 Household land and labour capacity

Figures 5.10 and 5.11 show household median land ownership and average household labour (both full-time and all adults¹⁸) for each of the four wealth classes in Villages 1 and 2, respectively. In both villages, there is a clear pattern of land holdings and labour capacity increasing with wealth class. Median household land holdings were greater in Village 2 than Village 1 for all but the poorest wealth classes (17.5 vs 11.5 ha, 9.8 h vs 5.0 ha, 4.6 vs 1.4 ha, for upper, middle and lower classes, respectively, and 1 ha for poor households in each village). The largest landholding in Village 2 (35 ha) was twice that in Village 1.

¹⁸ Under Lao Labour law (No. 43/NA, 2013), labour is defined as those 12 to 60 years of age. Here, part-time adult labour is defined as household members over 11 years of age who spend some of their time helping with agricultural activities. Part-time inputs were equated arbitrarily to 0.5 of a full-time adult.

Although median household size was equivalent in each village (Table 5.2), average household labour availability was greater on average in Village 2, by about 0.5 units, for each of the upper three wealth classes. The poor households in both villages have little or no part-time labour because the households are either younger couples who recently married and whose children are young, or relatively old couples who have retired and their children have already moved out.

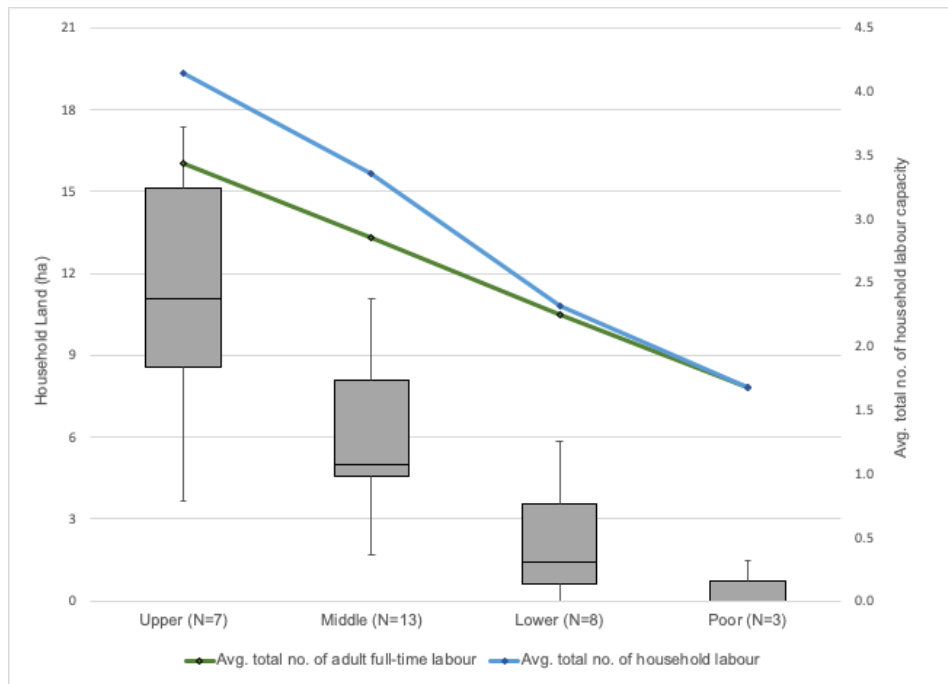


Figure 5.10: Household median land holdings and average labour capacity by wealth class in Village 1

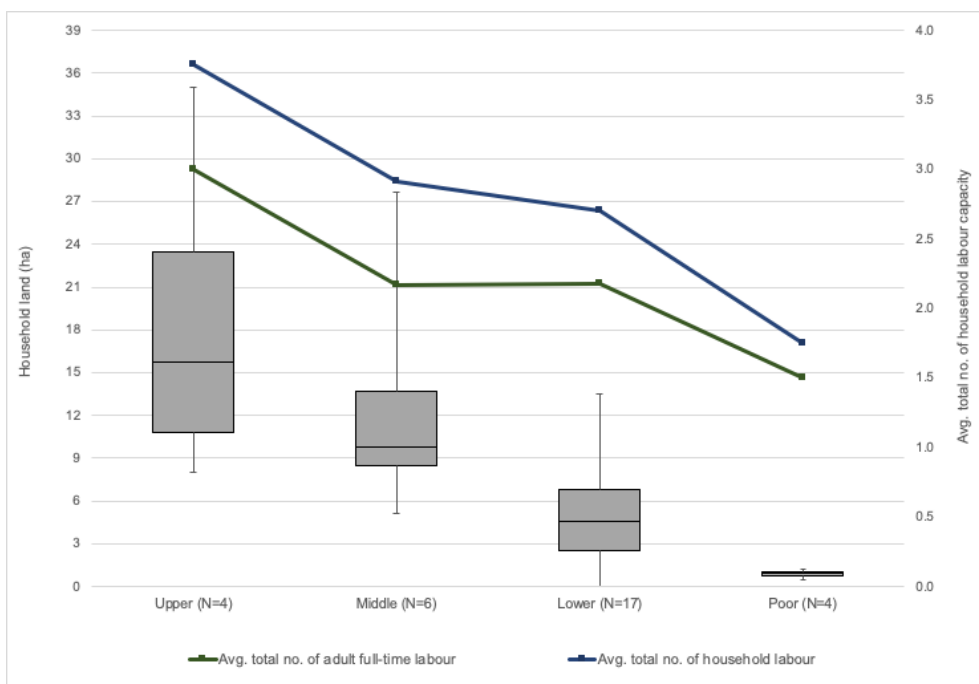


Figure 5.11: Household median land holdings and average labour capacity by wealth class in Village 2

5.3.4 Households' livelihood trajectories

Four main household livelihood trajectories associated with the cassava boom were apparent in the case study villages:

1. Adoption and continuation of cassava cultivation.
2. Adoption of and subsequent exit from cassava cultivation.
3. Non-adoption of cassava.
4. Households continuing to sell labour, as wage labour and for services

Adoption and continuation of cassava cultivation

Sixty percent of total surveyed households (42%, N=26 in Village 1 and 18%, N=11 in Village 2) followed this trajectory. As noted in Section 5.2.2, productivity declines in maize cropping catalysed the adoption of cassava by many households. Returns from cassava were reported to be almost double those from maize (approximate net return of cassava US\$920/ha, of maize US\$480/ha) (V2-09, middle class, February 2019), and harvesting and post-harvest storage of cassava were more flexible:

“Cultivating cassava is easy in term of managing the harvest period because we can just leave cassava root there [in the field] and harvest when we need money. We can harvest many times based on our labour availability which is different from maize that we need to harvest in one time.” (V1-06, upper wealth category, March 2019).

In addition, the cost of establishing a cassava crop is low compared to maize, as stakes from the previous season can be used for planting, whereas maize seed has to be purchased. Households have to buy cassava stakes only if they plan to expand their area of cultivation. In this case, they may acquire stems for free from their neighbours or relatives within the communities, or purchase from outside their community, for between US\$3.7–US\$7.3/ 100 mature stems.

At the time of fieldwork in 2019, 35% (N=11) of the households in Village 1, and only one household in Village 2, continued to cultivate maize. These households explained that they still cultivated maize because soil fertility was high, because of the location and type of their land (far from the village; too steep for cassava), and their inability to afford the transportation of cassava for processing. For example, two farmers stated:

“We are still cultivating maize because we do not have ‘lod sing’ [local transport] to transport cassava back to the village.” (V1-22 and V2-27, lower wealth category, February and March 2019).

Another reason for continuing to cultivate maize is that harvesting season corresponds to the time that children start the school or college year:

“We cultivate both cassava and maize. We are still cultivating maize because maize harvest is during September and October which we can send money to our elder son who is studying in Vientiane capital. For cassava, we begin to harvest from January, so it’s quite late to get money to send to our children when the semester starts.” (V1-08, Middle wealth category, March 2019).

Adoption of and subsequent exit from cassava cultivation

In Village 2, 15% (N=5) of households initially adopted cassava, but then exited and adopted livestock and/or invested in non-agricultural activities. The four households who adopted livestock were of middle (N=2) and lower (N=2) wealth classes; one of each of these also invested in a shop or food stall in the village. The remaining household is a lower wealth class who used to have livestock (10 head of cattle) but sold them in 2018 to buy a small truck to become a mobile food seller and used the surplus funds for family wedding expenses.

These households exited from cassava for a number of reasons. Three reported that cassava production declined, and it was not profitable to continue:

“We stopped cultivating cassava because its production declined. Cassava was good only in the beginning, so we decided to convert land to cultivate pasture.” (V2-11, lower wealth category, February 2019)

A second reason was not having sufficient labour (N=4), as family members fell ill or aged:

“We stopped cultivating cassava because we do not have enough labour in our family. My health is not good for 2-3 years now and I cannot work on heavy labour. So, we decided to invest in a shop.” (V2-10, middle wealth category, February 2019).

Some of these households transitioned to non-agricultural activities, facilitated by cross-border trade activities in Village 2:

“We used to cultivate cassava and also be cassava processor, we stopped doing that for two years now and we invested in shop and mobile food seller. Life is much better now. We do not have to work hard in the field. If we are cultivating cassava, we may not have a better life like we have now.” (V2-13, lower wealth category, February 2019).

Non-adoption of cassava

This transition occurred only in Village 2, in which 23% (N=7) of surveyed households adopted large livestock (buffalo and cattle) and/or non-agricultural activities rather than cassava production. This happened for a number of reasons. The first is linked to an international technical assistance project with an ecosystem focus that was initiated in Kenthao District in 2008, which helped villagers to improve soil quality with intercropping and direct seeding techniques, and also introduced pasture management for livestock for farmers with very infertile soil that was unsuitable for other crops (I-02, February 2019). The second is the strength of demand for domestic beef consumption and for export to China and Vietnam. Chinese demand for Lao cattle is 500,000 head annually; Vietnamese demand is up to 400,000 buffalo and cattle annually (Vientiane Times, 2020b). The Lao Government has restricted the import of livestock¹⁹ in order to promote commercial production in the country, and promoted livestock exports to China and Vietnam (Vientiane Times, 2020b). A Kenthao DAFO staff member noted:

“Livestock is one of our agricultural priorities and we have promoted [them] since the introduction of an ecosystem project. We have potential to expand and export to China and Vietnam.” (I-03, DAFO Kenthao District, March 2019)

Households invested in livestock on this basis:

“We spent our saving from cassava and maize investing in buffalos and cattle rearing and planned to cultivate pasture in our fallow land.” (V1-03, upper wealth category, March 2019).

A third reason was the reduced workload associated with livestock rearing and sale. A household explained:

“Raising cattle is better than cultivating maize or cassava because the markets are still in high demand. There are many brokers within and outside our village, if we want to sell our cattle, we just ring brokers. Since we adopted cattle, we do not have to work hard in the field like when we were cultivated maize. We are still going to our field every day to look after our cattle but its only light work and mostly only men go while women can stay at home look after our grandchildren.” (V2-05, lower wealth category, February 2019).

The majority of households who adopted livestock had relatively large landholdings and allocated an average of 70% of their landholdings to livestock rearing.

¹⁹ Agreement No. 0795/MAF on Import, Export and Transit of Livestock (dated, 18/04/2019).

Households continuing to sell labour, as wage labour and for services

About one-third of all households surveyed in each village are selling their labour in either or both agriculture and non-agricultural activities (N=10 in Village 1; N=11 in Village 2). These households are from middle, lower and poor wealth classes. Most poor wealth class households in both villages rely on wage labour for most of their total income (55–100% in Village 1; 74–100% in Village 2); for the other three wealth classes, the proportion of income from wage labour ranged from 2–20%.

The poor households continue to sell their labour because they have little or no land, and low household labour capacity, compared to other households (see Figures 5.10 and 5.11). The circumstances of these households vary – they comprise a young couple with young children, a widower, and a relatively older couple whose family members are ill and so cannot contribute labour. Some own land, but they rent it to others rather than cultivating it themselves. One household explained.

“Our land is far, and we do not have ‘lod sing’ [local transport] to transport maize or cassava. We just rely on selling our labour for daily basis. We do not have any new plans for our life. We will continue doing the same.” (V2-30, poor wealth category, March 2019).

A young couple who are currently landless expressed their ambitions:

“I [husband] used to work in Chinese furniture in the town nearby and also work in the other people fields [for cassava and other crops] but this year [2019] we start to rent land of 2.50 ha to cultivate cassava. We plan to buy land and ‘lod sing’ [local transport] after harvesting cassava this year. We hope this year is a good weather so we can harvest lots of cassava roots.” (V1-30, poor wealth category, April 2019)

5.3.5 Cassava production challenges

Crop decline and shortage of planting material

Without fertiliser application, cassava yields decline over time (Malik et al., 2020). This is one of the challenges faced by households in the study area, most of whom reported decline in their cassava yields. For example, one household reported that:

“I used to cultivate cassava 1 ha for three years, but the yield decreased every year. First year we received 60,000 THB, 2nd year was 30,000 THB and the 3rd year was only 25,000 THB. We decided to stop and convert the land to pasture.” (V2-12, lower wealth category, February 2019).

Most smallholder growers in Laos do not apply fertiliser (Malik et al., 2020); this was the situation in the case study villages. There are challenges for farmers in accessing information about crop management, particularly about fertiliser application and diseases. A CIAT project recently implemented demonstration cassava agronomy trails in both villages, and reported that even after farmers witnessed the positive results from the demonstration trails, none applied fertiliser (Newby et al., 2019). Project research found that only a few households, mostly wealthier ones, would consider fertilising, because they can afford to do so (ibid). Despite demonstrating the agronomic and economic response of low levels of purchased NPK fertiliser, changing farmer practices to save income from cassava to invest in their subsequent crop remained extremely challenging.

During the time of the fieldwork, many households planned to expand their cassava production on their own or rented land, and others to adopt cassava by renting land from others. However, these households struggled to find sufficient cassava stakes for this expansion. Finding a good quality of stems at the time of planting season was challenging due to some households harvesting cassava early which resulted in no good enough quality stems available when farmers wanted to plant. In addition, cassava disease began in the two villages and households found that identifying disease and selecting good quality stems was challenging. Thus, households used whatever cassava stems were available and accessible. At the time of my fieldwork, there was no restriction on imported cassava stems. Also, the idea of buying stems from neighbouring countries was not ideal or had not yet appeared in the case study villages and the nearby villages. As a result, some households were able to source these from within the village, others had to source them from further afield, and some households cultivated maize or red beans because they were unable to source stakes.

Drought and disease

Both villages reported a long period of drought during 2018–2019. Some farmers who planted cassava had to replant, costing more time and capital. Those unable to afford to replant left the land fallow for that year, and so did not receive income from cassava.

Pests and diseases of cassava have been reported in Laos (Malik et al., 2020), including in the case study villages. The common practice of farmers' sourcing of cassava planting stakes from other farmers can be a vector for the spread of pests and diseases (Graziosi et al., 2016). Mitigating the risks of pests and diseases will depend on technical advice and appropriate farming practices, such as those promoted by the CIAT project noted above. The main disease in the case study villages was 'cassava witches broom disease'. Through extension, farmers

can be taught to recognise the symptoms in the growing crop also in the harvested stems and select those that are healthy.

Lao Government issued the Plant Protection Law No. 06/NA, dated 09/12/2008 and the Decree of Prime Minister No. 229/PM, dated 31/05/2012 on implementation of this law. The Plant Protection and Quarantine (amended) No.13/NA dated 15/11/2016. In addition, in 2018, the phytosanitary measurement was discussed during the negotiation of the regional comprehensive economic partnership of the ASEAN member states and ASEAN's Free Trade Agreement partners (Australia, China, India, Japan, Korea and New Zealand).

The amended Plant and Protection Law addressed plant health and incorporated guidelines on plant inspection and certification and principles of the establishment of a framework for disease-free and pest-free or low pest and disease areas. However, Laos does not require plant inspection for imported plants, but an importer must provide plants health certificates issued by a competent body of the exporting country.

5.4 Discussion

The cassava boom in these two case study villages of Northern Laos illustrates the familiar pattern of crop booms described by many other studies: for cassava elsewhere (Mahanty and Milne, 2016; Newby et al., 2019); for other crops in Laos and neighbouring countries (Friis and Nielsen, 2016; Junquera et al., 2020; Kallio et al., 2019; Rigg et al., 2018; Vongvisouk and Dwyer, 2017); and more widely (Borras et al., 2016; Hall, 2011a). The strength of the market for cassava, with both transboundary markets in Thailand and the Paklai starch factory, was an important driver of adoption. As discussed in the Results, for all but a few households with access to fertile land, the emergence of these markets in conjunction with the decline in maize productivity were the primary catalysts for cassava adoption. The flexibility of cassava production and harvesting was also a factor, as Hall (2011a) noted for other boom crops in Asia. The success of a cohort of early adopters in each village prompted almost all other households in Village 1, and a majority in Village 2, to follow. However, some households in Village 2 decided instead to adopt livestock or pursue non-agricultural activities instead of cassava, and so did not participate in the cassava boom.

The similarities and differences between the two villages offer insights into how households interact with the dynamics of crop booms, and the consequences for household livelihoods. Local policy, markets, crop production decline and technical assistance interventions also impacted on household options and decisions. I discuss each of these elements below.

5.4.1 Livelihood trajectories from boom crop to boom crop

The cassava boom in the two villages illustrates how, in favourable circumstances, boom crops can provide pathways to improved household livelihoods. The previous maize boom in Laos created a cycle of debt for many households (Kallio et al., 2019; Vongvisouk et al., 2016), including those in the case study villages. Generally, the adoption of cassava enabled many households to repay their debts from maize growing over the past 2–3 years, and then generate surpluses to invest in other livelihood activities. This outcome contrasts with that of the cassava boom in Cambodia, where farmers who participated in cassava production boom, particularly in the initial process of clearing land to cultivate cassava, became indebted (Mahanty and Milne, 2016), as have participants in other boom ‘crops’, such as banana, maize and rubber in Laos (Friis and Nielsen, 2016; Higashi, 2015; Kallio et al., 2019; Manivong and Cramb, 2008; Vongvisouk and Dwyer, 2017, respectively). Similarly, a shrimp farming boom in Southern Thailand benefited households during the boom, but created indebtedness subsequently when the boom went to bust, leaving farmers unable to repay loans (Vandergeest, 2008). In this case of cassava in Laos, farmers’ outlays were minimal because of low inputs: free or low-cost planting stakes initially, use of their own stakes in subsequent seasons, and little or no use of fertilisers. Coupled with strong demand and rising prices, this meant initially cassava production was very profitable. However, household participation in cassava boom may change depending on households’ circumstances and their cropping management strategies, despite market demand and prices continuing to be high (Newby et al., 2019).

Households participated in the cassava boom in different ways, adapting to new opportunities and challenges according to their individual resources, constraints and preferences. At the extremes, some households fully participated in cassava while others did not participate at all; many households adopted cassava as a part of their livelihood portfolio, moving ‘sideways’ (sensu McCarthy, 2019 and Pritchard et al., 2017) dynamically between established and new activities. As with other boom crops, households who participated in the cassava boom did not abandon their subsistence crops, particularly paddy production remained the first priority for the allocation of household labour or, in a few cases upland, rice. This is a common feature of crop boom adoption in Laos, even when the boom crop provided higher returns (Kallio et al., 2019); and similarly elsewhere, such as in the case of a seaweed boom in Indonesia (Steenbergen, Marlessy, and Holle, 2017).

Livelihood trajectories and diversification in the case study villages were largely defined by household wealth class. As households accumulate wealth and assets from previous and current boom crops, they are more likely to diversify their livelihood activities across a broader range of agriculture and non-agricultural activities. All the wealthy households in both villages have capital and labour capacity to diversify their livelihood activities, while the less wealthy households, particularly the poorest, continue to rely solely on agriculture and/or wage labour. These results are consistent with others from Laos (see Castella et al., 2013; Hepp et al., 2019; Martin and Lorenzen, 2016; Newby et al., 2014 and Rigg, 2005).

As with the maize boom across Laos (Kallio et al. (2019), the cassava boom increased household wealth differentiation in the two villages. The better-off households, particularly those in Village 2, have shifted to less heavy labour-demanding agricultural (livestock) and non-agricultural activities. This trajectory is similar to that reported by Escarcha et al. (2020) in the Philippines, where households shifted from crop production to raising water buffalo based on household capacity and resources. Similarly, Vicol (2019, p. 156) found a potato boom in India led to the better-off groups moving into predominantly non-agricultural activities, and “non-farm activities are quickly becoming the basis of their class power”.

As a result of these changes, many cassava producing households are no longer simply ‘farmers’; their livelihood activities are now more diverse and dynamic. This parallels trajectories of change in rural northern Thailand, where rural livelihood activities within households are “diverse and spatially promiscuous” (Rigg et al., 2020, p.306). As Pritchard et al. (2017, p. 52) reported of households in an Indian potato boom, who they described as keeping “one foot sideways”: “households may remain landholder yet are also highly and increasingly active in the non-farm economy without necessarily harbouring a long-term plan to leave the land”. This is a continuation of livelihood diversification strategies, drawing from both on-farm and off-farm activities in rural Laos over the past decades report by Rigg (2005), and across the border in Thailand (Rigg et al., 2012).

5.4.2 Gender roles in livelihood trajectories

In the two case study villages, there was little differentiation evident between men’s and women’s participation in cassava growing or sales. This contrasts to results from Vietnam reported by Hoa et al. (2019), that men are dominant in the cassava value chain, and in Tanzania by Masamha et al. (2019), who reported that women received a lower price than men when selling cassava. The activity that was gender-differentiated in our case was transporting cassava root to sell at the factory gate. This was mostly undertaken by men, due

to heavy labour needs for loading and the need to stay away from home for up to 2 days due to long queues at the factory gate; women did not do this as they have responsibilities to look after their families at home. Masamha et al. (2019) reported similarly for cassava in Tanzania, that rural women are less likely to travel far from home, and by Singh-Peterson and Iranacolaivalu (2018, p. 19) in Fiji, who noted that women have the “double burden” of taking care of children and elderly family members, which became a barrier for them to participate in cassava cultivation.

Where households sold and transported their cassava root to the starch factory, as was the case for most in Village 1, men’s behaviour sometimes created a dispute between husband and wife over income and responsibility, because of the time men spent away and their propensity to spend money on alcohol. This issue was raised during informal discussions with households during my stay in the village. For example, a woman observed:

“The factory should organise better. So, we do not have wait too long. Sometimes, men have to stay overnight and spent more money on food and drink because there are drink stalls next to the factory. I’ve heard that some families disputed or complained about this issue.” (V1-06, upper wealth class, March 2019)

As women and men in a household may have different priorities for how to use their income (Moglia et al., 2020), the cassava boom may have exacerbated intra-household conflicts about managing income. This situation was also found in rubber boom in Vietnam; (Dao, 2018, p. 1592) reported “conflict and violence over the control of income from rubber”, and that men have increased their alcohol consumption. In Village 2, in contrast, most households do not have to wait to sell their cassava root, because they sell directly to traders, and there were no reports of household conflicts over cassava income at the time of the fieldwork. However, other conflicts were evident in Village 2, associated with drug use; for example, tragically, one of the cassava collectors shot and killed his wife at the time I was staying in the village.

A greater gender differentiation emerged in Village 2 due to livelihood transitions from crops (maize, cassava) to livestock. Generally, households of adult children with resident parents assign responsibility for the livestock to the parents because it is less heavy labour-demanding; the adult children are responsible for heavy labour activities of cultivating crops (maize, cassava, rice). The lighter labour requirements of livestock create opportunities for households to reallocate their labour and diversify their livelihood activities. This was also reported for the Philippines, where a livelihood transition from crop production to livestock production facilitated participation of women and elderly farmers (Escarcha et al., 2020). In

these multigenerational households in the case study villages, livestock rearing is primarily a grandfather's responsibility, while the grandmother takes care of their grandchildren while the adult children are out in the field. Occasionally, women take some responsibility for livestock rearing if their husband unable to do so. However, when households sell livestock, women play a significant role in negotiating the price and related financial matters. Similarly, Nampanya et al. (2016) in Laos, and Asnawi et al. (2020) in Indonesia, report a significant role of women in managing financial aspects in the beef cattle farming.

5.4.3 Livestock – the next ‘boom crop’

The adoption of livestock rearing by many households, either proactively or because cassava yields from their lands are declining, has generally been positive for those households as show in the income Figure 5.8 and 5.9. However, there is already evidence of risks associated with livestock production, due to diseases, access to pasture, and oversupply. During fieldwork, some households in Village 2 reported the death of their livestock due to diseases and expressed their concern that, if the disease continued spreading, they may have to shift to yet other, unknown, crops. In addition, households have to sell some of their livestock as their numbers increase, due to insufficient pasture and expanding cassava areas which resulted in land competition and land use decisions between cattle rearing and cultivating cassava. A similar issue was reported in the adjacent Luang Prabang Province by Phouyyavong et al. (2019), where land for cattle rearing became more limited due to the expansion of other cash crops, including rubber. Foot and mouth disease outbreaks have been recorded throughout Laos, causing financial losses to households of up to 60% of their annual income (Nampanya et al., 2015). Furthermore, Laos is a transit country for livestock from Thailand to China and Vietnam, which has resulted in disease outbreaks in Laos, and making it challenging to mitigate transboundary spread of diseases (Ahuja, 2012).

Nevertheless, households in the case study villages, as in Laos in general (Rigg, 2005), are seldom solely engaged in a single livelihood activity like livestock rearing; typically, they diversify their farming system and livelihood activities. Thus, the livestock-rearing households tend to incorporate this activity into a broader portfolio, as so contain risk, as is commonly reported in elsewhere in Southeast Asia (see Escarcha et al., 2020; McCarthy, 2019 and Rigg et al., 2020).

5.4.4 Policy intervention

Limits to the production capacity of the Paklai factory meant it did not always accept fresh root; and when it was open, farmers had both to wait for up to two days to deliver their root,

and up to another two days for payment. The Thai market for cassava fresh root and dried chips offered both a direct and convenient alternative, most directly for farmers in Village 2, but also for those in Village 1. However, market dynamics changed significantly in January 2019, when the Governor of Xayabouly Province banned the export of raw agricultural products – cassava, maize, and Job’s Tears (Order No 3). His justification for doing so was the Provincial Socio-Economic Development Plan (Governor of Xayabouly Province, 2019), which promoted domestic agricultural processing and the added value of domestic production. The principal beneficiary of this decision was the Paklai cassava starch factory, and small and medium chip producers, although investment costs for the latter were increased. Medium-size cassava collectors in Kenthao, who used to export fresh root to Thailand, were directly impacted. The medium cassava collector in Village 2 mentioned that:

“Since the govt do not allow us to export fresh root, we have to adapt our business, we invested more capital in expanding space to dry cassava, purchased machines and other materials. We found that it takes longer process for us to get the return compared to the past, we do not have to dry the roots; we just collect and export to Thailand. We are also a little worry if we put a big investment which, later, we do not have enough cassava root, but we will take a risk.” (V2-15, upper wealth category, March 2019)

However, the ban has created job opportunities for local villagers as a daily wage labourer to chop, dry and transport cassava chips. A young man in Village 2 explained that:

“I help my parent to earn income from working as a daily labourer at the cassava dried chips processor in this village. I may or may not return to Xayabouly District to work at the truck repairing shop, I can stay with my parent here.” (V2-29, poor wealth category, March 2019).

The response to the export ban

However, since the provincial governor announced the ban on fresh root export to Thailand in early 2019, the starch factory has not been able to increase their maximum production capacity throughout the harvesting season. Farmers and traders in Paklai and Kenthao Districts have found other ways to sell cassava. Some follow the officially-sanctioned market chains, of selling cassava fresh root to the Paklai starch factory, either directly or via small and medium collectors and processors. Others who have sufficient capital and labour capacity have changed from selling fresh root to processing into dried chips, which they later export in contravention of Order No 3 to Thailand, via medium and large processors in Kenthao District.

As the Paklai starch factory is struggling to maximise its processing throughout the harvesting season because most farmers rush to harvest and prefer to receive immediate payment, the

factory has requested the district authorities (DAFO and DOIC) to manage the cassava fresh root supply system. As a result, DAFO of Paklai District has recently established a cassava supply zone which assigns targeted villages, primary those close to the factory, to sell to the factory. However, some farmers nevertheless continue selling to other traders, and expressed the reasons why they do not want to sell fresh root to the factory: it deducts volume 3% of cassava root for soil content, there are long queues to deliver and weigh their cassava, and delays in payments. In contrast, there is no deduction for soil content when farmers sell to small and medium collectors and processors, and farmers received immediate cash payment – even though the price paid by traders is lower (approximately 4%) than the factory gate.

5.5 Conclusion

This case study research on rural households' participation in the cassava crop boom in Northern Laos, and the associated and livelihood outcomes and trajectories, illustrate key factors driving this boom specifically, and other crop booms more generally: market 'pull' mediated by policy settings; the roles of crop characteristics and technical interventions; and the strategies of households in capitalising on their land and labour assets, and in diversifying their livelihood portfolios to the extent possible.

Cassava became an important crop and income source for households in the case study villages, as in many parts of Kenthao and Paklai Districts. This income source generated the income that allowed these households to invest in 'new non-cassava agricultural activities', and away from agricultural activities, mostly to service enterprises. This shift was most marked in the better-off households.

This cassava boom follows a similar pattern of crop boom – bust cycles in Southeast Asia, in which households may adopt successive boom 'crops' (including livestock), moving from one to the other following the intersection of market cycles, policy settings, crop productivity, and household capacity for and experience of participating in the crop boom. Paradoxically, adoption of the boom crop may generate household debt as well as income, as was the case for many case study households with the preceding boom crop, maize. In contrast to this and some experience with cassava elsewhere, participation in the cassava boom in the case study villages helped the households to repay these prior debts because the cassava price remained high over the 6 years since first adoption, and because input costs were low. The surplus income allowed households to invest in other livelihood activities, both agricultural and non-agricultural. While household livelihood strategies were largely consistent across all but the poorest wealth class, the wealthier households have opportunities and capabilities to engage

in a wider range of livelihood activities, both agricultural and non-agricultural, while the poorest households continue to rely solely on agriculture and/or wage labour. There was a marked trend of wealthier households shifting more to non-agricultural activities, and of participation in the cassava boom exacerbating wealth differentiation, consistent with the results of other studies.

Although participation in the cassava boom was much better financially for households than maize, both booms were unsustainable from a crop production perspective. The progressive decline in maize yield on all but the most fertile sites was a major factor driving adoption of cassava; but, by the time of fieldwork 6 years later, cassava productivity in the case study villages had begun to decline because of successive cropping with no fertiliser applications. This in turn was prompting a shift to livestock and other, non-agricultural activities, despite the cassava market remaining strong, notwithstanding export restrictions imposed by the Provincial Governor. Some households with larger land and labour resources moved directly from maize to livestock; this allowed them to allocate their household labour more effectively, particularly through the use of elderly household members. Women benefited from this livelihood transition because they were less involved in heavy labour-demanding work, and had more time for other family responsibilities, which included the financial elements of livestock farming. Regardless of the major source of household income, and as is common across Southeast Asia, households did not abandon their pre-existing livelihood activities, but retained rice farming for both subsistence and sale of the surplus, and the vestiges of previous boom crops. Their diversification of household livelihood activities within and outside of agriculture parallels that reported elsewhere in Asia.

Although cassava markets are projected in a high demand for the next 5 years (EMR, 2020), it is uncertain whether cassava production will remain significant in the case study area. This is partly because the Lao Government decision to ban the export of cassava fresh root to encourage domestic processing lacked complementary support for long-term sustainable cassava production. It seems likely that farmers in the case study villages will continue to diversify away from cassava to the next boom 'crop', unless there is more integrated and effective collaboration between the private sector processor, national and local government, and the technical projects and farmers to establish more sustainable cassava production in Laos.

6 Riding the boom – outcomes, conjunctures and learnings from the three boom crop case studies

6.1 Introduction

This chapter draws from the three case studies presented in Chapter 3–5 to consider the similarities and differences between the three boom crops (teak, banana and cassava), in terms of the outcomes for rural households' livelihoods, the factors that enabled the boom and have shaped its trajectory, and the likely future of each crop in each of the case study contexts. This analysis builds on the contributions of many earlier studies, including that of and those reviewed by Cramb et al. (2017, p. 940), who note that “a number of elements (from the agro-ecological to the political) come together at particular conjunctures to influence agrarian structures and trajectories” and that “these conjunctures influence subsequent developments through path-dependence”, and that, as Li (2014, p. 16–17), has observed, these “conjunctures are complex [and] dynamic, but ... not random”.

6.2 Household livelihood outcomes

6.2.1 The contribution of the boom crops to households' livelihoods

In each of the three case studies, the boom crop has played an important role in improving the livelihoods of the majority of households, by improving their assets or income (Figure 6.1), albeit differentially. The nature of the contribution to livelihood improvement differed in each case, as a consequence of the different crop characteristics, production systems and market chains. The poorer households in each of the case studies benefited least from the boom, primarily because they lacked the land to commit to growing the crop. However, many poor households were able to benefit from selling wage labour in the cassava case, and similarly in the second contract period for banana production in Village 1 of that case, where all but a few poor households without surplus able-bodied labour were able to benefit in this way. Conversely, as reported from many other studies (Hall, 2011a; Cramb et al., 2017), wealthier households were able to take greatest advantage of the opportunities presented by the boom crop, and generally diversified their livelihood activities as a result.

The major benefits of household participation in teak growing – securing land through tree planting and using teak as a long-term investment or ‘green bank’ – were different from those of the other two case study crops, as a consequence of the long time period from planting to harvest. Households only planted teak if they had or could claim land for teak surplus to that required for their other livelihood activities; around two-thirds of sampled households were

able to do. Most households then only sell teak when they need cash, either predictably – such as for funding their children’s education, or cultural ceremonies – or unexpectedly, such as for healthcare expenditure.

The different forms of participation in banana production in the two case study villages had different implications for household livelihoods. In Village 1, the opportunities for labour participation in the second contract period meant that almost all households were participating as labourers, in addition to the land lease income received by the 70% of households able to lease their land. Households used this income to improve their houses; wealthier households also invested in non-agricultural activities, and resource-poor households in agricultural land, particularly paddy fields, which they explained was because “no matter how poor we are, at least we have paddy rice for consumption, we feel secure” (Fieldnotes, May 2019). However, most households were also concerned about the health impacts of heavy labouring and exposure to chemicals.

In Village 2, income from banana production was limited to that from land leases, which provided an opportunity for households to shift away from agriculture, although some continued in service provision roles. While households invested in improving their houses and other assets, and in small-medium enterprises, there was also a sense amongst many of them that that they were ‘earning money without working’, leading them to spend much more on leisure activities, particularly drinking alcohol, with potentially adverse household and community impacts.

The cassava boom played a significant role in increasing household incomes in that case compared to the previous boom crop, maize. In both case study villages, most households who were in debt from their previous participation in maize cultivation were able to repay their debts and invest surplus cassava income in new agricultural and non-agricultural activities. A diversity of opportunities to participate in the cassava market chain meant that many households were able to benefit from strong market demand and high prices. In some cases, households expanded their cassava fields or roles in intermediate processing; but in other cases, particularly in Village 2, households elected to shift to less labour-intensive livestock production – the next boom commodity.

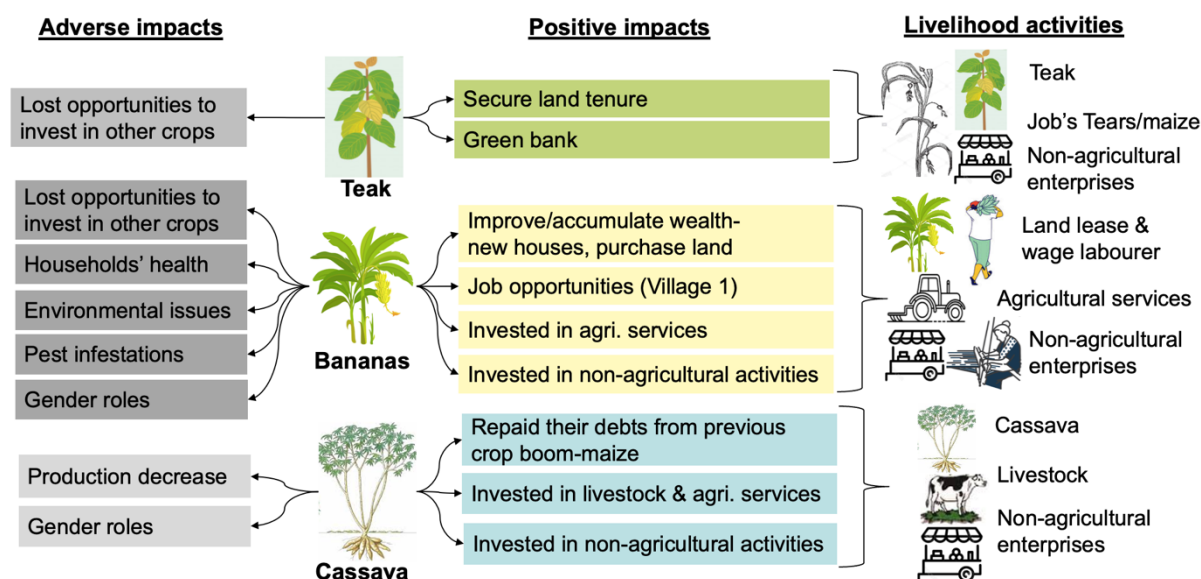


Figure 6.1: Principal household livelihood outcomes associated with the three boom crops

6.2.2 Winners, losers and gender impacts

Generally, boom crops have created winners and losers in terms of livelihood outcomes (Glassman, 2010). The three case studies illustrated this to different degrees, with participation in the boom crop advantaging those who were already wealthier and increasing the differentiation of wealth between households. Nevertheless, as discussed above, where there were opportunities for participation through selling labour, as well as using or leasing land for crop production, as in the banana and cassava cases, poorer households also benefited from the boom. Cassava production has greater seasonal variation in labour demand than does banana, which benefits households who can use the time that their labour is not required for other productive activities. In contrast, households engaged as labourers in banana production had little time for any other activities.

Households who were coerced to participate in banana production (c. 10% of households), and those who were thwarted or excluded from participation (c. 22% of households; Chapter 4.2.2), were losers from the banana boom in different ways, but in each case by not being able to exercise their choice of livelihood activities. At least some of those labouring in Village 1 of the banana case study may suffer the longer-term health consequences of continual heavy labour and exposure to chemicals, including through the loss of access to clean drinking and bathing water.

The banana case study conformed in many respects to the situation described previously for the rubber boom in Laos, one of “turning land into capital while turning people to labour” (Baird 2011, p. 10 and Hirsch and Scurrah, 2015, p. 15). In Village 1 of the banana case study, the

situation largely corresponds to that described for rubber production by Kenney-Lazar (2012, p. 1032), of dramatically-transformed agrarian property and social relations of production in which “peasants entered an altered relation to the land as semi-proletarianized wage labourers”. However, in all cases studied here, participation in the boom crop did not fully compromise households’ ownership of their land. In two cases, however, it did restrict their options for using the land for extended periods: for the duration of the 15+ year harvest cycle for teak; and for at least the 5-year contractual period for bananas, and perhaps subsequently, depending on the extent of land restoration at the end of banana cropping.

The transition from the previous and to the next boom crop can also foster winners and losers. In the cassava case, favourable markets and prices allowed many households who had become indebted by participating in the maize boom to repay their debts and accumulate surpluses. Conversely, in the banana case, the wealth of some households has been built on their participation in the previous maize boom as maize traders and through providing tractor services; these roles were no longer required when many villagers leased their land for banana production. As a result, these households had to pursue more distant work, increasing transportation costs and time and, in some cases, requiring husbands to stay away from their families for several months.

In the cassava case, some households chose not to participate, or decided to exit, in favour of cattle production. These households might be regarded as winners. In the banana case study, most households have become largely reliant on land lease fees and, in Village 1, labour income. Neither may continue beyond the current contract period as banana production shifts from the North to elsewhere in Laos, leaving behind an altered landscape which may or may not be amenable to other cash crops. In addition, in Village 2, it seems likely that at least some households or household members have become accustomed to income without work, and to high levels of alcohol consumption, suggesting that it may be difficult for them to adjust to post-banana boom life and livelihoods.

Gender-specific impacts

Gender roles in agricultural systems in Laos, as more generally (FAO, 2018a; Ireson, 1992), are divided primarily based on labour requirements; typically, men are responsible for heavy labour while women undertake less heavy work and, in some cases, managing finance and sales. This general pattern was evident both for teak and cassava, with men and women working together in many planting and management tasks, but men undertaking the heavier labour. In the teak cases, women were responsible for contacting traders and negotiating the

price with them. While men were responsible for loading the teak logs if traders were not responsible for the harvesting process. However, in the cassava case, both men and women were engaged in sales; because the time away from home required for the transport of cassava to processing facilities, only men were involved in that activity, reiterating the roles of women as carers of both children and older household members.

Gender roles in banana production, where labour is contracted under supervision from banana companies, are different from those in teak and cassava. To contract a household for work as a 'plantation manager', companies required the presence of at least two able-bodied adults, including a man; this meant women had to rely on men if they wished their household to engage in this work, and the policy precluded some women-headed households. However, women could work independently as daily or seasonal labourers, and some of them valued this opportunity to earn income independent of men.

For women who were not able to or did not need to engage in labouring, the income from banana land leases allowed them to pursue other non-agricultural activities, which they appreciated. Many women still engaged in labouring aspired to this situation. In the cassava case, in households who shifted to cattle rearing, women have more time to stay home to look after their grandchildren or invest in shops or food stalls.

In summary, gender-specific outcomes of participation in the case study boom crops were mixed. Those from participation in teak were essentially gender-neutral, although women's roles in negotiating sales was enhanced. In the cases of banana and cassava, women felt outcomes were positive where additional income allowed the diversification of household activities away from agriculture, and they could engage in tasks requiring less heavy labour and that were more family friendly. While women regarded their participation as contracted managers or labourers in banana production essentially as necessary rather than desirable, they appreciated the opportunity that the latter presented to earn income independent of men.

6.3 Factors enabling the crop booms

This section discusses the factors that have facilitated the teak, banana and cassava booms in Northern Laos, in the context of Cramb et al.'s (2017) proposition that "a number of elements (from the agro-ecological to the political) come together at particular conjunctures to influence agrarian structures and trajectories" (p. 940). It uses the model presented in Chapter 2 (Figure 2.3), and described further in Chapter 3, which is adapted from Meijer et al. (2015); Pannell et al. (2006) and Versteeg et al. (2017) to structure the analysis; that model considers factors

that enable crop booms in terms of those external to the village (markets, policies and crop characteristics), within the village (village characteristics, peer effects and opinion leaders), and within the household (household characteristics, knowledge about growing the crops and livelihood strategies) (Figure 6.2).

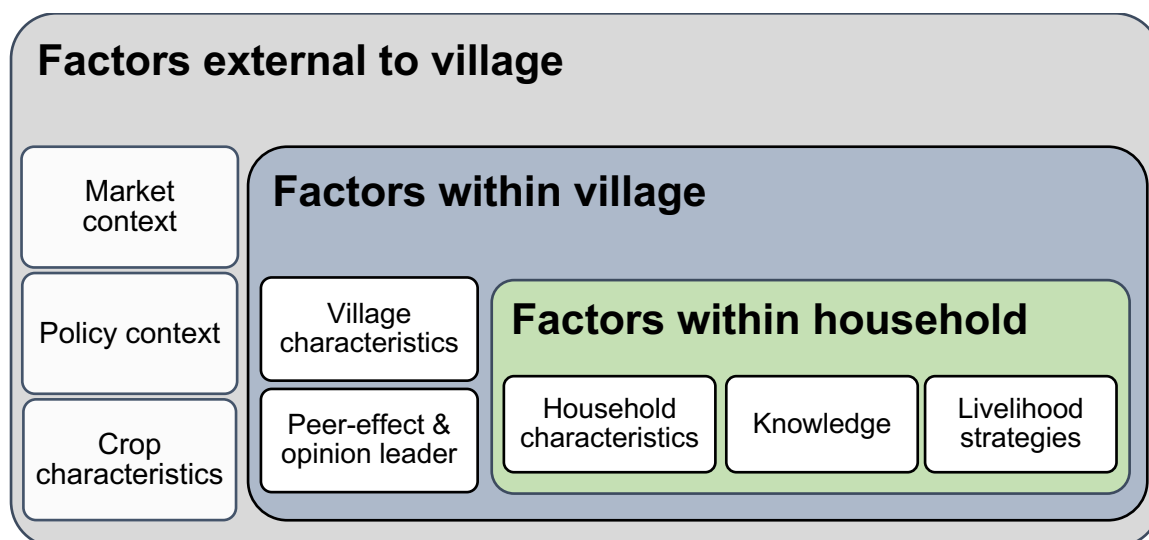


Figure 6.2: Model of factors enabling crop booms

Source: Adapted from Meijer et al., (2015), Pannell et al., (2006), Versteeg et al. (2017)

The relative significance of each of these factors at the time of boom crop adoption, as revealed by my fieldwork, is summarised in Table 6.1, which also presents the average non-labour costs to households and returns (data from my fieldwork). It is evident from Table 6.1 that most factors had a high degree of influence on households' adoption decisions, although there were exceptions. I discuss these factors in the sections below.

Table 6.1: Factors enabling crop booms and household decision-making

Factors	Teak (Luang Prabang Province)	Banana (Oudomxay Province)	Cassava (Xayabouly Province)
Factors external to village			
Markets	L: early adopters M–H: later adopters	H	H
Policies	H	M–H	M–H
Crop characteristics	(≥ 15 years) M	(5–6 years) M	(Annual) H
Factors within village			
Village characteristics	H (Land location: proximity to roads & rivers); land availability)	H (Proximity to export markets (China))	H (Proximity to the starch factory and Lao–Thai border)
Peer effects & opinion leaders	H	H	M–H
Factors within household			
Household characteristics	H (All wealth categories but poor)	H (All wealth categories)	H (All wealth categories)
Knowledge about growing the boom crops	M (Agricultural extension; peers)	L (Investors; households)	M (Investors; households)
Livelihood strategies	H ('Green bank'; diversification)	H (Main cash crop; diversification)	H (Main cash crop; diversification)
Input costs and returns			
Input cost (US\$/ha) (excluding labour)	70	0	180
Income frequency	Episodic	Annual (Lease); Monthly (Labour)	Annual
Income (US\$)	@year15: 6,977/ha (465/year, undiscounted)	Land lease: 500– 1,100/ha/year; Land lease + labour: 2,500–3,500 /ha/season	1,950/ha/season

Note: L=Low influence; M= Moderate influence; H= High influence.

Source: Adapted from (Cramb et al., 2017, Table 3)

The situation for each of these factors at the time of the fieldwork is summarised in Table 6.2 and discussed in the sections below.

Table 6.2: A summary of key enabling factors at the time of fieldwork

Factors	Teak	Banana	Cassava
Factors external to village			
Markets	Remain strong globally, but relatively poorer in local markets	Remain strong	Generally strong, but some local market unpredictability
Policies	Log export ban (PMO 15); constraint in applying plantation certification and selling/transport logs	Moratorium on banana expansion; Lao Good Agricultural Practice	Fresh root export ban
Crop characteristics	Long period until return	Spread of disease; soil depletion	Spread of disease; soil depletion
Factors within village			
Village characteristics	Land availability and suitability	Land availability and suitability	Competition for land between pasture and cassava
	Long period until return	Waste and water pollution; disease and soil depletion	Diseases & soil depletion; limited availability of planting material
Peer-effect	Follow new livelihood trends; shift away from agriculture	Follow new livelihood trends; shift away from agriculture	Follow new livelihood trends; shift away from agriculture and/or to new agricultural enterprise (cattle rearing)
Factors within household			
Household characteristics	Wealth categories and labour availability		
Knowledge & attitudes	Little adoption of improved management practices; preference for shorter-cycle crops	Preference for crop that does not require constant heavy labour and extensive chemical use	Little adoption of improved management practices; preference for activities that use less heavy labour (e.g., cattle rearing)
Livelihood strategies	Retain teak while it remains a good option within livelihood portfolio	Continue to rely on banana lease and/or labour income	Cassava remains preferred crop for some, but unlikely to be sustained in long term
	Where possible, households shifted away from agricultural activities and invest in off-farm activities		

6.3.1 Factors external to the village

Market contexts

For each of the crops, there were and remain strong global markets. However, the direct influence of markets on household adoption decisions varies. At the outset, smallholder teak growing was not strongly influenced by market factors, but rather by the policies of the Lao Government (Hansen et al., 1997). However, over time, markets came to play a stronger role in the decisions of intermediate and late adopters, and whether adopters continued to grow teak or withdrew in favour of other crops. The importance of local market signals for household decisions was illustrated by the difference between the two teak case study villages, with the behaviour of a monopoly trader in one village and the closer proximity of that village to markets for other products encouraging households to withdraw from teak growing; this was in contrast to the continuation of teak growing in the other village, where growers felt they were receiving a fair price, and access to other markets was more constrained.

The high demand for banana and cassava from the export destinations (China, Thailand and Vietnam) were key driving forces in their adoption in Laos, and in the case study villages. However, these market factors do not stand alone; they were also amplified by the Lao Government's policies on socio-economic development, investment promotion, and land and forest use, as discussed in the following section). Export demand for cavendish banana production has remained high since banana cropping was introduced to Laos. However, once households have made the decision to contract their land and/or their labour for banana growing, markets are no longer a consideration to them. In contrast, since cassava was introduced to Laos and to the case study villages, there have been price fluctuations in cassava markets, which have been reflected in responses in Laos (Chapter 5). At the time of my fieldwork, cassava prices had increased in both global and local markets, leading to cassava production becoming the top agricultural export in Laos in early 2021 (Newby, 2021) and to some case study households expanding their cassava plots.

Policy contexts

Amongst the three case study crops, teak was the most explicitly policy-led at the time of initiation. The policies of the Lao government to increase forest cover to 70%, and to promote tree planting and permanent agriculture to upland communities as a means of eliminating swidden agriculture systems under the Land and Forest Allocation program during the 1980s–1990s, had a significant influence on the teak boom in Northern Laos (Castella et al., 2013; Fox et al., 2009; Hansen et al., 1997; Vongkhamchanh and Van der Heide, 1989). These

policies allowed and facilitated the early adopters to 'book land' by establishing teak and accumulate these land assets. Subsequently, as available land was claimed, land was no longer available to be booked by later adopters.

While Lao Government policies continued to promote tree planting to substitute for wood harvesting from natural forests (Smith et al., 2017a), other policy changes meant that the policy context became less of a driver, and more of a constraint, to teak growing. Firstly, the teak promotion program, particularly the provision of free seedlings to households, ended in the mid-1990s. The incentive of land tax exemption for planting 1,100 tree/ha in registered plantations did not apply in the case study villages (Chapter 4.1.3). The 2016 moratorium on log exports (PMO 15) depressed demand and prices for logs, and so had a negative impact on smallholder growers and other actors in the teak value chains (Chapter 4.4.1). In addition, the emerging legality requirements of international markets, to which Laos is responding with the development of an EU VPA and timber legality system, will pose more challenges for smallholder teak growers as most of their plantations remain unregistered (Smith et al., 2018c). Lastly, the new national policy on income tax includes forest businesses selling timber; this is likely to impose more costs for smallholder teak growers, and may discourage households from planting or replanting teak (Smith et al., 2018c).

While, as noted in the preceding section, strong market demand for banana and cassava was a key driver in those booms, a series of policy decisions in the period 2000–2010 were important in facilitating investment. As discussed in Chapter 5.1, the 5th and 6th National Socio- Economic Development Plans and the Land and Forest Allocation Policy sought to 'turn land into capital' (Dwyer, 2007), initially though favouring large-scale concessions and through contract farming. Subsequently, the amendment to the Investment Promotion Law (No. 02/NA, dated 8 July 2009) allowed foreigners to own land and provided incentives for foreign investment in various forms, including reduced duties and taxes; and the suspension of land concessions in 2009 encouraged investors to look for alternative investment models in the forms of lease and contract farming. Subsequently, cross-border trade policies further opened Laos to global markets by reducing barriers to trade in the Greater Mekong Subregion (Leebouapao et al., 2020). These policy contexts favoured the banana and cassava investments that were the subject of my case studies, as well as other boom crops; international investors were able to capitalise on their experience of operating in Laos with previous boom crops, particularly rubber, sugarcane, maize and Job's Tears. These same policies also facilitated the most recent crop booms: pumpkin, watermelon, snake bean and fruit orchards.

Over time, the pro-investment policies for banana, initially facilitated by Provincial and District level agencies (Chapter 4.1.4), were countered by policy measures intended to address environmental and health problems reported by local communities and the media (Finney and Khotpanya, 2018; Inkey, 2019; IWMI, 2016), and concerns about the impacts of banana expansion on paddy fields for food security. In 2014, the Lao Government issued the notification (No. 830/PM, 2014) on the moratorium on planting of banana in paddy fields in the six Northern provinces. However, the moratorium was interpreted differently by the central and local governments, researchers and media, leading to differences in implementation between provinces that confused investors, officials and farmers (Chapter 4.4.4). In parallel, Laos developed GAP guidelines and a Production Standard, but implementation has been limited (Chapter 4.4.4). One focus of PMO 09/2018 was to strengthen compliance of banana production with Lao GAP (Chapter 4.1.4).

The moratorium on banana plantations led to the decline of banana plantation investment in the Northern Provinces, which was accelerated by the arrival of Panama disease in 2017. Consequently, banana investors have moved south to Central and Southern Laos; some investors remain in the same areas but have shifted their investment in other crops.

When the cassava boom began in my case study sites in 2012, the general policy context for investment – in terms of those favouring commodity crop investments – was favourable, as discussed above for the case of banana. However, during my fieldwork in 2019, the Provincial Government announced a ban on export of raw agricultural products – cassava, maize, and Job's Tears (Order No 3) – arguing that this would promote domestic food processing and create local job opportunities. This Order disrupted one of the value chains for case study village production (Figure 5.3), creating barriers for medium-scale collectors and processors who used to export fresh root directly to Thailand; they had to decide whether to make new investments in buying equipment and expanding their drying areas to produce cassava dried chips. Informal discussions during fieldwork suggested that the ban was partly motivated by the goal of improving supply to the Paklai starch factory, which had been finding it difficult to source sufficient cassava fresh root to maximise its production throughout the harvesting season. The DAFO and the starch factory plan to classify harvesting zone. This example illustrates how the interaction between policy and market factors shapes the context for boom crop participation.

In all three case study crops, the initial unreservedly favourable policy context has been superseded by some form of export ban (teak and cassava) or ban on crop expansion (banana).

Crop characteristics

Crop characteristics are an important influence on crop booms (Borras et al., 2016; Hall, 2011a), and played an important role in the case study crop booms (Table 6.1). Short-term annual crops may be the first choice of farmers, as they receive immediate returns; and can respond flexibly to global market trends (Borras et al., 2016).

Teak was appealing to farmers in part because of its low input costs, if farmers collect seed and propagate teak seedlings themselves; this is possible because teak is easy to propagate (Hansen et al., 1997). Most farmers in the case study villages regarded teak in these terms, as requiring low labour input for planting and for management only for the first 3 years. They persisted with this low labour input strategy despite evidence from researchers that greater management inputs would substantially increase returns (Dieters et al., 2014; Race and Wettenhall, 2016).

The long-term production cycle of teak that was initially a strong positive influence on households' adoption decision, in part because it allowed them to 'book' or formally claim land without committing labour on an ongoing basis, has become less attractive to many households as alternative shorter harvest-cycle crops (e.g., rubber, maize, Job's Tears, banana, pineapples) were introduced into the villages. However, the 'green bank' attributes of teak, and its low labour input management, remain attractive to some households, especially those that are absentee landowners.

Banana is an example of a medium-term crop that produces for up to 5–6 years after first planting. Households who participated in banana production through leasing land received returns annually, and did not incur any input costs, because all investment costs are the responsibility of the investors. Therefore, some of these households expressed their view that 'leasing land for the banana company is earning money without working', as Friis and Nielsen (2016) also reported elsewhere in Northern Laos. Those who sold their labour in Village 1, in many cases in addition to leasing their land, did not feel this way.

The high levels of chemical use in banana production, and the impacts of rat infestation on rice and maize production, are crop characteristics that discourage households from wanting to enter into further land leasing contracts for banana. For those households also selling their labour, the intensive continuous work demands also mitigated against continued participation, with a quarter of those surveyed intending to withdraw their labour in the future.

While teak has low input costs but delivers returns only in the long term, cassava is considered by farmers as a low investment crop that provides short-term returns. Cassava can grow in soils of poor fertility and allows flexibility in the time to harvest (up to 2 years), allowing farmers flexibility in allocating their labour to other activities. Cassava can be sold as either fresh root or dried chips, which increases market options for growers. In addition, cassava is a 'flex crop' that is in high demand across a range of global markets, for food, ethanol, pharmaceutical and cosmetic production; therefore, the cassava boom is similar to those of other flex crops such as sugarcane, oil palm, and soybean (Borras et al., 2016). However, just as teak growers' inability or unwillingness to invest more labour in management limited the return they realised from teak, the non-use of fertiliser by cassava growers means that soil fertility and cassava production are declining with soil fertility, and farmers are having to shift to other crops – in the case study villages, pasture production for cattle rearing.

6.3.2 Factors within the village

Village characteristics

Village-level characteristics, such as geographic location, climatic conditions and accessibility to transport, facilitated crop booms in the case study crops. Teak grows well in Luang Prabang Province, including on sloping land not suited to other crops, and with access along the Mekong River and its tributaries as well as by road. These conditions influenced the teak boom in this area (Hansen et al., 1997). The banana boom in Oudomxay Province was facilitated by the suitability of climate and soil, and proximity to the Chinese export market (Manivong et al., 2016). Similarly, the cassava boom in Xayabouly Province was enabled by the availability of suitable land and the proximity to Thailand, as well as the subsequent establishment of a starch factory in Paklai District. Cassava growers felt secure because of the markets for both fresh root and dried chips.

Land availability in the villages influenced the development of the crop booms. The early adopters of teak had greatest opportunity to plant close to the village, and to roads and rivers. As a result, the majority of teak plantations in Laung Prabang are along roads and rivers (Boer, 2019). In the case of the banana and cassava booms, these crops replaced previous boom crops, particularly maize; and in some banana cases, replaced paddy rice. In both the banana and cassava cases, the availability of land was less of a limiting factor to the boom continuing than the crop characteristics described above.

Peer effects and opinion leaders

Knowledge and information from peers had a significant influence on households adopting the case study boom crops. In the case of teak, early adopters were influenced primarily by government officers giving effect to the pro-teak policy; intermediate and later adopters were more influenced by information about teak growing from their community leaders and peers. The majority of these households mentioned that they adopted teak because they wanted to follow others.

Similarly, the adoption of banana production illustrates how local community norms influence household decision-making; households often express that they are 'following others'; or 'follow society's development' (Friis and Nielsen, 2016). However, as described in Chapter 4.3.2, there were also negative impacts for households which experienced coercion to give up their land for banana production from community leaders and from peers. For those who are selling their labour, less demanding agricultural or off-farm activities are desired by many households. Working in the banana plantation has come to be seen as being for the poor and 'low class', and this adds to the appeal of investing in off-farm activities. For women who have resources, opening shops or food stalls are attractive options; men are more interested in investing in local transport services.

'Following others' was also evident as a motivation in informal discussions with cassava growers. For example, households witnessed their neighbours earning more income from cassava, and so repaying their debts from the previous maize boom; this observation influenced other households' adoption decisions.

6.3.3 Factors within households

Household characteristics

Household characteristics, particularly wealth, age and labour availability, play an important role in their decision-making about boom crops. Generally, wealthy households with greater land holdings are those most advantaged by participating in each boom crop, because land is a central asset enabling participation. However, for banana and cassava production, households who had little, or no land were also able to participate by selling their labour.

The age of the household head and of their family members is also relevant to adoption decisions. For example, teak growers are more likely to be households where the head's age is 40 years or more; younger couples are more likely to grow crops with faster returns. This is

in contrast to participation as labourers in banana or in cassava, because these crops require intensive labour to manage the production system. Banana companies prefer people who are over 60 years old not to work in banana production.

Labour availability also influenced household's decisions. For example, children of teak growers in Luang Prabang were often encouraged to work in in Luang Prabang city rather than on the farm, and their household was making livelihood and adoption decisions on the assumption that they would not be available for agricultural work. In the cassava case, some households decided not to participate in cassava growing because of the labour demands, preferring instead to adopt beef cattle raising, or lease their land to others, and mostly or partly exit agriculture.

Gender was not a major factor in most households' decisions about adoption or participation, other than for those selling their labour as banana plantation managers, for which companies required the household to have at least an able-bodied male labourer.

Knowledge about growing the boom crops

Households engaged in teak production initially acquired knowledge from government extension services. As teak is easy to propagate and manage, early adopters transferred necessary knowledge to their peers in the later stages of adoption. Knowledge generated by researchers about improved management practices, particularly thinning and pruning (Dieters et al., 2014), was not adopted, largely because of the additional labour inputs required.

Cassava-growing households in the case study area learned how to cultivate cassava commercially from Thai growers and from the starch factory when it was established in Xayabouly Province. Households commented that cassava cultivation is easy compared to maize. Similarly to teak, while researchers have demonstrated that the benefits of applying fertilisers outweigh the costs (Newby et al., 2019), farmers continue to practice their traditional cultivation system without fertilisers.

In contrast, households participating in the banana boom did not feel confident or able to cultivate cavendish bananas by themselves. They explained that most of the production information, for the use of fertiliser, herbicide and insecticide, was written in the Chinese language, and the specifications and formulations were prepared by the plantation supervisors, who were mostly Chinese.

Livelihood strategies

Households in Laos diversify their livelihoods as part of survival strategies but also to build their wealth (Rigg, 2006). The early teak-adopting households grew teak as a strategy to book and maintain the right to land. Teak growers have not seen themselves as 'tree growing enterprises', but rather as making a long-term investment with less labour requirement that allows the household or individual to allocate their labour to other livelihood activities, particularly off-farm. The 'green bank' that teak represents is an important component of household asset accumulation for adopters, complementing returns from other livelihood activities.

Households that adopt banana and cassava do so to earn an immediate return while also keeping their subsistence crops and using the income to diversify their livelihood activities. However, households who commit labour to banana and cassava production have limited livelihood alternatives, as their time and energy are committed to that crop. In addition, those who leased land for banana production are committed to a 5-year contract; cassava growers can elect to shift to other activities on an annual basis.

In each case, participation in the boom crop has generally been positive for household livelihoods, as it has allowed livelihood diversification as well as to accumulation of wealth. However, households' views of the desirability of participation have changed over time, because of changing individual circumstances, including labour availability; the emergence of alternative crops and off-farm opportunities; and, for banana, the negative impacts on health and environment, or for cassava, the loss of production over successive cycles. Thus, livelihood strategies are continuing to adapt and evolve.

6.4 Conjunctures of factors over time

Different periods of time have elapsed since the initial adoption of the boom in each case study; for teak, some 40 years (corresponding to almost three crop cycles for households who chose to harvest at 15 years); for banana, either 8 or 4 years, in Villages 1 and 2 corresponding to almost two and almost one crop cycles, respectively); for cassava, around 7 years (corresponding to at least seven crop cycles). Figure 6.3 presents a representation of the how the enabling factors relevant to the adoption of each of the three crops (Figure 6.2) have changed over the time since the start of the boom for each, as revealed by my fieldwork.

The traffic light code in Figure 6.3 uses green to indicate a strong positive influence, red to indicate a strong negative influence; and yellow to indicate a moderate influence (positive or negative). In summary, this analysis suggests that, in each case, the overall pattern of factors that encouraged the boom at its start have changed over time to being more negative: most strongly so for banana, and partly so for cassava and teak. These changes help explain the transitions evident in the fieldwork research for each case study. I discuss the conjunctures of these factors (*sensu* Cramb et al., 2017 and Sultana, 2021) and their outcomes for the trajectories of the crops and household livelihoods, in the sections below, in response to the research questions.

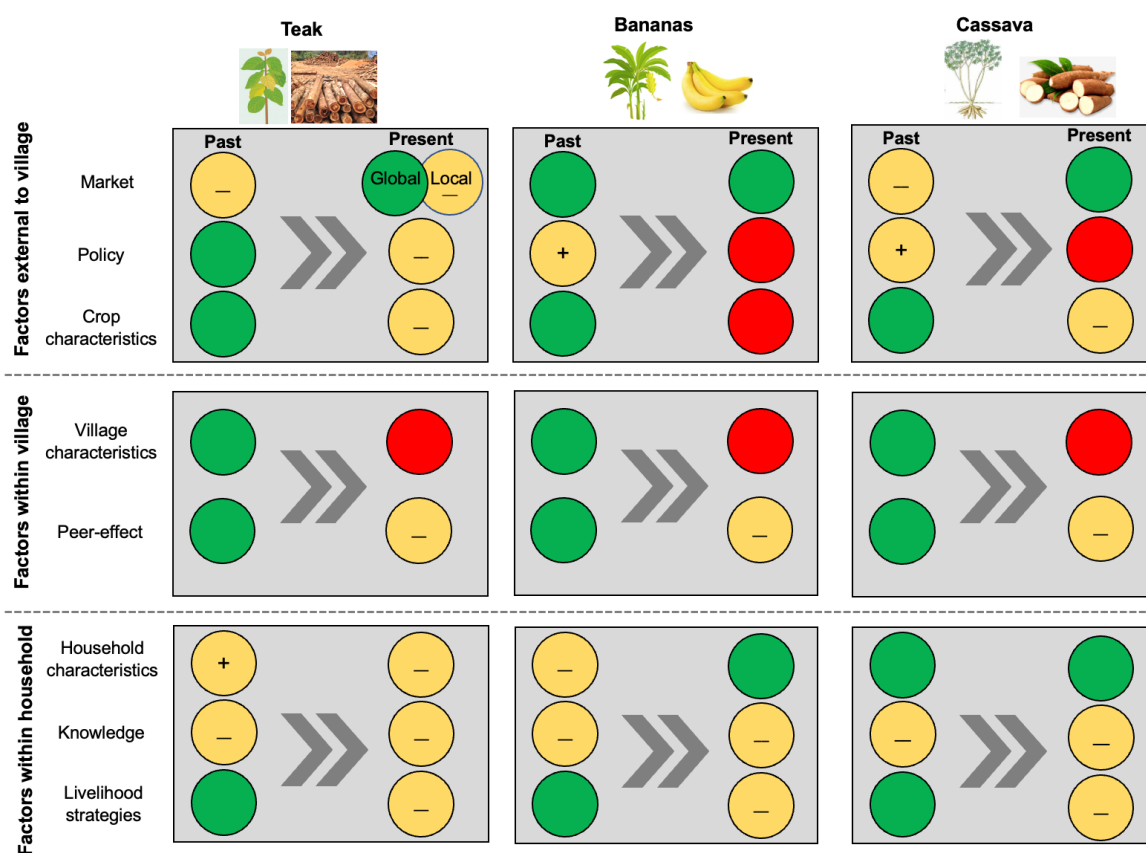


Figure 6.3: Traffic light representation of the influence of factors relevant to adoption at the start of the boom and the time of case study fieldwork, for each of the three boom crops

Legend:

- Strong-Negative
- Moderate +/-
- Strong-Positive

6.4.1 What external factors influence the Northern Lao crop booms?

Different combinations of factors drove and are sustaining each of the three crop booms (Table 6.1 and Figure 6.3). In the case of market factors, markets for teak were only a moderate, at best, influence on the teak boom, as most households explained that “they did not know about teak price when they made a decision to plant teak” (Fieldnotes, 2018). While the global teak market remains strong, this has not been translated into strong prices at the local level, for the reasons described in Chapter 3. In contrast, markets for banana production have remained consistently strong; those for cassava have fluctuated more but are currently strong. However, the relative attractiveness of all three crops has been diminished by emerging market demand for other crops, in conjunction with constraints policy changes and of each’s characteristics, as discussed below.

The policy factors relevant to each crop have become less favourable over time. While the Lao Government continues to promote reforestation and tree plantations, it has not maintained the strong early teak promotion programs with free seedlings and extension services, and smallholder tree growers and value chains have been adversely impacted by policies directed at natural forest value chains and large-scale growers. In each case, moratoriums on exports (teak and cassava fresh root) or expansion (banana) have impacted negatively on incentives or opportunities for continuing participation in growing the crop.

The characteristics of all three boom crops were favourable to adoption at the outset. For teak, the long time to returns and low labour inputs remain attractive to some households, but others are preferring crops with more immediate returns. In the case of banana, the extensive use of chemicals in banana production and the prevalence of crop diseases are now a major limitation to ongoing production. In the case of cassava, while households initially received a higher income than cultivating maize, returns have reduced due to soil depletion and disease; farmers are not willing to apply fertiliser, and have no experience distinguishing between disease-free and disease-affected planting materials.

These conjunctures of external factors for each crop demonstrate that, so long as neither market nor policy factors are too constraining, one of these factors being favourable will enable a boom in a crop that has favourable characteristics. These examples also demonstrate that the crop characteristics that matter for adoption are dynamic and relative. The long period to a return from teak was not a constraint when there were no better options but became a constraint as more attractive options became available. Crop disease has become a constraint for both banana and cassava, as has the unsustainability of production systems for each.

6.4.2 How and why do rural households participate in the boom crops?

In the context of the external factors discussed above, factors within the village and the household determine households' participation in crop booms. In each case, both the village characteristics and peer-effect factors were initially favourable (Table 6.1 and Figure 6.3). However, over time, village characteristics have become negative because remaining lands are unavailable and/or unsuitable, and – in the case of banana and cassava – unable to support continuing production of that crop without substantial changes to the production system. In each case, peer effects have gone from being largely favourable to more neutral. Many teak growers now wish to adopt a shorter-cycle crop, as their neighbours have done. Many households selling their labour for banana production would like to emulate those in their community who have transitioned to less labour-intensive and non-agricultural activities. Cassava growers are observing neighbours who have shifted to less labour-intensive beef production and non-agricultural activities. Thus, a conjecture of village characteristics and peer effects, in conjunction with the crop characteristic and market factors, is leading households to shift away from each of the three boom crops.

Household characteristics (wealth categories, age and available labour) are an important factor in participation in each crop. These relevant to teak adoption have changed little over time, continuing to favour wealthier households with more land. In contrast, household characteristics associated with participation in banana in Village 1 and cassava have become more favourable, because of labour opportunities in both cases and other value-chain opportunities in the cassava case.

Household knowledge in relation to each boom crop has changed little over time. Teak and cassava growers have not adopted the improved management strategies demonstrated by researchers. Households engaged in banana production have not gained knowledge from their participation: "How can we grow it [bananas] by ourselves because all the input products are in Chinese language. We don't know what they put in the water [the insecticide and herbicide spray] and there are so many steps from start until harvesting. We just follow what the Chinese supervisor told us to do" (V1-17, committed, middle wealth category, May 2019).

In contrast, the role of each boom crop in the livelihood strategies of households has changed over time, as alternative crops and other livelihood options emerge; although the extent to which households can capitalise on these also depends on individual circumstances and opportunities. In part, this reflects the success of participation in the crop boom helping households diversify their livelihood portfolios: teak growers can adopt crops with shorter

periods until returns; some of those who leased their land for banana or paid their maize crop debts from cassava income have shifted to non-agricultural activities or to other stages of agricultural value chains. In cases where labour inputs are intensive, as for banana and cassava, or production systems prejudicial to health, as for banana, households are keen to withdraw their labour and direct it to other activities. In the cassava case, the arrival of a new boom 'crop', cattle rearing, provided the opportunity to further diversify or to shift entirely to that activity.

It is evident from the three cases that a conjuncture of household factors, particularly those associated with household characteristics, intersect with the other two sets of factors to determine the extent of household engagement with particular crops.

6.4.3 The livelihood outcomes of households' participation in the booms

Generally, each boom crop has generated a positive impact on households' livelihoods in terms of incomes and assets, including increased land values, housing quality, and vehicle ownership. However, the booms also contributed to differentiation between households in the case study villages, as summarised in Table 6.3. I follow the example of Cramb et al. (2017) to illustrate the differentiation of households in each case study, based on my interpretation in relative terms for each village.

Table 6.3: Factors that may affect household differentiation in the three crop booms

Factors	Teak (Luang Prabang Province)	Banana (Oudomxay Province)	Cassava (Xayabouly Province)
Land abundance	Initially high; now low	Low	Low
Tenure security	High	Moderate-High	Moderate-High
Access to paddy rice land	Limited	Limited	Limited
Extent of participation in cash crop production	Moderate-High	Moderate-High	High
Absentee management	High	Low	Low
Income risk due to yield and/or price fluctuation	Low	Labour-High Lease-Low	High
Alternative sources of livelihood	Moderate-High	Low-Moderate	Moderate
Complementary to other livelihood activities	Moderate-High	Labour-Low Lease-High	Moderate
Strength of community institutions	Moderate	Low	Moderate

Source: Adapted from Cramb et al. (2017, Table 5)

For the case of teak, the availability of land until the early 2000s enabled households to accumulate land by planting teak. Early settlers who planted teak benefited most from the teak boom; poor households with little were unable to participate in teak growing (Tables 3.4 and 3.5). The rate of absentee ownership of teak was high in both case study villages, particularly in Village 1. Those with plots in strategic locations, for example along roads, were able to benefit from the associated increased land values and were able to sell their teak plots to wealthier households within and outside the villages. The nature of teak cultivation which requires less regular management relative to other crops means that teak-growing households have more time and labour to invest in other livelihood activities. Thus, the teak case study clearly shows greater household differentiation in the villages studied (Cramb et al., 2017; Newby et al., 2014).

In the banana case, households who leased their land reported that they felt security of land tenure, as they registered their right to use the land in the land tax book. Those able to lease land experienced less risk in relation to this baseline income for the 5-year contract period. Thus, the differentiation between those who could lease land and those who could not (Table 4.4) was the first factor contributing to household differentiation in the banana case. This was amplified in Village 1 because of the limited alternative livelihood opportunities, and the absence of banana labour opportunities there in the first contract period. However, in the second contract term when households were able to contribute labour, they were dependent for income on the weight and quality of bananas harvested, and so vulnerable to factors such as climatic variability and illness. Furthermore, households who sold their labour for banana production had a limited time to engage in other livelihood activities, and so a low level of complementary livelihood activities, because the intensive labour requirements meant they had 'no time to rest' (Fieldnotes, 2019).

This differentiation may increase further; some households who both lease land and contribute their labour as plantation managers have new concrete houses, have purchased vehicles, and have invested in off-farm activities. However, many of those without, or not able to lease their land, and who are dependent solely on selling their labour for income, are planning to withdraw their labour due to health concerns, thus diminishing their income opportunities. Their alternative livelihood options are limited because, in both villages, the rat infestation associated with banana plantations is impacting adversely on other crops such as maize and rice.

The contrast between Villages 1 and 2 in the banana case study also illustrates how village characteristics can impact on differentiation. Village 2 is located along the highway, so

households are able to benefit from investing in shops and food stalls that service customers from outside the village. However, Village 1 is located in a relatively remote area, and does not present these alternative income opportunities.

The cassava case study illustrates how pre-existing household differentiation, based on landholding and assets associated with the previous boom crop (maize), can be amplified by the successor boom crop. Households who benefited most from cassava were those who had land and machinery (mainly tractors to transport planting material and fresh root during planting and harvesting season). Wealthier households were also those able to choose to shift or diversify into non-agricultural or cassava value-chain activities; or invest in cattle, which requires high input costs and land availability. In contrast, households who had little to no land or machinery were able only to sell their labour for cassava production as a daily labourer. Thus, while every household with available labour was able to participate in and benefit from the cassava boom, the extent to which they could do so depended primarily on their individual circumstance at the start of the boom.

In addition, across three boom crops the level of strength of community institute is low for teak and banana but moderate for cassava. In the cassava case study, there was a collaboration project between ACIAR and CIAT that were working to improve cropping systems, providing cleaned planting material for households and strengthening the collaboration between private sectors and government agencies and smallholders to look/plan beyond project assistance (post-project assistance).

7 Conclusions

The countryside and rural people have been deeply implicated in, and have contributed significantly to, Southeast Asia's urban and industrial transition and, therefore, to its 'miracle'. The rural has been far from a bit player in Asia's growth story ... What does Asia's development look like if we take a view from the countryside? (Rigg, 2020, p. 1)

7.1 Introduction

Many rural households in countries of the Global South are shifting from primarily subsistence livelihoods to participation in commercial agriculture. Growing and globalising markets have made this possible, and government policies have promoted this transformation for a range of national political and socio-economic reasons. Increased commercialisation has been at the heart of most rural development and poverty reduction strategies, although the benefits to farming households have long been debated and researched. There has been a long debate about the relative merits of small versus large-scale agriculture in the context of food security, and the persistence of small-scale agriculture. Bernstein (2010, p. 11) portrays much of this debate as being between "small is beautiful" versus "big is ugly", or "virtuous peasant" versus "vicious corporate agriculture". A substantial body of research suggests that, while small is not necessarily beautiful, it can be under a range of circumstances, and that there is no one-size-fits-all agricultural policy that will work in order to reduce poverty (Fan et al., 2015).

Rural livelihoods are shaped or reshaped by development policy and market factors (Cramb et al., 2017), and farmers in Southeast Asia have demonstrated themselves to be adaptable, resilient and persistent in the face of these factors (De Koninck et al., 2012; Li, 2014; Rigg, 2020; Rigg et al., 2016). In Laos, as elsewhere in Southeast Asia, crop booms have been a feature of agricultural commercialisation, typically in landscapes characterised as resource frontiers (Hall, 2011a; Cramb et al, 2017). A body of research, in Laos and elsewhere, has explored the implications for rural households, and provided the platform for my research. Informed by the literature introduced in Chapter 1 and reviewed in Chapter 2, I identified three case study crops with contrasting characteristics that have been introduced to the resource frontier of Northern Laos, where market demand from adjoining international markets is strong, and where national agricultural and rural development policies have sought 'turning land into capital' (Dwyer, 2007), emphasised in the 7th NSEDP as "a key source of wealth for people and the nation" (MPI, 2011, p. 144); and in the context of opening up the economy to investment and trade (De Koninck et al., 2012; Hirsch and Scurrah, 2015; Kenney-Lazar, 2012; Lienhard et al., 2019).

Crop booms, and the bust cycles that often follow, are complex and dynamic, and subject to multiple interacting factors, the conjuncture of which determine their trajectories and outcomes (Cramb et al., 2017; Li, 2014; Ornetsmüller et al., 2019). My research drew from models of farmer adoption which considered factors external to the village (policies, markets and crop characteristics), within the village (village characteristics, peer effects) and within households (household characteristics, knowledge and livelihood strategies) (Meijer et al., 2015; Pannell et al., 2006; Versteeg et al., 2017), and their implications for household livelihoods (Junquera et al., 2020; Kallio et al., 2019; Versteeg et al., 2017). I adapted the way that I applied these models as I undertook the field research for each of my case study crops – successively, teak, a long-term wood crop with a typical production cycle of c.15 years; banana, a medium-term food crop with a typical production cycle of 5 years; cassava, a short-term ‘flex’ crop with a production cycle of 12 months. The definitions of boom crops that I adopted (Chapter 2.1: Hall, 2011a; Mahanty and Milne, 2016) were appropriate, noting that the boom may be short-lived (e.g. for cassava, some farmers adopted the crop for only 1 or 2 years), and vary in its expression (e.g. banana dominated the landscape, whereas teak occupied only surplus land).

In Figure 7.1, I summarise the structure of my thesis in the form that I presented in Figure 1.1, and list key research findings in response to the three research questions. I summarise these findings in section 7.2 and discuss their implications in section 7.3. In sections 7.4 and 7.5, I reflect on limitations of the research and areas of future research; the chapter concludes with some final remarks.

7.2 Key findings in relation to each research question

As illustrated by Figure 2.5, each of the research questions is informed by different components of the research framework: Research Question 1 primarily by factors external to the village and elements of those within the village, Research Question 2 primarily by elements of factors within the village and those within the household, and Research Question 3 primarily by the livelihood analysis. The key findings for each are summarised below, noting that households’ decision-making and livelihood strategies reflect complex interactions between these components, and how those interactions are expressed in particular contexts.

Research Question 1: What factors influence the Northern Lao crop booms?

As expected from the literature, multiple interacting factors influenced the Northern Lao crop booms that I studied. My results were consistent with those reported elsewhere in Asia, characterised by Cramb et al. (2017, p. 962) as driven by many motivations and dynamics,

but around a common core of 'favourable agricultural commodity markets'. Such favourable markets existed for each of the case study crops and were the primary drivers of the banana and cassava booms. However, the policy contexts of 'turning land into capital' (Dwyer, 2007).

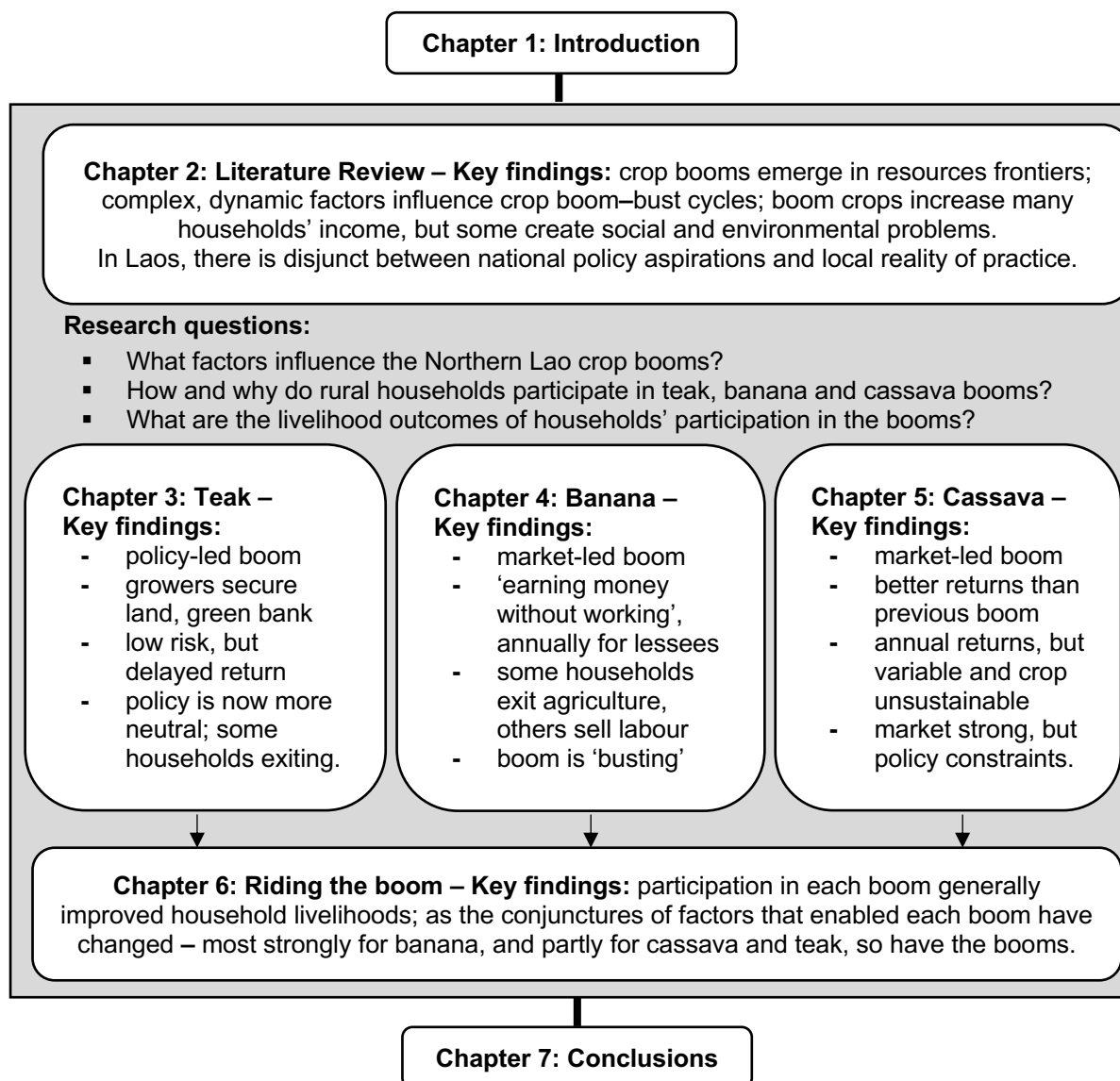


Figure 7.1: Key findings for each of Chapters 2–6

and of 'opening up' the Lao economy (Lienhard et al., 2019) were critical enabling policy factors for these two crops; policies which encouraged teak growing, and rewarded it by allowing land banking, were most influential in its early adoption. The characteristics of the three crops were also important: the relatively low labour inputs for teak, the company-led plantation production system for banana, and the production system for cassava that has low barriers to entry for those with machinery, each favoured their adoption.

In all three cases, market and policy factors interacted over time, and with crop characteristics and households' experiences of participation, to determine the trajectory of each boom. While markets for each crop remained strong, other crops also became more appealing, either because of higher or quicker returns (particularly for teak), or because the current production systems were not sustainable (banana and cassava). In each case, the policy environment became less favourable over time; in the case of teak, primarily because growers were caught collaterally in regulations focused on natural forest products and large-scale plantations; in the case of banana, by measures intended to mitigate environmental and health impacts; and in the case of cassava, by regulations intended to promote local processing.

Crop characteristics, including production systems, were also important factors in changing smallholder responses over time. Some teak-growing households favoured crops with more immediate returns; environmental and human health impacts, and the impacts of plant disease, meant that banana production was unlikely to continue in the case study villages; and sustainable cassava production systems require higher inputs than case study households were willing to make. Consistent with the findings of Cramb et al. (2017), the trajectory of change was specific to each crop and set of household circumstances.

Within the village and within household, land availability and suitability are important factors influencing boom crop adoption and expansion. All three case studies have shown that land is a central asset for households to be involved in crop booms. Where communities had been relocated, early settlers with advantages in knowledge and access to information were able to book land and then invest in the boom crops. Over time, later settlers and members of the next generation were unable to access land in this way, and so unequal land distribution became manifest for households within communities (Newby et al., 2014).

Research Question 2: How and why do rural households participate in teak, banana and cassava booms?

In each of the three case study crops, most households participate by committing land to the crop. In crops such as teak and cassava, those who commit land generally also commit labour, although there were some exceptions. For banana, the default model of participation was to commit land but not labour; this changed in one of the case study villages in the second contract period, when most households also committed labour.

Committing land necessarily requires rights over land that can be made available for the crop. A proportion of households sampled in each case study crop (c. 10% for teak; c. 13% for

banana; c. 21% for cassava) either did not own any land or have sufficient land to adopt that crop. In the case of banana, a further 14% were willing but unable to lease their land. For the poorer amongst these households, the only option for participation and generating income were by selling their labour to those who had land or, in the banana case study, to the plantation company. Those from better-off households might instead participate by working in other roles in the value chain: as traders of teak or cassava, as small-scale processors of cassava chips, or through providing related services, such as transport. Households with surplus labour were able to benefit from the labour demands of banana and cassava production. Conversely, some households without sufficient labour, or who did not wish to commit the necessary labour, elected to not participate in the cassava boom, and instead leased their land to others or shifted their activities to cattle production.

The reasons that households participated in each boom crop varied between the crops. In the case of teak, early adopters were influenced most by the opportunity to accumulate land and assets over the medium term, rather than generate immediate returns; and the advice of officials and community leaders that teak was a good choice. Observation of their peers' success was important for later adopters, as found for other crops, for example, rubber (Junquera et al., 2020). The adoption of banana and cassava were determined primarily by the relatively attractive financial returns, similarly to other cash crops, for example, coffee (Nghiem et al., 2020) and, in the case of cassava, by the need to find an alternative to the previous boom crop, maize. In one of the banana case study villages, pressure from the Village Head and Committee was also instrumental in persuading a critical mass of households, and coercing some of them, to contract their land in the first contract period, as has been reported elsewhere (e.g. Nolte, 2014, in Zambia). In the same village in the second contract period, both village-level and District Agriculture officials were instrumental in helping villagers persuade the company to hire them as the primary labour force for banana production.

Research Question 3: What are the livelihood outcomes of households' participation in the booms?

Participation in each of the crop booms helped facilitate households' transition from subsistence and semi-subsistence towards agricultural commercialisation, with both positive and negative livelihood impacts. Rigg (2020, p. 52) observed that "land conversion has livelihood effects" that "transform some means for making a living and opens up others". While generally positive, the livelihood impacts of households' participation in the case study crops were mixed and context-dependent, as discussed in Chapter 6. That this was the case is

consistent with the wider literature for agriculture (Li, 2014; McCarthy, 2010; Ton et al., 2018) and for plantation forestry (van der Meer Simo, 2020). Similarly consistent with a large body of literature (Cramb et al., 2017; Newby et al., 2014; Pritchard et al., 2017; Sunam et al., 2021; Vicol, 2019), the greatest benefits generally accrued to those who already had most assets, of land and other resources; not all households had the same opportunities to benefit from the booms. However, the benefits for some poorer households were real and significant for them, such as for the poor families who were able to buy paddy land with income from selling their labour for banana production. Conversely, in the banana case study, many households experienced both short- and longer-term adverse impacts on their health.

The livelihoods of households in the case study areas have been shaped (or reshaped) by the crop booms. Over time, many households who benefited from the boom crops have shifted their livelihoods away from on-farm to primarily off-farm activities, in a process of de-agrarianisation (Vandergeest, 2012). However, rural households in Laos are not relinquishing all their agricultural land, particularly their paddy rice fields. Rather, households incorporate on-farm and off-farm activities into a portfolio of livelihood activities, operating as 'multifunctional' households (Rigg et al. (2018)). In some cases, households received income from off-farm activities and reinvested in agriculture, a process which Vandergeest (2012) described as re-agrarianisation.

In addition, the livelihood outcomes in one of the banana case study villages illustrates, as has other literature on boom crops facilitated by Lao Government policy, the process of 'turning land into capital' while 'tuning people into labour' (Baird, 2011; Hirsch and Scurrah, 2015). However, the conversion of land into capital in each case was not necessarily a permanent one; in contrast to the earlier large-scale land concession model, where households lost their rights to land (Baird, 2019; Kenney-Lazar, 2018), land ownership remained with the household (teak and cassava), or was returned to it after the lease contract finished (bananas).

Overall, the case studies demonstrated that households, as more generally in rural households in Laos, are unlikely to have a long-term livelihood plan. They are relying on their capacity to generate livelihoods from their land, labour and other assets, including by trying opportunities that are introduced into their communities in the form of boom crops. In these cases, households' livelihood strategies can be described as 'riding the boom'.

7.3 Implications for Lao Government policies

Smallholder agricultural households in Laos have been a focus of the last three National Socio-Economic Development Plans – for example, the 8th NSEDP (2016–2020) states that “An inclusive approach will also focus on supporting small holder farmers (the majority of Lao farmers) to diversify and improve production within integrated farming systems.” (MPI, 2016, p. 94). These households have also been centrally involved in ongoing processes of land reform, market integration and agricultural commercialisation since the 1980s. During this time, the Lao Government has re-characterised Laos from being ‘land-locked’ to ‘land-linked’ (Souvannavong, 2013); for example, the Socio-Economic Development Strategy 2001–2010 aimed to “Develop our country to become the central point of transit of the region in the future” (Noonan and Noonan, 2021, p. 46), and the resource frontiers that were at the geographical periphery of Laos have similarly been reinterpreted as geographically proximate to the growing markets of China, Thailand and Vietnam. Households in these regions have been offered opportunities to participate in a series of commodity crop booms, and their livelihoods have changed, both positively and negatively, as a result. The case studies reported here, of three different boom crops with contrasting characteristics, offer insights which can inform national policies aimed at improving Lao rural livelihoods through agricultural development.

My results demonstrate that pathways for transformations of rural households away from subsistence, and with it out of poverty (de-agrarianisation through innovation, adoption, modernisation, and intensification) are not linear or direct, but rather a consequence of particular conjunctures and path dependencies (*sensu* Cramb et al., 2017 and Li, 2014). Many households have benefited, but primarily through becoming ‘multifunctional’ (*sensu* Rigg, 2018), keeping at least one foot in the farm (*sensu* McCarthy, 2019). One strength of early Lao land allocation policies and more recent trends away from large-scale concessions since 2007 have been to enable smallholders to retain ownership of their land, even if use may be foregone for a period, such as in the banana case here. Participation in boom crops has exacerbated wealth differentiation in rural communities, as those with assets – particularly land – are able to capitalise on those over successive crops. Where there are still land allocation opportunities in rural Laos, the interests of poorer households with less access to land should be prioritised so that these households are not left even further behind.

As the banana case demonstrates, rural households’ opportunities to benefit from boom crops can depend on strong village-level institutions, and facilitation by government agencies (DAFO, DONRE) to negotiate and re-negotiate contracts with investors. This enabling and honest-broker role needs to be strengthened in Laos, either by civil society organisations such

as the Lao Farmer Network, or government agencies, playing a stronger role. Similarly, in the teak case, different levels of government have an important role to play in facilitating diverse and competitive markets for smallholder teak, avoiding the monopoly situation found in one village. The cassava case demonstrates the need for engagement between the private and public sectors to provide disease-free or disease-resistant planting materials, improved varieties, production inputs, technical knowledge, finance and markets to smallholders, and enable households to take advantage of these. As Cramb et al. (2017, p. 962) stated, “smallholder success depends on crucial contributions to value chains by private- and public-sector actors”, and “public agencies committed to smallholder development can broker innovative arrangements between farmers and agribusiness that ensure all parties benefit”. However, there were no effective partnerships between government, business and smallholders, to the advantage of the latter, in any of the case studies.

Of the three case study crops, two – banana and cassava – were not environmentally sustainable under current production systems: in the banana case, because of the level of pesticide inputs and arrival of a viral disease; in the cassava case, because of the depletion of soil fertility under low-input cropping regimes. In both cases, the most likely outcome is for households to shift away from that crop to another, as had already happened in the cassava case, and is happening there again with the shift of some farmers to beef production. In the case of bananas, Chinese investors have shifted to horticultural crops (pomelo, mango and mandarin), and in other cases away from agriculture to a proposal for an electronics assembly factory. When the successor crop is sufficiently rewarding, as was the case for cassava following maize, households can pay off debt; but the converse, and possibility of sinking further into debt, is also a real possibility (Ornetsmüller et al., 2019). Options for farmer-accessible and affordable crop insurance and risk management tools might help alleviate this prospect; for example, the Vietnamese Government initiated a pilot agriculture insurance scheme in 2011 (King and Singh, 2020).

In contrast, teak growing is environmentally sustainable but not sufficiently financially attractive for those households that have enough labour and the inclination to participate in alternative crops; it remains attractive mainly as a means of land security. The regulatory environment for smallholder teak growers has also become more difficult, further dissuading continued participation. Thus, in each of the three case study crops, the boom is subsiding, and households are having to continue to adapt to changing circumstances and opportunities, as they have before. This means that households are likely to continue to be multifunctional and opportunistic; but that the “smallholder-oriented development strategy” envisaged by

Cramb et al. (2017, p. 940) is unlikely to be realised without more effective policies to enable and support smallholders.

The objectives of current 9th Five-year National Socio-Economic Development Plan (2021–2025, final draft March 2021) (MPI, 2021) for the agricultural sector focus on production linked to value chains of processing industries for domestic and for export markets, and on actively promoting and strengthening local micro, small, and medium entrepreneurs (MPI, 2021). My results suggest this is likely to favour households who are already better-off and with more capacity to engage in these processes. Households with few land or labour assets will continue to have few choices and limited opportunities to benefit from agricultural development, other than by selling their labour.

The 9th NSEDP also promotes “shifting away from monocropping to polyculture ..., promoting Green Agriculture Practices and organic agriculture ..., enhancing agriculture productivity by adopting high-tech tools, scientific and technological advances, innovations, and new seeds, [and] shifting away from sporadic traditional agriculture practices to Smart Farming facilitated by modern technologies” (MPI, 2021, p. 20). The case studies identify a number of challenges to realising this ambition: current Green Agriculture Practices for banana are not implemented in the field and cassava and teak growers are unwilling to invest in additional inputs despite local research results demonstrating their cost-effectiveness. Without adequate, effective, and well-disseminated policies and programs, there are likely to be more threats to the health, and hence, sustainability of these crops and those that replace them. For example, there have been disease outbreaks in cassava in Laos since 2015 (CIAT, 2019) and in May 2021, a new (lumpy skin) disease was reported spreading in cattle (Laoedaily, 2021). As the Government’s vision to becoming ‘land-linked’ comes to greater fruition, closer attention needs to be paid to associated biosecurity risks; smallholders on the periphery, and the institutions that support them, can play an important role as sentinels in biosecurity monitoring, such as through the program implemented in Northern Australia (Maclean et al., 2021). The various challenges of sustainable agricultural production in Laos are likely to be exacerbated by climate change (World Bank, 2011).

As discussed in Chapter 6, the regulatory environment for each crop has become more constraining over time – deliberately so for banana, but inadvertently for cassava and teak, where export restrictions intended to favour domestic processing depressed markets in both cases, and – for the case of teak – emerging legality and sustainability requirements are disadvantaging smallholder growers and traders, rather than enabling them as should be the case. The example of banana is one where greater regulation was appropriate, although

constrained by limited implementation; but the cases of cassava and teak illustrate how smallholders can be collaterally disadvantaged by policies directed at benefiting or constraining other value-chain actors.

In summary, it is not evident that current or planned policy settings pay sufficient attention to the impacts on smallholders. This is ironic, as past policies have been successful in rendering the formerly geographically and politically peripheral Lao borderlands more central to a commodity crop-based rural economy; the smallholder farmers whose land and work have been central to realising that goal now find themselves increasingly peripheral to the implementation, if not the stated ambition, of Lao agricultural development policy. Policy development and implementation need to better appreciate the reality of local contexts, in terms of both external and internal elements (Chapter 6), and ensure that rural households are enabled to maintain or improve their wellbeing and livelihoods from participating in the crop booms without being locked into low productivity, inadequate crop management capacities and capital, with debts, and greater risk of losing their land assets.

7.4 Limitations of the research

My research was constrained by the time and resources available to a PhD scholar, and so my fieldwork could only be conducted at a single point in time for each case study village. This meant that understanding households' trajectories over time relied on participants' memories and my observations of their circumstances. I also learned from conducting the fieldwork, and was able to approach that for banana and cassava on the basis of analysing results from the teak case study and reflecting on that experience and the data it generated.

The constraints of PhD research also mean that my research has a small empirical evidence base of two case study villages per boom crop, across three crops. Similarly, I focused primarily on farming households, rather than on other value-chain actors. These constraints limit the focus of the thesis to these rural households.

In addition, the household livelihood outcomes that I assessed reflected households' wealth at the time when I was in the field. This in turn reflected prior resource and asset endowments, opportunities and decisions, some of which were also the outcomes of crop booms predating my research. This confounding is unavoidable within a PhD research timeframe.

7.5 Areas of further research

Across three case studies, I found that rural households in the six case study villages rarely have a long-term plan for their livelihood strategies. Households are 'riding the booms', trying out the new crops introduced to their communities with only limited choice of how, or whether, they participate. Their choices are governed by their current circumstances, primarily the assets with which they have been endowed and accumulated. Better understanding of how these household levels of agency can be enhanced would be a worthwhile topic for further research.

In the teak case study, the Lao Government policies on the green economy, forestry modernisation, and legality verification are complex in terms of both the signals they send to smallholders, and the regulations they require them to follow. There are opportunities for future research on how smallholders can be involved and respond to these processes: What mechanisms would facilitate different levels of government, the private sector and smallholders to work together for sustainable teak growing in Laos? If teak growers are not able to adapt to the emerging policies and market demands for legally-grown wood, there will be little reason for them to not exit teak growing when their current crop is harvested. Conversely if they opt to 'hold on' to their teak as a land security measure, rather than harvesting it, they risk missing out income from this asset and the opportunities present through other crops.

Both media reporting and the public view of the banana boom has been negative, in terms of social and environmental aspects, and led the Government to take immediate action (i.e., a moratorium) on banana expansion. This action, together with disease spread, has forced banana investors to end their investments in Northern Laos and move to other areas, or change their investment to other crops. Therefore, it would be interesting to explore household livelihood strategies and pathways following the banana boom, as Village 2 and nearby villages have already shifted to other crops (pomelo, mango and mandarin), and away from agriculture to non-agricultural activities (e.g., electronics assembly). Given the findings on labour participation in banana production and how these differed between the two villages (positively in one case – 'income without working' – and negatively the other) it would be interesting to explore how households with these very contrasting experiences respond to post-banana boom circumstances.

In the cassava case, land suitability and the cassava price are central to the future of the crop. Even though applying fertilisers and intercropping to improve cassava production have been

demonstrated and promoted by a development project, households have been unwilling or unable to adopt these new technologies. In this case, it would be interesting to further research how different levels of government, the private sector, and households could better work together to sustain their cropping systems while cassava remains in high demand in the global market. What are the incentives or motivations for households to adopt sustainable crop management – without which, the production base will not be sustained?

7.6 Concluding remarks

While Laos was once geographically at the “periphery of state socialism”, it now sits on the margins of global capitalism (Soukamneuth, 2006, p. 10), and in parallel, Laos is moving from being ‘land-locked’ to ‘land-linked’. Boom crops which emerged in the resource frontiers of the upland periphery of Laos are now a central feature of economic development and the Lao Government’s expectations for the transformation of rural households away from subsistence and poverty. However, these policies and strategies for bringing the country’s people out of poverty and subsistence are not linear or direct; nor does there appear to be a direct line from the periphery to the centre in policy development, notwithstanding the stated ambition of successive National Development Plans.

As is the case elsewhere (Bernstein, 2016), policies for rural development in Laos no longer place smallholders at the centre, and appear to overlook “the view from the countryside” (Rigg, 2020, p. 1). While there has been diversification in rural Laos through the emergence of multifunction households (Rigg, 2018) and most households retain one foot on the farm (McCarthy, 2019; Pritchard et al., 2017), development outcomes have not been equal. Some households have managed to move towards the centre of policy ambition, while others remain more at, and linked to, the periphery.

My purpose in undertaking this PhD research was to contribute to improving the livelihoods of poor rural households in Northern Laos. I hope the results that I have reported in this thesis, along with those from the work of other researchers, contribute to that goal by presenting and reflecting on the “view from the countryside” (Rigg, 2020, p.1).

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Appendices

Appendix 1. Participant Information and Written and Oral Consent Forms

Participant Information Sheet

Researcher:

My name is Soytavanh Mienmany. I am a PhD student from the Fenner School of the Environment and Society at the Australian National University. I am doing research on farmers' adoption decision-making about teak, banana and cassava in Northern Laos, my interest is to explore the reasons behind farmers' adoption decision-making about teak, how these factors impact their livelihood outcomes and understand how teak has become a boom crop.

This research is done in conjunction with National University of Laos (NUoL) as part of a collaborative research project funded by the Australian Centre for International Agricultural Research (ACIAR) with title "Advancing enhanced wood manufacturing industries in Laos and Australia - VALTIP3". Within this research project, I participate in the following activities (1) identifying, mapping (from inputs to market) and analysing the major value chains for the Lao smallholder plantation resource (2) farmer decisions making about teak, banana and cassava and (3) characterising typologies of smallholder plantations and smallholder strategies with respect to their plantations and wood sales.

Project Title:

Riding the Boom: Farmers' decision-making about boom crops in Northern Laos.

General Outline of the Project:

▪ Description and Methodology

The aim of my project is to understand the interaction between specific crops that become boom crops, farmer's decision making about those crops and the impact that the choices farmers make about adopting or not adopting boom crops have on their livelihood.

My research will use a combination of methodologies including semi-structured interviews, focus group discussions, review and analysis of secondary data and household surveys. I will be talking to farmers, government, researchers and industry representatives.

▪ Use of Data and Feedback

Data will be analysed and reported as results for my research project. The results from this study will be distributed to the participants in a number of ways. For industry staff or government officers, I will send a copy of the final research report; please provide me with a nominated email address or postal address if you wish to receive a copy of the results. For farmers, counterparts from the National University of Laos will report back in person to the participating communities.

▪ Project Funding

This study is funded by the Australia Awards Scholarship and Australian Centre for International Agricultural Research.

Participant Involvement:

▪ Voluntary Participation & Withdrawal

Your participation in this study is voluntary. You may decline to take part in the research activity without providing any explanation, until the work is prepared for publication. Even after agreeing to be involved in the research, you may choose not to answer any particular question, discontinue the interview, inquiry about the research, or completely withdraw from the research any time. If you decide to withdraw from the research, I will no longer use your information and will destroy the information accordingly.

▪ What does participation in the research entail?

After agreeing to be involved in this study, I will interview you and ask questions on the following types of information with government officers and academic institutions:

- The role of you/ your organization in related to banana and cassava plantations
- Your knowledge about history of banana and cassava plantations
- The past and current policies related to banana and cassava
- The future strategies about banana and cassava plantations
- The key challenges of the future strategies and the possible solutions

For villagers, participants who participate in the household survey are expected to participate in individual interviews. If you agree to be interviewed, a time and venue that suit both of us will be mutually determined. The time required will not be more than 2 hours and you will not be required to participate in more than 1 interview. When conducting group discussions, 8 to 15 people will be engaged in a group interview that is not expected to take longer than 2 hours. I will record the answers to the question by written notes, and will request additional permission to audio-record responses which will be transcribed to written text. I will not use video-recording during data collection. Additional permission will also be requested to take any photos of on-site activities. Whilst collecting the data I will ensure it is kept securely, and not made available to any other person.

Please be aware to not make any self-incriminating comments, or detrimental comments about others that might put them at risk. If such comments arise, I will protect your and others' identity by ensuring reporting of results is done in a way that pose no adverse impacts or risks to any party.

▪ Location and Duration

The interview will be undertaken at the time and place most convenient to you and the duration will be about 90-120 minutes.

▪ Remuneration

There is no remuneration.

▪ Risks

All risks are addressed by maintaining confidentiality at all stages of the research, and by protection of data (described below). The research is designed, and will be conducted and reported, in ways that mean information cannot be used to identify individuals.

There are also risks to participants that they might be identified by third parties. In addition to the confidentiality provisions below, I will not reveal any names to other participants both during in the field and in the final report.

- **Benefits**

There are no immediate direct benefits. However, this study will benefit Lao PDR policy makers, smallholders, and those seeking to improve the implementation of sustainable livelihood outcomes. There is also wider academic benefits in understanding farmer households' engagement and livelihood experience with boom crops.

Confidentiality:

- **Confidentiality**

Data given for the research will be kept confidential as far as the law allows. Only I and my supervisors can access the data. During the data collection, I will put any relevant information in a secure place that cannot be accessed by other participants. For the publication of results, confidentiality will be maintained through anonymity, and by not identifying the specific location of case study beyond the district level.

Data Storage:

- **Where**

All written data will be put in a secure location. After being transferred into electronic files, the data will be password protected and stored on Australian National University computers, and backed up by a password protected portable hard drive. Audio recording data will be also moved from the recording device to password protected files.

- **How long**

All data will be stored for a period at least 5 years from the date of any publication arising from the research. Ongoing storage will be sorted with my ANU supervisor based on the applicable code of conduct.

- **Handling of Data following the required storage period**

If the data is unused after 5 years, it will be archived in a non-identified format. If the data is used at a later date, I will ensure that this will not expose any risks to you, and it will continue to be stored securely.

Queries and Concerns:

▪ Contact Details for More Information

If you have any questions about the research you can contact me at:

Soytavanh Mienmany

Fenner School of Environment and Society
College of Science
The Australian National University
Canberra, ACT, Australia
Mobile number: (Laos) +856 20 55154872
(Australia) +61 420601689
Email: Soytavanh.mienmany@anu.edu.au

If you have further questions about my research or would like to make complaints about my research conduct, you can contact my supervisor:

Professor Peter Kanowski

Fenner School of Environment and Society
College of Science
The Australian National University
Canberra, ACT, Australia
Mobile number: +61 261255334
Email: peter.kanowski@anu.edu.au

or the ACIAR project coordinator at the National University of Laos:

Associate Professor Latsamy Boupha

Project Manager, Vice DEAN of Faculty of Forestry National University of Laos
P.O. Box:7322, Vientiane, Laos
Mob: 856 20 9980 1393
Email: l_boupha@yahoo.com

Ethics Committee Clearance

The ethical aspects of this research have been approved by the ANU Human Research Ethics Committee (Protocol 2018/680). If you have any concerns or complaints about how this research has been conducted, please contact:

Ethics Manager

The ANU Human Research Ethics Committee
The Australian National University
Telephone: +61 2 6125 3427
Email: Human.Ethics.Officer@anu.edu.au

Written Consent for Participants

Riding the Boom: Farmers' decision-making about boom crops in Northern Laos (To be translated into Lao)

I have read and understood the Information Sheet you have given me about the research project, and

I have had any questions and concerns about the project (listed here _____

_____) addressed to my satisfaction.

I agree to participate in the project YES NO

Individual interview

Focus group interview

Take pictures of effects of boom crops (teak, banana and cassava) on livelihoods

I agree to this interview being audio-recorded YES NO

I agree to be identified in the following way within research outputs:

Full name YES NO

Pseudonym YES NO

No attribution YES NO

Signature:.....

Oral Consent script for Participants

Riding the Boom: Farmers' decision-making about boom crops in Northern Laos

I have read to you the Information Sheet about the research project. Was this information clear? Do you have any questions about the project?

Do you agree to participate in this project? (Yes/No)

In what part of the research do you agree to participate?

Individual interview

Focus group interview

Take pictures of effects of boom crops (teak, banana and cassava) on livelihoods

Do you agree for this interview to be audio-recorded? (Yes/No)

When I prepare the research outputs, I can attribute information to you in three ways: full name, pseudonym, or I can use NO attribution and hold your information confidentially.

- Would you like information attributed using your full name? (Yes/No)
- Would you like to be referred to using a pseudonym (false name)? (Yes/No)
- Would you prefer that your information be not attributed to anyone at all? (Yes/No)

May we start the interview now?

Appendix 2.1: Scoring system for livelihood assets for household wealth classification (teak case study)

Housing	score
Concrete	5
Concrete + wood	4
Building a new concrete	3
Wooden +bamboo	2
Bamboo	1

Transport & mechanisation	Score
Two or more <i>vehicles</i> + tractor/truck or three more vehicles	5
At least one vehicle	4
hand tractor&/or two more motorbike	3
Hand tractor + motorbike	2
Hand tractor or motorbike or boat	1
None	0

Livestock (Village 1)	Score
Large livestock > 10	5
Large livestock > 5 - 10	4,5
Large livestock < 5	4
med. livestock 5 - 10	3,5
med. livestock < 5 &/or poultry > 100	3
med. livestock < 5 &/or poultry > 50 - 100	2,5
med. livestock < 5 &/or poultry > 30 - 50	2
No med. Livestock; poultry > 20 - 30	1,5
No med. Livestock; poultry > 10 - 20	1
No med. Livestock; poultry < 10	0,5
None	0

Land (ha) (Village 1)	Score	Land (ha) (Village 2)
> 7	5	> 10
> 4 - 7	4	> 7 - 10
> 2 - 4	3	> 3 - 7
> 1 - 2	2	> 1 - 3
< 1	1	< 1
None	0	None

Net Income in 2018 (US\$) (Village 1 & 2)	Score
> 5,000	5
> 2,500 - 5,000	4
> 1,500 - 2,500	3
> 1,000 - 1,500	2
> 500 - 1,000	1
0 - 500	0,5
In debt	0

Wealth classification		
	wealth	score
Village 1	Upper	> 3.6
	Middle	> 3 - 3.6
	Lower	1.5 - 3
	Poor	< 1
Village 2	Upper	> 3.3
	Middle	> 2.5 - 3.3
	Lower	1.5 - 2.5
	Poor	< 1.5

Household survey data for teak case study

HHs	HH characteristics							Land (ha)										Income and expenditure in 2017 (USD)									
	Age (HH Head)	Education of HH head	HH size (no.)	Full time	Part-time	Family labour < 12 yrs old (no.)	Total	Teak	Rubber	Paddy	Maize/plan d rice/red beans/pb's tears	Fallow	Pasture/forage	fish pond (unit)	other agri land (Veg...	Prop. total land to teak (%)	Estimated total	Net income	Livestock	teak	rubber	wage labourer	Other agric. product	Off-farm (govt salary, business...	Remittance		
V1-01	60	5	4	2	1	0	5,00	2,00	0,00	2,00	1,00	0,00	0,00	0,00	0,00	40%	4.224	4.224	19.000.000	-	-	-	300.000	18.000.000	-		
V1-02	49	12	4	2	2	0	4,50	3,00	0,00	0,00	1,50	0,00	0,00	1,00	0,00	67%	9.446	9.446	38.000.000	3.000.000	-	-	-	32.400.000	10.000.000		
V1-03	37	12	3	2	0	1	6,40	2,90	2,00	0,00	1,50	0,00	0,00	0,00	0,00	45%	4.870	4.870	4.000.000	-	-	-	21.000.000	18.000.000	-		
V1-04	46	12	5	2	3	0	4,00	3,00	0,00	1,00	0,00	0,00	0,00	0,00	0,00	75%	6.569	6.569	-	28.000.000	-	-	-	30.000.000	-		
V1-05	35	12	5	2	2	1	8,40	5,20	2,20	1,00	0,00	0,00	0,00	1,00	0,00	62%	3.748	3.748	5.600.000	-	-	-	6.175.000	21.320.000	-		
V1-06	50	3	4	2	2	0	5,00	1,00	0,00	0,00	3,00	1,00	0,00	0,00	0,00	20%	5.770	5.770	34.000.000	450.000	-	-	-	16.500.000	-		
V1-07	63	2	5	2	2	1	6,50	1,50	0,00	0,00	5,00	0,00	0,00	0,00	0,00	23%	6.716	6.716	30.900.000	11.500.000	-	-	-	16.900.000	-		
V1-08	75	12	4	2	2	0	6,50	3,00	2,00	0,50	0,00	1,00	0,00	0,00	0,00	46%	3.975	3.975	13.000.000	1.500.000	-	-	-	1.600.000	18.000.000	1.000.000	
V1-09	62	0	6	4	0	2	5,50	1,50	0,00	0,00	1,50	2,50	0,00	0,00	0,00	27%	425	425	-	-	-	-	-	3.750.000	-		
V1-10	58	3	6	4	2	1	7,50	2,00	1,00	1,50	2,00	1,00	0,00	0,00	0,00	27%	4.174	4.174	6.700.000	4.000.000	7.000.000	-	14.150.000	5.000.000	-		
V1-11	56	2	4	3	0	0	3,30	0,80	1,00	0,50	1,00	0,00	0,00	0,00	0,00	24%	2.033	2.033	1.250.000	-	-	-	-	11.100.000	-	5.600.000	
V1-12	63	0	4	4	0	0	5,50	0,20	1,00	0,80	2,50	1,00	0,00	0,00	0,00	4%	2.548	2.548	3.750.000	-	-	-	-	12.750.000	-	6.000.000	
V1-13	75	0	5	2	3	0	6,80	1,50	2,00	0,00	1,50	1,80	0,00	0,00	0,00	22%	4.757	4.757	24.500.000	-	13.000.000	-	-	4.500.000	-	-	
V1-14	43	5	4	3	0	1	5,20	0,00	2,00	0,50	2,70	0,00	0,00	0,00	0,00	0%	2.005	2.005	2.300.000	-	-	-	-	12.400.000	-	3.000.000	
V1-15	64	1	4	4	0	2	5,50	0,00	1,00	0,00	2,00	2,50	0,00	0,00	0,00	0%	906	906	1.100.000	-	-	-	-	6.500.000	-	400.000	
V1-16	69	0	5	4	0	1	5,30	0,30	1,00	0,00	3,00	1,00	0,00	0,00	0,00	6%	1.472	1.472	-	-	-	-	-	12.000.000	-	1.000.000	
V1-17	58	5	5	2	3	0	3,50	1,00	1,00	0,00	1,50	0,00	0,00	0,00	0,00	29%	1.393	1.393	-	1.500.000	800.000	-	-	10.000.000	-	-	
V1-18	33	7	4	2	0	2	3,30	0,00	0,00	0,30	1,00	2,00	0,00	0,00	0,00	0%	3.868	3.868	1.300.000	-	-	18.000.000	8.850.000	6.000.000	-	-	
V1-19	40	10	3	2	0	1	2,00	0,00	0,00	0,00	1,00	1,00	0,00	0,00	0,00	0%	1.872	1.872	-	2.500.000	-	10.000.000	30.000	-	-	4.000.000	
V1-20	35	7	5	2	1	2	2,00	0,00	0,00	0,00	1,00	1,00	0,00	0,00	0,00	0%	4.587	4.587	-	-	-	18.000.000	11.500.000	9.000.000	2.000.000	-	
V1-21	35	12	4	2	0	2	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0%	8.981	8.981	9.300.000	-	-	-	-	70.000.000	-	-	
V1-22	40	12	6	2	2	2	4,20	0,00	1,00	0,50	1,20	1,50	0,00	0,00	0,00	0%	6.597	6.597	-	-	6.500.000	-	7.750.000	44.000.000	-	-	
V1-23	42	5	5	2	3	0	4,00	0,00	1,50	0,00	2,50	0,00	0,00	0,00	0,00	0%	4.236	4.236	900.000	-	-	-	-	36.500.000	-	-	
V1-24	51	1	5	4	1	0	5,80	0,00	1,00	0,00	1,80	3,00	0,00	0,00	0,00	0%	3.454	3.454	18.500.000	-	-	-	-	9.500.000	-	2.500.000	
V1-25	46	5	5	3	2	0	4,00	0,00	0,00	0,50	2,00	1,50	0,00	0,00	0,00	0%	3.511	3.511	13.500.000	-	-	-	-	17.500.000	-	-	
V1-26	31	5	5	2	0	3	4,00	0,00	1,00	0,00	1,00	2,00	0,00	0,00	0,00	0%	3.398	3.398	-	-	14.000.000	14.000.000	-	2.000.000	-	-	
V1-27	42	2	9	2	4	3	1,00	0,00	0,00	0,00	1,00	0,00	0,00	0,00	0,00	0%	883	883	-	-	-	1.000.000	6.800.000	-	-	-	
V1-28	32	2	4	1	1	2	1,00	0,00	0,00	0,00	1,00	0,00	0,00	0,00	0,00	0%	164	164	-	-	-	200.000	450.000	-	-	800.000	
V1-29	35	12	5	2	0	3	8,70	2,50	4,20	0,00	2,00	0,00	0,00	0,00	0,00	29%	18.914	18.914	-	8.000.000	2.000.000	40.000.000	50.000.000	67.000.000	-	-	
V1-30	39	5	5	3	2	0	3,70	0,20	1,00	0,50	2,00	0,00	0,00	0,00	0,00	5%	4.236	4.236	2.200.000	-	-	-	-	23.200.000	-	12.000.000	
V1-31	40	5	6	2	2	1	5,00	1,00	2,00	0,00	2,00	0,00	0,00	0,00	0,00	20%	3.817	3.817	-	1.100.000	-	-	-	32.600.000	-	-	
V1-32	73	5	6	2	2	2	2,00	0,50	0,50	0,00	0,50	0,00	0,00	0,00	0,50	25%	4.530	4.530	1.600.000	-	-	-	-	6.000.000	32.400.000	-	
V2-01	45	12	3	1	1	1	3,91	3,00	0,00	0,90	0,00	0,00	0,00	0,01	0,00	77%	3.964	3.284	8.000.000	-	-	-	-	3.000.000	24.000.000	-	
V2-02	41	3	4	2	2	0	8,20	4,00	2,00	1,20	0,00	1,00	0,00	0,00	0,00	49%	1.450	680	1.800.000	-	3.000.000	5.000.000	-	3.000.000	-	-	
V2-03	62	5	6	2	1	1	5,70	3,70	0,00	0,00	1,00	1,00	0,00	0,00	0,00	65%	3.284	2.877	5.000.000	-	-	-	-	2.000.000	-	22.000.000	
V2-04	44	2	5	2	2	1	25,50	7,50	0,00	1,00	0,00	17,00	0,00	0,00	0,00	29%	3.930	3.318	4.000.000	-	-	-	-	29.500.000	1.200.000	-	
V2-05	68	12	6	2	3	1	16,00	10,00	0,00	0,00	0,00	6,00	0,00	0,00	0,00	63%	4.881	3.749	22.500.000	-	-	-	-	15.600.000	5.000.000	-	
V2-06	55	5	5	3	1	1	13,30	2,50	8,00	0,00	2,50	0,00	0,00	0,30	0,00	19%	5.153	3.115	4.000.000	-	15.000.000	-	-	6.300.000	10.200.000	10.000.000	
V2-07	44	5	5	2	0	3	6,00	1,50	0,00	1,50	1,50	1,50	0,00	0,00	0,00	25%	3.352	1.722	3.200.000	-	-	-	-	2.400.000	24.000.000	-	
V2-08	46	2	4	2	2	0	6,20	2,00	0,00	0,00	1,20	1,20	0,00	1,80	0,00	32%	3.443	2.084	4.200.000	-	-	-	-	21.200.000	5.000.000	-	
V2-09	46	5	7	4	2	1	30,00	11,00	7,00	0,00	6,00	6,00	0,00	0,00	0,00	37%	7.373	6.535	-	-	40.000.000	-	-	23.100.000	2.000.000	-	
V2-10	43	5	3	2	0	1	7,50	4,50	0,00	0,50	2,00	0,50	0,00	0,00	0,00	60%	1.982	1.348	1.000.000	-	-	3.000.000	-	500.000	-	-	
V2-11	48	5	6	2	4	0	2,50	1,00	0,00	0,00	0,50	1,00	0,00	0,00	0,00	40%	1.370	1.099	1.500.000	-	-	5.600.000	-	5.000.000	-	-	
V2-12	48	2	5	2	3	0	6,50	4,50	0,00	0,00	1,00	1,00	0,00	0,00	0,00	69%	940	668	1.400.000	-	-	-	-	6.900.000	-	-	
V2-13	69	6	4	3	1	0	8,50	2,50	0,00	0,00	2,00	4,00	0,00	0,00	0,00	29%	1.948	815	2.500.000	-	-	-	-	4.500.000	200.000	10.000.000	
V2-14	54	2	4	3	1	0	7,20	1,00	0,00	0,00	2,00	4,20	0,00	0,00	0,00	14%	317	113	-	-	-	-	-	2.800.000	-	-	
V2-15	38	4	7	2	2	2	7,25	4,00	0,00	1,75	1,50	0,00	0,00	0,00	0,00	55%	2.650	2.016	17.000.000	-	-	3.000.000	-	3.400.000	-	-	
V2-16	75	2	2	0	2	0	9,50	4,50	0,00	2,00	3,00	0,00	0,00	0,00	0,00	47%	1.024	1.296	700.000	-	-	-	-	9.740.000	-	1.000.000	
V2-17	30	6	6	2	2	2	12,00	4,00	0,00	0,00	4,00	4,00	0,00	0,00	0,00	33%	1.263	549	3.600.000	-	-	2.500.000	-	5.050.000	-	-	
V2-18	52	2	4	3	1	0	5,40	1,00	0,00	0,50	3,10	0,80	0,00	0,00	0,00	19%	1.155	815	-	-	-	2.000.000	-	7.500.000	-	700.000	
V2-19	60	5	5	3	1	1	6,00	2,00	0,00	0,00	3,00	1,00	0,00	0,00	0,00	33%	362	249	-	-	-	300.000	-	2.900.000	-	-	
V2-20	70	0	4	2	2	0	6,00	1,00	0,00	0,00	3,00	2,00	0,00	0,00	0,00	17%	1.563	997	7.700.000	-	-	-	-	6.100.000	-	-	
V2-21	48	5	4	2	2	0	7,00	3,00	0,00	0,00	3,00	1,00	0,00	0,00	0,00	43%	1.654	1.246	200.000	-	-	-	-	4.400.000	-	10.000.000	
V2-22	35	8	6	2	2																						

Appendix 2.2: Scoring system for livelihood assets for household wealth classification (banana case study)

Housing	score
Concrete	7
Concrete + wood & building new house	6
Wooden & building new house	5
Concrete + wood	4
Wooden	3
Wooden +bamboo	2
Bamboo	1

Transport & mechanisation	Score
Two or more <i>vehicles</i> + tractor/truck or three more vehicles	5
Truck + tractor or two vehicles	4
Truck + hand tractor or single vehicle	3
Hand tractor + motorbike	2
Motorbike	1
None	0

Livestock (Village 1)	Score
Large livestock > 10	7
Large livestock 5 – 10; > 10 med. livestock	6,5
Large livestock 5 – 10; up to 10 med. livestock	6
Large livestock 1 – 4; >10 med. livestock	5,5
Large livestock 1 – 4; up to 10 med. livestock	5
med. Livestock > 10	4,5
med. Livestock 5 – 10; > 30 poultry	4
med. livestock 5 – 10; 10 – 30 poultry	3,5
med. livestock 5 – 10; < 10 poultry	3
med. livestock 1 – 4; poultry > 30	2,5
med. livestock 1 – 4; poultry 10 - 30	2
med. livestock 1 – 4; poultry < 10	1,5
No med. Livestock; poultry > 30	1
No med. Livestock; poultry 10 - 30	0,5
No med. Livestock; poultry <10	0

Land (ha) (Village 1 & 2)	Score
> 40	7
> 35 - 40	6,5
> 30 - 35	6
> 25 - 30	5,5
> 20 - 25	5
> 15 - 20	4,5
> 10 - 15	4
> 7.5 - 10	3,5
> 5 - 7.5	3
> 3 - 5	2,5
> 1.5 - 3	2
> 1 - 1.5	1,5
> 0.5 - 1	1
< 0.5	0,5
None	0

Net Income in 2018 (US\$) (Village 1 & 2)	Score
> 15,000	7
> 10,000 - 15,000	6
> 6,000 - 10,000	5
> 3,000 - 6,000	4
> 1,000 - 3,000	3
> 500 - 1,000	2
0 - 500	1
In debt	0

Wealth classification		
	wealth	score
Village 1	Upper	> 4.2
	Middle	> 3.2 - 4.2
	Lower	2 - 3.2
	Poor	< 2
Village 2	Upper	> 4.1
	Middle	> 3.1 - 4.1
	Lower	2 - 3.1
	Poor	< 2

Household survey data for banana case study

HHs	HH Characteristics				Land					Income in 2018 (USD)								
	Age (HH Head)	Total HH occupants (no.)	HH labour (no.)	Total	Leased to bananas	Paddy	Maize/upland rice/fallow/pasture	Tree plantation (rubber & teak)/cardamom	Prop. total land to bananas (%)	Estimated total	Net income	Land leased to bananas	Plantation manager	Plantation daily labourer	Other agric. product.	Off-farm	Estimated total non-bananas	Prop. total bananas (%)
V2-01	62	6	2	42.60	8.60	1.00	29.00	4.00	20%	249.279	134.606	8.608	0	0	240.672	240.672	3%	
V1-14	55	5	4	14.00	1.00	1.80	11.20	0.00	7%	32.822	24.894	1.133	0	0	2.242	29.447	31.689	3%
V1-15	36	4	2	3.60	3.60	0.00	0.00	0.00	100%	32.392	15.403	4.077	0	0	0	28.314	28.314	13%
V1-07	45	7	4	6.30	2.90	0.90	1.00	1.50	46%	25.936	6.003	3.284	0	0	0	22.651	22.651	13%
V2-02	36	4	2	11.70	1.00	0.20	9.00	1.50	9%	8.636	5.261	680	0	0	1.161	6.795	7.956	8%
V1-01	39	5	3	6.00	2.20	0.00	0.80	3.00	37%	19.254	4.417	2.492	0	0	0	16.762	16.762	13%
V1-06	31	6	2	7.50	3.10	1.20	2.00	1.20	41%	21.179	8.234	3.511	0	0	0	17.668	17.668	17%
V1-04	42	5	3	6.08	2.48	0.50	3.10	0.00	41%	5.640	3.420	2.809	0	0	2.039	793	2.831	50%
V1-12	51	5	4	7.55	5.85	1.03	0.67	0.00	77%	7.985	6.626	6.626	0	0	1.359	0	1.359	83%
V1-09	46	2	2	4.43	2.50	0.18	1.75	0.00	56%	8.007	3.930	2.831	0	0	147	5.029	5.176	35%
V1-10	45	3	2	0.80	0.50	0.00	0.30	0.00	63%	10.539	7.820	906	0	0	0	9.633	9.633	9%
V1-11	50	4	2	5.50	2.70	0.80	2.00	0.00	49%	11.779	10.420	3.171	0	0	45	8.562	8.608	27%
V1-02	47	2	2	3.47	3.07	0.40	0.00	0.00	88%	3.851	1.812	3.398	0	0	0	453	453	88%
V1-03	36	3	2	5.25	3.00	0.35	1.90	0.00	57%	6.229	3.964	3.171	0	0	2.831	227	3.058	51%
V1-05	57	2	1	1.70	1.70	0.00	0.00	0.00	100%	1.982	1.287	1.925	0	0	0	57	57	97%
V2-03	43	5	1	7.60	2.10	1.00	4.50	0.00	28%	4.202	1.484	1.076	0	0	0	3.126	3.126	26%
V1-08	66	2	1	1.40	1.40	0.00	0.00	0.00	100%	2.560	1.654	1.586	0	0	0	974	974	62%
V1-13	55	6	2	7.25	4.20	0.70	2.35	0.00	58%	19.820	11.439	4.757	0	0	1.563	13.500	15.063	24%
V1-16	55	5	3	8.35	2.00	0.35	6.00	0.00	24%	3.556	1.755	906	0	0	612	2.039	2.650	25%
V1-19	55	5	4	7.25	3.90	1.35	2.00	0.00	54%	38.544	23.911	4.417	0	0	136	33.991	34.127	11%
V2-04	60	5	4	29.00	1.00	2.00	26.00	0.00	3%	5.255	4.032	1.133	0	0	612	3.511	4.123	22%
V1-17	35	4	2	2.30	1.50	0.80	0.00	0.00	65%	78.431	14.214	1.699	0	0	0	76.732	76.732	2%
V1-20	45	4	4	6.09	1.62	1.46	3.01	0.00	27%	6.931	4.298	1.835	0	0	3.058	2.039	5.097	2%
V1-23	62	5	2	5.15	2.90	0.55	1.40	0.30	56%	8.772	7.130	3.613	0	0	0	5.159	5.159	41%
V1-22	41	5	4	2.95	2.25	0.20	0.50	0.00	76%	7.806	3.389	2.548	0	0	727	4.530	5.257	33%
V1-18	37	5	2	5.05	0.55	0.60	3.90	0.00	11%	16.955	8.913	623	0	0	476	15.856	16.332	4%
V1-25	38	4	2	3.70	2.30	0.70	0.70	0.00	62%	8.981	7.350	2.605	0	0	1.416	4.961	6.376	29%
V1-26	27	5	2	8.40	3.80	0.80	3.80	0.00	45%	7.939	4.768	4.304	0	0	917	2.718	3.636	54%
V1-24	56	6	2	4.07	2.70	0.67	0.70	0.00	66%	6.274	1.701	3.058	0	0	2.242	974	3.217	49%
V1-21	35	5	2	2.20	2.00	0.20	0.00	0.00	91%	4.191	3.171	2.265	0	0	1.812	113	1.925	54%
V2-13	43	4	2	11.80	9.00	0.50	1.30	1.00	76%	11.903	9.638	2.492	6.342	57	340	2.673	3.013	75%
V2-12	52	6	4	3.38	1.82	0.78	0.00	0.78	54%	12.543	11.014	810	5.323	227	6.184	0	6.184	51%
V2-15	40	5	2	5.50	0.50	1.00	4.00	0.00	9%	6.501	5.142	227	3.398	113	2.763	0	2.763	57%
V2-16	34	5	2	7.55	1.00	0.55	6.00	0.00	13%	6.799	3.967	909	5.663	227	0	0	0	100%
V2-14	46	6	4	2.66	1.16	0.50	0.50	0.50	44%	5.300	3.092	714	4.530	57	0	0	0	100%
V2-05	44	6	2	2.47	0.75	0.50	0.00	1.22	30%	1.257	804	487	0	340	430	0	430	66%
V2-06	31	4	2	4.37	1.37	0.70	2.30	0.00	31%	8.823	5.652	861	0	340	3.092	4.530	7.622	14%
V2-17	39	9	4	5.40	2.50	0.60	2.00	0.30	46%	5.586	2.811	670	4.757	23	-	136	136	98%
V2-07	42	5	3	3.20	0.40	0.40	1.40	1.00	13%	2.458	1.099	340	0	34	2.084	0	2.084	15%
V2-18	51	7	5	4.60	1.20	0.90	2.50	0.00	26%	7.724	6.637	815	3.398	340	3.171	0	3.171	59%
V2-09	48	7	6	16.44	0.82	2.50	10.80	2.32	5%	10.799	7.515	566	0	68	7.220	2.945	10.165	6%
V2-19	49	6	4	14.50	1.50	0.50	11.50	1.00	10%	5.159	3.233	1.082	2.492	113	0	1.472	1.472	71%
V2-08	34	5	2	2.15	1.45	0.50	0.00	0.20	67%	7.271	4.553	770	0	45	612	5.844	6.456	11%
V2-11	55	9	4	6.80	2.60	0.40	3.80	0.00	38%	4.321	2.282	2.039	0	357	1.925	0	1.925	55%
V2-10	37	9	4	2.77	1.40	0.37	0.00	1.00	51%	1.574	487	498	0	340	0	736	736	53%
V2-28	36	4	2	3.70	0.00	0.70	3.00	0.00	0%	1.676	940	0	0	34	396	1.246	1.642	2%
V2-31	59	4	4	3.20	0.00	2.80	0.40	0.00	0%	1.959	(759)	0	0	340	1.620	0	1.620	17%
V2-23	54	7	4	2.10	0.00	0.60	1.50	0.00	0%	3.511	682	0	3.398	113	0	0	0	100%
V2-24	25	2	2	7.50	0.00	0.50	7.00	0.00	0%	3.432	2.192	0	3.398	34	0	0	0	100%
V2-22	31	5	2	0.60	0.00	0.00	0.60	0.00	0%	3.511	1.472	0	3.171	340	0	0	0	100%
V2-20	39	7	2	0.50	0.00	0.50	0.00	0.00	0%	1.835	(91)	0	1.812	23	0	0	0	100%
V2-29	37	5	2	1.50	0.00	0.00	1.50	0.00	0%	1.133	113	0	0	680	453	0	453	60%
V2-27	23	7	2	3.08	0.00	0.50	2.58	0.00	0%	1.699	(283)	0	0	1.359	0	340	340	80%
V2-30	30	5	2	1.40	0.00	0.20	1.20	0.00	0%	1.733	(68)	0	0	680	0	1.053	1.053	39%
V1-29	50	3	2	1.10	0.00	0.00	1.10	0.00	0%	7.668	4.553	0	0	0	1.325	6.342	7.668	0
V1-27	45	4	2	0.60	0.00	0.00	0.60	0.00	0%	2.990	1.291	0	0	0	0	2.990	2.990	0
V1-31	28	3	2	1.50	0.00	0.00	1.50	0.00	0%	1.631	1.218	0	0	0	1.631	0	1.631	0
V1-28	37	2	2	0.20	0.00	0.00	0.20	0.00	0%	2.850	546	0	0	0	2.283	566	2.850	0
V1-30	38	5	2	0.20	0.00	0.00	0.20	0.00	0%	2.718	1.685	0	0	0	408	2.310	2.718	0
V2-21	28	4	2	0.00	0.00	0.00	0.00	0.00	0%	4.559	3.200	0	4.530	28	0	0	0	100%
V2-26	23	5	2	0.00	0.00	0.00	0.00	0.00	0%	963	45	0	0	283	680	0	680	29%
V2-25	29	3	2	0.00	0.00	0.00	0.00	0.00	0%	566	-	0	0	566	0	0	0	100%

Appendix 2.3: Scoring system for livelihood assets for household wealth classification (cassava case study)

Housing	score
Concrete	5
Concrete + wood	4
Building a new concrete	3
Wooden +bamboo	2
Bamboo	1

Transport & mechanisation	Score
Two or more 'lod sing' + tractor/truck or three more vehicles	5
Lod sing'+ tractor/truck or two vehicles	4
Lod sing' + hand tractor/motorbike or single vehicle	3
Hand tractor + motorbike	2
Hand tractor or motorbike or boat	1
None	0

Livestock (Village 1)	Score	Livestock (Village 2)
Large livestock > 10	5	Large livestock > 40
Large livestock > 5 - 10	4,5	Large livestock > 20 - 40
Large livestock: < 5	4	Large livestock: 10 - 20
med. livestock 5 - 10	3,5	Large livestock < 10; med. livestock > 10
med. livestock < 5 &/or poultry > 100	3	Large livestock < 10; med. livestock < 10
med. livestock < 5 &/or poultry > 50 - 100	2,5	med. Livestock < 10; poultry > 30
med. livestock < 5 &/or poultry > 30 - 50	2	med. Livestock < 10; poultry < 30
No med. Livestock; poultry > 20 - 30	1,5	No med. Livestock; poultry > 30
No med. Livestock; poultry > 10 - 20	1	No med. Livestock; poultry 10 - 30
No med. Livestock; poultry < 10	0,5	No med. Livestock; poultry < 10
None	0	None

Land (ha) (Village 1)	Score	Land (ha) (Village 2)
> 18	5	> 30
> 15 - 18	4,5	> 20 - 30
> 12 - 15	4	> 15 - 20
> 9 - 12	3,5	> 10 - 15
> 6 - 9	3	> 7 - 10
> 3 - 6	2,5	> 4 - 7
> 1.5 - 3	2	> 2 - 4
> 1 - 1.5	1,5	> 1 - 2
> 0.5 - 1	1	0.5 - 1
< 0.5	0,5	< 0.5
None	0	None

Net Income in 2018 (US\$) (Village 1 & 2)	Score
> 20,000	5
> 15,000 - 20,000	4,5
> 10,000 - 15,000	4
> 7,000 - 10,000	3,5
> 4,000 - 7,000	3
> 2,000 - 4,000	2,5
> 1,500 - 2,000	2
> 1,000 - 1,500	1,5
> 500 - 1,000	1
0 - 500	0,5
In debt - 0	0

Wealth classification		
	wealth	score
Village 1	Upper	> 3.5 - 4.5
	Middle	> 2.5 - 3.5
	Lower	1.5 - 2.5
	Poor	< 1.5
Village 2	Upper	> 4.5 - 5
	Middle	> 3.5 - 4.5
	Lower	1 - 3.5
	Poor	< 1

Household survey data for cassava case study

HHs	HH characteristics							Land (ha)										Income 2018 (USD)														
	Age (HH Head)	Education of HH head	HH size (no.)	Family labour >= 12 yrs old (no.)	Full time	Part-time	Family labour < 12 yrs old (no.)	Total	Cassava	Paddy	Maize/upland rice/red beans/job's tears	Fallow	Pasture /forage	Tamarind	Teak	other agri land (bamboo plantation)	fish pond (unit)	Prop. total land to pasture (%)	Prop. total land to cassava (%)	Estimated total	Net income	Cassava	Cassava collector	Livestock	Daily labourer from cassava/ lease land	Other agric. product.	Off-farm	Tractor hire /transport service	Remittance	Estimated total non-cassava & agri.	Estimated total other agri/livestock Product.	Prop. total cassava (%)
V1-01	48	6	10	8	6	2	2	17.34	3.50	2.19	0.00	0.25	11.00	0.10	0.30	0.00	1.00	60%	19%	12.003	8.266	6.609	-	3.776	-	1.618	-	-	-	0%	45%	55%
V1-02	39	5	4	3	2	1	1	9.30	3.00	0.80	5.00	0.00	0.50	0.00	0.00	0.00	0.00	5%	32%	21.897	11.984	5.189	-	-	-	4.119	-	12.588	-	57%	19%	24%
V1-03	36	5	3	3	2	1	0	17.25	7.00	1.00	0.95	0.00	7.00	0.00	0.30	1.00	0.00	41%	41%	9.397	6.565	9.202	-	-	-	195	-	-	-	0%	2%	98%
V1-04	45	8	6	5	4	1	1	7.85	4.45	0.90	2.50	0.00	0.00	0.00	0.00	0.00	0.00	0%	57%	30.720	21.185	12.198	-	-	-	3.102	-	15.420	-	50%	10%	40%
V1-05	65	5	6	6	4	2	0	11.05	5.00	1.00	4.80	0.00	0.00	0.00	0.25	0.00	0.00	0%	45%	25.183	18.889	4.547	-	-	-	1.529	3.372	15.735	-	76%	6%	18%
V1-06	39	7	4	3	2	1	1	13.03	4.70	1.33	4.00	1.00	1.00	0.00	1.00	0.00	1.00	7%	33%	9.005	5.858	4.387	1.259	-	-	3.359	-	-	-	0%	37%	63%
V1-07	50	5	6	6	4	2	0	3.67	0.80	0.37	1.50	0.00	0.00	0.00	1.00	0.00	0.00	0%	22%	9.551	6.179	1.391	-	-	-	1.753	6.406	-	-	67%	18%	15%
V1-08	45	8	5	4	2	2	1	4.56	2.50	0.73	1.00	0.00	0.33	0.00	0.00	0.00	0.00	7%	55%	10.008	5.288	5.243	-	-	-	944	3.821	-	-	38%	9%	52%
V1-09	48	5	5	4	3	1	1	4.67	4.00	0.67	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0%	86%	7.123	4.876	6.955	-	-	56	112	-	-	0%	2%	98%	
V1-10	39	12(diploma)	5	4	2	2	1	8.10	2.50	0.50	2.10	0.00	0.00	0.00	3.00	0.00	0.00	0%	31%	9.261	6.564	3.776	2.023	-	-	3.462	-	-	-	0%	37%	63%
V1-11	38	8	4	3	2	1	1	8.55	4.00	0.75	1.80	2.00	0.00	0.00	0.00	0.00	0.00	0%	47%	6.707	3.476	4.842	-	-	-	1.236	629	-	-	9%	18%	72%
V1-12	42	5	3	3	3	0	0	7.09	2.50	0.36	1.73	2.50	0.00	0.00	0.00	0.00	0.00	0%	35%	4.618	3.270	3.584	-	-	-	753	281	-	-	6%	16%	78%
V1-13	48	4	5	4	3	1	1	6.90	5.50	0.90	0.00	0.00	0.50	0.00	0.00	0.00	0.00	7%	80%	5.837	4.288	5.724	-	-	112	-	-	-	0%	0%	100%	
V1-14	52	7	2	2	2	0	0	2.46	2.16	0.30	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0%	88%	8.642	5.270	3.584	-	5.058	-	-	-	-	-	0%	59%	41%
V1-15	38	5	4	3	2	1	1	11.05	5.00	1.00	4.80	0.00	0.00	0.00	0.25	0.00	0.00	0%	45%	6.763	4.743	1.765	-	-	-	4.586	412	-	-	6%	68%	26%
V1-16	59	2	5	5	3	2	0	1.70	1.00	0.70	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0%	59%	4.302	2.661	4.280	-	-	-	22	-	-	-	0%	1%	99%
V1-17	42	12(diploma)	6	5	4	1	1	8.32	6.50	0.32	0.00	0.00	0.00	0.00	0.00	1.50	0.00	0%	78%	9.821	7.168	9.909	-	-	337	-	175	-	-	2%	0%	98%
V1-18	56	6	5	5	4	1	0	5.00	0.00	0.00	0.00	5.00	0.00	0.00	0.00	0.00	0.00	0%	0%	3.082	1.733	2.407	-	-	-	112	562	112	-	22%	18%	78%
V1-19	42	5	3	3	3	0	0	4.98	4.50	0.48	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0%	90%	9.807	1.468	7.222	-	-	-	562	-	2.023	26%	0%	74%	
V1-20	60	5	5	5	4	1	0	4.10	3.90	0.20	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0%	95%	6.476	5.127	6.420	-	-	-	-	-	56	1%	0%	99%	
V1-21	27	5	5	4	3	1	1	3.80	3.80	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0%	100%	6.226	4.174	3.852	-	-	-	2.248	-	126	2%	36%	62%	
V1-22	30	12	4	2	2	0	2	3.50	1.75	0.00	1.75	0.00	0.00	0.00	0.00	0.00	0.00	0%	50%	4.859	3.735	1.619	-	-	140	2.900	-	-	0%	60%	40%	
V1-23	35	5	2	2	2	0	0	0.83	0.00	0.33	0.50	0.00	0.00	0.00	0.00	0.00	0.00	0%	0%	4.384	3.260	3.745	-	-	-	639	-	-	15%	0%	85%	
V1-24	36	5	3	2	2	0	1	5.83	0.33	0.00	3.00	2.50	0.00	0.00	0.00	0.00	0.00	0%	6%	4.866	1.944	1.070	-	-	-	1.548	2.248	-	-	46%	32%	22%
V1-25	52	8	4	3	3	0	0	0.80	0.50	0.30	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0%	63%	2.007	1.220	3.21	-	-	-	1.886	-	-	84%	0%	16%	
V1-26	30	7	4	2	2	0	2	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0%	0%	7.905	6.500	7.276	-	-	629	-	-	-	0%	0%	100%	
V2-15	48	12(Diploma)	8	5	4	0	3	19.60	0.00	2.00	0.00	0.00	14.60	0.00	3.00	0.00	1.00	71%	0%	39.967	35.246	-	37.764	2.203	-	-	-	-	-	0%	6%	94%
V2-16	39	8	5	4	2	1	1	9.00	2.50	1.00	0.00	0.00	4.50	0.00	1.00	0.00	1.00	45%	25%	8.812	5.539	4.721	-	-	4.091	-	-	-	-	0%	46%	54%
V2-17	60	5	6	4	2	2	2	14.80	2.00	0.80	0.00	0.00	11.00	0.00	0.00	1.00	1.00	70%	13%	6.523	4.256	3.147	-	-	-	3.776	-	-	-	0%	55%	45%
V2-18	44	9	6	5	3	1	1	5.10	2.00	0.50	0.00	0.00	2.40	0.20	0.00	0.00	0.00	47%	39%	4.406	3.915	4.091	-	-	315	-	-	-	-	0%	7%	93%
V2-19	36	5	4	3	2	1	1	7.16	0.83	0.50	0.00	0.00	4.00	0.00	1.83	0.00	0.00	56%	12%	3.185	730	944	-	1.454	-	787	-	-	-	0%	70%	30%
V2-20	52	5	4	4	2	2	0	8.70	1.00	0.70	1.00	0.00	6.00	0.00	0.00	0.00	1.00	62%	10%	4.801	3.124	1.888	-	-	2.203	-	616	-	94	2%	59%	39%
V2-21	47	0	6	4	2	2	2	6.81	1.00	0.32	0.00	0.00	5.49	0.00	0.00	0.00	0.00	81%	15%	5.350	4.123	2.832	944	1.574	-	-	-	-	-	0%	29%	71%
V2-22	50	0	6	4	4	0	1	5.54	2.37	0.62	0.50	0.00	2.05	0.00	0.00	0.00	0.00	37%	43%	982	736	41	-	629	47	264	-	-	-	0%	91%	9%
V2-23	42	8	7	6	2	2	1	13.51	0.33	1.45	1.00	3.00	7.73	0.00	0.00	0.00	1.00	53%	2%	245	(736)	47	-	-	88	110	-	-	0%	45%	55%	
V2-24	38	5	4	2	2	0	1	4.40	0.00	0.20	2.00	0.00	2.20	0.00	0.00	0.00	0.00	50%	0%	1.267	448	-	-	472	315	677	-	-	-	0%	91%	25%
V2-25	55	3	4	3	2	1	1	4.56	0.00	0.36	0.70	3.50	0.00	0.00	0.00	0.00	0.00	0%	0%	362	116	-	-	-	47	315	-	-	-	0%	87%	13%
V2-26	48	0	2	2	1	1	0	2.00	1.00	0.00	0.00	0.00	1.00	0.00	0.00	0.00	0.00	50%	50%	2.895	1.951	1.574	-	-	63	-	-	1.259	43%	0%	57%	
V2-27	32	2	4	3	2	1	1	1.00	0.50	0.00	0.50	0.00	0.00	0.00	0.00	0.00	0.00	0%	50%	650	(214)	629	-	-	20	-	-	-	0%	0%	100%	
V2-28	30	5	3	2	2	0	1	-	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0%	0%	983	(157)	787	-	-	197	-	-	-	-	0%	0%	100%
V2-29	56	5	3	3	2	1	0	0.83	0.00	0.33	0.50	0.00	0.00	0.00	0.00	0.00	0.00	0%	0%	535	(41)	-	-	-	393	142	-	-	-	0%	26%	74%
V2-30	45	5	2	2	2	0	0	0.50	0.00	0.00	0.00	0.00	0.50	0.00	0.00	0.00	0.00	0%	0%	283	53	-	-	-	157	-	94	-	31	44%	0%	56%
V2-31	48	3	4	2	2	0	2	1.20	0.00	0.00	1.20	0.00	0.00	0.00	0.00	0.00	0.00	0%	100%	178	-	-	-	-	178	-	-	-	0%	0%	100%	
V1-27	29	5	4	2	2	0	2	2.00	0.00	1.00	0.00	0.00	1.00	0.00	0.00	0.00	0.00	50%	0%	2.332	1.770	-	-	-	337	1.995	-	-	0%	86%	14%	
V1-28	38	5	4	3	2	0	1	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0%	0%	35.939	32.005	-	-	-	-	35.939	-	-	-	100%	0%	0%
V1-29	68	3	2	2	0	0	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0%	0%	100	281	-	-	-	-	-	-	100	100%	0%	0%	
V1-30	28	5	4	2	2	0	2	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0%	0%	809	472	-	-	-	337	472	-	-	58%	0%	42%	
V1-31	49	5	3	3	3	0	0	1.50	0.00	0.00	1.50	0.00	0.00	0.00	0.00	0.00	0.00	0%	0%	2.214	163	-	-	-	1.371	2						

Appendix 3: Fieldwork guide for each case study

Government (Provincial and district, other actors in the value chains) Introduction and interview (2 days or more)

- Meet provincial and district government officers in order to introduce research team and inform what my research is about and take a chance to interview them about various policies that influence boom crops and farmer decision-making.

Community (village) engagement/introduction (1–2 days)

- Meet with the Village Head and Committee and explain the research objective, activities and period to conduct the fieldwork.
- Gather village information: number of households, demographic and land area and agriculture activities.
- Prepare for the focus group discussion (FGD), discuss with the Village Head, Committee and field assistant. Decide who will be involved, how many people, what kind of information/activities and how long it will take?
- Checking and confirm the participants and make appointment.

Village transact and observations (1–2 days)

- Spend one to two days to observe the village landscape.

Organise Focus Group Discussion (8–10 people) (1 day)

FGD will include:

- 1) Village mapping which includes land use, agriculture activities and village landmark. Result of this activity: there will be two maps: past (how many years?) and the current village map.
- 2) Village timeline related to boom crops.
- 3) Household classification: poor, medium and better-off.
- 4) Impact analysis: the implication of boom crops for households' livelihoods.
- 5) A seasonal calendar.

Conduct individual/household interview: (12–15 days – “1–2 interviews per day”)

- At the end of the FGD I will inform participants about the potential to conduct in-depth interviews.
- Select 20 households/village based on the adoption, non-adoption and withdrawal from boom crop categories and then wealth class within.

Appendix 4: Interview guide: key informants (government)

Opening/ contact	<ol style="list-style-type: none"> 1. What is the role of you/ your organisation in related to teak plantations in Laos? 2. Do you think [teak] is an important tree crop for farmers in Laos? Why/ why not? And continue asking about banana and cassava 3. How did it become important (or not important)? [How and why teak plantations were well adopted/developed/promoted in particular place like in Luangprabang not in other areas?] 4. How did banana and cassava become an important (or not important) in your province/district? 5. For those who think it is important – do you think it ss becoming more/ less/ the same importance over the next decade? Why?
Past policies	<ol style="list-style-type: none"> 6. What have been the key periods in development of teak plantations in your province/ district? Following with the question about banana and cassava <ul style="list-style-type: none"> ▪ Were there particular legislation or decrees emerging in those periods? ▪ How did they influence teak plantation development? ▪ How does the local government coordinate with actors involved in teak plantation boom?
Current policies	<ol style="list-style-type: none"> 7. From your perspective, what current policies related to teak/banana/cassava plantation are important? and why 8. Is teak/banana/cassava still an important crop? How do you promote it? How much teak/banana/cassava still have in your province/district? Are people still planting teak? If not, why? 9. Are you promoting something else? 10. Which organisations/people have most influence on teak/banana/cassava plantation policy? And why? 11. How have the local government and farming community worked towards boom crop (teak, banana, cassava) management? What do you think about this relationship? 12. What do you think about the current policies? [links to future] (What do the current policies mean for the sustainable agriculture?) (Think about the issues of boom crops that government try to support of the environment controls e.g., in the case of teak government promotes forest cover, income and land distribution, the case of banana boom government promote the environmental protection and ban for banana? What do local people think about this?)
Future strategies	<ol style="list-style-type: none"> 13. What do you think the future for teak/banana/cassava plantation should be? (In which way do you think boom crop is better?) i.e., farmers shouldn't follow the boom and bust cycle. e.g., banana now switch to sugarcane. Teak, e.g., plantation register? cassava is about contract farming or smallholder 14. What are the key challenges for plantation policy to realise this future? 15. How can these challenges be addressed? 16. From past, current policies and future strategies, in what ways do you think policy that relate to teak (forest, plantation, land, agriculture) can be improved?

Appendix 5: Interview guide for village leaders

History and demographic:

1. When did this village establish/settle?
2. How many people, households in this village?
3. List the ethnic groups and a percentage estimate of the group in the village?
4. What are the wealth range (poor, medium and better-off) in this village and how? Is there a great difference in wealth among households in this village? If yes, what percentage of house those categories?
5. How many adults has how many years in the school?
6. How many farmer groups or agriculture/forestry groups in this village? For which crops?

Socio-economic status:

1. How do most residents of the village derive most of their basic income?
2. What percentage of households in this village depend significantly on boom crops for family income?
3. What percentage of households in village depend significantly on other commercial crops for their income?
4. How many months of a year do most household have sufficient rice or consume their own food crops?
5. Approximately what percentage of households in this village own livestock?
6. What percentage of households in this village own agriculture land?
7. What is the most frequent kind of house lived in by resident in this village? (This info can get from village transect walk too)
8. Approximately what percentage of households in this village have family members who work outside the village?

Resident and external actors:

1. Any/How many brokers, traders for boom crops (teak, banana and cassava) in this village?
2. In general, how often to government official come to the village? And for what purpose?
3. In your opinion, how do certain crops become boom crops?
4. Currently, what are the government types of supports promoting crops? What do you think about that? And how do residents respond to the support?
5. What would you think to be a better policies/supports/promotions?

Appendix 6: Guide for individual/household interview

1. General information

Questionnaire number	
Date of interview	
Name of the village	
Name of interviewer (s)	
Gender of respondent	Female <input type="checkbox"/> Male <input type="checkbox"/>
Name Head of Household:	
Name of respondent	
Relationship of the respondent to the household head, if not the head	<input type="text"/> 1 = Wife / spouse in a polygamous household please identify if it is first, second, third wife; 2 = Other family member; 3 = Other non-family member
Cell phone number of Respondent	
<p>Has your family always lived in this village? Yes <input type="checkbox"/> No <input type="checkbox"/></p> <p>If No: When did you move here? (Month and year) _____</p> <p>Where did you move from? (Village and District name) _____</p> <p>Why did you move? _____ 1. Work Related 2. School / Studies 3. Marriage 4. Other Family Reasons 5. Better Services / Housing 6. Land / Plot 7. Other, Specify</p>	

2. Demography

Could you list all members of your household? We consider member of a household all people that regularly eat in your household, even if they are not related to you. Please start with yourself first, followed by your spouse/spouses and your children. Please also list any workers that live with you.

HH member ID	Name (*)	Sex <i>1 = Male 2 = Female</i>	Age	Relationship to head of household	Occupation <i>No key, pls specify exactly the job title</i>	Marital status	Education levels	If married, does spouse live in this household now? <i>1 = Yes 2 = No</i>	If married, is the spouse from this village? <i>1 = Yes 2 = No</i>
1									
2									
3									
4									
5									
6									
7									
8									
9									
10									
11									
12									

3. Land assets

Plot ID	Size	Unit of size <i>Rai</i>	Tenure Permanent land title	Ownership <i>Who own the land (husband or wife or other members in the family)</i>	Mode of acquisition <i>Use Key A1</i>	Sources of water <i>Use Key A2</i>	Distance from house (m)	If cultivated, enter first year of cultivation <i>If not cultivated, leave blank.</i>	Fenced? <i>1 = Yes 2 = No</i>	Main land use <i>Use Key A3</i>	Have you planted any trees on this land? <i>1 = Yes 2 = No</i>	Do you manage any trees on this plot? <i>1 = Yes 2 = No</i>	Does the plot have fruit trees? <i>1 = Yes 2 = No</i>
1													
2													
3													
4													
5													
Key A1	1 = Inherited, 2 = Donated, 3 = Bought, 4 = Borrow for free, 5 = Rent, 6 = Others, specify												
Key A2	1 = Rainwater, 2 = Tanks, 3 = Infrastructure for water harvesting, 4 = Dams or water ponds, 5 = Boreholes, 6 = Water pumps, 7 = River/stream, 8 = Lake												
Key A3	1= annual crops, 2=perennial crop, 3=annual crops integrated with perennial crops, 4= Fallow, 5= Wood lot, 6= grazing area, 7= Forest, 8= other, specify												

4. Understand the external and internal factors that influence farmers' adoption decisions

	Adopters & still growing	Adopters but not still growing	Non-adopters
External [adoption reasons]	When Why start Why continue What plans for future?	When Why start Why stop What plans for future?	Why not What choice did you make instead? What plans for future?
[internal]	Do you like growing this crop? Why? Did/ do you have enough/ right knowledge to grow the crop well How did you get/ improve your knowledge?	Did you like growing this crop? Why? (Did/ do you have enough/ right knowledge to grow the crop well How did you get your knowledge?	What crops do you like growing/ why What crops do you have enough/ right knowledge about? How did you get your knowledge?
management] (Crop characteristics?)	Were government 'officials' or policy instruments important in your decision? If yes, who? Were markets/ prices important in your decision? If so, from whom/ where	Were government 'officials' or policy instruments important in your decision to start/ stop? If yes, who? Were markets/ prices important in your decision to start/ stop? If so, from whom/ where	Were government 'officials' or policy instruments important in your decision to not grow the crop? If yes, who/ how? Were markets/ prices important in your decision to not grow the crop? If yes, who/ how?
	Where are you growing the crop/ why? What inputs do you need? How do you access them? How are the crops harvested/ what implications? (labour etc)	Where were you growing the crop/ why/ what's there now	What are you growing? What inputs do you need? How do you access them? How are the crops harvested/ what implications? (labour etc)
Market info	What market info did you have at the start/ now? How did/ do you access Are there other crops for which you have 'good' market info	What market info did you have at the start/ now Are there crops for which you have 'good' market info	
Perception (value chains actors)	In your opinion, who play a critical role in disseminate information about boom crops?	In your opinion, who play a critical role in disseminate information about boom crops?	

5. Livelihood outcomes: what are the significant changes after adopt/non-adopt boom crop?

Livelihood outcomes	Adopters & still growing	Adopters but not still growing	Non-adopters
Livelihood activities	What are different livelihood activities that farmers involve or make for a living? On- and off-farm, seasonal calendar	What are different livelihood activities that farmers involve or make for a living? On- and off-farm, seasonal calendar	What are different livelihood activities that farmers involve or make for a living? On- and off-farm, seasonal calendar
Labour	How many people work in your farm (boom crops and non-boom crops)? Do you hire any labour?	How many people work in your farm (boom crops and non-boom crops)? Do you hire any labour?	How many people work in your farm? Do you hire any labour?
Income (details in the table 6)	How much your income from on- and off-farm activities?	How much your income from on- and off-farm activities?	How much your income from on- and off-farm activities?
Land ownership & management (Use the technique of drawing land use plan that I have done with Jono's fieldwork)			
Household expenditures			
Household learning and share experience about boom crops	How do you share your farming experience/ knowledge? Who do you often share with? Why?		

6. Income

During the last 12 months did any cash come to the household through any of the following means?

I will ask you separately the income from boom crop (teak)

Means of cash income in the last 12 months (please mark all that apply in the next column)	Mark the single most important source of cash income here:	Please estimate the annual household income from all household members over the past 12 months (excluding this survey month)	
		Amount over past 12 months <i>(local currency)</i>	Amount over month prior to this survey month <i>(local currency)</i>

1. Sale of food crops				
2. Sale of livestock				
3. Sale of livestock products				
4. Sale of cash crops				
5. Business income				
6. Wages or salaries in cash				
7. Other casual cash earnings				
8. Cash remittances				
9. Fishing				
10. Selling local brew				
11. Sale of forest products (e.g., charcoal, firewood, timber, honey, medicinal plants, wild foods)				
12. Rent received				
13. Pension received				
14. Governmental allowances				
15. Other (Specify: _____)				
16. Estimated Total Annual Household Income				

How much do you earn from selling teak in last 12 months? _____ kip

The form of selling teak (sell in round log or whole field (land + teak) or only teak): _____

7. Remittances

Are there any other members of your family that do not live in your household but help the family with money or other contributions? 1. Yes, 2. No
If yes,

ID	Relationship to head of household <i>Use Key J1</i>	Occupation	Living where	Contributing <i>Use Key J2</i>	Frequency <i>Use Key J3</i>

Key J1: 1=Head, 2=Spouse, 3=Son/Daughter, 4=adopted son/daughter, 5=Sister/Brother, 6=Grandchild, 7=Father/Mother, 8=Cousin, 9= other

Key J2: 1=food, 2=money, 3=helps with labour, 4=others

Key J3: 1= weekly, 2= monthly, 3= if needed

8. Credit

Over the past 12 month did you or anybody else in the household borrow money from an institution?

Yes	NO
-----	----

I would like to ask about the source and the use of the LARGEST amount your household has borrowed in the last 12 months.

Who made the decision to take out the loan? [_____]
1=Head, 2=Spouse, 3=Son/Daughter, 4=Joint decision between head and spouse 5= other

What is the nature of the source? <i>Tick only one</i>	By when do you think you will be able to pay the credit back? <i>Tick only one</i>	Could you tell us what the main use of the credit was? <i>Tick only one</i>
Commercial banks	Already paid back	Planting trees
Micro-finance institute	Within 6 months	Funeral
Insurance company	Within 1 year	School fees
Saving group	Within 3 years	Purchased land
Grocery/local merchant	Greater than 3 years	Purchased fertiliser, seeds, seedlings

Temple			Purchased livestock	
Other, please specify			Business	
			House (build/repair)	
			Wedding/Ceremony	
			Other, please specify	

9. Social networks

Does the household head or his/her spouse have a relative that does not belong to your household and works for the government?

Yes	No

If yes, what is your relationship

Position

1=Sibling, 2=Uncle/aunt, 3=Cousin, 4=Other

Does the household head or his/her spouse have a relative that does not belong to your household and works in the teak timber industry/business?

Yes	No

If yes, what is your relationship

Position

1=Sibling, 2=Uncle/aunt, 3=Cousin, 4=Other

Do you have a close relative that does not belong to your household and has a position in the village administration?

Yes	No

If yes, what is your relationship

Position

1=Sibling, 2=Uncle/aunt, 3=Cousin, 4=Other

This part of the questionnaire is aimed at gaining an understanding of the social networks within the area. We would like to know up to 6 people you seek assistance if you need advice or help with any issues related to boom crops. This could be any person in an organisation, a neighbour, friend or family member. If at any time you feel uncomfortable answering these questions then please inform me.

ID	Name	Gender 1 = Male 2= Female	Lives where?	What is the nature of the advice you would usually seek from would him or her? 1=family; 2=field; 3=business; 4=health	Did you see him / her		Does he/ she come to you for advice or help? 1 = Yes, 2 = No	Phone number
					Last week? 1 = Yes, 2 = No	Last month? 1 = Yes, 2 = No		
1								
2								
3								
4								
5								
6								

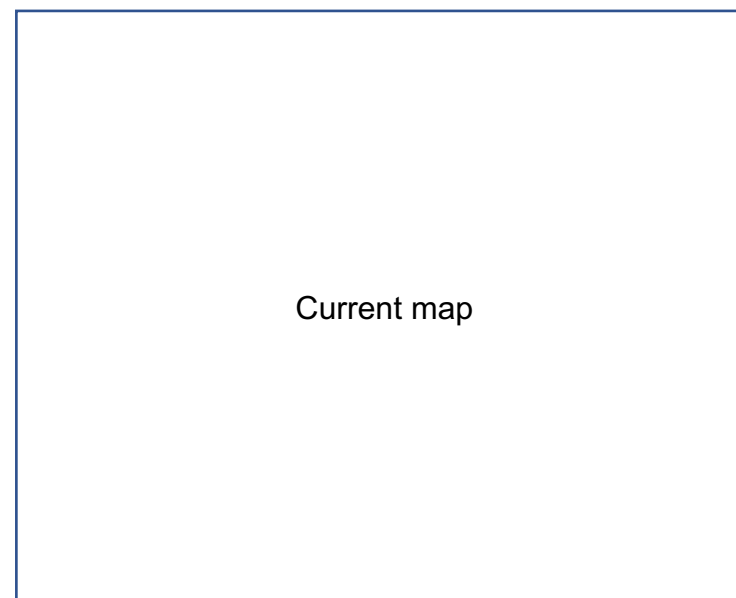
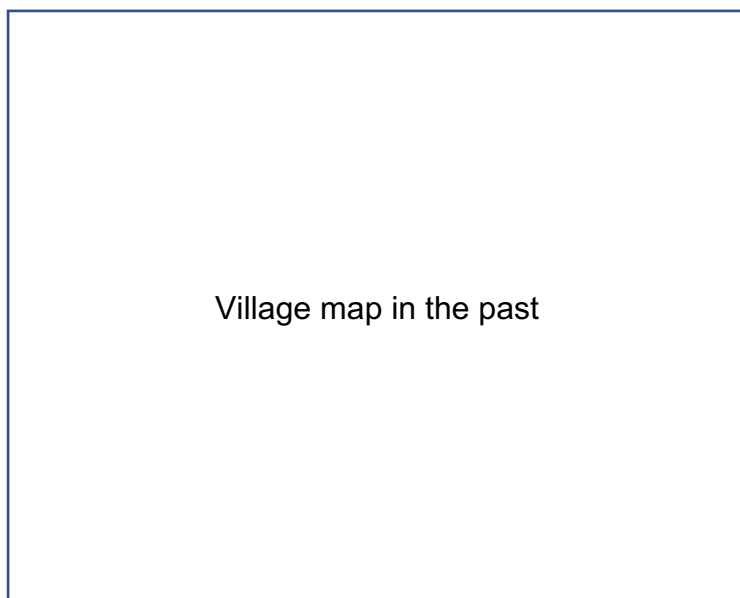
10. Shock and crisis (teak)

Enumerators: Only ask these questions for the 2 most severe shocks					
Shock	1=Yes 2 = No	Identify the TWO most significant shocks: 1 = Most severe 2 = 2nd most severe	Did the shock cause a reduction in household income and/or assets? 1 = Income loss 2 = Asset loss 3 = Both 4 = Neither	How dispersed was this shock in terms of who it affected?	How did your household cope with this shock?
Loss of crops due to drought					
Loss of crops due to floods					
Crop disease or crop pest					
Loss of crops due to fire					
PMO 15					
Livestock died or were stolen					
Trees were stolen					
Loss of salaried employment or non-payment of salary					
Large fall in sale prices for crops					
Large rise in price of food					
Large rise in input prices					
Loss of land (e.g., road or railway) or trees (powerline)					
Chronic /severe illness or accident of a household member					
Death of a household member or other close family					
Other (<i>describe</i>):					

Appendix 7: Guide for focus group discussions

a) Village mapping

Land cover class (past)	Land cover class (current area?)	Current state (quality), increasing/decreasing	Driver of change	Management and ownership (current)	Management and ownership (past)	Impact on livelihood
E.g., forest						
Natural forest						
Plantation						
Fallow land						
Farmland/crops						
Road						
Water						



b) Timeline analysis

Boom crop trends and interaction/farmers response to the boom (e.g., teak)

Number of participants: _____ people, Women: _____
 Village name: _____ District: _____ Province: _____
 Facilitator/Investigator: _____ Assistant: _____ Date: _____

Time (Year)	Boom crop events	How did these crops become boom? (information networking: where did farmers get this info from)	Who adopted? (How many people?) and why did they adopt?	How many people adopt/continue now?	How many people withdraw	Notes

Draw the timeline when the boom crop has introduced to the village:



Years

c) Household classification

This FGD will allow participants to define the household wealth range (How do you classify the households who are poor, medium and better-off)

Household group	Criteria 1 (e.g., land)	Criteria 2 (e.g., rice)	Criteria 3 (e.g., assets)
Poor (how many poor households in this village?)			
Medium (how many medium households in this village?)			
Better-off (how many better-off households in this village?)			

d) Impact analysis

The implication of boom crops on households' livelihoods

Questions:

- 1) What are your/their livelihood activities from on-farm and off-farm activities?
- 2) What is your main income source from on-farm and off-farm activities)?
- 3) How do you/farmers in the three categories (below) manage their land?
- 4) What was your/their lifestyle before adopting boom crops? (Maybe their food sources are more from forest but now they rely on market)
- 5) What is your/their lifestyle now? (They may change from farm to be employment)

Before adoption boom crops	After adopting the boom crop	withdraw from boom crops

e) Seasonal calendar

Timeline	Livelihood activities	Months												Notes
		J	F	M	A	M	J	J	A	S	O	N	D	
Adopters & still growing	1.													
	2.													
	3.													
	4.													
	5.													
Adopters but not still growing	1.													
	2.													
	3.													
	4.													
	5.													
Non-adopters	1.													
	2.													
	3.													
	4.													
	5.													
Non-adopter then adopted	1.													
	2.													
	3.													
	4.													
	5.													