

More than the Trees: A Comparative Study of the Contribution of Four Tree Plantation Models to Rural Livelihoods in Lao PDR

Alexander van der Meer Simo

Submitted in fulfilment of the requirements for the degree of
Doctor of Philosophy
of the Australian National University
May 2021



**The Fenner School of Environment and Society
The Australian National University, Canberra**

Candidate's Declaration

Statement of originality

This thesis is a Thesis by Compilation and conforms to the requirements of the procedure for *Higher degree by research - thesis by compilation and thesis by creative works* of the Australian National University. It is presented as a collection of linked papers with the overarching aim of understanding the linkages between commercial tree plantations and informing relevant policies in the Lao PDR (Laos). The thesis begins with an extended introduction of the background to the work and explanation of the connection between the four substantive chapters and ends with a concluding chapter. Each of the four substantive chapters is a stand-alone published paper. The relevance of each of the papers to the overall project is summarised in a foreword at the start of each chapter.

The three papers with a focus on Laos have been co-authored with two members of my academic panel: Professor Peter Kanowski and Dr. Keith Barney. In each case, I instigated, planned and conducted the research, undertook data analysis, and drafted the manuscript. My co-authors provided academic guidance and assistance on the structure, content and presentation of the data, and with editing before and after external review. The attribution statement for each publication is presented in Table I, overleaf.

The title of this thesis – More than the trees – takes inspiration from Jonathan Rigg's (2014) book 'More Than the Soil: Rural Change in Southeast Asia'.

Declaration

I declare that this thesis is my own original work and that it contains no material which has been accepted for the award of any other degree or diploma in any university. To the best of my knowledge, it contains no material previously published or written by another person, except where due reference is made in the text.

Aud.MSimo

6 November 2020

Table I Attribution statement of the chapters comprising this thesis

Chapter	Attribution statement
1	<p>Introduction (unpublished)</p> <p>I wrote this chapter with academic guidance and extensive constructive input to various drafts from all members of my academic panel Professor Peter Kanowski, Professor Rod Keenan, Dr. Hilary Smith and Dr. Keith Barney.</p>
2	<p>van der Meer Simo, A. (2020). Livelihood impacts of plantation forests on farmers in the Greater Mekong Subregion: a systematic review of plantation forest models. <i>Forests</i>, 11(11), 1162; https://doi.org/10.3390/f11111162</p> <p>I instigated the work, undertook the research and analysis and was the author. The chair of my academic panel, Professor Peter Kanowski, provided academic guidance and extensive constructive input to various drafts.</p>
3	<p>van der Meer Simo, A., Kanowski, P. and Barney. K. (2019) Revealing environmental income in rural livelihoods: evidence from four villages in Lao PDR. <i>Forests, Trees and Livelihoods</i>, 28(1), p. 16-33.</p> <p>I instigated the work, undertook the research and analysis and drafted the manuscript. The co-authors provided academic guidance on the structure, content and presentation of data and further academic and editorial input to revisions following external review.</p>
4	<p>van der Meer Simo, A., Kanowski, P. and Barney. K. (2020) Economic returns to households participating in different models of commercial tree plantations in Lao PDR. <i>International Forestry Review</i>, 22(1), p. 132-152.</p> <p>I instigated the work, undertook the research and analysis and drafted the manuscript. The co-authors provided academic guidance on the structure, content and presentation of data and further academic and editorial input to revisions following external review.</p>
5	<p>van der Meer Simo, A., Kanowski, P. and Barney. K. (2020) The role of agroforestry in swidden transitions: a case study in the context of customary land tenure in Central Lao PDR. <i>Agroforestry Systems</i> (2020), 94(5), p. 1929-1944.</p> <p>I instigated the work, undertook the research and analysis and drafted the manuscript. The co-authors provided academic guidance on the structure, content and presentation of data and further academic and editorial input to revisions following external review.</p>
6	<p>Conclusion (unpublished)</p> <p>I wrote this chapter with academic guidance and extensive constructive input to various drafts from all members of my academic panel Professor Peter Kanowski, Professor Rod Keenan, Dr. Hilary Smith and Dr. Keith Barney.</p>

Acknowledgements

It is 2030 days since I officially became a PhD candidate at the Australian National University. Designing, executing and writing up this PhD have included numerous ups and downs. A constant during that process, though, have been the wonderful people who I have come across and who have helped me to get to this point. All that remains to be written is my gratitude to these people because those who gave so much. They may not remember but I always will.

First of all, I want to thank my primary supervisor Prof. Peter Kanowski, from the Australian National University. With his knowledge, experience and foremost humanity Peter Kanowski guided me through each of the stages of this project. I will be proud if his influence is felt not only anywhere in this thesis but in any step that I take in the future. I also want to remind him that while one day I may finally not be his student, he will always be a mentor to me. I will stick around for as much as I can.

Perhaps drawing from his experience as a Captain of the Oxford University Cross Country Club, Peter was able to create a fantastic team around me. This started with the “recruitment” of the three other members of my academic panel, all of whom also worked for the Australian Centre for International Agricultural Research (ACIAR) Project ADP/2014/047 “Improving policies for forest plantations to balance smallholder, industry and environmental needs in Lao PDR and Vietnam”: Dr. Keith Barney and Dr. Hilary Smith from the Australian National University and Prof. Rod Keenan from the University of Melbourne. Keith Barney’s attention to detail and understanding of Laos are second to none and have been pivotal in building my credibility as a researcher. Hilary Smith’s and Rod Keenan’s reputation opened a multitude of doors through this journey, particularly to engage a wide number of forestry companies in Laos and to spend enough time collecting data in the field. Keith, Hilary and Rod ‘barracked’ for me when I most needed it, helping me to become stronger, even after the punches. It is also important to acknowledge that while a supervisor may guide a student in the right direction, it is confirmation from others that allows true momentum. Every ACIAR project meeting or email discussion in which they included me was a contributor to that momentum.

Contributing to the ACIAR project also provided invaluable institutional and human support. A number of people deserve special mention in the context. Dr. Tony Bartlett, former Forestry Research Program Manager with ACIAR, for being the first one in Canberra to make time to help me re-orientate my career and provide encouragement to contact Peter Kanowski and to undertake a PhD. Dr. Thu-Ba Huynh from the University of Melbourne, for organising free-flowing academics to submit project outputs in a timely manner; it was that collaborative exercise that helped keep my writing going. Dr. Somvang Phimmavong for hosting me during my time at the Faculty of Forestry Science of the National University of Laos and for facilitating all the red stamps that I needed to do fieldwork in Laos. Also, for putting me in contact with Palama Homduangphachanh, Sisouthone Oupaxayorvanh, and for allowing Soytavanh Mienmany, Ekvinay Sayaraj and Vansy Phengthajaim to join our fieldwork team.

Their support and assistance in the field helped me learn and discover things about Laos that I would have never had without them. I am also indebted to their patience with me; I hope that I did better as a friend as our fieldwork progressed.

Special thanks to everyone in the four villages where I collected data and in the other two villages where I tested my data collection tools. Thank you for allowing me to spend time in and around your homes and fields. Thank you for so being so generous with your time and knowledge, for explaining over and over again, and for showing me what I had not seen. I owe you this whole lot. Likewise, thanks to the Xepon district DAFO and DONRE staff, the Nong, Hinheup, and Pakkading districts DAFO staff, and the Savannakhet, Vientiane and Bolikhamxay Provinces PAFO staff who welcomed me in their offices and facilitated access to the field and secondary data.

Other people with whom I had the privilege to collaborate throughout the ACIAR project and who contributed to my fieldwork and to producing a more informed view on tree plantations in Laos are Stephen Midgley, Peter Fodge, Martin Forsen, Luc McWhirter and Helena Axelsson Svensson. While we have not always agreed on some issues, I acknowledge that we share a passion for making tree plantations contribute positively to farming livelihoods, which served as a platform for respectful debate and collaboration.

I also want to thank three established academics in my research topic who provided regular mentorship and insightful discussions while I was doing fieldwork in Laos: Dr. Jonathan Newby, Dr. Michael Dwyer, and Assoc. Prof. Manolo Bartomeu. Their knowledge of and experience in my research topic and their genuine interest in my preliminary findings when we met in Vientiane were essential to improve lines of inquiry every time that I went back to the field. I will be proud if any of my contributions ever inform their work in this important topic. Amongst my friends in Laos I was also fortunate to count Rik Delnoye and Justine Sylvester, two people with great hearts in the right place and from whom the literature will benefit the day they publish their experiences in development in Laos. I should also credit Rik for instilling in me an interest in Laos and natural curiosity about rural livelihoods.

I must acknowledge that my contributions to this field benefited from four generous friends in Australia who offered to read and comment on different drafts of the chapters in this thesis. These are (in no particular order) Richard Beggs, Edwina Fingleton-Smith, Caitlin Wood, and Claudia Munera. I am proud to count these four “soon to be Drs.” among my friends. Another set of “soon to be Drs.” who I have been privileged to count as friends are my dear younger sisters and fellow ‘PK’s journal club’ members Depi Susilawati, Soytaoanh Mienmany, and Giselle Cruzado Melendez. By now you should know that while the Big Brother may have a louder voice, he does not have as much to say as you do. These seven fellow PhD students have humbled my intellect and I hope they keep commenting on my forthcoming attempts to become a better person.

Another two people that I would like to thank are Dr. Nyree Mason, and Assoc. Prof. Navneet Dhand. Nyree Manson's advice on statistical analysis and graphs in three of the chapters in this thesis were only bettered by her patience in helping a novice like me. Navneet Dhand's offer to coordinate the FAORAP research project 'Understanding the impact of planted forest on smallholder livestock farmers and their livelihoods in the Greater Mekong Subregion (GMS)' at the University of Sydney provided economic support to write a systematic review of the literature. Without it, the whole undertaking would have been even more onerous than it already was.

Finally, I wish to acknowledge my wife's ongoing and unconditional support through each of the steps that were mentioned above. Emma, the love of my life, thank you for supporting me every time that my spirit fell, for giving me words of support and comforting hugs to renew my energy every time I wanted to quit, and for providing a roof and food for our family for most of these 2030 days.

Preface

When I set out on this project in April 2015, my interest in doing a PhD was barely academic. Instead, my strongest motivation was to inform poverty alleviation policies in Laos, a country where I worked for different international NGOs from 2009 to 2011. Obtaining a degree from an Australian university also seemed like a good step to develop a career in the interface between forestry and international development from my new ‘home’. My undergraduate and postgraduate forestry studies, and a period of employment at a forestry college, underpinned my view that tree plantations are a legitimate and valuable component of rural development strategies. It is perhaps for this reason that I was enthusiastic to hear that my research would include collaboration with tree plantation companies with which I had worked in 2010, to seek funds for an agricultural research centre demonstrating best farming practices for sustainable economic development in central Laos. I soon came to realise that I had not considered the emotional and intellectual challenges that would follow from that decision. For most of these five and a half years, I have felt completely under-educated. To compensate, I focused on building and strengthening relationships with people I encountered, and I hope that they were able to see beyond the researcher.

An explicit objective of the initial study design, and of the ACIAR project to which my research contributed, was to assess the contribution that a range of tree plantation models made to the livelihoods of Lao farmers. For my study I wanted to deviate from the more commonly studied models, namely large-scale concessions of eucalypts and rubber trees, smallholder and contract farming of rubber tree plantations, and smallholder teak plantations. The tree plantation models I selected comprised two forms of ‘land-sharing’ concessions for eucalypts (*Eucalyptus* hybrids), and one each of contract eucalypt growing and farmer-led agroforestry using yang bong (*Persea kurzii*). Conducting livelihood studies is time demanding. While my collaboration with the ACIAR research project suggested that my fieldwork in each village would last approximately two weeks, in the process I resolved that I would spend longer periods in the field. By living at ground level, I was able to undertake a more comprehensive collection of data on non-timber forest products, which I used to generate a detailed analysis of ‘environmental income’. This allowed me to develop a more informed understanding of how tree plantations contribute to local livelihoods and poverty alleviation efforts. While I do not claim that my methodology is completely original, I am confident that it motivated a number of colleagues and peer students to revisit their own research approaches.

Through the PhD process I also realised that convincing some of those companies about my genuine intentions was a tremendous challenge. This was particularly so as my findings indicated that where contracts are not honoured, where there is insufficient time to grow intercrops, or where labour opportunities are limited, tree plantations are unlikely to improve livelihoods. Someone once said that our most constructive criticism is on the issues and the people we value. An even older adage is not to

bite the hand that feeds you. However, it is also said that integrity is choosing thoughts and actions based on values rather than personal gain. As one of the world's leading research universities, the Australian National University is committed to the highest standards of research integrity. This includes publishing the evidence that one finds, at the risk of limiting one's access to prospective feeding hands.

Altogether, completing this thesis has been a very humbling experience. Whilst it was a privilege to have undertaken this experience, I am glad that it is coming to an end, as I am certain that both my wife and my supervisors think that their lives will be better when this project is completed.

Abstract

Tree plantations are a growing and highly contested element of rural development in the global South. Most studies of large-scale plantations established under public land concession arrangements identify predominantly adverse impacts on local people's livelihoods. More locally-responsive plantation models have been suggested as an alternative, in parallel with debate about what models of tree plantation are preferable for effective and equitable rural development, including in terms of their contribution to rural poverty alleviation. Possible models vary in terms of land tenure, stakeholders' responsibilities in the establishment and management of the plantation, and integration with other land uses. Professional and advocacy paradigms often shape the discourses in favour or against each of these tree plantation models.

In this context, this thesis explores how four different models of tree plantation established for forest production in Lao PDR (Laos) contributed to the livelihoods of participating households in four purposely-selected villages. Although they have diversified over time, livelihoods in these villages remain largely based on farming. The case study tree plantation models comprised two forms of 'land-sharing' concessions for eucalypts (*Eucalyptus* hybrids), and one each of contract eucalypt growing and farmer-led agroforestry using yang bong (*Persea kurzii*). Their implementation in Laos offered an opportunity for comparative assessment of the livelihood impacts of different tree plantations models, and the implications for rural development and poverty alleviation policies.

Data collection approaches and protocols were consistent across case study villages, although with some minor variation. They comprised a survey of, and in-depth conversations with, c. 25 households in each village; participatory activities of active field observation and dialogue, focus group discussions, semi-structured interviews based on photo-elicitation, and diaries of environmental product collection; and a review of relevant secondary sources from government agencies and forestry companies.

Unlike most socio-economic studies of tree plantation in Laos and in the Mekong region, my analysis considered the opportunity costs of households' pre-plantation activities and situated the returns from plantations within the participants' wider household income portfolio. A principal finding was that, despite the substantial decline of many natural resources in Laos, the agroecological environments of patches of secondary forests in various stages of fallow and regrowth, that farmers create through swidden agriculture, remain of fundamental importance to their livelihoods. The mean annual household environmental income – including from 'degraded' forests and swidden agriculture – in all case study villages was much higher than those reported in similar recent studies in Laos. This finding – which suggests a mismatch between policy makers', plantation companies' and local people's perceptions of the 'value' of forest lands – helps to explain why many local people oppose large-land concessions in Laos. These results suggest that the value of the current land use to rural livelihoods should be an issue of greater concern and more rigorous study in the context of land and development

policies and programmes in Laos, particularly those that promote the conversion of land used for swidden agriculture into tree plantation concessions.

Considering the contributions from tree plantations to livelihoods, the results showed that these were positive where plantation models allowed for intercropping by households and when plantation companies offered more labour for local people. In contrast, where contracts to grow trees were not honoured, crops could not be grown jointly, and plantation labour opportunities were limited, returns to households were not competitive with alternative land uses, including traditional swidden agriculture. These results suggest that, in order to best contribute to livelihoods, tree plantation development should allow space for other land uses within the plantation system and adopt plantation management strategies that employ more local labour. The results also showed local people's interests in maintaining diversified livelihood strategies.

Further, the relatively high returns from the farmer-led agroforestry model demonstrate that farmers can successfully grow trees independently where markets are strong, and that agroforestry systems such as that used for yang bong are attractive because of the intermediate returns they generate. However, consistent with those of other recent studies of the swidden transition in Laos and elsewhere in Southeast Asia, results of the farmer-led agroforestry case study indicate that an unequal distribution of customary land among households within the community influences how farmers make claims to land and therefore the extent to which households can benefit from tree growing in practice. These results also show that new market opportunities and farmers' dynamic livelihood strategies both define and constrain the opportunities of agroforestry systems to contribute to land use transitions. In this case, the expansion of agricultural monocrops (e.g. banana plantations) is likely to exacerbate social differentiation, further diminish the safety net represented by 'common' forest lands and undermine prospects for realising Lao's national forest cover goals.

As with the opportunity costs of pre-plantation activities, few previous studies and discussions of tree plantations in Laos and in the Mekong region have situated the economic returns for plantation participants within the participants' wider income portfolio. My results demonstrate that such empirical and analytical gaps in research on tree plantations need to be addressed if the case for policies to promote such plantations is to be evidence-based. A multidisciplinary livelihoods framework recognises that, even when returns from tree plantations are positive, these plantations may not be the preferred option of farming households because other options provide greater returns or because of their preference to diversify income sources.

Overall, the results from these Lao and Mekong region case studies suggest that tree plantations are not inherently positive or negative for local livelihoods. While all the plantation models studied can impact positively on local livelihoods, their potential to do so increases where trees are integrated with other land uses, where more local labour is employed, and where the opportunity costs of conversion of land to tree plantations are lowest. These factors are each context-dependent.

Table of Contents

Candidate's Declaration	i
Acknowledgements	iii
Preface	vi
Abstract	viii
Table of Contents	x
List of figures	xii
List of tables.....	xiii
List of abbreviations and acronyms	xv
Chapter 1: Introduction	1
1.1 Tree plantations.....	1
1.2 Laos as a national case study.....	3
1.2.1 <i>Context</i>	3
1.2.2 <i>Overview of the tree plantation sector of Laos</i>	4
1.3 Structure, objectives and contribution of the thesis	6
Chapter 2: Livelihood impacts of plantation forests on farmers in the Greater Mekong Subregion: a systematic review of plantation forest models	12
Chapter 3: Revealing environmental income in rural livelihoods: evidence from four villages in Lao PDR	34
Chapter 4: Financial contribution to households from different models of commercial tree plantations in Lao PDR	54
Chapter 5: The role of agroforestry in swidden transitions: a case study in the context of customary land tenure in Central Lao PDR	76
Chapter 6: Conclusions	93
6.1 Introduction.....	93
6.2 Research findings.....	94
6.2.1 <i>Impacts of different models of tree plantations on livelihoods in the Greater Mekong Sub-region</i>	94
6.2.2 <i>The economic value of swidden agriculture</i>	95
6.2.3 <i>Economic contribution of tree plantation models to rural livelihoods in Laos</i>	95
6.2.4 <i>Independent smallholder agroforestry and swidden agriculture transitions</i>	96
6.3 Implications for Laos	97

6.4 Wider implications	99
6.5 Limitations of the research.....	102
6.6 Future research priorities.....	103
6.7 Final remarks.....	104
References.....	105
Annex 1 - Detailed synopsis of methodology.....	114

List of figures

Chapter	No.	Caption	Page
1	1.1	Thesis logic diagram illustrating the main research components and objectives (adapted from Robins (2008))	8
2	1	Systematic mapping process of the study, illustrating publications from the initial search to review for synthesis (adapted from Moher et al. (2009))	16
3	1	Location of Laos and indicative location of the four case study villages	40
3	2	Data collection process	42
3	3	Annual household environmental (cash and subsistence) income (US\$) across sample population against annual household non-environmental (cash and subsistence) income (US\$) (N = 51)	47
3	4	Annual household cash environmental income (US\$) across sample population against annual household non-environmental cash income (US\$) (N = 51).	48
4	1	Indicative locations and pseudonyms of four case study villages in Laos	60
4	2	Sources of household benefits and costs over the cycle of each plantation model	65
5	1	Indicative location of Ban Xepon	81
5	2	Land use types in Ban Xepon (Source: District Office of Natural Resources and Environment, 2012); total village 933.7 ha	81
5	3	Case study village and land use history	84
5	4	Relationship between number of yang bong and undeveloped chap chong plots and household wealth class (N = 24)	84
5	5	Changes within main land use systems in Ban Xepon (Source: District Office of Natural Resources and Environment, 2012; field surveys 2016)	86
5	6	Projected returns to land (\$/ha; 7-year cycle) to households (bars) and to labour (\$/day) (dots) from yang bong agroforestry and banana land leases	87
5	7	Contributions of on-, off-, and non-farming activities to household income in Ban Xepon, 2016 (N = 13)	88
6	6.1	Key findings of this research	94

List of tables

Chapter	No.	Caption	Page
Candidate's declaration	I	Attribution statement of the chapters comprising this thesis	ii
1	1	Research objectives and specific questions	8
2	1	Roles and responsibilities of smallholders, companies, and public agencies in different plantation models (adapted from Bernstein et al. (1992))	16
2	2	Inclusion/exclusion criteria for systematic literature review	17
2	3	Case study questions on livelihood effects of plantation forests (adapted from Mahanty et al. (2013))	17
2	4	Overview of geographical distribution of case studies reviewed by plantation forest model	18
2	5	Overview of economic effects by plantation forest models	20
2	6	Overview of effects on human capital by plantation forest models	21
2	7	Overview of effects on access to land by plantation forest models	22
2	8	Overview of effects on social capital by plantation forest models	23
2	9	Overview of effects on local infrastructure by plantation forest models	23
2	A1	List of search terms in English language on Scopus, Web of Science and CAB Abstracts	26
3	1	Basic demographic, land uses and geographic characteristics of case study villages	41
3	2	Extent of land use types in Ban Nong and potential utility for generating environmental and shifting agriculture income	44
3	3	Annual household livelihood and cash income in case study villages, and proportions obtained as cash and subsistence	45
3	4	Annual household environmental incomes (total, cash and subsistence) and environmental reliance in case study villages and across livelihood income terciles	46
3	5	Annual contribution to households from forests and fallows (N = 51) and from rivers (N = 41) in each case study village, represented as means of both livelihood and cash income	49
3	6	Indicators of NTFP collected in each case study village over a two-week period	50
4	1	Demographic, land use and plantation-related characteristics of case study villages	61

4	2	Benefits and input costs for households of the case study plantation models	62
4	3	Projected and realised Net Present Value (\$/ha; 7-year cycle; 8% discount rate) to households from case study plantation models and one hypothetical model	66
4	4	Household average 2016 and annual realised plantation-derived income from case study plantation models, proportional contributions to total household livelihood income (2016), and contributions of plantation income to national poverty alleviation target	68
4	5	Attitude of households to the further expansion of commercial tree plantations in their village	69
4	A1	Net realised household economic benefits (undiscounted \$/ha) from plantation models in each year of 7-year plantation cycle	75
4	A2	Projected and realised Net Present Value (\$/ha; 7-year cycle) to households from case study plantation models and one hypothetical model at different discount rates	75
5	1	Summary of research methods, data sources and their thematic coverage	82
5	2	Land ownership and use in Ban Xepon (N = 24)	85
A1	A1	Questionnaire template	119

List of abbreviations and acronyms

ACIAR	Australian Centre for International Agricultural Research
CAB	Commonwealth Agricultural Bureaux, CAB International
CSR	Corporate Social Responsibility
DAFO	District Agriculture and Forestry Office
DONRE	District Office of Natural Resources and Environment
FAO	Food and Agriculture Organization of the United Nations
GMS	Greater Mekong Sub-region
GoL	The Government of Lao People's Democratic Republic (Laos)
LAK	Lao Kip
MRLG	Mekong Region Land Governance Project
NPV	Net Present Value
NTFP	Non-timber forest product
PAFO	Provincial Agriculture and Forestry Office
PE(I)CO	Population, Exposure/Intervention, Comparator, Outcome
PEN	The Poverty Environment Network
PFA	Production Forest Area
PLUP(LA)	Participatory Land Use Planning (and Land Allocation)
PM	Prime Minister
SEA	Southeast Asia
SPSS	Statistical Package for the Social Sciences
TLUC	Temporary Land Use Certificate
UXO	Unexploded Ordinance
VDF	Village Development Fund
WFP	The World Food Programme of the United Nations
WWF	The World Wide Fund for Nature

Chapter 1: Introduction

“Ending deforestation and degradation in forests will require expansion of a range of plantation types” (WWF, 2012, p. 21)

This thesis contributes to the long-standing debate about the role of tree plantations¹ in improving local livelihoods (*sensu* Bebbington, 2000)² in rural areas of the Global South (Cossalter and Pye-Smith, 2003); in particular to the debate about the relative merits of different plantation models to promote sustainable livelihoods (Morrison and Bass, 1992; Kanowski, 2005; Cramb *et al.*, 2017). It does so by investigating a targeted set of research questions related to these issues in Lao PDR (Laos). This chapter introduces the rationale and focus of this research, including objectives and related research questions. While providing a brief outline implies a review of some of the relevant literature – as done in the next sections – I refer the reader to Chapter 2 for a more comprehensive literature review. The chapter concludes with a diagram connecting logic between the subsequent chapters of the thesis.

1.1 *Tree plantations*

Tree plantations are a subset of ‘planted forests’, established through planting or seeding mainly for productive purposes (Del Lungo *et al.*, 2006; Evans *et al.*, 2009). As with most agricultural crops (Evans, 1992), the majority of plantation forests are intensively-managed monocultures, with the primary objective to generate high yields, per unit area and time, of one or a few products (Kanowski, 2005; Jurgensen *et al.*, 2014). As global consumption of forest products continues to grow, responsibly established and managed plantations can play a central role in ensuring that the supply of their materials is sustainable (Payn *et al.*, 2015; O'Brien, 2016). Although they constitute only 3% of the global forest cover, plantation forests provide in between one third and half of the global industrial roundwood production (Jurgensen *et al.*, 2014). Because of their productive efficiency, plantation forests can also play an important role in the face of increasing competition for land worldwide (Ghazoul *et al.*, 2019). Tree plantations have also been promoted because of their potential contribution to mitigate climate change by fixating carbon dioxide, particularly in degraded agricultural lands (Seymour, 2020). In these contexts, Barua *et al.* (2014) projected that the area of plantation forests will increase from 54.3 to 90 million hectares between 2012-2050. It is anticipated that most of this expansion will occur in the Global South (Carle *et al.*, 2020).

¹ Terminology in this field continues to change, and terms such as ‘forest plantations’, ‘plantation forests’, ‘timber plantations’, ‘commercial tree plantations’, ‘industrial tree plantations’ are commonly used interchangeably. In Chapters 1 and 6 I will use the term ‘tree plantations’ to be consistent with the terminology used in Chapters 3 and 4. The term ‘commercial’ is dropped for brevity.

² “The way people make a living” (Bebbington, 2000, p. 498).

With few exceptions, tree plantations have been longer established in temperate and boreal zones than tropical and subtropical zones, where most of the expansion of tree plantations has occurred since the 1970s (Evans, 2009; Barua *et al.*, 2014). The shift of establishment of tree plantations to the Global South has been driven by a series of factors that include their cheaper land and labour costs (Brown, 2000; Lu and Schönweger, 2019), their higher productivity per hectare (Brown, 2000), the generally laxer environmental rules in many of countries of the South (Overbeek *et al.*, 2012), and the emergence of markets in the region (Carle *et al.*, 2020), particularly China. The expansion of tree plantations in the Global South also needs to be framed in the context of global efforts to mitigate the decline of natural forests (Warman, 2014; Keenan *et al.*, 2015; Payn *et al.*, 2015; Pirard *et al.*, 2016), which in tropical countries are driven by demand of industrial wood and land-use changes (Sloan and Sayer, 2015). The general portrayal of those who promote the expansion of tree plantations is also that they can support the development of local communities where plantations are established, offering to rural farmers a market-based pathway out of poverty, an escape from the drudgery of subsistence production, and even environmental improvements (FAO *et al.*, 2010; Midgley *et al.*, 2017).

However, there is considerable controversy about the social and environmental impact of tree plantations (Cossalter and Pye-Smith, 2003; Gerber, 2011; Overbeek *et al.*, 2012). Critics of tree plantations point out their negative impacts on a wide range of aspects, including, soil, water, biodiversity, and the landscape. The most relevant criticism, perhaps, is that large-scale tree plantations have caused the displacement of local populations and conflict over land use (Gerber, 2011; Li, 2015). This had led to the question of what type of tree plantations ‘models’ are preferable with respect to the interests of local communities, including their economic development (Morrison and Bass, 1992; Kanowski, 2005; Cramb *et al.*, 2017). As many of the preceding sources illustrate, that question has elicited different opinions from different stakeholders. However, despite calls for comparative studies (Nawir *et al.*, 2007; Batra and Pirard, 2015; D’Amato *et al.*, 2017), with some exceptions, little empirical comparative research is available on how different models of tree plantations contribute, positively or negatively, to the livelihoods of local people.

Indeed, research on the socio-economic impacts of plantations has tended to be case studies on a single plantation model. While a single case study approach is often able to create high quality understanding of a subject (Yin, 2003), single case studies are limited in terms of the possibility to develop broad generalizations (Gustafsson, 2017). Further, different methodological and analytical tools limit the ability to compare findings across different tree plantation models. Laos is a good example of a country in which to investigate the contribution of different tree plantation models to farmers’ livelihoods, because a diversity of tree plantation investors, ownership, and spatial arrangements are present there (Phimmavong *et al.*, 2009).

Consequently, this thesis seeks to address that gap in knowledge by investigating how four purposely selected tree plantation models established for forest production in Laos have contributed to

the livelihoods of participating households. Each of the four tree plantation models selected, described below, was studied in a different village. Together, these models represent widest spectrum of plantation models that could be investigated within the available time and budget.

1.2 *Laos as a national case study*

1.2.1 Context

There is considerable debate about both definitions of forest and actual forest extent in Laos (Koch, 2017). One of the latest official reports estimated that forests covered 57.4% of the total land area in 2015 (Department of Forestry, 2018b), making Laos one of the most forested countries in the region. However, the quality and quantity of forests have been declining substantially over the last decades. Causes for this decrease in forest resources include forest conversion to agriculture, mining and tree plantation concessions, unsustainable and illegal timber harvesting, pioneer swidden agriculture, and hydropower developments (Koch, 2017). The Lao Government has long recognised high deforestation and degradation rates in the country, and introduced several policy instruments and incentives to increase forest cover³, including through tree plantation establishment (Government of Lao PDR, 2005; Phimmavong *et al.*, 2009; Phimmavong *et al.*, 2019). Further, key development banks, private sector actors and Lao state agencies have long promoted Laos as a ‘new frontier’ for business opportunities in the natural resources sector, including tree plantations (Barney, 2009; World Bank, 2017; World Bank, 2019).

Most development of tree plantations has taken place in the context of state policies aimed at economic development of rural areas, particularly in upland poor districts where government policies aim to reduce and eventually phase out swidden agriculture (Fox *et al.*, 2009; Phimmavong *et al.*, 2009). In the context of these policies, most farmers are amidst a transition from a subsistence to a full market economy (Rigg, 2006a; Rigg, 2006b), including from swidden agriculture to tree plantations, and rotational swidden agriculture is still fundamental to many farmers’ livelihoods (Friis *et al.*, 2016). Swidden agriculture continues to be used in cultivation of upland rice, while the agroecological patches of fallow forests that swidden agriculture creates enable the collection of environmental products and goods (fuel wood, wildlife, and timber and non-timber forest products), and provide pasture for livestock. Researchers have established that swidden and secondary forestlands provide not only important sources of environmental income⁴ to households (Foppes and Ketphanh, 2000; Russell *et al.*, 2013), but can serve as a safety net or a ‘non-commodified subsistence guarantee’ for vulnerable households (Barney and van der Meer Simo, 2019). However, as in other parts of Southeast Asia, the

³ There is significant REDD+ activity in Laos. This has focused on natural forest and not the plantation sector (Ramcilovic-Suominen and Nathan, 2020).

⁴ Following Sjaastad *et al.* (2005), ‘environmental income’ is defined as “rent captured through alienation or consumption of natural capital within the first link in a market chain” (p. 45).

Lao Government sees swidden agriculture as a forest-degrading practice at the core of rural poverty (Government of Lao PDR, 2005; Lestrelin *et al.*, 2012).

In that context, tree plantations have been established through a range of investment models, such as company-led concessions, contract farming arrangements, smallholder-led agroforestry systems and plantations, and village land lease schemes (Smith *et al.*, 2017). This variety of experiences – with their successes, failures, and challenges – permits a comparative examination of the livelihood impacts of different tree plantation models, and of the implications for rural development and poverty alleviation policies. Although details of the Lao tree plantations sector are provided in the subsequent chapters, I present below a brief overview of the history of tree plantations in Laos and the policy context in which they operate.

1.2.2 Overview of the tree plantation sector of Laos

Until the early 1990s, most tree plantations in Laos were small-scale experimental plantations of teak (*Tectona grandis*) and rubber (*Hevea brasiliensis*) trees established in the 1900s under the French colonial rule (Stuart-Fox, 1995; Phimmavong *et al.*, 2009), and of eucalypts (*Eucalyptus* hybrids) introduced in the 1970s through the Lao-Australian Reforestation Project (Phimmavong *et al.*, 2009). This experimental focus changed around the 1980s, when Lao Government policies and development programs started to encourage Lao farmers to establish teak plantations as an alternative to replace swidden agriculture. In that context, teak became the most important perennial planted in the northern Lao uplands, particularly in Luang Prabang Province (Roder *et al.*, 1995; Hansen *et al.*, 2007). Currently, teak plantations continue to be established in smallholdings for a range of reasons, including in response to state policies and market opportunities, to strengthen claims to land, and to address land degradation (Newby *et al.*, 2014; Newby *et al.*, 2012). Boer (2019) estimates that the area of teak trees established independently by farmers in Luang Prabang Province is over 18,000 ha.

In addition to teak, rubber is another important smallholder tree crop Laos, particularly in Central (Andriess, 2014) and Northern Laos (Alton *et al.*, 2005; Manivong and Cramb, 2008), where farmers have planted rubber trees, either on their own, or with government or financial support from other farmers, including from neighbouring provinces in China (Baird and Vue, 2015). The Department of Forestry estimates that smallholders have established 78,000 ha of rubber trees independently (Smith *et al.*, 2020), although what proportion of these are still held by independent smallholders are largely unknown (Vongvisouk and Dwyer, 2016). Further, the Department of Forestry estimates that over 70,000 hectares of other native tree species other than teak were planted between 1975 and 2016 (Department of Forestry, 2018c), but there are no precise estimates of the current area of these species. Further, little is known about their contribution to the incomes of Lao smallholders, despite expectations that they represent an alternative model of rural development to larger-scale and more top-down approaches, such as corporate plantation concessions (Cramb *et al.*, 2017).

Foreign tree plantation companies – e.g. Burapha Agroforestry Co., Ltd. and BGA-Laos Plantation Forestry Ltd. – started to play a significant role in the Lao tree plantation sector in the mid-1990s (Barney, 2007; Phimmavong *et al.*, 2009), often with the support of international development banks (Barney, 2007). From the early 2000s to 2012, policy emphasised attracting international tree plantation investors through a state land concession approach (Schönweger, 2012). This resulted in the arrival of several forestry companies seeking large areas of land (Baird, 2019), some in conjunction with prospective processing investments. It is estimated that 213,500 ha of tree plantations have been established under concession arrangements, the majority of which are rubber tree plantations in southern Laos (Kenney-Lazar, 2012); c. 60,000 ha have been planted with eucalypts (Department of Forestry, 2018a)⁵. The establishment of most tree plantations following this land concession model resulted in adverse outcomes for customary land rights, livelihoods, and environmental values (Baird, 2011; Baird, 2014; Kenney-Lazar, 2012; Kenney-Lazar, 2015; Friis *et al.*, 2016). Consequently, in 2012, the Lao Government announced a moratorium (PM Decree 13, the 2nd such moratorium), extended in 2015, on some new concessions, including for rubber trees and eucalypts which slowed the development of concession-based plantations.

In more recent years, ‘land-sharing’ concessions and contract farming schemes have been favoured by the Lao Government. As an example, two companies gained endorsement for their land-sharing eucalyptus-rice agroforestry model (Vientiane Times, 2016). This model has been considered innovative and attracted significant international interest (e.g. New Generation Plantations Platform, 2016; Phimmavong *et al.*, 2019).

However, the land-sharing approach is not completely novel nor singular to Laos. In the early *taungya* agroforestry system, for instance, which was developed in the nineteenth century in British colonial Burma and subsequently expanded to other regions of Asia, Africa and Latin America (MacDicken and Vergara, 1990; Nair, 1993), annual crops were established within plantations of teak trees with the goal of providing farmers working on these plantations with food during the first years of the teak crop cycle (Nair, 1993). Bryant (1994) argued that granting swidden farmers the possibility to plant food crops in *taungya* teak plantations was British colonial foresters’ response to local opposition to tree plantation establishment; as well as an effective means to encourage these farmers to protect the trees, which remained the property of state forestry agencies (Bryant, 1996). In Thailand, under the Forest Village Scheme introduced by the Forest Industries Organisation, a *taungya* system was implemented in the 1960s to induce swidden farmers to restore degraded forestlands (Boonkird *et al.*, 1984). Similarly, in Nigeria, for instance, a *taungya* system proved to be an effective means of allocating land to smallholder farmers who then cleared land for tree plantations at a relatively low cost for the government (Olawoye, 1975; Adegbehin and Igboanugo, 1990). Having made the point about the long history of integrating trees with agricultural crops, it is important to note that the purpose of

⁵ This figure includes a small but unquantified area of Acacia plantations.

most corporate-led tree plantations worldwide has been the production of single fast growing tree species (Cossalter and Pye-Smith, 2003). In that context, those two Lao examples can be seen as a genuine effort by these tree plantation companies to have a positive impact on livelihoods by growing more than trees. Further, recognition of those two companies' approach in Laos suggested that the Lao Government acknowledged the efforts of companies that demonstrated high Corporate Social Responsibility (CSR) principles and participatory village-level engagement standards.

Notwithstanding this recognition, the endorsement of those two companies came with the suggestion that the companies should operate following tree-growing contracts with farmers (Vientiane Times, 2016). Endorsement of the contract farming model was primarily based on the relative success of rubber plantations established in the central and northern regions of Laos (Baird and Vue, 2015; Andriesse, 2014; cf. Khamphone and Sato, 2011) alongside the endorsement from international development banks (IFC, 2018). The Department of Forestry estimates that 68,000 ha of rubber trees have been established under the contract farming model (Smith *et al.*, 2020). Latex price volatility, however, has “affected the robustness of contracts between farmers and companies” and, as a result, contracts are often not honoured or abandoned (Smith *et al.*, 2020, p. 15). Less is known about the experiences of Lao smallholders who collectively have planted nearly 5,000 ha of eucalypts and 500 ha of acacias in response to contracts offered by tree plantation companies⁶.

More recently, the Lao Government has decided to allow the establishment of new tree plantations on National Production Forest Areas (PFA) (Prime Minister's Office, 2018), which are one of the three official forest categories comprising State forestlands. The establishment of forest plantations in PFA aims to provide economic benefits to local communities, to help meet national forest cover objectives, and to build a critical mass of forest resources that supplies a competitive forestry industry. How this will occur in practice, for example in terms of the models proposed or accepted, or the implications for local livelihoods, are still unknown. The results of this research may inform the decisions of the Lao Government in relation to the delegation of control over ‘state’ land.

1.3 Structure, objectives, and contribution of the thesis

The thesis consists of three parts, outlined in this chapter. One part, presented as Chapters 1 and 6, introduces and concludes the thesis. The second part (Chapter 2) presents a systematic literature review of the impacts of different models of tree plantations on livelihoods in the Greater Mekong Sub-region (GMS). The review is part of a project funded by the FAO Regional Office for Asia and the Pacific. That project aims to identify sustainable farming systems that better support smallholder livelihoods in the GMS countries, in particular those where the recent expansion of large-scale tree plantations has been associated with mainly negative livelihood impacts.

⁶ Data from company sources.

The third part of the thesis comprises three published chapters (3-5). These three papers focus on the Lao People's Democratic Republic (Laos), and are the result of my contribution to the Australian Centre for International Agricultural Research (ACIAR) Project ADP/2014/047 "Improving policies for forest plantations to balance smallholder, industry and environmental needs in Lao PDR and Vietnam". An explicit aim of the ACIAR project was to inform national policies aimed at improving the benefits that different stakeholders derive from tree plantations. Such an aim is better fulfilled by progressive publishing of papers in specialist journals than the traditional approach of submitting a unitary PhD thesis. Publishing refereed papers also served as a strategy to build my credibility as a researcher and, at times, close unproductive iterations of contested debates. Finally, the nature of peer-reviewed publications, each with their own focus and word-limit requirements, made more tolerable the thought of writing in a non-native language.

These chapters report the findings of my research into the four plantation models: two forms of land-sharing plantation concessions, and contract and independent tree growing. The concession model was excluded from the study because it has been the subject of much previous research in Laos and elsewhere (Gerber, 2011; Malkamäki *et al.*, 2018).

While each chapter of the thesis is distinct in subject and focus, one of the caveats of a thesis by compilation is the inevitable repetition or omission of content, particularly in the introduction, background, and methods of the refereed papers. Consequently, word limits and responses of referees may sometimes result in content that, although adequate in itself, is not necessarily comprehensive from a thesis perspective. To resolve some of these issues and assist navigation through the document, I provide a conceptual diagram of thesis structure (Figure 1, adapted from Robins (2008)), and a foreword at the start of each chapter. The conceptual diagram shows the overall structure of the thesis, including how the objectives of each chapter contribute to the main aim of the research. I also provide a detailed synopsis of the research methods employed to collect data in the case study villages in Annex 1. In Annex 1, I also reflect on ethical dimensions of the research, how my positionality as a Western researcher might have influenced the informants of this study, and how I proactively tried to minimise this possibility.

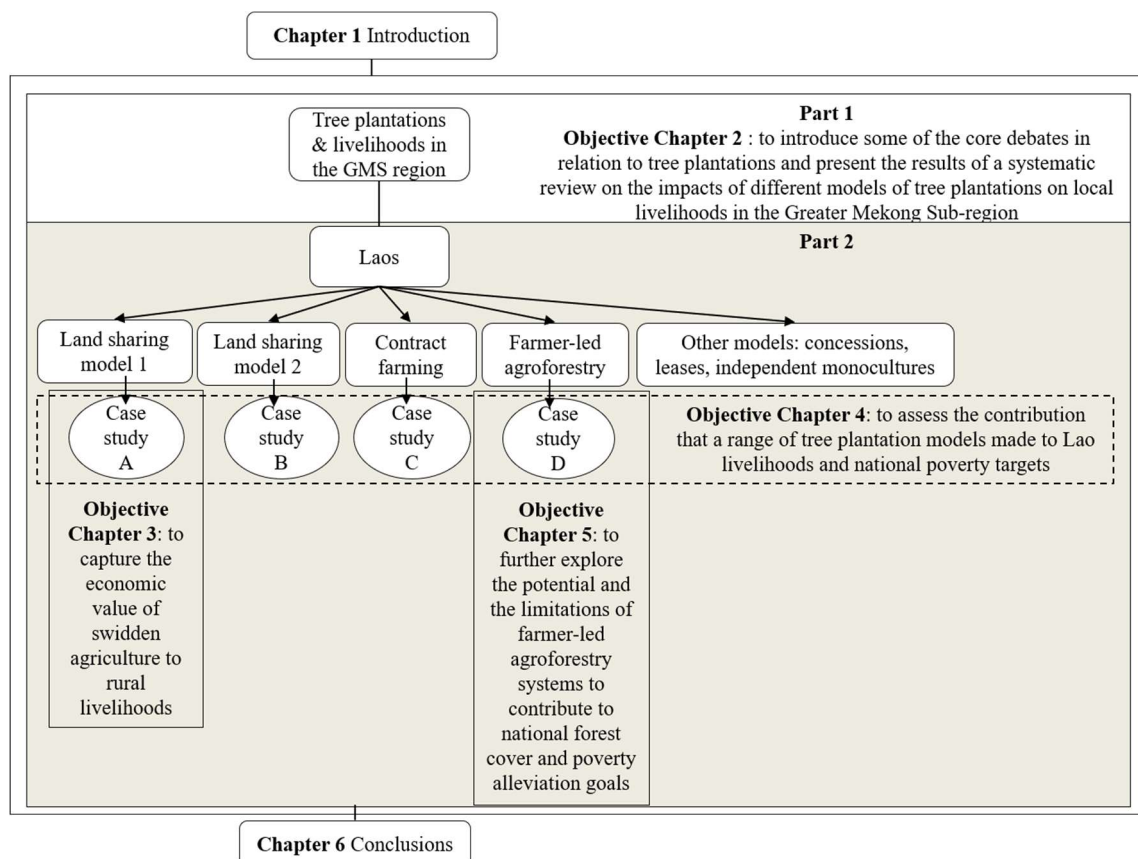


Figure 1.1 Diagram of thesis structure illustrating the main research components and objectives (adapted from Robins (2008))

The research objectives of each of the chapters introduced above were addressed through a set of specific research questions (Table 1).

Table 1 Research objectives and specific questions

Objective	Research question(s)	Chapter
(1) to introduce some of the core debates in relation to tree plantations and present the results of a systematic review on the impacts of different models of tree plantations on local livelihoods in the GMS	What are the direct and indirect socio-economic impacts of the establishment of plantation forests on local people of the GMS region? How do the impacts differ across different models of plantation forests and across different geographical and institutional contexts in the GMS region?	2
(2) to capture the economic value of swidden agriculture to Lao rural livelihoods	What is the role of environmental income in household income portfolios in the case study villages? How might environmental income affect wealth inequality in such rural communities? What are the policy implications of a clearer appreciation of environmental income for rural livelihoods in the context?	3

(3) to assess the contribution that a range of tree plantation models made to Lao livelihoods and national poverty targets	<p>How are economic benefits to households distributed temporally over a complete plantation cycle of each model?</p> <p>What is the total economic return to households from each of the four plantation models?</p> <p>What is the contribution of each plantation model to household income?</p> <p>What is the potential and realised contribution of each plantation model to the national poverty alleviation target?</p>	4
(4) to further explore the potential and the limitations of farmer-led agroforestry systems to contribute to national forest cover and poverty alleviation goals	<p>What are the relative contributions of yang bong (<i>Persea kurzii</i>) agroforestry, swidden, and investor-led plantations to farmer livelihoods and household incomes in the case study village?</p> <p>How do farming households perceive the future of different land use and cropping systems in their village?</p> <p>How do the policy and institutional contexts in which households operate shape their land use choices, and the associated livelihood outcomes?</p>	5

Chapter 2 introduces some of the core debates in relation to tree plantations and presents the results of a systematic review of the impacts of different models of tree plantations on livelihoods in the GMS. In particular, it highlights the failure in much published research to consider other sources of income – including from pre-plantation activities – alongside the contribution of tree plantations themselves. This finding is consistent with Newby *et al.*'s (2014) conclusion that those who promote tree plantations in the context of sustainable livelihoods need to “look beyond the woodlot” (p. 499); and with the pivotal premise of this thesis that both research and efforts in tree plantations need to be more than the trees.

At the outset of the research, my main purpose was to inform tree plantation policies aimed at poverty alleviation in Laos. An examination of the literature, and of discussions that this research was part of, revealed that no study fully captured the economic benefits that Lao smallholders derive from the swidden agricultural lands on which tree plantations are often established. I decided to address this empirical gap, as presented in Chapter 3, because it is logical that the benefits farmers derive from tree plantations should adequately compensate the opportunity cost to them of the replacement of other land use systems (see also Malkamäki *et al.*, 2018). An explicit objective of the initial study design was to assess the contribution that a range of tree plantation models make to the livelihoods of Lao farmers.

To standardise comparisons, Net Present Value (NPV) per hectare of each plantation model was calculated. Chapter 4 reports the extent to which different tree plantation models contributed to

household income in each case study village, and the potential contribution of the different tree plantation models to national poverty alleviation targets. The results presented in Chapter 4 align with existing literature that promotes agroforestry plantations as a promising model of rural development in Laos and internationally. Following from this, the objective of Chapter 5 is to discuss the potential and limitations of agroforestry systems regionally in the context of customary land tenure, and the implications of this for national forest cover and development goals.

Part 1

The published paper⁷ presented in this part of the thesis sets the scene around tree plantations and explores the debates within the literature about the scale and type of plantation forests that most effectively contribute to the livelihoods of farmers in the GMS region. Based on the respective roles of farmers, governments, and corporations in the establishment of tree plantations, the paper identifies a range of models implemented in the region and reviews the literature on the livelihood impacts of each of these models. The paper also reviews the research approaches that scholars have employed to investigate these issues. The paper identifies the need to adopt a more holistic perspective on livelihoods if the case for tree plantations is to be made on an informed basis.

⁷ The following typographical and grammatical errors were after publication of this paper: 1) in page 2 of the paper, the 3rd line from the top the “bust” should be “but”; 2) in the second last paragraph of page 2 of the paper, line 7 (and in several other places in the paper) the possessive “et al.” (e.g. “Malkamäki *et al.* [38] review”) should be “et al.’s” (as in “Malkamäki *et al.’s.* [38] review”).

**Chapter 2: Livelihood impacts of plantation
forests on farmers in the Greater Mekong
Subregion: a systematic review of plantation
forest models**

Review

Livelihood Impacts of Plantation Forests on Farmers in the Greater Mekong Subregion: A Systematic Review of Plantation Forest Models

Alexander van der Meer Simo

Fenner School of Environment and Society, Australian National University, Canberra 2601, Australia;
alex.vandermeer@anu.edu.au

Received: 5 August 2020; Accepted: 27 October 2020; Published: 31 October 2020



Abstract: Background and Objectives: Plantation forests remain a highly contested element of rural development. Successive reviews of large-scale plantations established under land concessions identify predominantly negative impacts on local farmers' livelihoods. Although concession models of plantation development have been common in the global South, other models characterised by different forms of land tenure, labour arrangements, and plantation design have also emerged. The impacts of these models on the livelihoods of local farmers are likely to be more varied. This paper presents the results of a systematic review on the impacts of different models of plantation forests on the livelihoods of local farmers in the Greater Mekong Sub-region. Materials and Methods: Seventy-two of more than 1000 publications were identified as meeting review criteria and were assessed systematically to identify how plantation forests impacted on the natural, financial, human, physical, and social assets of proximate rural communities. Plantation models included: state forest plantations; land and land-sharing concessions; land purchase programs; and "enrolled", contracted, and independent smallholders. Results: The results confirm those of earlier studies that land concessions delivered lasting livelihoods benefits only to few communities. A small number of positive examples among these cases demonstrate, however, that these plantation models are not necessarily detrimental to local livelihoods. Other plantation forest models, based on contract farming, land purchase, and independent smallholders have generally brought economic benefits to local people, although differentially. Research Highlights and Conclusions: Overall, this review suggests that plantation forests are not inherently positive or negative for local livelihoods, and all plantation models have the potential to contribute positively to local livelihoods. Future research on this topic needs to adopt more holistic livelihoods perspectives.

Keywords: Greater Mekong Sub-region; impacts; livelihoods; plantation forests; plantation models

1. Introduction

The global impetus for planting trees has never been greater. Ambitious global goals for forest and land restoration have been set by the Bonn Challenge [1,2], the New York Declaration on Forests [3], and the World Economic Forum's One Trillion Trees initiative [4]. These have contributed to the continued expansion of planted forests, of which plantation forests [5] have been an important component [6,7], in part because of narratives linking them to national economic development and rural poverty alleviation goals [8–10].

A common characterisation of plantation forests has been as large-scale corporate enterprises [11–14]. However, plantation forests comprise various forms of land tenure arrangements, silvicultural practices, and scales of trees planted deliberately for primarily commercial purposes [8,15]. A long standing debate, particularly in countries of the Global South, has been about the scale and

type of plantation forests that most effectively achieve a wide range of production and development goals [16–18]. Specifically, this debate is related to the role and responsibilities of farmers, (syn. here smallholders, but see [19]), governments, and corporations in the establishment of plantation forests [16,20]. This debate has also been an issue of concern in the literature about agricultural cash crops [21–23] and in the literature about farming livelihoods in the developing world [24,25]. Professional paradigms and values often guide the discourses in favour or against how these roles and responsibilities should be expressed to best benefit farmers participating in the establishment and management of new plantation forests [8,17].

The use of land concessions for promoting plantation forests has followed that established for other estate crops such as rubber and palm oil [25] and has paralleled the widespread allocation of natural forest concessions for timber harvesting, especially in the tropics [26]. Plantation forestry businesses usually promise to develop much-needed infrastructure and to increase rural employment [27–29]. Consequently, many governments have granted public land concessions to private plantation forest companies in exchange for lease payments and/or the provision of services [30]. Such private investment has been held to result in win–win situations for both investors and hosting countries, provided that investments are well managed [31]. It is also understood that large-scale forestry businesses, such as those based on pulp and paper production in regions with increasing competition for land, need to secure a minimum supply of raw materials to make their investments, including their own processing facilities, financially viable [32]. There is a parallel presumption that farmers lack adequate skills or information to meet the commercial forest industry’s quantity and quality requirements [33], and are unable to wait the time required between the expense of planting and the returns from harvesting trees [34]. Consequently, concessions have been the dominant model for tree plantation establishment and management in many countries of the global South [32,35].

The impacts of large-scale plantation forests on farming communities has been the focus of much research. Problems commonly associated with large-scale plantations include failure of corporations to respect land rights of local people [11,13], the unequal distribution of benefits [36], and their narrow extractivist focus (cf. [8,37]). A recent global meta-study of large-scale corporate-led plantation forests suggested that the socio-economic impacts of tree plantations on farmers were predominantly negative [38]. Alternatively many academics (e.g., [20,39–41]) have argued that more small-scale farmer-led plantations may address some of the negative impacts associated with typical forest plantations, while providing economic benefits to farmers. This position contrasts with those who advocate for halting support for plantation forests altogether, and to instead shift efforts to improve farming livelihoods on education, health, land tenure and food production sectors [42].

In these contexts, this paper presents the results of a systematic review of the academic literature on the impacts of different models of plantation forests on the livelihoods of farmers in the Greater Mekong Subregion (GMS)—a trans-national region that includes the countries of Cambodia, Laos, Myanmar (Burma), Thailand, and Vietnam, and Chinese Yunnan Province and Guangxi Zhuang Autonomous Region. Systematic reviews are a form of retrospective research that synthesise the results of multiple primary investigations [43]. Originally employed for medical studies, systematic reviews have become increasingly popular in other disciplines, including forestry. Examples include Malkamäki et al. [38] review of the livelihood impacts of large-scale commercial tree plantations, Foli et al. [44] review of the impacts of tree cover on the productivity of farming systems, and Filoso et al. [45] review of forest restoration and water provision services. Systematic reviews aim to synthesise current scientific knowledge to inform and guide future research and decision making in their respective areas [46].

In recent decades, the GMS has experienced both significant deforestation and forest degradation and an expansion of plantation forests [47]. This review addresses the following research questions:

1. What are the direct and indirect socio-economic impacts of the establishment of plantation forests on farmers of the GMS region?
2. How do the impacts differ across different models of plantation forests and across different geographical and institutional contexts in the GMS region?

The geographical scope of the review excludes regions outside the GMS with significant development of commercial tree plantations [7,48]. However, the papers reviewed include examples of a diversity of plantation forest models beyond the most commonly assessed large-scale plantation concessions. Plantation forest models can be defined by the stratification of ownership and management of the factors of production, investment capital, land, and labour by different actors [22] (Table 1). The different ways in which these three elements are combined implicitly result in different roles and benefits for farmers in the communities where the plantations are established [20,24], corresponding to the columns in Table 1:

- State plantation forests: Are those that have been developed on publicly owned land and that are owned and managed by public agencies. Here, farmers' role is often limited to the provision of labour in planting and maintaining trees and possible use of inter-alley land.
- Land concessions: Since the rise of neoliberalism in the 1970s, public agencies have facilitated private sector investment in plantation forests by selling or leasing public land or forests to corporations [49]. Principle amongst the benefits associated to this approach has been the provision of rural employment, although benefits for farmers can also be delivered through improved infrastructure associated with plantation development (e.g., roads, electricity, and perhaps education and health services).
- Land-sharing concessions: Some plantation forestry firms have implemented a different approach to plantation development, organised around "land-sharing" with farmers through the promotion of complementary livelihood activities within plantation boundaries, in addition to the provision of labour [38]. Examples of such "land-sharing concessions" include intercropping of staples [50], agricultural cash cropping [51], and collection of non-timber forest products (NTFPs) [28].
- Enrolled farmers: In some cases where land is privately owned by farmers, public agencies have encouraged their enrolment in plantation forests programs led by the industry. Farmers usually receive inputs and advice for the establishment of the forest plantations on their own lands but cannot then opt out. As in the models above, the principle benefit for farmers in this model is through employment in the plantation.
- Contract farming: Alternatively, farmers using their own land and labour can enter commercial relationships with corporations through contracts. Although contracts can be highly diverse and relate to either employment, produce, or land tenancy, those in which corporates set fixed payments per farmers' production are the most typical.
- Land purchase programs: In other cases, some plantation forestry firms have purchased or leased land that was privately owned by farmers. Under this model, the benefits for farmers are the financial returns from such land sales or leases.
- Independent smallholders: Finally, smallholders can use their own (small) land and labour base for the development of their own plantations. Under this model, smallholders' benefits are primarily the financial returns from their plantations, although benefits can also be delivered through returns from intercrops and livestock as it often the case in agroforestry plantations.

While the ways in which plantation models impact the livelihoods of farmers are complex, it is possible to develop better understanding of key patterns through comparative studies [20]. To that end, this comparative systematic review aims to improve understanding of the association of livelihood outcomes with particular models, rather than to rank models by livelihood outcomes. This will provide insights regarding the type of plantations that might be promoted to improve the livelihoods of rural communities. Using a common analytical framework to systematically examine the way that several cases of the same plantation model impact the livelihoods of farmers also gives effect to de Haan's [52] suggestion that livelihood studies will benefit from two complementary research strategies: meta-analysis and comparative reviews. This review uses the long-established Sustainable Livelihoods Framework (SLF) [53] as a framework for conceptualising livelihoods and defining the questions asked of each case included in the review.

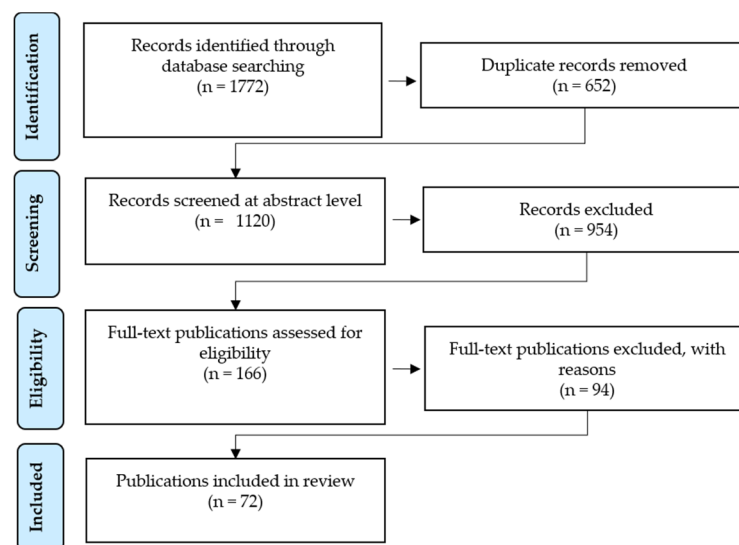
Table 1. Roles and responsibilities of farmers, companies and public agencies in different plantation models [24].

		State Forest Plantation	Land Concession	Land Sharing Concession	Enrolled Farmers	Contract Farming	Land Purchase Program	Independent Smallholders
Who owns what?	Land	S	S > I	S or I	F	F	F > I	F
	Tree/produce	S	I	I	I	I or F	I	F
	Investment capital	S	I	I	I	I	I	F
	Inter-alley farming use (if applicable)	F	I	F	F	F	I	F
Who decides?	Planting of trees	S	I	I	I	F	I	F
	Harvesting of trees/produce	S	I	I	I	F	I	F

S = state; F = farmer; I = industry (forestry firms); > denotes a transfer of roles or responsibilities.

2. Materials and Methods

Systematic reviews commonly rely on the application of PICO or PECO (Population, Intervention/Exposure, Comparator, Outcome) mnemonics to identify relevant studies [43]. I adjusted Malkamäki et al. [54] search protocol to formulate a comprehensive list of search terms incorporating population, exposure, outcome and context elements (see Appendix A). The literature search was conducted on 31 October 2019 using English language searches on Web of Science (448 hits), Scopus (751 hits), and CAB Abstracts (573 hits) (Figure 1).

**Figure 1.** Systematic mapping process of the study, illustrating publications from the initial search to review for synthesis (adapted from [55]).

These 1772 search results were exported to EndNote citation manager software (version Endnote X9.3.3). After the removal of 652 duplicates, the titles and abstracts of 1120 studies were reviewed to further refine our list based on the inclusion and exclusion criteria presented in Table 2.

Table 2. Inclusion/exclusion criteria for systematic literature review.

Included
<ul style="list-style-type: none"> • Publications before 1 November 2019 and available in Scopus, Web of Science, or CAB Abstracts; that focused on • Impacts of plantation forests on farmers' livelihoods, livelihood strategies, rural livelihoods, or poverty alleviation, located within Greater Mekong Sub-region; where • The impacts on the target population are revealed through studies in which researchers collected primary data from asking the target population or from actual measurements, experiences, or observations in the field rather than from theory, assertion, or secondary data.
Excluded
<ul style="list-style-type: none"> • Technical analysis, historical reviews, policy documents or assertion papers with no specific focus on farmers' livelihoods and with no primary collection of data; and • Studies relying only on online databases from national surveys or on biophysical spatial digital data; and • Studies focusing on communities outside of the actual plantation areas, either nearby or distant communities.

The inclusion criterion was that study data were based on field observations. Studies that drew only on secondary data such as biophysical, spatial, or socio-economic census data were excluded. This review also excluded studies targeting populations outside the jurisdictions of the plantations under study (e.g., “telecoupling” [56]).

The 166 remaining publications included a number with an abstract or title that provided insufficient information for inclusion or exclusion (e.g., [57,58]), but the content included important background information. Three publications could not be retrieved for assessment and a further 91 were excluded because they did not meet the inclusion criteria of relevant populations, intervention/exposure, and direct impacts on local communities. This resulted in a final list of 72 publications that were fully reviewed using a publication assessment sheet for consistency. As noted above, the assessment sheet drew on the SLF [53] to guide interpretation of how plantation forests in each case study impacted on the livelihoods of the associated farmers.

The SLF conceives of subjects'—who may be individuals, households, or communities—livelihoods as a dynamic combination of five categories of assets, viz., natural, financial, human, physical, and social [59]. Because the SLF has been widely used in rural development studies in very heterogeneous contexts, researchers have developed various context-specific indicators to assess each of these asset categories [60,61]. Following Mahanty et al. [62] approach to investigating the livelihood impacts of PES schemes, I chose to synthesise this complexity of context-specific livelihood indicators into the response to a single overarching question for each livelihood asset (Table 3). In that context, the reported impacts on each livelihood asset in each case study were classified as positive, negative, mixed, or neutral, and recorded in conjunction with the study's main conclusions and recommendations.

Table 3. Questions on livelihood impacts on case studies of plantation forests (adapted from [62]).

Livelihood Assets	Questions
Financial	Do plantation forests change the net income of farmers?
Human	Do plantation forests lead to improvements in capacity, skills and/or knowledge, and health of farmers?
Natural	Do plantation forests cause changes in access to natural resources by farmers?
Social/Political	Do plantation forests change the quantity or quality of social capital of farmers? If so, does this change the capacity of farmers to influence wider institutions and decision-making processes?
Physical	Do plantation forests influence development of local infrastructure?

Following Malkamäki et al. (2018), different case studies in a same publication were analysed separately. Where authors had drawn from the same case study in different publications (e.g., scholar contributions from different analytical perspectives such as in Baird [63], Baird and Barney [64], Baird [65]) the results were collated by case study rather than by publication. Publications based on case studies published previously (e.g., [20,66,67]) were reviewed for results that were added to those from the original publications. When publications included case studies from outside the GMS region (e.g., [39]), only the case studies within the GMS region were assessed.

3. Results

3.1. Overview of the Publications Reviewed

3.1.1. Geographical and Temporal Distribution

This study synthesises the results of 72 publications and 86 case studies of the impacts on farmers of plantation forests in the GMS region. The plantation forest models in these 86 case studies covered a wide range of investment and ownership arrangements (Table 4). The dominant model (40%) was plantation forests established and managed by smallholders. Thirty of these case studies reported on monoculture plantation forests, most of which were rubber tree plantations (30 case studies). Another sixteen of these case studies reported about smallholders who planted trees in combination with other crops or livestock (i.e., agroforestry). Examples of this were recorded in all countries of the GMS region, but particularly in China, Laos, and Thailand.

Table 4. Overview of geographical distribution of case studies reviewed by plantation forest model.

Model/Country	Cambodia	China	Laos	Myanmar	Thailand	Vietnam	Total
State owned plantations				2			2
Land concessions	5		9	2	1		17
Land-sharing concessions	1						1
Enrolled farmers		1	1		1	6	9
Land purchasing program		1			1		2
Contract farming		1	3		2	1	7
Smallholder monocultures		2	9	2	14	3	30
Smallholder agroforestry	1	3	1	1	7	3	16
Not specified					2		2
Total	7	8	22	7	28	14	86

Almost one fifth of the case studies reviewed reported on land concessions, of which all except three were located in Cambodia or Laos. Examples of other plantation forests models are more limited and typically based in a small number of countries, except for contract farming plantation forests which were found in all countries in the GMS region except Cambodia and Myanmar.

The temporal expansion of commercial tree plantations in the region has been matched by research published on the topic. Publications in the subject area began to “boom” around 2008, with a peak around 2017. Thirty four of the 72 publications reviewed were published in the period 2015–2019.

3.1.2. Research Design and Methods Applied in the Publications Reviewed

Despite the heterogeneity of plantation forest models, only 14 of the 72 publications offered comparative evidence from multiple case studies. Seven of these 14 publications were based in Thailand, of which five provided comparative data from independent monoculture and agroforestry smallholder growers. Amongst these, Boulay et al. [68] reported on smallholder and contracted tree farmers and Barney [39] reported on contracted tree farmers and one land purchase. Other publications that offer a comparative perspective from two case studies are Baird [63] and Baird and Barney [64], on land concessions in Cambodia and Laos; Andriessé's [69] comparison of smallholders and contracted rubber tree farmers in Cambodia and Laos, respectively; and Sturgeon's [70] study of independent and contracted rubber tree farmers in China's Xishuangbanna prefecture. Only three publications [71–73] provide data from more than two plantation models. Kusakabe [73] analyses the livelihood impacts of rubber land concessions in Myanmar's Northern Shan State and Laos' Luang Namtha Province and of rubber smallholders in the same Lao province. Feurer et al. [72] and Friis et al. [71] provide evidence on livelihood and land use changes from three different plantation forest models in Myanmar and Laos, respectively.

Most publications had a descriptive socio-economic focus. Ten publications focused on land-use change dynamics and nine had an econometric focus. Although most publications recorded income of various forms that local people derived from plantation forests, only a few publications provided a holistic measure of annual income (viz [41,70,74–77]) that situated these benefits in the context of overall household income. Only four of the nine publications that reported financial returns from discounted cash flow analysis appropriately discounted the opportunity costs from pre-plantation or alternative income activities. Two Thai publications focused exclusively on the health impacts from rubber plantations.

3.2. Impacts by Livelihood Asset

3.2.1. Do Plantation Forests Change the Net Income of Farmers?

Fifty-eight publications reported economic outcomes from a total of 72 publications. Most of these outcomes were positive, particularly for plantation forests established by smallholders, either as monocultures or as part of agroforestry systems (Table 5). There was evidence of this in all the countries in the GMS. In Myanmar, for instance, Feurer et al. [72] found that rubber was the main source of income for case study smallholders. Similarly, based on the economic returns from rubber and teak growing, Manivong and Cramb [66] and Midgley et al. [78], respectively, suggested that plantation forests had the potential to reduce poverty in northern Laos. Andriessé [69], Sturgeon [70], Chambon et al. [76], Viswanatham [61], and Nguyen et al. [79], came to similar conclusions in Cambodia, China, Thailand, and Vietnam, respectively.

Several publications associated the expansion of smallholder plantation forests with increased wealth inequality, both drawing from and amplifying inequities in the (customary) land tenure systems. Examples of these are the introduction of acacias in Vietnam [80], of rubber [34,81] and teak [67] in Laos, and of rubber in Thailand [82]. In some instances, the expansion of smallholder plantation forests also resulted in decreasing income diversity and increased dependency on monocultures [71,77,83]. Agroforestry plantations offered income streams from intercrops and livestock that reduced dependency on monocultures, particularly during the period before the main tree crops yield an income. Such models can help smallholders, particularly those with little land, to diversify their sources of income, as found in studies of multiple cases from China [84,85], Myanmar [72], Vietnam [58,86], comparative studies between independent smallholder monoculture and agroforestry plantations [61,87–89], and two single case studies on independent smallholder agroforestry plantations in Thailand [76,90].

Table 5. Overview of economic impacts on local farmers by plantation forest models.

	Reported Impacts Mostly Positive	Reported Impacts Mostly Negative	Reported Impacts Both Positive and Negative	Reported Impacts Unmet Objectives
State owned plantations	0	0	1	0
Land concessions	0	10	4	0
Land-sharing concession	1	0	0	0
Enrolled farmers	2	1	2	0
Land purchasing program	0	0	1	1
Contract farming	4	1	1	0
Smallholder monocultures	18	1	8	1
Smallholder agroforestry	14	0	1	0
Not specified	1	0	0	0
Total	40	13	18	4

In four publications the economic impacts from land concessions were mixed. Kusakabe and Aye Chan [73] reported that the increase in wage income that farmers experienced from working in a concession came at the cost of losing environmental income. Three other publications [91–93] reported that, whilst labour conditions and incomes were often characterised as inadequate, local plantation workers were relatively satisfied with their wages because of the lack of local alternatives, also characterising these cases as having mixed impacts. Dwyer et al. [94] found similar evidence in a Cambodian land-sharing concession. However, the company in that case had allowed local farmers to harvest tree stumps for charcoal production from its concession area, which was an important source of cash, especially for land-poor and landless households.

3.2.2. Do Plantation Forests Lead to Improvements in Capacity, Skills and/or Knowledge, and Health of Farmers?

The review found limited but mixed evidence on the impacts of plantation forests on improving the capacity, skills, and/or knowledge of local farmers (Table 6). Maung and Yamamoto [95], for instance, reported that farmers gained access to health services in two of the three villages where state owned teak plantations were established by the Myanmar Forest Department. However, other farmers experienced “difficulties in accessing health care services and their children (did) not have the opportunity to attend even a primary school” (p. 45). In these cases, farmers were able to intercrop at the initial stages of plantation development, but not at later stages, exacerbating the negative impacts on household nutrition of the conversion of local state forest areas to teak (*Tectona grandis*) plantations.

Table 6. Overview of impacts on human capital by plantation forest models.

	Reported Impacts Mostly Positive	Reported Impacts Mostly Negative	Reported Impacts Both Positive and Negative
State owned plantations	0	0	1
Land concessions	0	10	0
Enrolled farmers	0	4	0
Contract farming	0	1	0
Smallholder monocultures	1	1	0
Smallholder agroforestry	3	0	0
Not specified	0	2	0
Total	4	18	1

Similar negative impacts associated with the loss of local access to forest and/or grazing lands were reported in most cases of land concession models [71–73] and, in Vietnam, in plantation forest programs enrolling farmers [74,75,96,97]. In addition to impacts on nutrition, the loss of access to forestlands was associated with loss of areas important for refuge from natural hazards or for the preservation of cultural values (p. 12, [63]) Such losses can lead to the disappearance of important rituals and traditions [98]. Likewise, conversion of forestlands to plantation forests can contribute to loss of knowledge of traditional production systems [72,74].

Negative impacts on human wellbeing were reported across all plantation models reviewed and may follow from causes other than the direct loss of common forestlands. In Laos, Friis et al. [71] found that the loss of grazing areas contributed to the abandonment of buffalo rearing, which led to lower productivity in rice paddies. Abandonment of buffaloes also led to an increase of weeds in the areas where buffaloes had previously grazed, which then led to higher labour requirements for weeding and lower soil fertility. These impacts were common to the three plantation models (concession, contract farming, and smallholder monocultures) in that study. In Thailand, three studies reported on negative health impacts from working in plantations, such as use of pesticides [99], malaria infections [100], and musculoskeletal problems [91].

There was also evidence from the studies reviewed that plantation forests can have positive impacts on human wellbeing. In some instances, plantations offered farmers an opportunity to access land to which they did not previously have access. Such access increased food security when tree planting was done in conjunction with intercropping [90] or livestock [72]. Income from sales of tree products mean that some households can invest in education and/or health improvements [101] or purchase food at lower cost, as Sturgeon [70] reported for Chinese farmers purchasing rice over the Lao border. There is also evidence that local farmers can assign positive values to plantations because of the acquisition of new knowledge and skills from managing their own trees [72,89,102].

3.2.3. Do Plantation Forests Cause Changes in Access to Natural Resources by Farmers?

There was evidence of forest plantations affecting access to natural resources in forty-five case studies. The nature of these impacts is generally associated with particular forest plantation models (Table 7). The impacts from land concession plantations were overwhelmingly negative because most of these plantations were established on land that farmers used for cultivating crops [71,73], collecting non-timber forest products (NTFPs) [63,64,103], and/or grazing livestock [63,64,103]. The quantity of the labor that forest plantation companies provided seldomly compensated the communities for losing access to (common) natural resources. Similar impacts were reported from state-owned plantation forests. In Myanmar, Hlaing et al. [104] reported that local farmers perceived the State Forest Plantations Department to be one of the main causes for the depletion of forests on which they depended.

Table 7. Overview of impacts on access to land by plantation forest models.

	Reported Impacts Mostly Positive	Reported Impacts Mostly Negative	Reported Impacts Both Positive and Negative
State owned plantations	0	1	1
Land concessions	0	16	0
Enrolled farmers	2	3	1
Contract farming	4	1	1
Smallholder monocultures	3	1	4
Smallholder agroforestry	5	0	1
Total	14	22	7

The impacts of other plantation models differed by case and household, and were related to whether and when the impacts of reduced access to land valuable for local livelihoods were “compensated” by the economic benefits of the plantations [39,71,72]. Studies often reported that the use of plantation land for multiple purposes, such as agricultural crops or livestock, made up for the time lag before independent, contracted or enrolled farmers obtain benefits from the planted trees [84,88,89,104,105].

Some studies reported that plantation forest programs have increased and secured access to land for many farmers in China [106], Laos [78], Thailand [82], and Vietnam [107]. The impacts of these programs have been mixed, however, as they tend to reinforce pre-existing inequality in access to land in all these countries [67,81,82,108,109]. The net impact of the reduction of access to land because of privatisation of land for plantations depended in part on the extent of land for grazing and NTFP collection that remained accessible to land-deprived households.

3.2.4. Do Plantation Forests Change the Quantity or Quality of Social Capital of Farmers? If So, Does This Change the Capacity of Farmers to Influence Wider Institutions and Decision-Making Processes?

Seventeen of the 72 publications reviewed reported that plantation forests affected the social capital of local communities (Table 8). These were mostly negative for land concession and enrolled farmers plantation models. As with the cases reviewed above, impacts were not distributed evenly, and the most vulnerable groups often suffered the most negative impacts. For example, Srikham [98] found that the conversion of swidden fields to rubber land concessions in southern Laos led to migration of land-dispossessed farmers, and monetised social relationships within and between families in affected communities. In Vietnam, Dao [74] reported escalating gendered “conflict and violence over the control of income from rubber” (p. 1592) within families that had contributed land to plantation forests, and an increase of alcohol consumption by men. Work in the plantation forests also dismantled reciprocity systems in villages and, on occasions, led to fights between families for the most convenient working spots [75].

Negative social impacts from plantation forest programs also arose because of unequal distribution of land where smallholders could establish plantations. Consequently, in some cases, smallholders’ plantations were associated with consolidation of existing inequalities in landholding and exacerbated social differentiation. Examples of this were the introduction of acacias in Vietnam [80] and rubber [34] and teak [67,101] in Laos. In China, however, Sturgeon [70] found that the increased income that the minority ethnic groups Akha and Dai gained from rubber farming challenged negative social stereotypes about these groups.

Table 8. Overview of impacts on social capital by plantation forest models.

	Reported Impacts Mostly Positive	Reported Impacts Mostly Negative	Reported Impacts Both Positive and Negative
Land concessions	0	3	0
Enrolled farmers	0	3	1
Land purchasing program	0	1	0
Contract farming	2	0	0
Smallholder monocultures	1	3	2
Smallholder agroforestry	1	0	0
Total	4	10	3

3.2.5. Do Plantation Forests Influence Development of Local Infrastructure?

Seven publications reported negative impacts on local infrastructure of the establishment of plantation forests, four of which were land concession cases (Table 9). These case studies suggested that negative impacts relate mostly to the direct loss of pre-existing local infrastructure [73,74,103,110]. In Laos, Baird and Barney [64] reported mixed findings from a school and health care centre supported by a plantation forest company with a land concession, including a lack of qualified teachers and health providers (p. 781). Contrarily, Senties Portilla [93] reported that the construction of new roads by plantation forest companies improved trade and transport, which farmers associated with diversification of farming incomes (p. 1264).

Table 9. Overview of impacts on local infrastructure by plantation forest models.

	Reported Impacts Mostly Positive	Reported Impacts Mostly Negative	Reported Impacts Both Positive and Negative
State owned plantations	0	0	1
Land concessions	1	4	1
Enrolled farmers	0	2	0
Land purchasing program	0	1	0
Total	1	7	2

Results from other plantation forest models were mixed. In Thailand, a company removed access to existing road and irrigation infrastructure through a land purchasing program, forcing local farmers to sell their land [39]. In Myanmar, local Forest Departments sometimes allowed farmers to transform wetland areas not suitable for planting teak into rainfed paddy fields [95]. That study also reported that while schools were established in permanent plantation villages, schools in temporary plantation villages lacked enough qualified staff, leading to mixed outcomes (p. 36).

4. Discussion

4.1. The Debate about the Livelihood Impacts of Plantation Forests

Controversy about the positive and negative impacts of tree plantations on farmers and rural communities is long-standing [8,11,42,111]. Proponents and detractors of different plantation models often contribute to this debate by highlighting benefits and costs of the cases they use as evidence. Malkamäki et al. [38] systematic review offered a valuable contribution to the debate, both from a methodological perspective and in its synthesis of the impacts of the selected cases of plantation forests globally. My systematic review further informs this debate by providing evidence from forest plantation models not considered by Malkamäki et al. [38]; for example, contract farming and

smallholder plantation forests and reforestation schemes such as the National Greening Program in the Philippines [112,113], the 5 million ha reforestation program in Vietnam [58,96], and China's Conversion of Cropland to Forest Program [114]. Accordingly, while Malkamäki et al. [38] review reported that "the socio-economic impacts of large-scale tree plantations have been mostly negative" (p. 99), this review identified successful examples from all plantation forests models reviewed. This result offers a more nuanced assessment of plantation forests than some of the general critiques [11,13,42].

4.2. The Debate about Plantation Forests models

The review has also provided insights regarding the plantation models that should be promoted to most effectively improve the livelihoods of rural communities. Results demonstrate that the livelihood impacts of plantation forests are highly heterogeneous, but there are some general patterns. Overall, the results confirm the findings of earlier studies from outside the GMS region (e.g., [13,14,38,115]) that land concessions were generally detrimental to farmers because the lands that governments designated for plantation concessions were important sources of food, materials, energy, and environmental income for local people (*sensu* [116]). Further, the employment opportunities that plantation concessionaires offer, which are often seasonal, short-term, and low paid [38,117], did not compensate for such losses. One way to mitigate these negative impacts of land concessions was to designate areas only where land availability is sufficient to ensure that local livelihood uses are not displaced by concessions; Kusakabe and Ayu Chan [73] reported on a rubber land concession in Northern Laos where this was the case. Alternatively, plantation investors could improve engagement with local communities to foster better socio-economic outcomes, as reported by Dwyer et al. [94] for a land-sharing concession in Cambodia.

Another model commonly used to promote the expansion of commercial tree plantations is that of contract farming arrangements between farmers and private firms, also referred to as "out-grower" schemes [22,118]. These are perceived to address barriers to adoption, and hence increase the likelihood of success, and often bring technical and financial support to contracted farmers [119–121]. However, contract farming has been criticised for fostering unequal power relationships between farmers and companies, loss of autonomy, and elite capture due to the varied capacity of rural households to sustain contractual arrangements [21]. This leads to further land accumulation by elites [22]. Review results on the social impacts of the contract farming model are mixed and inconclusive. Barney [39] reported that tree farming is much like any other cash crop in Thailand, with potential positive economic but negative environmental impacts. Further, although contracted farmers may enjoy the advantage of access to knowledge and training through the contracting company, there is no evidence that contracted farmers receive greater economic returns than independent tree farmers [68]. Farmers might be better off by exiting contractual arrangements as better offers arrive [39] but may benefit when markets are depressed [68]. The evidence here, however, draws from only five publications that reported on contracted farmers. Consequently, it is not possible to draw firm conclusions about the impacts of contract tree farming from this review.

A third major model to promote plantation forest expansion is through independent smallholders [20,41,67]. Review results show that, if reliable markets exist, farmers can successfully develop a range of commercial tree crops [61,69,70,76,79,82,101]. However, as in many case studies of independent smallholders [67,80,85,109,122], as well as of contracted tree farmers and farmers enrolled in afforestation programs [123,124], communities are not socially homogeneous locally or regionally. This is particularly evident in the distribution of rights to land. Unequal distribution of land among households within a community restricts the opportunity for land-poor households to benefit from tree-planting, including in state-led cases, unless policies specifically address land allocation and distribution impacts.

More broadly, the mixed economic impacts of some plantation models above may also reflect the price volatility of commodities, a risk that most farmers in the Global South try to mitigate by diversifying their productive activities [125].

4.3. The Future Role of Plantation Forests Researchers

In addition to the challenges of each plantation forest model, most econometric studies highlighting the economic benefits of plantation forests did not consider the opportunity costs of pre-plantation uses or realistic labour alternatives (cf. [86,105,126]). In addition, few studies situated the economic returns for plantation participants within the participants' wider portfolio of incomes (cf. [41,76,77]). Income from participation in plantations must be considered alongside these other sources of income if a realistic appraisal is to be made of the contribution of plantation forests to rural livelihoods poverty alleviation targets (see [127]). In that context, the value of the environment to local livelihoods should be a central consideration for future studies of plantation forests replacing subsistence agriculture [86,105,128].

Such empirical and analytical gaps in research on plantation forests need to be addressed if the case for plantation forests is to be made on an informed basis. As Newby et al. [67] concluded, those promoting plantation forests in support of sustainable livelihoods need to "look beyond the woodlot" (p. 499). A multidisciplinary livelihoods approach [61,70,71,76] is an appropriate framework to recognise that even when returns from plantation forests are positive, tree plantations may not always be the best option for farmers. Similarly, farmers may be motivated to participate in plantation forest schemes primarily to secure access to land; their subsequent decisions to retain trees may depend more on prospective direct income benefits [78]. In such cases, because trees require minimal labour compared to other enterprises, farmers might still consider tree plantations to be an attractive complement to other livelihood activities. Further research in this area could help clarify the decision context within which farmers select their enterprise portfolio, as well as the opportunities to include plantation forests in that portfolio.

5. Conclusions

Few aspects of rural development have generated as much debate as plantation forests [8,11,15]. The defense of plantation forests comes mostly from those who see these systems as an opportunity to foster economic development in deprived rural areas [9,10,111]. Criticism of forest plantations comes mainly from authors who focused on large-scale plantation forests (land concessions, state forest plantations, and enrolled farmers forest plantations) that did not respect the rights of local populations [13,42]. Few farming communities in the studies reviewed here who engaged in such plantation forests considered that the enterprises brought real, lasting, livelihoods benefits. The reality of losing access to their lands was too often very different from the promise of jobs, income, and infrastructure associated with plantation development. The few positive (or neutral) examples among these plantation models, however, demonstrate that the models are not inherently at fault. Indeed, they can have benefits such as (albeit temporary) wage employment, especially if enough land was available for alternative long-term sources of livelihood.

Conversely, economic benefits for farmers that more than compensate for the costs of conversion of their land to plantation forests have been seen in models where plantation forests are owned and managed by smallholders, in contract farming plantation forests, and in land purchasing programs. Such models are much more embedded in the local economy [20]. However, the distribution of these benefits is unequal, with many of the costs of land loss disproportionately borne by the most vulnerable. This is particularly the case where land tenure arrangements were weak before the development of tree plantations.

In conclusion, as Kanowski [17] argued, plantation forests are not inherently good or bad. Some plantations have been good for local livelihoods, and others have not. Outcomes are context-dependent because local socio-economic and governance conditions shape their potential to improve local livelihoods or impact them adversely; and because plantation forests interact with pre-existing and prospective productive options for farmers. Further, although I found no references to some plantation models in all jurisdictions, it is not possible to conclude whether this is due these models being under-researched or non-existent in that jurisdiction. Exploring this issue could be a fruitful avenue for future research.

Funding: This publication benefitted from support of the FAORAP to the research project, “Understanding the impact of planted forest on smallholder livestock farmers and their livelihoods in the Greater Mekong Subregion (GMS)” that the author coordinates at the University of Sydney. This research is part of the author’s PhD candidature at the Australian National University. The author received support from the ACIAR through the Project ADP/2014/047 “Improving policies for forest plantations to balance smallholder, industry, and environmental needs in Lao PDR and Vietnam”, to which this work also contributes, and from the Fenner School of Environment and Society at the Australian National University.

Acknowledgments: I would like to thank the support of three peer PhD candidates at the Australian National University at different stages of writing this manuscript. Edwina Fingleton-Smith encouraged me to place this systematic literature review in the wider context of my PhD thesis, and shared initial ideas on the analysis and synthesis of results. Claudia Munera advised me on (software) strategies to manage efficiently the different sets of publications retrieved and retained. Richard Beggs proof-read and suggested grammatical improvements to the first complete draft of this manuscript. I would also like to thank Peter Kanowski at the ANU for his ongoing mentorship, as well as encouraging comments and constructive suggestions to improve earlier versions of this manuscript and to reflect on what this research may mean for forestry researchers and practitioners more widely. I am also grateful to four anonymous reviewers whose helpful comments and attention to detail significantly improved the final version of this manuscript.

Conflicts of Interest: I declare no conflict of interest.

Appendix A

Table A1. List of search terms in English language on Scopus, Web of Science and CAB Abstracts.

	Search String
Term/Theme 1 (Population) and	“household*” or “small-holder*” or “smallholder*” or “rural” or “local” or “community” or “farmer*” or “out-grower*” or “outgrower*” or “tree grower*” or “tree-grower*”
Term/Theme 2 (Exposure) and	“Forest* plantation*” or “plantation forest*” or “tree plant*” or “tree farm*” or “commercial plantation” or “afforestation” or “reforestation” or “monoculture” or “plantation investment” or “wood plantation” or “pulpwood” or “industrial tree plantation” or “acacia*” or “eucalypt*” or “rubber” or “teak” or “agroforest*”
Term/Theme 3 (Context) and	“Lao*” OR “Vietnam*” or “Cambodia*” or “Thai*” or “Myanmar” or “Burm*” or “Mekong” or “Yunan” or “Guangxi Zhuang” or “Southeast Asia”
Term/Theme 4 (Outcome)	“livelihood*” or “conflict*” or “effect*” or “impact*” or “well-being” or “wellbeing” or “income” or “employment” or “job*” or “subsistence” or “labor” or “labour” or “attitude” or “perception” or “poverty” or “livestock” or “benefit” or “food” or “security”

References

1. Laestadius, L.; Buckingham, K.; Maginnis, S.; Saint-Laurent, C. Before Bonn and beyond: The history and future of forest landscape restoration. *Unasylva* **2015**, *66*, 11.
2. Verdone, M.; Seidl, A. Time, space, place, and the Bonn Challenge global forest restoration target. *Restor. Ecol.* **2017**, *25*, 903–911. [CrossRef]
3. NYDF Assessment Partners. Protecting and Restoring Forests: A Story of Large Commitments Yet Limited Progress. Five-Year Assessment Report. 2019. Available online: <https://forestdeclaration.org/> (accessed on 27 October 2020).
4. World Economic Forum. One Trillion Trees—World Economic Forum Launches Plan to Help Nature and the Climate. Available online: <https://www.weforum.org/agenda/2020/01/one-trillion-trees-world-economic-forum-launches-plan-to-help-nature-and-the-climate/> (accessed on 27 October 2020).
5. Mather, A. Global Forest Resources Assessment 2000 Main Report. *Land Use Policy* **2003**, *20*, 195. [CrossRef]
6. Carle, J.B.; Duval, A.; Ashford, S. The future of planted forests. *Int. For. Rev.* **2020**, *22*, 65–80. [CrossRef]
7. Korhonen, J.; Nepal, P.; Prestemon, J.P.; Cabbage, F. Projecting global and regional outlooks for planted forests under the shared socio-economic pathways. *New For.* **2020**, 1–20. [CrossRef]

8. Christian, C.; Charlie, P.-S. *Fast-Wood Forestry: Myths and Realities*; Center for International Forestry Research (CIFOR): Bogor, Indonesia, 2003; p. 60.
9. Mayers, J. *Poverty Reduction Through Commercial Forestry: What Evidence? What Prospects? Forests Dialogue: New Haven, CT, USA*; Yale University: New Haven, CT, USA, 2006.
10. FAO. Assessment of the contribution of forestry to poverty alleviation in Asia and the Pacific. In *Making Forestry Work for the Poor*; Food and Agriculture Organization Regional Office for Asia and the Pacific: Bangkok, Thailand, 2012; p. 380.
11. Carrere, R.; Lohmann, L. *Pulping the South: Industrial Tree Plantations and the World*; Zed Books: London, UK, 1996.
12. Von Braun, J.; Meinzen-Dick, R. *Land Grabbing by Foreign Investors in Developing Countries: Risks and Opportunities*; International Food Policy Research Institute: Washington, DC, USA, 2009.
13. Gerber, J.-F. Conflicts over industrial tree plantations in the South: Who, how and why? *Glob. Environ. Chang.* **2011**, *21*, 165–176. [[CrossRef](#)]
14. Li, T.M. Transnational Farmland Investment: A Risky Business. *J. Agrar. Chang.* **2015**, *15*, 560–568. [[CrossRef](#)]
15. Kanowski, P.; Murray, H. Intensively-managed planted forests: Towards best practice, in TDF Review. In *The Forests Dialogue*; Yale University: New Haven, CT, USA, 2008.
16. Morrison, E.; Bass, S. What about the people? In *Plantation Politics: Forest Plantations in Development*; Sargent, C., Bass, S., Eds.; Earthscan Publications Ltd.: London, UK, 1992; pp. 92–120.
17. Kanowski, P. Intensively managed planted forests. In *The Forests Dialogue*; Yale University: New Haven, CT, USA, 2005; p. 8.
18. Schirmer, J. Plantations and social conflict: Exploring the differences between small-scale and large-scale plantation forestry. *Small-Scale For.* **2007**, *6*, 19–33. [[CrossRef](#)]
19. Lowder, S.K.; Scoet, J.; Raney, T. The number, size, and distribution of farms, smallholder farms, and family farms worldwide. *World Dev.* **2016**, *87*, 16–29. [[CrossRef](#)]
20. Cramb, R.; Manivong, V.; Newby, J.C.; Sothorn, K.; Sibit, P.S. Alternatives to land grabbing: Exploring conditions for smallholder inclusion in agricultural commodity chains in Southeast Asia. *J. Peasant Stud.* **2016**, *44*, 939–967. [[CrossRef](#)]
21. Smalley, R. Plantations, Contract Farming and Commercial Farming Areas in Africa: A Comparative Review. In *LACA Working Paper 55*; Future Agricultures Consortium: Brighton, UK, 2013.
22. Hall, R.; Scoones, I.; Tsikata, D. Plantations, outgrowers and commercial farming in Africa: Agricultural commercialisation and implications for agrarian change. *J. Peasant Stud.* **2017**, *44*, 515–537. [[CrossRef](#)]
23. Hazell, P.B.R. Options for African agriculture in an era of high food and energy prices. *Agric. Econ.* **2013**, *44*, 19–27. [[CrossRef](#)]
24. Bernstein, H.; Crow, B.; Johnson, H. *Rural Livelihoods: Crises and Responses*; Oxford University Press: Oxford, UK, 1992.
25. Byerlee, D. The Fall and Rise Again of Plantations in Tropical Asia: History Repeated? *Land* **2014**, *3*, 574–597. [[CrossRef](#)]
26. Agrawal, A.; Chhatre, A.; Hardin, R. Changing Governance of the World's Forests. *Science* **2008**, *320*, 1460–1462. [[CrossRef](#)] [[PubMed](#)]
27. Andersson, K.; Lawrence, D.; Zavaleta, J.; Guariguata, M.R. More Trees, More Poverty? The Socioeconomic Effects of Tree Plantations in Chile, 2001–2011. *Environ. Manag.* **2015**, *57*, 123–136. [[CrossRef](#)]
28. Pirard, R.; Petit, H.; Baral, H. Local impacts of industrial tree plantations: An empirical analysis in Indonesia across plantation types. *Land Use Policy* **2017**, *60*, 242–253. [[CrossRef](#)]
29. Degnet, M.B.; Van Der Werf, E.; Ingram, V.; Wesseler, J. Do Locals Have a Say? Community Experiences of Participation in Governing Forest Plantations in Tanzania. *Forests* **2020**, *11*, 782. [[CrossRef](#)]
30. Van Hensbergen, B. Forest Concessions—Past Present and Future? In *Forestry and Institutions Working Paper 36*; Food and Agriculture Organization: Rome, Italy, 2016; p. 76.
31. FAO; IFAD; UNCTAD; The World Bank Group. *Principles for Responsible Agricultural Investment that Respects Rights, Livelihoods and Resources: A Discussion Note Prepared by FAO, IFAD, the UNCTAD Secretariat and the World Bank Group to Contribute to an Ongoing Global Dialogue*; UN: Geneva, Switzerland, 2010; p. 8.
32. Korhonen, J.; Zhang, Y.; Toppinen, A. Examining timberland ownership and control strategies in the global forest sector. *For. Policy Econ.* **2016**, *70*, 39–46. [[CrossRef](#)]

33. Juyjaeng, C.O.; Suwanmaneepong, S. Comparison of Costs and Returns on Oil Palm Production of Member and Non-member Farmers under Large Agricultural Plot Scheme in Bang Saphan Noi District, Prachuap Khiri Khan Province. *Int. J. Agric. Technol.* **2017**, *13*, 1923–1936.
34. Baird, I.G.; Vue, P. The Ties that Bind: The Role of Hmong Social Networks in Developing Small-scale Rubber Cultivation in Laos. *Mobilities* **2015**, *12*, 136–154. [[CrossRef](#)]
35. Bissonnette, J.-F.; De Koninck, R. The return of the plantation? Historical and contemporary trends in the relation between plantations and smallholdings in Southeast Asia. *J. Peasant Stud.* **2017**, *44*, 918–938. [[CrossRef](#)]
36. Barr, C.M.; Sayer, J.A. The political economy of reforestation and forest restoration in Asia–Pacific: Critical issues for REDD+. *Biol. Conserv.* **2012**, *154*, 9–19. [[CrossRef](#)]
37. Niskanen, A. *Environmental-Economic Evaluation of Forest Plantations*; Springer Science and Business Media LLC: Berlin/Heidelberg, Germany, 1996; pp. 187–196.
38. Malkamäki, A.; D’Amato, D.; Hogarth, N.J.; Kanninen, M.; Pirard, R.; Toppinen, A.; Zhou, W. A systematic review of the socio-economic impacts of large-scale tree plantations, worldwide. *Glob. Environ. Chang.* **2018**, *53*, 90–103. [[CrossRef](#)]
39. Barney, K. Re-encountering resistance: Plantation activism and smallholder production in Thailand and Sarawak, Malaysia. *Asia Pac. Viewp.* **2004**, *45*, 325–339. [[CrossRef](#)]
40. Obidzinski, K.; Dermawan, A. Smallholder timber plantation development in Indonesia: What is preventing progress? *Int. For. Rev.* **2010**, *12*, 339–348. [[CrossRef](#)]
41. Sikor, T. Tree plantations, politics of possession and the absence of land grabs in Vietnam. *J. Peasant Stud.* **2012**, *39*, 1077–1101. [[CrossRef](#)]
42. Overbeek, W.W.; Kröger, M.M.; Gerber, J.-F.J. An Overview of Industrial Tree Plantation Conflicts in the Global South: Conflicts, Trends, and Resistance Struggles. EJOIT Report. Available online: <https://repub.eur.nl/pub/95586/> (accessed on 27 October 2020).
43. Collaboration for Environmental Evidence: Guidelines for Systematic Review and Evidence Synthesis in Environmental Management. 2013. Available online: <http://www.environmentalevidence.org/information-for-authors> (accessed on 27 October 2020).
44. Foli, S.; Reed, J.; Clendenning, J.; Petrokofsky, G.; Padoch, C.; Sunderland, T. To what extent does the presence of forests and trees contribute to food production in humid and dry forest landscapes? A systematic review protocol. *Environ. Évid.* **2014**, *3*, 15. [[CrossRef](#)]
45. Filoso, S.; Bezerra, M.O.; Weiss, K.C.B.; Palmer, M.A. Impacts of forest restoration on water yield: A systematic review. *PLoS ONE* **2017**, *12*, e0183210. [[CrossRef](#)]
46. Cook, C.N.; Possingham, H.P.; Fuller, R.A. Contribution of Systematic Reviews to Management Decisions. *Conserv. Biol.* **2013**, *27*, 902–915. [[CrossRef](#)]
47. Yasmi, Y.; Durst, P.; Haq, R. Forest Change in the Greater Mekong Subregion (GMS). In *Forest Change in the Greater Mekong Subregion (GMS)*; United Nations Publications: Bangkok, Thailand, 2018.
48. Cubbage, F.W.; Kanieski, B.; Rubilar, R.; Bussoni, A.; Olmos, V.M.; Balmelli, G.; Mac Donagh, P.; Lord, R.; Hernández, C.; Zhang, P.; et al. Global timber investments, 2005 to 2017. *For. Policy Econ.* **2020**, *112*, 102082. [[CrossRef](#)]
49. Garforth, M.; Mayers, J. *Plantations Privatization Poverty and Power: Changing Ownership and Management of State Forests*; IIED: London, UK, 2005.
50. Levall, S.; Prejer, B. *Inclusive Business and Shared Values: Case Study of Stora Enso in Lao PDR*; Swedish University of Agricultural Sciences: Uppsala, Sweden, 2013.
51. Obodai, J.; Adjei, P.O.-W.; Hamenoo, S.V.Q.; Abaitey, A.K.A. Towards household food security in Ghana: Assessment of Ghana’s expanded forest plantation programme in Asante Akim South District. *GeoJournal* **2017**, *83*, 365–380. [[CrossRef](#)]
52. De Haan, L.J. The livelihood approach: A critical exploration. *Erdkunde* **2012**, *66*, 345–357. [[CrossRef](#)]
53. Scoones, I. Sustainable rural livelihoods: A framework for analysis. In *IDS Working Paper 52*; IDS: Brighton, UK, 1998.
54. Malkamäki, A.; D’Amato, D.; Hogarth, N.J.; Kanninen, M.; Pirard, R.; Toppinen, A.; Zhou, W. The socioeconomic impacts of large-scale tree plantations on local communities: A systematic review protocol. In *The Socioeconomic Impacts of Large-Scale Tree Plantations on Local Communities: A Systematic Review Protocol*; Center for International Forestry Research (CIFOR): Bogor, Indonesia, 2017.

55. Moher, D.; Liberati, A.; Tetzlaff, J.; Altman, D.G.; Prisma Group. Preferred Reporting Items for Systematic Reviews and Meta-Analyses: The PRISMA Statement. *PLoS Med.* **2009**, *6*, e1000097. [[CrossRef](#)] [[PubMed](#)]
56. Baird, I.G.; Fox, J.M. How Land Concessions Affect Places Elsewhere: Telecoupling, Political Ecology, and Large-Scale Plantations in Southern Laos and Northeastern Cambodia. *Land* **2015**, *4*, 436–453. [[CrossRef](#)]
57. Sokhannaro, H. *Oil Palm Development in Cambodia*, in *Oil Palm Expansion in South East Asia: Trends and Implications for Local Communities and Indigenous Peoples*; Forest Peoples Programme: Marsh, UK, 2011.
58. Dang, T.K.P.; Visseren-Hamakers, I.J.; Arts, B. Forest devolution in Vietnam: From rhetoric to performance. *Land Use Policy* **2018**, *77*, 760–774. [[CrossRef](#)]
59. Bebbington, A. Capitals and Capabilities: A Framework for Analyzing Peasant Viability, Rural Livelihoods and Poverty. *World Dev.* **1999**, *27*, 2021–2044. [[CrossRef](#)]
60. Belcher, B.; Roberts, M. Assessing participatory photography as a method to understand local perspectives on environment and development in northern Lao PDR. *For. Trees Livelihoods* **2012**, *21*, 145–157. [[CrossRef](#)]
61. Viswanathan, P. Emerging smallholder rubber farming systems in India and Thailand: A comparative economic analysis. *Asian J. Agric. Dev.* **2008**, *5*, 1–19.
62. Mahanty, S.; Suich, H.; Tacconi, L. Access and benefits in payments for environmental services and implications for REDD+: Lessons from seven PES schemes. *Land Use Policy* **2013**, *31*, 38–47. [[CrossRef](#)]
63. Baird, I.G. Resistance and Contingent Contestations to Large-Scale Land Concessions in Southern Laos and Northeastern Cambodia. *Land* **2017**, *6*, 16. [[CrossRef](#)]
64. Baird, I.G.; Barney, K. The political ecology of cross-sectoral cumulative impacts: Modern landscapes, large hydropower dams and industrial tree plantations in Laos and Cambodia. *J. Peasant Stud.* **2017**, *44*, 769–795. [[CrossRef](#)]
65. Baird, I.G. Problems for the plantations: Challenges for large-scale land concessions in Laos and Cambodia. *J. Agrar. Chang.* **2019**, *20*, 387–407. [[CrossRef](#)]
66. Manivong, V.; Cramb, R. Economics of smallholder rubber expansion in Northern Laos. *Agrofor. Syst.* **2008**, *74*, 113–125. [[CrossRef](#)]
67. Newby, J.; Cramb, R.; Sakanphet, S. Forest Transitions and Rural Livelihoods: Multiple Pathways of Smallholder Teak Expansion in Northern Laos. *Land* **2014**, *3*, 482–503. [[CrossRef](#)]
68. Boulay, A.; Tacconi, L.; Kanowski, P. Financial Performance of Contract Tree Farming for Smallholders: The Case of Contract Eucalypt Tree Farming in Thailand. *Small-Scale For.* **2012**, *12*, 165–180. [[CrossRef](#)]
69. Andriess, E. A comparison of rubber smallholder livelihoods in Cambodia and Laos. *Southeast Asian Rev.* **2014**, *24*, 167–206. [[CrossRef](#)]
70. Sturgeon, J.C. Governing minorities and development in Xishuangbanna, China: Akha and Dai rubber farmers as entrepreneurs. *Geoforum* **2010**, *41*, 318–328. [[CrossRef](#)]
71. Friis, C.; Reenberg, A.; Heinemann, A.; Schoenweger, O. Changing local land systems: Implications of a Chinese rubber plantation in Nambak District, Lao PDR. *Singap. J. Trop. Geogr.* **2016**, *37*, 25–42. [[CrossRef](#)]
72. Feurer, M.; Heinemann, A.; Schneider, F.; Jurt, C.; Myint, W.; Zaehring, J.G. Local Perspectives on Ecosystem Service Trade-Offs in a Forest Frontier Landscape in Myanmar. *Land* **2019**, *8*, 45. [[CrossRef](#)]
73. Kusakabe, K.; Myae, A.C. Precarity and Vulnerability: Rubber Plantations in Northern Laos and Northern Shan State, Myanmar. *J. Contemp. Asia* **2018**, *49*, 586–601. [[CrossRef](#)]
74. Dao, N. Rubber plantations and their implications on gender roles and relations in northern uplands Vietnam. *Gend. Place Cult.* **2018**, *25*, 1579–1600. [[CrossRef](#)]
75. Dao, N. Rubber plantations in the Northwest: Rethinking the concept of land grabs in Vietnam. *J. Peasant Stud.* **2015**, *42*, 347–369. [[CrossRef](#)]
76. Chambon, B.; Ruf, F.O.; Kongmanee, C.; Anghong, S. Can the cocoa cycle model explain the continuous growth of the rubber (*Hevea brasiliensis*) sector for more than a century in Thailand? *J. Rural Stud.* **2016**, *44*, 187–197. [[CrossRef](#)]
77. Sakayarote, K.; Shrestha, R.P. Simulating land use for protecting food crop areas in northeast Thailand using GIS and Dyna-CLUE. *J. Geogr. Sci.* **2019**, *29*, 803–817. [[CrossRef](#)]
78. Midgley, S.; Blyth, M.; Mounlamai, K.; Midgley, D.; Brown, A. *Towards Improving Profitability of Teak in Integrated Smallholder Farming Systems in Northern Laos*; Australian Centre for International Agricultural Research (ACIAR): Canberra, Australia, 2007; p. 95.
79. Nguyen, T.T.; Bauer, S.; Uibrig, H. Land privatization and afforestation incentive of rural farms in the Northern Uplands of Vietnam. *For. Policy Econ.* **2010**, *12*, 518–526. [[CrossRef](#)]

80. Thulstrup, A.W. Plantation livelihoods in central Vietnam: Implications for household vulnerability and community resilience. *Nor. Geogr. Tidsskr. Nor. J. Geogr.* **2014**, *68*, 1–9. [[CrossRef](#)]
81. Darr, D.; Uibrig, H. Promotion of Farm Forestry in Laos Enhances Creation of Individual Land Property. *Asia-Pac. J. Rural Dev.* **2004**, *14*, 39–51. [[CrossRef](#)]
82. Thongyou, M. Rubber Cash Crop and Changes in Livelihoods Strategies in a Village in Northeastern Thailand. *Asian Soc. Sci.* **2014**, *10*, 239–251. [[CrossRef](#)]
83. Arvola, A.; Anttila, J.-P.; Hogarth, N. By accident or by design? Influence of government policies on drivers and barriers of smallholder teak growing in Lao PDR. *For. Trees Livelihoods* **2018**, *28*, 34–51. [[CrossRef](#)]
84. Min, S.; Huang, J.; Bai, J.; Waibel, H. Adoption of intercropping among smallholder rubber farmers in Xishuangbanna, China. *Int. J. Agric. Sustain.* **2017**, *15*, 223–237. [[CrossRef](#)]
85. Fu, Y.; Brookfield, H.; Guo, H.; Chen, J.; Chen, A.; Cui, J. Smallholder rubber plantation expansion and its impact on local livelihoods, land use and agrobiodiversity, a case study from Daka, Xishuangbanna, southwestern China. *Int. J. Sustain. Dev. World Ecol.* **2009**, *16*, 22–29. [[CrossRef](#)]
86. Hoang, L.T.; Roshetko, J.M.; Huu, T.P.; Pagella, T.; Mai, P.N. Agroforestry—The Most Resilient Farming System for the Hilly Northwest of Vietnam. *Int. J. Agric. Syst.* **2017**, *5*, 1–23. [[CrossRef](#)]
87. Somboonsuke, B.; Wetayaprasit, P.; Chernchom, P.; Pacheerat, K. Diversification of Smallholding Rubber Agroforestry System (SRAS) Thailand. *Kasetsart J. Soc. Sci.* **2011**, *56*, 327–339.
88. Longpichai, O.; Perret, S.R.; Shivakoti, G.P. Role of Livelihood Capital in Shaping the Farming Strategies and Outcomes of Smallholder Rubber Producers in Southern Thailand. *Outlook Agric.* **2012**, *41*, 117–124. [[CrossRef](#)]
89. Kittitornkool, J.; Kaewwongsri, P.; Tongkam, P.; Bumrungsri, S.; Sawangchote, P. Livelihoods of small-scale rubber farmers: A comparative study of rubber agroforestry systems and monocropping rubber plots in Southern Thailand. *Kasetsart J. Soc. Sci.* **2019**, *40*, 420–426.
90. Jongrungrot, V.; Thungwa, S.; Snoeck, D. Tree-crop diversification in rubber plantations to diversify sources of income for small-scale rubber farmers in Southern Thailand. *Bois Forets Des Trop.* **2014**, *321*, 21. [[CrossRef](#)]
91. Meksawi, S.; Tangtrakulwanich, B.; Chongsuvivatwong, V. Musculoskeletal problems and ergonomic risk assessment in rubber tappers: A community-based study in southern Thailand. *Int. J. Ind. Ergon.* **2012**, *42*, 129–135. [[CrossRef](#)]
92. Souphonphacdy, D.; Yabe, M.; Sato, G. Impact of rubber concession on rural livelihood in Champasack Province, Lao PDR. *J. Fac. Agric.* **2012**, *57*, 339–344.
93. Portilla, G.S. Land concessions and rural youth in Southern Laos. *J. Peasant Stud.* **2017**, *44*, 1255–1274. [[CrossRef](#)]
94. Dwyer, M.B.; Polack, E.; So, S. 'Better-practice' Concessions? Some Lessons from Cambodia's Leopard Skin Landscape. *Rev. Int. Polit. Dév.* **2015**, *6*. [[CrossRef](#)]
95. Maung, T.M.; Yamamoto, M. Exploring the Socio-Economic Situation of Plantation Villagers: A Case Study in Myanmar Bago Yoma. *Small Scale For.* **2008**, *7*, 29–48. [[CrossRef](#)]
96. McElwee, P. Reforesting "Bare Hills" in Vietnam: Social and Environmental Consequences of the 5 Million Hectare Reforestation Program. *Ambio* **2009**, *38*, 325–333. [[CrossRef](#)] [[PubMed](#)]
97. Beckman, M.; Nguyen, M.V.T. Upland development, climate-related risk and institutional conditions for adaptation in Vietnam. *Clim. Dev.* **2015**, *8*, 413–422. [[CrossRef](#)]
98. Srikham, W. The effects of commercial agriculture and swidden-field privatization in southern Laos. In *Shifting Cultivation Policies: Balancing Environmental and Social Sustainability*; Centre for Agriculture and Bioscience International: Wallingford, UK, 2017; pp. 636–648.
99. Nippanon, P.; Sriruacha, C.; Tantriratna, P.; Phajan, T.; Suwannaphant, K.; Laohasiriwong, W. Chemical Pesticide Use and Quality of Life of Rubber Farmers in the Northeast of Thailand. *Kathmandu Univ. Med. J.* **2019**, *17*, 3–8.
100. Pattanasin, S.; Satitvipawee, P.; Wongklang, W.; Viwatwongkasem, C.; Bhumiratana, A.; Soontornpipit, P.; Jareinpituk, S. Risk factors for malaria infection among rubber tappers living in a malaria control program area in southern Thailand. *Southeast Asian J. Trop. Med. Public Heal.* **2012**, *43*, 1313–1325.
101. Newby, J.; Cramb, R.A.; Sakanphet, S.; McNamara, S. Smallholder Teak and Agrarian Change in Northern Laos. *Small Scale For.* **2011**, *11*, 27–46. [[CrossRef](#)]

102. Yamanoshita, M.Y.; Amano, M. Capability development of local communities for project sustainability in afforestation/reforestation clean development mechanism. *Mitig. Adapt. Strat. Glob. Chang.* **2011**, *17*, 425–440. [[CrossRef](#)]
103. Kenney-Lazar, M. Plantation rubber, land grabbing and social-property transformation in southern Laos. *J. Peasant Stud.* **2012**, *39*, 1017–1037. [[CrossRef](#)]
104. Hlaing, Z.C.; Kamiyama, C.; Saito, O. Interaction between Rural People’s Basic Needs and Forest Products: A Case Study of the Katha District of Myanmar. *Int. J. For. Res.* **2017**, *2017*, 1–18. [[CrossRef](#)]
105. Van Thang, H.; Van Do, T.; Kozan, O.; Catacutan, D.C. Cost-benefit analysis for agroforestry systems in Vietnam. *Asian J. Agric. Ext. Econ. Sociol.* **2015**, *5*, 158–165. [[CrossRef](#)]
106. He, J.; Lang, R.; Xu, J. Local Dynamics Driving Forest Transition: Insights from Upland Villages in Southwest China. *Forests* **2014**, *5*, 214–233. [[CrossRef](#)]
107. Thulstrup, A.W. Livelihood Resilience and Adaptive Capacity: Tracing Changes in Household Access to Capital in Central Vietnam. *World Dev.* **2015**, *74*, 352–362. [[CrossRef](#)]
108. Sikor, T.; Baggio, J.A. Can Smallholders Engage in Tree Plantations? An Entitlements Analysis from Vietnam. *World Dev.* **2014**, *64*, S101–S112. [[CrossRef](#)]
109. Xu, Y.N. Land grabbing by villagers? Insights from intimate land grabbing in the rise of industrial tree plantation sector in Guangxi, China. *Geoforum* **2018**, *96*, 141–149. [[CrossRef](#)]
110. Bues, A. *Increasing Pressure for Land-Implications for Rural Livelihoods in Developing Countries: The Case of Cambodia*; Welthungerhilfe: Bonn, Germany, 2011.
111. Midgley, S.J.; Stevens, P.R.; Arnold, R.J. Hidden assets: Asia’s smallholder wood resources and their contribution to supply chains of commercial wood. *Aust. For.* **2017**, *80*, 10–25. [[CrossRef](#)]
112. Ranada, P. *Aquino Admin Reforestation Program Expanded Until 2028*; Rappler: Pasig, Philippines, 2015.
113. Israel, D. Taking stock of the National Greening Program six years hence. In *Policy Notes (2016–2026)*; Philippine Institute for Development Studies: Quezon City, Philippines, 2016.
114. Bennett, M.T.; Xie, C.; Hogarth, N.; Peng, D.; Putzel, L. China’s Conversion of Cropland to Forest Program for Household Delivery of Ecosystem Services: How Important is a Local Implementation Regime to Survival Rate Outcomes? *Forests* **2014**, *5*, 2345–2376. [[CrossRef](#)]
115. Reyes, R.; Nelson, H. A tale of two forests: Why forests and forest conflicts are both growing in Chile. *Int. For. Rev.* **2014**, *16*, 379–388. [[CrossRef](#)]
116. Sjaastad, E.; Angelsen, A.; Vedeld, P.; Bojő, J. What is environmental income? *Ecol. Econ.* **2005**, *55*, 37–46. [[CrossRef](#)]
117. Bleyer, M.; Kniivilä, M.; Horne, P.; Siteo, A.; Falcão, M.P. Socio-economic impacts of private land use investment on rural communities: Industrial forest plantations in Niassa, Mozambique. *Land Use Policy* **2016**, *51*, 281–289. [[CrossRef](#)]
118. Ton, G.; Vellema, W.; Desiere, S.; Weituschat, S.; D’Haese, M. Contract farming for improving smallholder incomes: What can we learn from effectiveness studies? *World Dev.* **2018**, *104*, 46–64. [[CrossRef](#)]
119. Nawir, A.A.; Kassa, H.; Sandewall, M.; Dore, D.; Campbell, B.; Ohlsson, B.; Bekele, M. Stimulating smallholder tree planting-lessons from Africa and Asia. *Unasylva* **2007**, *58*, 53.
120. FAO. From Land Grab to Win-Win-Seizing the Opportunities of International Investments in Agriculture, in Economic and Social Perspectives. In *Policy Brief 4*; Economic and Social Development Department of the Food and Agriculture Organization of the United Nations (FAO): Rome, Italy, 2009; p. 4.
121. IFC. Working with Smallholders: A Handbook for Firms Building Sustainable Supply Chains. In *IFC Sustainable Business Advisory*; World Bank Group: Washington, DC, USA, 2013.
122. Filipinski, M.J.; Van Asselt, J.; Nischan, U.; Belton, B.; Htoo, K.; Win, M.T.; Hein, A.; Kham, L.S.; Naing, Z.M.; Payongayong, E.; et al. *Rural Livelihoods in Mon State: Evidence from a Representative Household Survey*; International Food Policy Research Institute: Washington, DC, USA, 2017.
123. Clement, F.; Amezaga, J.M. Linking reforestation policies with land use change in northern Vietnam: Why local factors matter. *Geoforum* **2008**, *39*, 265–277. [[CrossRef](#)]
124. Clement, F.; Amezaga, J.M. Afforestation and forestry land allocation in northern Vietnam: Analysing the gap between policy intentions and outcomes. *Land Use Policy* **2009**, *26*, 458–470. [[CrossRef](#)]
125. Schroth, G.; Ruf, F. Farmer strategies for tree crop diversification in the humid tropics. A review. *Agron. Sustain. Dev.* **2013**, *34*, 139–154. [[CrossRef](#)]

126. Ubukata, F.; Takeda, S.; Watanabe, H.; Jamroenprucksas, M. *The Profitability of Eucalyptus Farm Forest in Northeast Thailand*; Forest Research; Kyoto University: Kyoto, Japan, 1998; pp. 35–42.
127. Simo, A.V.D.M.; Kanowski, P.; Barney, K. Economic returns to households participating in different models of commercial tree plantations in Lao PDR. *Int. For. Rev.* **2020**, *22*, 132–152. [[CrossRef](#)]
128. Simo, A.V.D.M.; Kanowski, P.; Barney, K. Revealing environmental income in rural livelihoods: Evidence from four villages in Lao PDR. *For. Trees Livelihoods* **2018**, *28*, 16–33. [[CrossRef](#)]

Publisher’s Note: MDPI stays neutral with regard to jurisdictional claims in published maps and institutional affiliations.



© 2020 by the author. Licensee MDPI, Basel, Switzerland. This article is an open access article distributed under the terms and conditions of the Creative Commons Attribution (CC BY) license (<http://creativecommons.org/licenses/by/4.0/>).

Part 2

Three published papers are presented in this part of the thesis. Together they contribute to the rural policy debate in Lao PDR by exploring the role of tree plantations in contributing to local livelihoods. Chapter 3¹ investigates the economic value to Lao farmers of the “degraded” forestlands and reveals that this value is higher than commonly assumed. With this background, Chapter 4 reports the projected and realised economic benefits of rural households participating in four different tree plantation models implemented in Lao PDR. The chapter also presents the results of a hypothetical model under both ‘land shortage’ and ‘no land shortage’ scenarios. The relatively high returns from the independent smallholder model demonstrate that farmers can successfully grow trees independently where markets are strong, and that agroforestry systems such as that used in the case study village are a plausible model to promote tree plantations because of the intermediate returns they generate. This case, however, also illustrates some of the limitations of independent smallholder growing, particularly, the limited market for yang bong bark as reflected in a decreasing market price. The chapter includes an analysis of alternative market opportunities and the dynamic livelihood strategies of farmers in the context of customary land tenure. Results suggests that, unless wider land use and distribution policies specifically address ongoing forest conversion and unequal land distribution, the expansion of agricultural plantation crops is likely to exacerbate social inequality, further diminish the safety net represented by ‘common’ ‘degraded’ forest lands, and undermine prospects for realising national forest cover goals.

⁸ The following typographical and grammatical errors were identified after publication of this paper: 1) the third sentence of the second paragraph of page 19 of the paper starts should have included “Foppes and Samontry (2010)” before “estimated”; 2) in page 25 of the paper, the last sentence of the first paragraph of section ‘Environmental income and its significance for livelihoods’ says that Ban Xepon was the village with the least annual household environmental income. However, the correct name of the village here should have been Ban Nong (and not Ban Xepon).

Chapter 3: Revealing environmental income in rural livelihoods: evidence from four villages in Lao PDR

Chapter 4: Financial contribution to households from different models of commercial tree plantations in Lao PDR

Chapter 5: The role of agroforestry in swidden transitions: a case study in the context of customary land tenure in Central Lao PDR



The role of agroforestry in swidden transitions: a case study in the context of customary land tenure in Central Lao PDR

Alex van der Meer Simo · Peter Kanowski · Keith Barney

Received: 21 October 2019 / Accepted: 11 June 2020 / Published online: 18 June 2020
© Springer Nature B.V. 2020

Abstract Agroforestry has been promoted as a promising model of rural development in Lao PDR (Laos), where much upland land use is in transition. Relatively little is known about the contributions of agroforestry systems to Lao farmers' livelihoods, how these systems compare to alternatives, or the extent to which they might contribute to the national policy objective of replacing swidden agriculture. The consequences of customary land tenure for such transitions in Laos are also poorly understood. We investigated independent adoption by farmers in a Central Lao village of an agroforestry system that combines 'yang bong' (*Persea kurzii*) trees on 7-year rotations with intercrops of rice and bananas. The returns to land from this agroforestry system were more financially rewarding for farming households than swidden cultivation, demonstrating that farmers can develop land use intensification pathways that replace swidden cultivation. However, case study farmers anticipated further expansion of banana monocrops rather of agroforestry systems. In addition, the adoption of the agroforestry system has fostered wealth differentiation in the case study village, reflecting both prior and emerging inequities in the customary land tenure system. Our results indicate that it is important to closely understand the institutional

and livelihood contexts of agroforestry systems, to better appreciate their role and potential in supporting sustainable land use transitions. In this case study, the intersection of customary land use practices, national policy goals and land allocation policies, new market opportunities, and farmers' dynamic livelihood strategies, both define and constrain the contribution of agroforestry to land use transitions.

Keywords Agroforestry · Land-use intensification · Laos · Livelihoods · *Persea kurzii* · Swidden

Introduction

Agroforestry systems can integrate agriculture, conservation, forestry and food security objectives (Lambin and Meyfroidt 2010; Lasco et al. 2014; van Noordwijk et al. 2018). Because agroforestry systems, in their many forms, are often locally well-adapted (Raintree and Warner 1986) and can be profitable for smallholders under favourable conditions (Byron 2001; Sandewall et al. 2015), they represent an alternative model of rural development to larger-scale and more top-down approaches, such as corporate plantation concessions (Cramb et al. 2017). Accordingly, agroforestry systems have been widely promoted to improve farmers' livelihoods (Thorlakson and Neufeldt 2012; van Noordwijk et al. 2011),

A. van der Meer Simo (✉) · P. Kanowski · K. Barney
Australian National University Fenner School of
Environment and Society, Canberra, ACT, Australia
e-mail: alex.vandermeer@anu.edu.au

particularly “in the search for solutions to the ‘problems’ of shifting cultivation” (Raintree and Warner 1986, p 40). However, agroforestry systems also face constraints. They may be less profitable than more intense monocropping agricultural systems, at least in the short term (Feintrenie et al. 2010; Pfund et al. 2011). Smallholders may lack the capital or incentives to adopt agroforestry systems (Rahman et al. 2017). In particular situations, there may be adverse social (Schroeder 1999) or environmental (Angelsen and Kaimowitz 2004; Otsuka et al. 2000) impacts associated with adoption.

In Lao PDR (hereafter, Laos), numerous studies have highlighted the relative socio-economic and environmental merits of smallholder tree growing, and recommended it as a more promising approach to rural development than the widespread adoption of plantation concessions (He and Martin 2015; Kameda and Nawata 2017; Manivong and Cramb 2008; Matsuo et al. 2016). This literature emphasizes the potential economic and ecological benefits of agroforestry systems (Alton et al. 2005; Newby et al. 2014; Openshaw and Trethewie 2006), particularly when they include native tree species (e.g. Matsuo et al. 2016; Miyazawa et al. 2014). However, other than from work reported by Newby et al. (2012, 2014) on teak (*Tectona grandis*), little is known about the contribution of these systems to the livelihood incomes of Lao farmers, or of their complex social and environmental impacts. We address this knowledge gap by investigating the following questions:

1. What are the relative contributions of agroforestry, swidden, and investor-led plantations to farmer livelihoods and household incomes in the case study village?
2. How do farming households perceive the future of different land use and cropping systems in their village?
3. How do the policy and institutional contexts in which households operate shape their land use choices, and the associated livelihood outcomes?

We operationalise these questions through a primary community case study approach, that focused on understanding farmer-led tree-based transformation of swidden cultivation, in a landscape also being reshaped by investor-led plantations.

Key contexts

Land use and access in Laos

Since the early 1990s, the Government of Laos (GoL) has sought to reconcile national objectives of economic development and environmental conservation through a series of participatory land use planning (PLUP) policies and programs. The background, rationale and specific objectives of these programs in Laos are described by Barney (2006) and Suhardiman et al. (2019). Briefly, they involve the mapping of land use zones and allocation of use rights, defining the socioeconomic activities that may occur in a specific area (Lestrelin et al. 2012). The underlying logic has typically been to separate community from state land, and agricultural from forest land, and reserve state forestland for national forest management and conservation objectives (see Vandergeest 2003). In Laos, state forestlands are typically classified into five categories: protection, conservation, production, regeneration, and degraded forests (National Assembly of the Lao People’s Democratic Republic 2019). At the village scale, the GoL may allocate ‘local use’ forests to be managed for community timber and non-timber forest product (NTFP) collection, according to Village Land and Forest Allocation Plans (Rock et al. 2015). However, these legal spatial categories represent how administrators assert these forestlands should be used, rather than how they may be used in practice (Suhardiman et al. 2019).

Concurrent to various land use planning programs, and as part of market-based economic reforms developed in the 1980s (Stuart-Fox 2005), the GoL has sought over the last 15 years to promote the commercialisation of agriculture, thereby ‘turning land into capital’ (Baird 2011; Dwyer 2007). Government agencies in Laos (Ministry of Agriculture and Forestry 2010), as across the Southeast Asian region (Dressler et al. 2017; Fox et al. 2009), have long sought to curtail swidden cultivation, which is often depicted, and mischaracterised as a major driver of deforestation and rural poverty (Cairns 2015; Robichaud et al. 2009; Seidenberg et al. 2003). Policy responses to the practice of swidden have included granting of state land concessions over fallow lands (Schönweger 2012) and promoting land registration for individual households (Hirsch 2011; Rock et al. 2015). However, definitions of which fallow lands might be allocated

for concessions are imprecise, and do not account for their livelihood or cultural values (see National Assembly of the Lao People’s Democratic Republic 2019); and the allocation to concessions of fallow lands in one location can lead swidden farmers to open up new land or intensify swidden cultivation elsewhere (Baird and Fox 2015). Further, formal land registration remains limited because systematic land titling has yet to take place in most rural areas, where access to land remains governed predominantly by customary land tenure arrangements (Suhardiman et al. 2019). Under such informal arrangements, which are not legally recognized by the GoL, ‘forestland’ in many locations has been claimed from the commons for private household use, a process known locally as “*chap chong*” (see Kenney-Lazar 2018). Under *chap chong*, villagers who first clear a plot¹ or otherwise claim forestland commons are generally able to secure² it for future use, after agreement from other villagers, if no other villager had previously asserted such claims.³ In periods when a *chap chong* plot is not used or cultivated, other villagers can generally graze livestock, hunt wildlife, collect dead wood, or gather NTFPs on that land (Barney and van der Meer Simo 2019). However, the rights to cultivate permanent crops (including planted trees), or to lease, sell or bequeath *chap chong* land remain with the customary owner (see also Ducourtieux et al. 2005).⁴ *Chap chong* practices seem to have expanded and accelerated in recent years, as the land frontier in upland Laos has closed, and as forest commons and fallows acquired market value (Friis and Nielsen 2016; Lund 2011). These practices now have the potential to exacerbate inequalities in resource access between households, and introduce new livelihood constraints for households whose access to land is now limited. Similarly, poorer households whose livelihoods are most dependent on forest fallows and commons may be disadvantaged, and unable to realise their subsistence

¹ The term ‘plot’ is widely used in Laos to refer to a parcel of land allocated to or used by a smallholder farmer (see Ducourtieux et al. 2005; Friis and Nielsen 2016; Kenney-Lazar 2012).

² Hereafter we use the term ‘own’ to recognise that this claim is generally not challenged within the village.

³ *Chap chong* rules are both varied and contested across and within communities in Laos.

⁴ We note similarities of *chap chong* in Laos with customary land rights in Malaysia, as reported by Cramb and Wills (1990).

needs, as forests that were previously treated as negotiated commons become privatised through the establishment of permanent crops based on *chap chong* claims (Barney and van der Meer Simo 2019). Thus, the complex and fluid institutions of customary tenure, overlain with the introduction of formal tenure, provide a critical context for land use systems, including agroforestry, in rural transitions in Laos.

The role of agroforestry in rural transitions in Laos

The Lao 2011–2020 Agricultural Development Strategy (Ministry of Agriculture and Forestry 2010) acknowledged the role of agroforestry in fostering farming diversification in support of improved nutrition and food security, particularly for upland farmers. Additionally, agroforestry was identified as contributing to halting upland deforestation, through payments for environmental services and adoption of “ecosystem-friendly agroforestry farming systems” (p 30). Agroforestry has likewise been identified as a plausible alternative to swidden cultivation in many studies, including those of smallholder rubber and teak tree growing (Alton et al. 2005; Arvola et al. 2019; Newby et al. 2014) and of some commercial forest plantation concessions (e.g. Phimmavong et al. 2019). These studies highlight the important role of agroforestry in replacing swidden cultivation, which, despite pressures and rhetoric to the contrary, remains central to the livelihoods of many rural Lao people (Pfund et al. 2011; van der Meer Simo et al. 2019).

Returns from smallholder tree growing in Laos

Tree plantations in Laos are established by both corporate (Phimmavong et al. 2009) and smallholder growers (Smith et al. 2017). Smallholder teak plantations are the most studied in Laos. Here, teak stands act as ‘bank accounts’ that smallholders can sell in times of need, and which support domestic and export value chains (Midgley et al. 2017). Newby et al. (2012) showed that the promotion of farmer teak plantings can accelerate processes of agrarian differentiation, with most economic benefits captured by a small group of better-off farmers and urban-based landholders (see also Hansen et al. 2007), while most of those with the greatest dependence on swidden agriculture became worse off through declining access to land. Newby et al. (2014) also noted that land-constrained

smallholders who adopted teak risked disadvantage unless they rented land from others to grow cash crops and upland rice while their teak trees matured.

Rubber is another well-studied smallholder tree crop in Laos. Manivong and Cramb (2008) showed that the daily returns to labour for rubber smallholders were higher than local non-farm wages, confirming the attraction of rubber cultivation for farmers. Comparatively high returns to land and labour catalysed the expansion of smallholder rubber plantations in northern Laos. Despite subsequent major declines in factory-gate prices of rubber (Shi 2008, 2015), tapping rubber has continued to be beneficial for smallholders who use household labour (Vongvisouk and Dwyer 2016). Studies of rubber cropping in Laos, as elsewhere (e.g. Indonesia: Ekadinata and Vincent 2011; Feintrenie et al. 2010), have also highlighted the importance to livelihoods of farmers retaining land ownership or rights, thus providing the option to convert to other crops if returns are low (Shi 2015; Vongvisouk and Dwyer 2016).

Studies of financial returns to smallholders from other tree crops in Laos are sparse. Van der Meer Simo et al. (2020) present returns from smallholder participation in different models of eucalypt growing; their results indicate that without intercropping by farmers, the returns to households are generally less than those from swidden agriculture (see also Phimmavong et al. 2019).⁵ Pandey's (2014) study of returns along yang bong (*Persea kurzii*)⁶ aromatic bark value chains in Laos found that yang bong plantations have been an important source of income for their smallholder growers, but did not address the potential income opportunities for growers from alternative crops, or their social and economic decision contexts. In the case of the Asian Development Bank's Industrial Tree Plantation Program in Laos (1993–2001), project-identified Lao farmers were provided with subsidized credit and technical support to establish smallholder eucalyptus plantations. However, the projected tree growth rates and smallholder returns

were not realized, and many participating households were left deeply in debt (Barney 2008). These examples illustrate how policy, institutional and market factors interact to create a complex environment for smallholder tree growers in Laos.

Methods

Case study site

This paper drew on research undertaken in Ban Xepon (a pseudonym), an ethnic Phu-Tai village (71 households, approx. population 355) located along the Route 9 East–West Corridor, a few kilometres from the Lao–Vietnam border in Xepon district, Savannakhet Province, Central Laos (Fig. 1). The village was identified through a larger collaborative research project,⁷ as one where smallholder adoption of tree growing had occurred independent of tree plantation companies. The Head of the Xepon District Agriculture and Forestry Office (DAFO) explained that most households in Ban Xepon had established yang bong (*Persea kurzii*) trees in an independently-developed agroforestry system that combines the trees on 7-year rotations with intercrops of rice (year 1) and bananas (years 2–5) (see also Pandey 2014). He also explained to the lead author that, at the end of each rotation, households harvest the yang bong trees down to the stumps, sell the bark to Vietnamese traders, keep most of the remaining wood for household fuelwood consumption, and again cultivate rice during the first year of the next coppice cycle.

A PLUP led by the District Office of Natural Resources and Environment (DONRE) in 2012 established the different official land use zones in Ban Xepon (Fig. 2). 'Village Use Forest', i.e. local production forests, was the most extensive forest category, occupying over 50% of the village area. Nearly the entire Village Use Forest area was comprised of smallholder yang bong tree plantations and rotational upland swidden fallow plots managed under *chap chong*.

⁵ Phimmavong et al. (2019) report returns for plantation companies in which smallholders provided labour.

⁶ 'Bong' bark is harvested from a number of tree species in Laos, and common names may refer to several species: e.g. 'yang bong' is also harvested from *Nothalphoebe umbelliflora*. Trees are grown primarily for their aromatic bark (viz. polyphenolic lignin), which is processed into incense sticks.

⁷ Australian Centre for International Agricultural Research Project ADP/2014/047, which investigated different models of tree plantation development in Laos (see van der Meer Simo et al. 2020).



Fig. 1 Indicative location of Ban Xepon

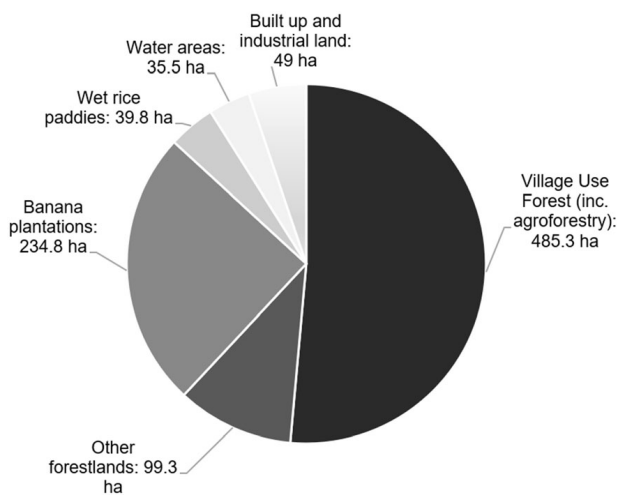


Fig. 2 Land use types in Ban Xepon (Source: DONRE, 2012); total village 933.7 ha

Data collection

Fieldwork was conducted in Ban Xepon between September and October 2016, by the lead author and two Lao research assistants (hereafter the ‘fieldwork team’). The lead author speaks Lao at an intermediate level; the two research assistants are fluent in both Lao and English. The team benefitted from the joint experience of four months of related rural fieldwork, prior to beginning this case study. Fieldwork began with the Village Deputy Head assisting in classifying

each household into one of three wealth categories, following (Cramb et al. 2004): poor, middle and wealthier, based on the ownership of a range of productive (e.g. land, livestock) and other assets (e.g. houses, vehicles). A wealth-based stratified random sampling of 25 households was then conducted following the approach adopted by Newby et al. (2012)⁸; five, thirteen and seven of the sampled households were classified as “poor”, “middle” and “wealthier”, respectively. One household (classified as “wealthier”) withdrew from the study during data collection. All sampled households own *chap chong* land, although the area each owned varied (see Results). Twenty-one of the participating households grew yang bong.

A mixed methods approach was employed to collect data on the livelihoods of sampled households (Table 1). Semi-structured interviews with government and village officials were used to establish their perspectives on the land use planning and agroforestry adoption processes. Household incomes in the village and the relative contributions of agroforestry, swidden, and investor-led plantations (Research Question 1) were estimated from a household questionnaire survey, NTFP collection diaries, and measures of

⁸ The mean household income of “poor”, “middle” and “wealthier” households was US\$3169, \$6285 and \$9408 respectively (2016 data).

Table 1 Summary of research methods, data sources and their thematic coverage

Research method	Date sources	Themes addressed
Semi-structured interviews	2 district government officers 2 village authorities	Agroforestry system history and components; village land use planning (PLUP) 2012
Household questionnaire survey	24 households	Household demographics, income sources, expenditure, livelihoods assets, rice grown, bought, sold, consumed, and borrowed over the course of a year, engagement with main land use systems
NTFP collection diaries and fuelwood substitution activities	13 households	Environmental income
Photo elicitation	11 households	Household livelihoods assets, NTFP collection
Focus group discussions	4 groups with members of 21–24 households	Village history, village resources distribution, uses and access, agroforestry and monoculture banana systems inputs and costs
Participant observation, village walks and informal conversations with the use of participatory maps from focus group discussion	Village informants	Livelihood strategies, land assets, access and use of resources, perceived positive and negative changes of well-being, personal and community issues

For methodological details, see van der Meer Simo et al. (2019)

fuelwood and rice consumption. The household survey was administered as a semi-structured questionnaire on household demographics, income sources, expenditure, livelihoods assets, and perceptions of well-being (van der Meer Simo et al. 2019). It included questions about the attitude of households to the further expansion of the three principal land use systems (Research Question 2). Thirteen of the sampled households agreed to complete daily NTFP collection diaries and fuelwood substitution activities over a two-week period. Diaries recorded the products collected, the quantity taken, the location of collection, and whether these products were consumed within the household, given to other households, or sold. Fuelwood consumption was estimated by giving the 13 diary-keeping households a cook stove and two bags of charcoal and recording the number of days until all the charcoal was consumed (van der Meer Simo et al. 2019). Environmental income⁹ was estimated from diaries and fuelwood consumption, and allowed characterisation of household livelihood

strategies and total annual livelihood incomes (both cash and subsistence sources; van der Meer Simo et al. (2019)).¹⁰ Individuals from the other 11 households agreed to take pictures of assets they considered as important for their livelihoods ('photo elicitation') (Belcher and Roberts 2012). This proved to be an insightful way to validate and enrich the information collected through the household survey questionnaires. Data on input costs and returns of the yang bong agroforestry system were validated through a group discussion with members of the 21 households growing yang bong, each of which owned at least one yang bong plot that had completed a 7-year cycle. Qualitative data from semi-structured interviews, focus group discussions, and participatory mapping were used to explore the policy and institutional contexts in which households operate (Research

⁹ Following Sjaastad et al. (2005), 'environmental income' is defined as "rent captured through alienation or consumption of natural capital within the first link in a market chain" (p 45). See also van der Meer Simo et al. (2019).

¹⁰ The absolute annual household environmental income (cash and subsistence) estimated in this study was within the range of that calculated in three other villages in Laos that were sampled in different periods throughout the year (van der Meer Simo et al. 2019). The proportion of annual household income derived as 'environmental income' (24%) is consistent with that reported by Angelsen et al. (2014), who found environmental income accounted for 22% of the total income of rural Asian households.

Question 3). The fieldwork team's extended presence in the village over seven weeks, allowed for visits to and walks through farmers' land, which assisted in triangulation of survey results and quantification of land use changes since the village PLUP in 2012.

Data analysis and definitions of livelihood strategies

During the course of fieldwork, data were recorded, pre-analysed and reflected upon iteratively by the research team. This allowed the identification of emerging patterns and data gaps, and the strategic use of research instruments to fill in these gaps. After fieldwork was completed, all quantitative data were entered in Excel tables for initial calculations, following the definitions below. Subsequently, these data were transferred to SPSS (IBM SPSS Statistics v24) for analysis.

We follow Barrett et al. (2001) and Martin and Lorenzen (2016) in distinguishing three broad livelihood strategies, comprising on-farm, off-farm, and non-farm activities. On-farm income derives from the combination of “activities on one's own property (e.g. land); regardless of sectoral or functional classification (Barrett et al. 2001, p 319)”. Off-farm income derives from agricultural and natural capital-based activities “undertaken away from one's own property (Barrett et al. 2001, p 319)”. Examples include agricultural wage labour, such as working in a plantation concession or someone else's land, or environmental income from forestlands (Angelsen et al. 2014). Income from the consumption or sale of livestock owned by households is included in the off-farm income category because the village livestock are free-ranging, and grasses and fodder for livestock are usually considered as accessible to all in the village. Non-farm income derives from “activities outside the agricultural sector, regardless of location or function” (Barrett et al. 2001, p 319), including from processing, transporting or trading of unprocessed farm products. Following Angelsen et al. (2014), incomes comprise both cash and in-kind earnings of households. All costs and incomes were reported in Laotian Kip (LAK) and converted to US\$ at the then exchange rate of \$1 to LAK 8112.

Returns from different land use systems

Net Present Values (NPV) per ha from agroforestry and household land leases for banana monoculture plantations¹¹ were calculated for 7 and 5-year periods respectively, at a discount rate of 12% (the lending rate of the Agriculture Promotion Bank of Laos at the time of fieldwork). The 7-year period corresponds to the production cycle for yang bong bark, which is harvested at year 7. This cycle also includes intercrops of rice (year 1) and bananas (years 2–5), and the use of yang bong wood for household fuelwood consumption (year 7). The 5-year period represents the typical plantation lease period in the village. Opportunity costs associated with converting swidden land to either of these two uses were estimated at \$223/ha/year,¹² on the basis of research in a nearby village (van der Meer Simo et al. 2019). The returns to labour from these two land use systems were calculated by dividing their respective NPV by the average number of days per ha that sampled households worked in each over the life of the plantation. Pandey's (2014) study found that households spend an average of 471 days/ha to prepare land and manage yang bong agroforestry plantations over a full 7-year plantation cycle; and an average of 28 days/ha to slash, burn, unload trunks, and (sometimes) burn land a second time in preparation for banana plantation establishment.

Results

Contextual conditions

As in many parts of upland Laos, the farming households of Ban Xepon used to rely upon rotational swidden cultivation to produce upland rice and other household food crops. Historically, villagers seldom had an incentive to make strong land claims because land was relatively abundant and not regarded as a commodity, and market access for commercial crops

¹¹ A Prime Minister's Order in 2016 suspended banana plantation expansion in Laos due to reported negative impacts on farmers' health and the environment. The focus of this Order is on northern Lao provinces. Banana plantations in Southern provinces for export to Thailand and Vietnam do not appear to have been impacted by this ban (Vientiane Times 2019).

¹² The equivalent NPV per ha after 7 years at 12% discount rate is \$ 1018.

was limited. In that context, land tenure and property were relatively flexible concepts in which households might conduct subsistence activities on a neighbour's *chap chong* plot within generally accepted community norms; e.g. the right to cut standing timber or clear fallows for the cultivation of upland rice remained with the *chap chong* owner. By 2005, almost all the swidden lands in the village had been appropriated by households under *chap chong* arrangements. By 2012, when the PLUP was undertaken, the only exceptions were the land recognised as ‘Village Conservation Forest’ (1.3 ha; 0.1% of land assigned to the village), forestlands with spiritual or cultural significance (56.4 ha; 6% of land assigned to the village), and the ‘National Protection Forest’ (41.6 ha; 4% of land assigned to the village) which villagers are legally permitted to use only for the collection of NTFPs and for grazing.

Older informants explained that Ban Xepon's population increased progressively since the original settlers arrived in the area in the late 19th century (Fig. 3). They also explained that they had observed a steady decline in the productivity swidden rice fields and fallows, with associated increasing difficulties in meeting their household's subsistence requirements. In parallel, in the mid-2000s, most farmers in the village began to plant yang bong trees on their *chap chong* plots. They did so after observing two

pioneering farmers in the village (one being the Village Head), who experimented with yang bong growing in 1997, after receiving seedlings from a Vietnamese trader. Typically, households planted yang bong trees on *chap chong* plots cleared in the previous season for upland rice cultivation (avg. 0.9 ha/plot). Improved infrastructure and trade opportunities then encouraged smallholders to expand yang bong plantations on their *chap chong* plots. The village location on the Route 9 East–West Corridor allowed households excellent access to road transport infrastructure and commercial trading networks, including Vietnamese and Lao traders buying yang bong bark. All the interviewed yang bong smallholders in Ban Xepon had also responded to new export market signals from Thailand and Vietnam and incorporated the cultivation of bananas in the agroforestry system or established monoculture plantations. As a result, the area of ‘village use’ forestland, most of which is swidden fallows, has decreased to less than one third of the land assigned to the village (Figs. 2 and 3).

Policy and political dynamics have also supported the expansion of the agroforestry systems in this village. The Village Head explained that, on two occasions, district officials and representatives of two unidentified companies had visited the village to find ‘available land’ to establish new commercial tree

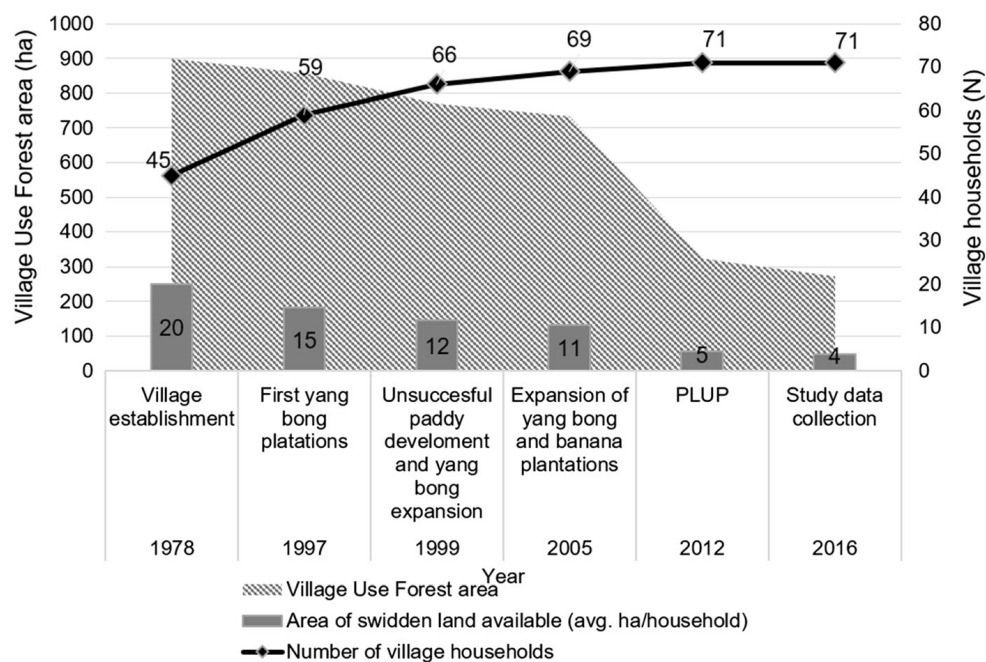


Fig. 3 Case study village and land use history

plantations. The Village Head explained that, on both occasions, his discussions with the Provincial Governor helped to prevent lands within the village territory being allocated to these projects. One of the arguments used to negotiate with Provincial authorities was that residents had established their own agroforestry plantations on land formerly used for swidden cultivation, and so were complying with GoL policies that promote the transition from swidden to permanent agriculture.

Land assets

Land ownership in Ban Xepon is unequally distributed among households. The number of plots owned by sampled households ranged between 3 and 17, with a mean area of 10.8 ha per household (range 3.4–27.2 ha). Some poorer households advised that they had sold *chap chong* plots to wealthier households as a coping strategy to compensate for shortages of labour or cash; for example, due to deaths or sickness of household members, or to purchase consumer goods such as motorbikes. The area of undeveloped *chap chong* land averaged 4.1 ha per household (range 1.7–7.4 ha). The area of yang bong plantations averaged 2.2 ha per household (range 0–9 ha) (Table 2).

All but one sampled household owned a larger area of undeveloped *chap chong* land than of yang bong plantations. Typically, households that were identified as “poor” owned a smaller area of undeveloped *chap chong* land, and they established fewer yang bong plantations. Conversely, households classified as “wealthier” typically owned larger areas of both undeveloped *chap chong* land and yang bong

plantation (Fig. 4). Fifty per cent of the sampled households owned at least seven yang bong or undeveloped *chap chong* plots, the number required to generate regular annual cash flows from the tree component of the yang bong agroforestry system. At the time of the study, only one sampled household had chosen to do so.

Land use trends

The area of each of yang bong plantations, banana monoculture plantations, and wet rice paddies in 2016 had increased since DONRE’s PLUP in 2012. In parallel, the area of Village Use Forest available for activities such as rotational swidden agriculture, NTFP collection and grazing had decreased by approximately 29% (Fig. 5).

Eighty percent of banana plantations in the village were under land leases of 3–7 years duration. Households reported that they had started to clear *chap chong* plots specifically to lease it to banana companies. This contrasts with earlier strategies in which households cleared fallows for upland rice cultivation, and subsequent establishment of yang bong or banana plantations.

The imperatives of household rice production strongly shape the attitude of households to the further expansion of different land use systems in the village. All households without wet rice paddy plots considered leasing their undeveloped *chap chong* land to Vietnamese entrepreneurs for banana plantations, from which they hoped to earn enough money to develop wet rice paddy plots in the future. Only one sampled household considered expanding yang bong plantations on undeveloped *chap chong* land; this

Table 2 Land ownership and use in Ban Xepon (N = 24)

	Total area owned by households (ha)	Wet rice paddy area owned by households (ha)	Yang bong area planted by households (ha)	<i>Chap chong</i> area owned by households (ha)	Banana plantation area managed by households (ha)	Area leased to banana companies (ha)
Minimum	3.4	0	0	1.7	0	0
Maximum	27.2	5.0	9	7.4	8	7.5
Mean	10.8	0.9	2.2	4.1	1.5	2.1
Median	9.4	1.1	1.9	3.9	1.3	2.1
Std. Dev.	4.8	1	1.9	1.5	1.7	1.8

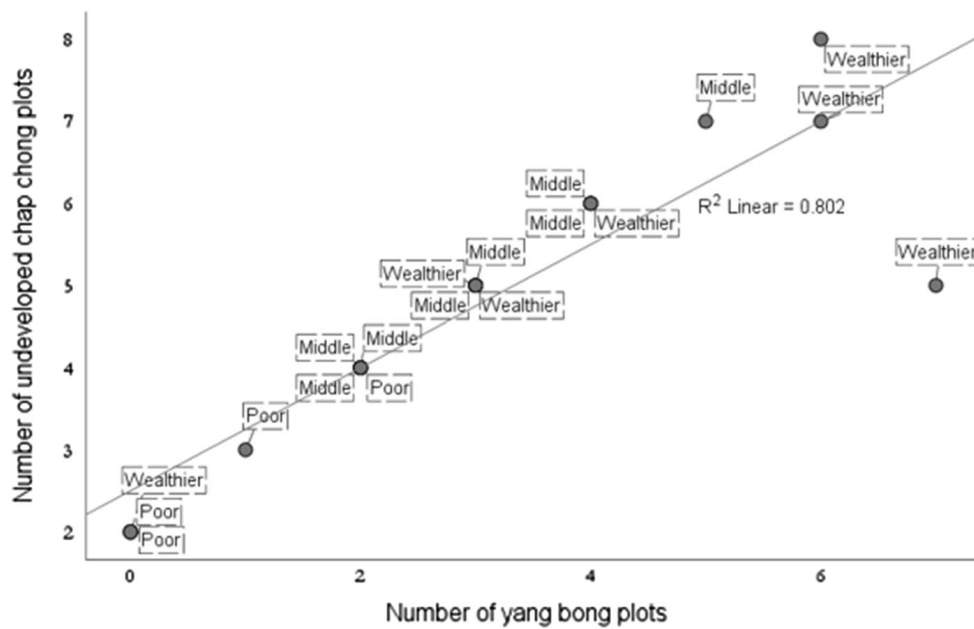


Fig. 4 Relationship between number of yang bong and undeveloped *chap chong* plots and household wealth class (N = 24)

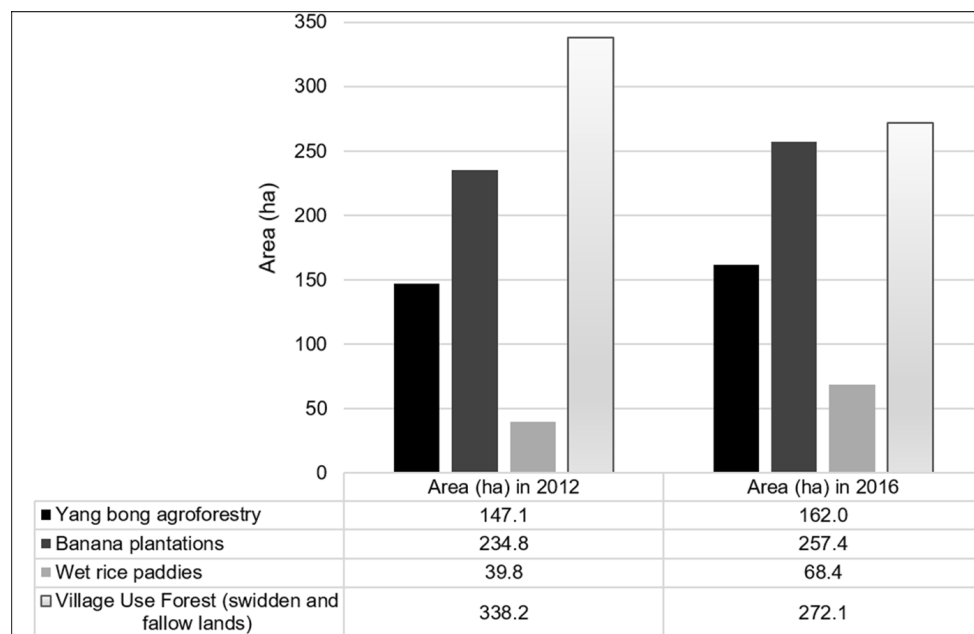


Fig. 5 Changes within main land use systems in Ban Xepon *Source:* DONRE 2012, field surveys 2016

household owned wet rice paddy land. No sampled households were considering converting their yang bong systems to other uses, despite the steep drop in dry ‘yang bong’ bark prices in the preceding 5 years, from 8000 LAK (\$0.98)/kg in 2011 to 4900 LAK (\$0.6)/kg in 2016 (farmgate prices to Vietnamese traders). Returns presented in Fig. 6 illustrate why households consider leasing undeveloped *chap chong*

land to banana companies rather than establishing more plantations in the future. At a 12% discount rate, the per hectare NPV returns from yang bong over a 7-year cycle totalled \$2596. This corresponds with an expected average discounted return to labour of \$5.5/worked day. Reported land lease prices for banana plantations ranged from \$115/ha to \$1069/ha, averaging \$325/ha, depending on the location and

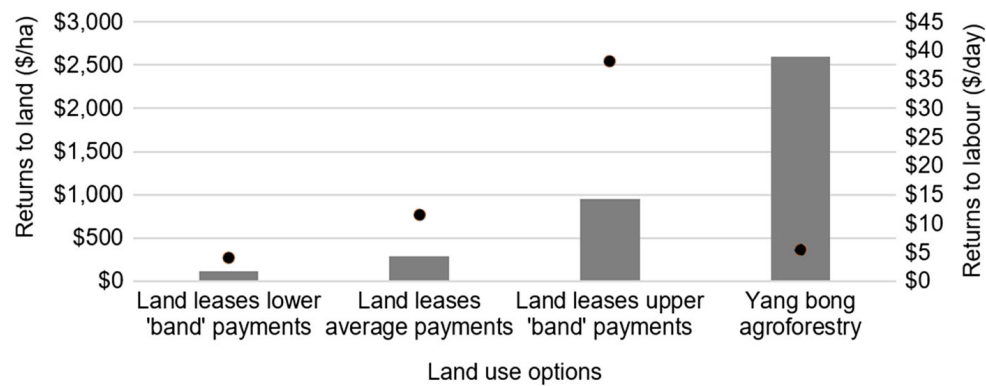


Fig. 6 Projected returns to land (\$/ha; 7-year cycle) to households (*bars*) and to labour (\$/day) (*dots*) from yang bong agroforestry and banana land leases

quality of the land and the length of the lease period (three to seven years). Based on the average and the upper band land lease payments (\$325/ha and \$1069 respectively), a household can expect a return of \$12–38/worked day from leasing *chap chong* land to companies (Fig. 6).

In addition, most returns from new agroforestry plantations will not be obtained until seven years after planting, whereas land lease payments will be received upfront. Returns to labour from future banana leases, for households renewing lease agreements or leasing *chap chong* land without having to prepare it, are likely to be even greater. Informants expected that future returns from land leases would generally be higher than those from establishing their own yang bong plantations.

Livelihood strategies

In 2016, household livelihood income ranged from \$2387 to \$12066 and averaged \$6767, of which an average of 57, 34 and 9% was derived from on, off, and non-farming activities, respectively. Yang bong agroforestry plantations were the largest source of on-farm income, averaging \$2652/household (range from -\$27 to \$6438). Other sources of on-farm income were agricultural crops (bananas and wet paddy rice), land leases for banana monocultures and upland rice, which was mostly cultivated for household consumption. Environmental income provided the largest source of off-farm income, averaging \$1771/household. Almost two-thirds (avg. \$1101/household) of this was obtained in the form of NTFPs from forests and fallows, most of which were undeveloped *chap chong* lands. Other sources of off-farm income were

domestic livestock (avg. \$460/household)—which households typically grazed in undeveloped *chap chong* lands—and agricultural wage labour from working on another household's land. Non-farming income, obtained mainly from trade, averaged \$636/household (range from zero to \$1578/household); with an outlying value of \$3698 from a household that reported participating in the trade of illegal wood¹³ (Fig. 7).

Discussion

Our results suggest that households prioritised food security and livelihood diversification over income maximisation. This is consistent with results reported by Martin and Lorenzen (2016), who found that livelihoods across all socioeconomic groups in rural southern Laos include a combination of farming and non-farming activities, although they remain highly dependent on agriculture. In our case study village, household sources of farming income were drawn from both private (e.g. yang bong and banana plantations) and 'common' fallow lands, with wealthier households able to generate more on-farm income. Farmers' responsiveness to new crop opportunities, first for yang bong and then for bananas, has allowed

¹³ Four other households of the 25 sampled in total reported earnings from the illegal timber trade; these ranged from \$2219 to \$9122. Because these households are not among the 13 from whom environmental income data was collected, these values are not included in this analysis. These results provide an estimate of the likely range of households' income from the illegal timber trade, including for households that did not report it.

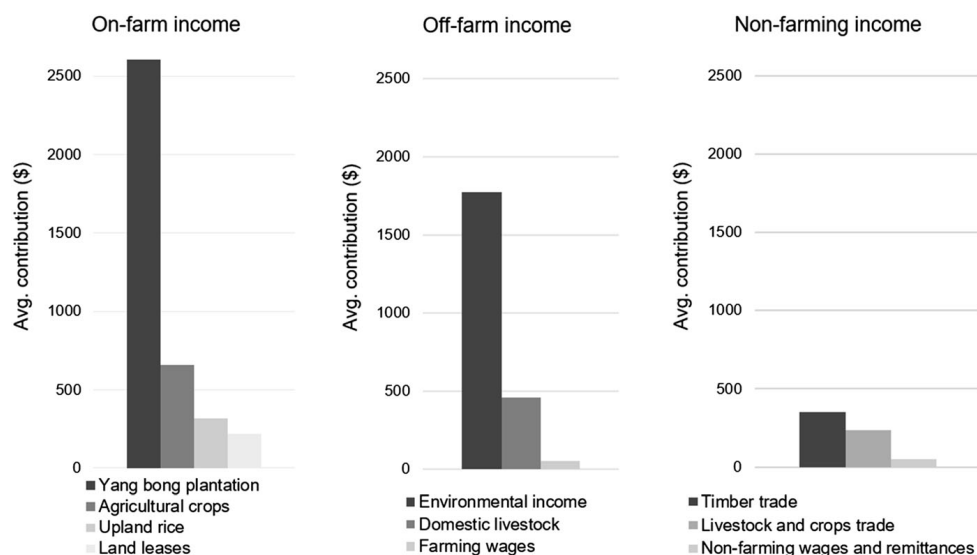


Fig. 7 Contributions of on-, off-, and non-farming activities to household income in Ban Xepon, 2016 (N = 13)

them to increase their annual income from farming. These results are consistent with (Bouahom et al. 2004) observation that Lao farmers are dependent on off-farm income by necessity rather than by choice.

Farmers' opportunities to diversify on-farm income depended on access to *chap chong* land, a right that is unevenly distributed across households. In that context, the adoption of more rewarding agricultural practices has fostered further wealth differentiation, both drawing from and amplifying inequities in the customary land tenure system (see also Suhardiman et al. 2019). Farmers who had access to more land because of prior *chap chong* claims were better placed to adopt agroforestry; whilst the adoption of agroforestry exacerbated differences in household incomes and allowed wealthier households the opportunity to acquire more *chap chong* land from other members of the community. If this trend continues, poorer households may ultimately lack sufficient land to sustain themselves from farming, and be forced into alternate strategies such as out-migration (Rigg 2006) or selling their labour (Rigg et al. 2020).

Our findings highlight the importance of recognising how the interaction between customary land tenure arrangements and market access can exacerbate land concentration and agrarian differentiation, as others have also noted (Kansanga et al. 2018; Kidido et al. 2017; White 2012). Without safeguards (e.g. setting aside a minimum of land to be kept as fallow) that prevent the eventual conversion of all *chap chong* land to more intensive forms of land use (yang bong

agroforestry or banana monocultures¹⁴ currently, or future alternative crops), social differentiation is likely to be further accentuated as households continue to convert their *chap chong* lands to cash crops. In our case study, it is evident that this conversion of *chap chong* lands will also lead to significant losses of environmental income from fallow lands, on which the poorest households are relatively more dependent (Angelsen et al. 2014; Broegaard et al. 2017; van der Meer Simo et al. 2019), and further diminish the safety net represented by the Village Use Forest land (see also Barney and van der Meer Simo 2019).

The Village Head's use of agroforestry adoption as an argument to protect local rights to land against concessionaires echoes other reports from Laos (Kenney-Lazar 2018; Suhardiman et al. 2019). This has implications for the GoL's plan of increasing forest cover through, in part, commercial tree plantations (Government of Lao PDR 2019). Our results suggest that, where markets and land are available, farmers will adopt commercially-oriented (agro) forestry under customary tenure arrangements; this farmer-centred approach could be part of a strategy to expand commercial tree plantations in less-contested spaces (Baird 2017; Cramb et al. 2017). Although yang bong agroforestry has been a successful

¹⁴ In contrast to reports from Northern Laos about the adverse environmental and health impacts of chemical use in banana plantations (Friis and Nielsen 2016), case study informants did not report any concerns about the use of chemicals.

innovation for adopting households, and for the village as a whole to retain autonomy over land use, it is not farmers' intention to expand the yang bong system to the full extent possible on their remaining *chap chong* land. Rather, most households across all wealth classes are keeping some of this land aside for non-agroforestry uses. This finding speaks, as do those of Suhardiman et al. (2019), to the likely outcomes of national land allocation policies for economic development and forest conservation. The transformation of swidden lands is more likely to manifest in non-(agro-)forestry outcomes, constraining the prospect of Laos reaching its national goal of 70% forest cover, itself a complex and contested issue (see also Mekong Region Land Governance 2019).

Conclusions

Most previous studies highlighting the merits of agroforestry in Laos have not considered the key context of access to land or situated the economic returns to smallholders from agroforestry within the wider range of livelihood options. In our case, yang bong agroforestry offered financial and political advantages over swidden; however, the appeal of yang bong systems to farmers has been overtaken by new opportunities to lease land for banana monocropping. Nevertheless, farmers' intentions to retain their established agroforestry systems suggest an ongoing role for agroforestry in their livelihood and land use portfolios.

Our results demonstrate that access to land was the foundation of household strategies to improve livelihoods. Land secured initially through *chap chong* was utilised to adopt agroforestry; opportunities to lease land to companies for banana plantations accelerated *chap chong* claims and correspondingly diminished access to common, swidden, land. The use of tree growing to secure land rights echoes the earlier experience of teak and rubber plantation expansion in northern Laos (Newby et al. 2012; Suhardiman et al. 2019, respectively).

The inequitable outcomes of the loss of access to *chap chong* land correspond to those reported in neighbouring countries. In Vietnam, the process of establishment of plantations on lands under customary management resulted in many of the costs of loss of access to those lands being disproportionately borne

by the most vulnerable, particularly women (Dao 2018), those with weaker customary rights (Sikor 2012), and by ethnic minority groups (Thulstrup 2014). In Yunnan Province of China, Sturgeon (2010) found that the transformation of traditional land use practices through the expansion of smallholder rubber plantations was generating greater economic stratification among households. Villamor et al. (2017) argued, for similar transitions in the northern Vietnamese uplands, that agroforestry systems might better balance the preferences of women and men, and lead to more gender-equitable livelihood outcomes.

While the longstanding arguments in favour of agroforestry systems, including food security, income diversification and forest landscape restoration (Lasco et al. 2014; van Noordwijk et al. 2018), remain valid, our results illustrate the importance of understanding the policy, institutional and livelihood contexts of agroforestry adoption, to best understand their future potential in supporting sustainable land use transitions. The capacity of case study farmers to respond to new crop opportunities, first for yang bong bark and then for bananas, and hence to continue livelihoods based on farming, depended both on their access to 'common' land and on the easy access to markets afforded by the location of the case study village. Further case studies would be informative in confirming the extent to which our findings are representative of the swidden transition in Laos, and the potential of agroforestry systems in that transition.

References

- Alton C, Bluhm D, Sannikone S (2005) Para rubber cultivation in Northern Laos: constraints and chances. Lao-German Program Rural Development in Mountainous Areas of Northern Lao PDR. GIZ, Vientiane, Lao PDR, p 183
- Angelsen A, Kaimowitz D (2004) Is agroforestry likely to reduce deforestation? In: Schroth G, da Fonseca G, Harvey CA, Gascon C, Vasconcelos HL, Izac A-MN (eds) Agroforestry and biodiversity conservation in tropical landscapes. Island Press, Washington DC, pp 87–106
- Angelsen A, Jagger P, Babigumira R, Belcher B, Hogarth NJ, Bauch S, Börner J, Smith-Hall C, Wunder S (2014) Environmental income and rural livelihoods: a global-comparative analysis. *World Dev* 64(Supplement 1):S12–S28
- Arvola A, Anttila JP, Hogarth N (2019) By accident or by design? Influence of government policies on drivers and

- barriers of smallholder teak growing in Lao PDR. For *Trees Livelihoods* 28:34–51
- Baird IG (2011) Turning land into capital, turning people into labor: primitive accumulation and the arrival of large-scale economic land concessions in the Lao People's Democratic Republic. *New Propos J Marxism Interdiscip Inq* 5:10–26
- Baird IG (2017) Resistance and contingent contestations to large-scale land concessions in Southern Laos and North-eastern Cambodia. *Land* 6:16
- Baird IG, Fox J (2015) How land concessions affect places elsewhere: telecoupling, political ecology, and large-scale plantations in southern Laos and northeastern Cambodia. *Land* 4:436–453
- Barney K (2006) A framework for analysing forest-land tenure in Lao PDR. A report for the rights and resources initiative in Asia. World Agroforestry Centre, Nairobi, Kenya, p 32
- Barney K (2008) Local vulnerability, project risk, and intractable debt: the politics of smallholder eucalyptus promotion in Salavane Province, Southern Laos. In: Snelder DJ, Lasco RD (eds) *Smallholder tree growing for rural development and environmental services: lessons from Asia*. Springer, Dordrecht, pp 263–286
- Barney K, van der Meer Simo A (2019) Forest Land commons in Laos in the twenty first century: agrarian capitalism and the 'non-commodified subsistence guarantee'. *Kyoto Rev Southeast Asia* 25:6p
- Barrett CB, Reardon T, Webb P (2001) Nonfarm income diversification and household livelihood strategies in rural Africa: concepts, dynamics, and policy implications. *Food Policy* 26:315–331
- Belcher B, Roberts M (2012) Assessing participatory photography as a method to understand local perspectives on environment and development in northern Lao PDR. For *Trees Livelihoods* 21:145–157
- Bouahom B, Douangsavanh L, Rigg J (2004) Building sustainable livelihoods in Laos: untangling farm from non-farm, progress from distress. *Geoforum* 35:607–619
- Broegaard RB, Rasmussen LV, Dawson N, Mertz O, Vongvisouk T, Grogan K (2017) Wild food collection and nutrition under commercial agriculture expansion in agriculture-forest landscapes. For *Policy Econ* 84:92–101
- Byron N (2001) Keys to smallholder forestry. For *Trees Livelihoods* 11:279–294
- Cairns MF (2015) *Shifting cultivation and environmental change: Indigenous people, agriculture and forest conservation*, 1st edn. Routledge, London
- Cramb R, Wills IR (1990) The role of traditional institutions in rural development: community-based land tenure and government land policy in Sarawak, Malaysia. *World Dev* 18:347–360
- Cramb R, Purcell T, Ho TCS (2004) Participatory assessment of rural livelihoods in the Central Highlands of Vietnam. *Agric Syst* 81:255–272
- Cramb R, Manivong V, Newby JC, Sothorn K, Sibat PS (2017) Alternatives to land grabbing: exploring conditions for smallholder inclusion in agricultural commodity chains in Southeast Asia. *J Peasant Stud* 44:939–967
- Dao N (2018) Rubber plantations and their implications on gender roles and relations in northern uplands Vietnam. *Gend Place Cult* 25:1579–1600
- Dressler WH, Wilson D, Clendenning J, Cramb R, Keenan R, Mahanty S, Bruun TB, Mertz O, Lasco RD (2017) The impact of swidden decline on livelihoods and ecosystem services in Southeast Asia: a review of the evidence from 1990 to 2015. *Ambio* 46:291–310
- Ducourtieux O, Laffort JR, Sacklokham S (2005) Land policy and farming practices in Laos. *Dev Change* 36:499–526
- Dwyer M (2007) Turning land into capital. a review of recent research on land concessions for investment in the Lao PDR. Land Issues Working Group, Vientiane, Lao PDR, p 50
- Ekadinata A, Vincent G (2011) Rubber agroforests in a changing landscape: analysis of land use cover trajectories in Bungo District, Indonesia. For *Trees Livelihoods* 20:3–14
- Feintrenie L, Schwarze S, Levang P (2010) Are local people conservationists? Analysis of transition dynamics from agroforests to monoculture plantations in Indonesia. *Ecol Soc* 15:37–52
- Fox J, Fujita Y, Ngidang D, Peluso N, Potter L, Sakuntaladewi N, Sturgeon J, Thomas D (2009) Policies, political-economy, and swidden in Southeast Asia. *Hum Ecol* 37:305–322
- Friis C, Nielsen JØ (2016) Small-scale land acquisitions, large-scale implications: exploring the case of Chinese banana investments in Northern Laos. *Land Use Policy* 57:117–129
- Government of Lao PDR (2019) No. 247/GO decree on promotion of tree planting for commercialization, Vientiane, Lao PDR, p 5
- Hansen PK, Sodarak H, Savathvong S (2007) Teak production by shifting cultivators in Northern Lao PDR. In: Cairns M (ed) *Voices from the forest: integrating indigenous knowledge into sustainable upland farming*. Resources for the Future, Washington DC, pp 414–424
- He P, Martin K (2015) Effects of rubber cultivation on biodiversity in the Mekong Region. *CAB Rev* 10:1–7
- Hirsch P (2011) Titling against grabbing? Critiques and conundrums around land formalisation in Southeast Asia. In: International conference on global land grabbing 6–8 April 2011 future agricultures consortium Institute of Development Studies (IDS), University of Sussex, Brighton, UK
- Kameda C, Nawata E (2017) Relationship between fallow period, forest vegetation and weeds in swidden agriculture in northern Laos. *Agrofor Syst* 91:553–564
- Kansanga M, Andersen P, Atuoye K, Mason-Renton S (2018) Contested commons: agricultural modernization, tenure ambiguities and intra-familial land grabbing in Ghana. *Land Use Policy* 75:215–224
- Kenney-Lazar M (2012) Plantation rubber, land grabbing and social-property transformation in southern Laos. *J Peasant Stud* 39:1017–1037
- Kenney-Lazar M (2018) Governing dispossession: relational land grabbing in Laos. *Ann Am Assoc Geogr* 108:679–694
- Kidido JK, Bugri JT, Kasanga RK (2017) Dynamics of youth access to agricultural land under the customary tenure regime in the Techiman traditional area of Ghana. *Land Use Policy* 60:254–266
- Lambin EF, Meyfroidt P (2010) Land use transitions: socio-ecological feedback versus socio-economic change. *Land Use Policy* 27:108–118

- Lasco RD, Delfino RJP, Catacutan DC, Simelton ES, Wilson DM (2014) Climate risk adaptation by smallholder farmers: the roles of trees and agroforestry. *Curr Opin Environ Sustain* 6:83–88
- Lestrelin G, Castella J-C, Bourgoin J (2012) Territorialising sustainable development: the politics of land-use planning in Laos. *J Contemp Asia* 42:581–602
- Lund C (2011) Fragmented sovereignty: land reform and dispossession in Laos. *Journal of Peasant Studies* 38:885–905
- Manivong V, Cramb R (2008) Economics of smallholder rubber expansion in Northern Laos. *Agrofor Syst* 74:113–125
- Martin SM, Lorenzen K (2016) Livelihood diversification in rural Laos. *World Dev* 83:231–243
- Matsuo MU, Sujan KC, Hirota I, Kojima M, Yoshida M, Yamamoto H (2016) Utilisation of *styrax tonkinensis* wood in Laos and its physical properties. *J Trop For Sci* 28:298–307
- Mekong Region Land Governance (2019) Land tenure security in 70 percent forestland policy of the Lao PDR, Discussion Note Series #6. Mekong Region Land Governance, Vientiane, Lao PDR, p 4
- Midgley S, Stevens P, Arnold R (2017) Hidden assets: Asia's smallholder wood resources and their contribution to supply chains of commercial wood. *Aust For* 80:10–25
- Ministry of Agriculture and Forestry (2010) Strategy for agricultural development 2011–2020. Ministry of Agriculture and Forestry, Government of Lao PDR, Vientiane, Lao PDR, p 42
- Miyazawa Y, Manythong C, Fukuda S, Ogata K (2014) Comparison of the growth traits of a commercial pioneer tree species, paper mulberry (*Broussonetia papyrifera* L. vent.), with those of shade-tolerant tree species: investigation of the ecophysiological mechanisms underlying shade-intolerance. *Agrofor Syst* 88:907–919
- National Assembly of the Lao People's Democratic Republic (2019) Forestry law (revised on 23 July 2019). Unofficial translation, Vientiane, Lao PDR
- Newby J, Cramb R, Sakanphet S, McNamara S (2012) Smallholder teak and agrarian change in Northern Laos. *Small Scale For* 11:27–46
- Newby J, Cramb R, Sakanphet S (2014) Forest transitions and rural livelihoods: multiple pathways of smallholder teak expansion in Northern Laos. *Land* 3:482–503
- Openshaw K, Trethewie R (2006) Shifting cultivation, agroforestry, non-timber forest products and related livelihood systems in Laos: a case study. *For Trees Livelihoods* 16:359–380
- Otsuka K, Suyanto S, Sonobe T, Tomich TP (2000) Evolution of land tenure institutions and development of agroforestry: evidence from customary land areas of Sumatra. *Agric Econ* 25:85–101
- Pandey B (2014) Lao PDR: sustainable natural resources management and productivity enhancement project. Value chain development study of Yang Bong (*Persea Kurzii*). Ministry of Agriculture and Forestry for the Asian Development Bank. Project Number: 37579-032, Vientiane, Lao PDR, p 42
- Pfund JL, Watts JD, Boissière M, Boucard A, Bullock RM, Ekadinata A, Dewi S, Feintrenie L, Levang P, Rantala S, Sheil D, Sunderland TCH, Urech ZL (2011) Understanding and integrating local perceptions of trees and forests into incentives for sustainable landscape management. *Environ Manage* 48:334–349
- Phimmavong S, Ozarska B, Midgley S, Keenan R (2009) Forest and plantation development in Laos: history, development and impact for rural communities. *Int For Rev* 11:501–513
- Phimmavong S, Maraseni TN, Keenan RJ, Cockfield G (2019) Financial returns from collaborative investment models of Eucalyptus agroforestry plantations in Lao PDR. *Land Use Policy* 87:104060
- Rahman SA, Jacobsen JB, Healey JR, Roshetko JM, Sunderland T (2017) Finding alternatives to swidden agriculture: Does agroforestry improve livelihood options and reduce pressure on existing forest? *Agrofor Syst* 91:185–199
- Raintree JB, Warner K (1986) Agroforestry pathways for the intensification of shifting cultivation. *Agrofor Syst* 4:39–54
- Rigg JD (2006) Forests, marketization, livelihoods and the poor in the Lao PDR. *Land Degrad Dev* 17:123–133
- Rigg J, Phongsiri M, Promphakpung B, Salamanca A, Sripun M (2020) Who will tend the farm? Interrogating the ageing Asian farmer. *J Peasant Stud* 47:306–325
- Robichaud WG, Sinclair AR, Odarkor-Lanquaye N, Klinkenberg B (2009) Stable forest cover under increasing populations of swidden cultivators in Central Laos: the roles of intrinsic culture and extrinsic wildlife trade. *Ecol Soc* 14:33–70
- Rock F, Sisoulath V, Metzger C, Chantangeun S, Phayalath X, Derbidge J (2015) Systematic land registration in rural areas of Lao PDR. Concept document for countrywide application. Deutsche Gesellschaft für Internationale Zusammenarbeit (GIZ) GmbH, Bonn (Germany) and Vientiane (Lao PDR), p 106
- Sandewall M, Kassa H, Wu S, Khoa P, He Y, Ohlsson B (2015) Policies to promote household based plantation forestry and their impacts on livelihoods and the environment: cases from Ethiopia, China, Vietnam and Sweden. *Int For Rev* 17:98–111
- Schönweger O (2012) Concessions and leases in the Lao PDR. Universität Bern, Bern
- Schroeder RA (1999) Shady practices: agroforestry and gender politics in the Gambia. University of California Press, Berkeley
- Seidenberg C, Mertz O, Kias MB (2003) Fallow, labour and livelihood in shifting cultivation: implications for deforestation in northern Lao PDR. *Geografisk Tidsskrift* 103:71–80
- Shi W (2008) Rubber boom in Luang Namtha: a transnational perspective. Deutsche Gesellschaft für Internationale Zusammenarbeit (GIZ) GmbH Available on LaoFAB document repository. <http://www.laofaborg>
- Shi W (2015) Rubber boom in Luang Namtha: seven years later. Field notes. Available on LaoFAB document repository. <http://www.laofaborg>
- Sikor T (2012) Tree plantations, politics of possession and the absence of land grabs in Vietnam. *Journal of Peasant Studies* 39:1077–1101
- Sjaastad E, Angelsen A, Vedeld P, Bojö J (2005) What is environmental income? *Ecol Econ* 55:37–46
- Smith H, Barney K, Byron N, van der Meer Simo A, Keenan R, Vongkhamsao V (2017) Tree plantations in Lao PDR: policy framework and review. Component report, ACIAR

- project ADP/2014/047: improving policies for forest plantations to balance smallholder, industry and environmental needs in Lao PDR and Vietnam, Canberra, Australia, p 85
- Stuart-Fox M (2005) Politics and reform in the Lao People's Democratic Republic. Working Paper No. 126. Asia Research Centre Murdoch University, Perth, Western Australia
- Sturgeon JC (2010) Governing minorities and development in Xishuangbanna, China: Akha and Dai rubber farmers as entrepreneurs. *Geoforum* 41:318–328
- Suhardiman D, Keovilignavong O, Kenney-Lazar M (2019) The territorial politics of land use planning in Laos. *Land Use Policy* 83:346–356
- Thorlakson T, Neufeldt H (2012) Reducing subsistence farmers' vulnerability to climate change: evaluating the potential contributions of agroforestry in western Kenya. *Agric Food Secur* 1:15p
- Thulstrup AW (2014) Plantation livelihoods in central Vietnam: implications for household vulnerability and community resilience. *Nor Geogr Tidsskr* 68:1–9
- van der Meer Simo A, Kanowski P, Barney K (2019) Revealing environmental income in rural livelihoods: evidence from four villages in Lao PDR. *For Trees Livelihoods* 28:16–33
- van der Meer Simo A, Kanowski P, Barney K (2020) Economic returns to households participating in different models of commercial tree plantations in Lao PDR. *Int For Rev* 22:132–152
- van Noordwijk M, Hoang MH, Neufeldt H, Öborn I, Yatich T (2011) How trees and people can co-adapt to climate change: reducing vulnerability through multifunctional agroforestry landscapes. World Agroforestry Centre, Nairobi
- van Noordwijk M, Duguma LA, Dewi S, Leimona B, Catacutan DC, Lusiana B, Öborn I, Hairiah K, Minang PA (2018) SDG synergy between agriculture and forestry in the food, energy, water and income nexus: reinventing agroforestry? *Curr Opin Environ Sustain* 34:33–42
- Vandergeest P (2003) Land to some tillers: development-induced displacement in Laos. *Int Soc Sci J* 55:47–56
- Vientiane Times (2019) Lao Ministry inspecting banana plantations to ensure sustainable agricultural practices. *Vientiane Times/Asia News Network*. Vientiane Times, Lao PDR
- Villamor GB, Catacutan DC, Van Anh TT, Thi LD (2017) Tree-cover transition in Northern Vietnam from a gender-specific land-use preferences perspective. *Land Use Policy* 61:53–62
- Vongvisouk T, Dwyer M (2016) Falling rubber prices in northern Laos: local responses and policy options. *Helvetas, Zürich*
- White B (2012) Agriculture and the generation problem: rural youth, employment and the future of farming. *IDS Bull* 43:9–19

Publisher's Note Springer Nature remains neutral with regard to jurisdictional claims in published maps and institutional affiliations.

Chapter 6: Conclusions

“Man has created new worlds – of language, of music, of poetry, of science, and the most important of these is the world of the moral demands, for equality, for freedom, and for helping the weak”.

The Open Society and Its Enemies, vol 1, p. 65, in Magee (1973)

6.1 Introduction

The unprecedented global expansion of tree plantations has long been driven primarily by the increasing demand for forest products, but also by the actual or prospective environmental benefits of plantations (FAO 1967, in Carle *et al.*, 2020). Since the 1970s, this expansion has occurred primarily in the Global South (Carle *et al.*, 2020), partly based on the premise that tree plantations will also provide economic benefits to local rural communities (Farley, 2007, Khamzina *et al.*, 2012, Midgley *et al.*, 2017, Faruqi *et al.*, 2018, Silva *et al.*, 2019). However, many critics argue that this potential has been largely unrealised, particularly in the context of large-scale corporate-led tree plantations (Malkamäki *et al.*, 2018). Examples of adverse outcomes for local communities from this model of tree plantations have included the loss of customary land rights (Gerber, 2011, Kenney-Lazar, 2012, Overbeek *et al.*, 2012) and the loss of environmental income, including from livestock grazing (Barney, 2007, Friis *et al.*, 2016, van der Meer Simo *et al.*, 2019). This has reinvigorated a longstanding discussion (Carrere and Lohmann, 1996) about the need to design more locally-responsive plantation models (Borras Jr *et al.*, 2016). As with agricultural crop production (Smalley, 2013, Hall *et al.*, 2017), a part of that discussion is a debate about the role and responsibilities that different actors – principally farmers, governments, and corporations – should take in the ownership, establishment and management of tree plantations (Morrison and Bass, 1992, Cramb *et al.*, 2017). This thesis has contributed to that debate in two main ways. First, it has presented the findings of a systematic literature review of the impacts of different models of tree plantations on livelihoods in the Greater Mekong Sub-region, as presented in Chapter Two, and summarised below in section 6.2.1. Second, it has provided empirical findings on the interactions between four tree plantation models and the livelihoods of farmers in Laos, as presented in Chapters Three, Four and Five, and summarised below in sections 6.2.2 to 6.2.4 (Figure 6.1).

The findings of this thesis have implications for the future establishment of tree plantations in Laos, which I discuss in section 6.3. The findings also relate to wider forest- and rural development related issues beyond the Lao context, which I discuss in section 6.4. Section 6.5 concludes this thesis by suggesting future research opportunities to better inform those issues.

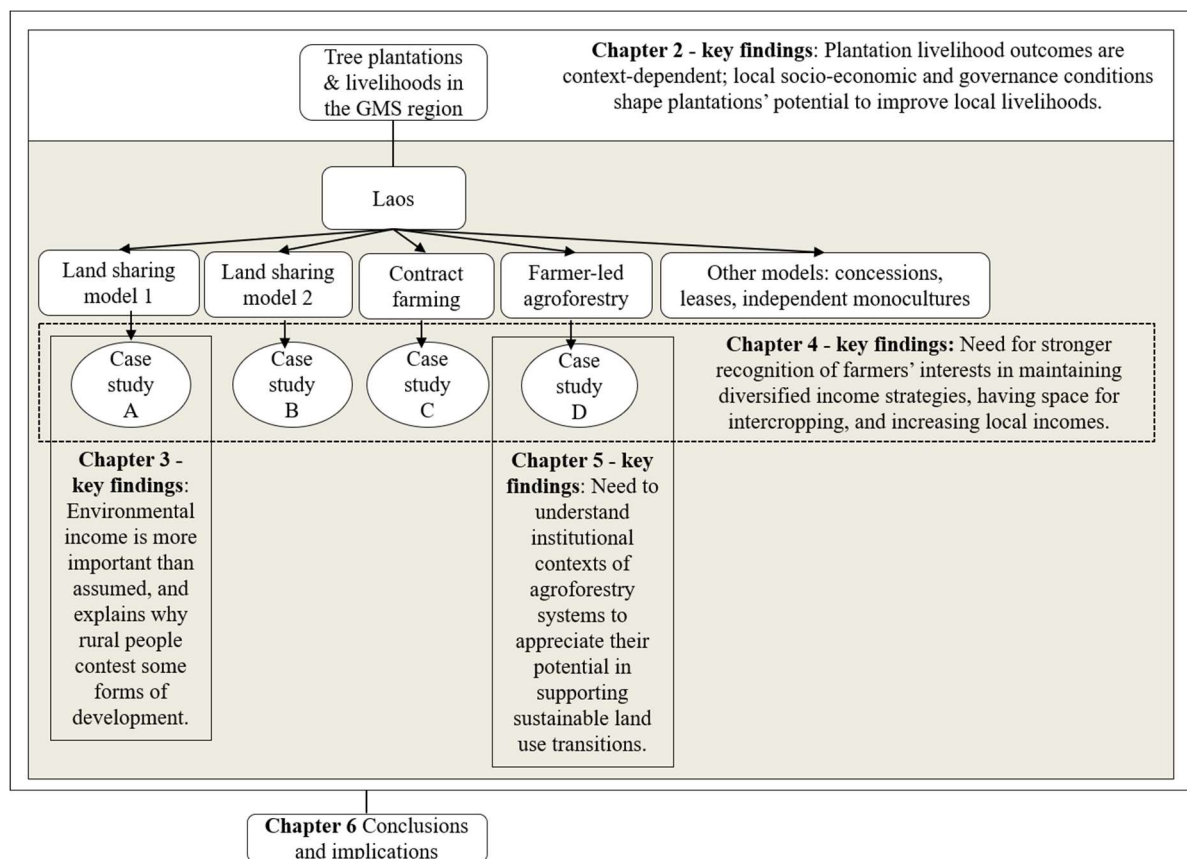


Figure 6.1 Key findings of this research

6.2 Research findings

6.2.1 Impacts of different models of tree plantations on livelihoods in the Greater Mekong Sub-region

The results of the systematic literature review confirmed earlier findings that land concession-based tree plantations are often detrimental to local livelihoods (Gerber, 2011, Malkamäki et al., 2018). Yet, there are exceptions where tree plantation companies have, for example, integrated trees with existing local farming activities (Dwyer et al., 2015), which demonstrate that this model is not inherently adverse for local livelihoods. Particularly in contexts where there is no local shortage of agricultural land, and thus the opportunity costs of converting traditional agriculture can be assumed to be zero, land concessions can have positive benefits such as (albeit transitory) wage employment for local and migrant farmers (see also van der Meer Simo et al., 2020a). The results of the systematic review also showed that the impact from other tree plantation models are mixed and context-dependent. This finding is consistent with the wider literature for agriculture (Ton et al., 2018). Reliable markets are one of the key conditions for smallholders to generate benefits from commercial tree crops (Byron, 2001, Sturgeon, 2012, Andriess and Choi, 2014, Chambon et al., 2016). However, because of the unequal distribution of land within communities, not all farmers have had the same opportunities to successfully integrate and benefit from tree-growing (Clement and Amezcaga, 2009, Newby et al., 2014,

Friis and Nielsen, 2016). In such contexts, to avoid further wealth differentiation, the promotion of tree plantations might be preceded by efforts that specifically address inequality in land distribution (van der Meer Simo et al., 2020b).

The systematic review of the literature also found that very few earlier studies had situated the economic contribution from tree plantations within the participants' wider portfolio of incomes or accounted for the opportunity costs of pre-plantation activities to farmers; none of 72 studies assessed did both of these. In that context, my empirical work has contributed to fill these analytical gaps in relation to four tree plantation models in the Lao context.

6.2.2 The economic value of swidden agriculture

The first empirical objective of my research in Laos was to capture the economic value of swidden agriculture to the people who participated in my study. The reason for that was that swidden agriculture, which tree plantations often replace, has been associated with forest degradation and poverty in Laos (Ministry of Agriculture and Forestry, 2010). Yet, to date, there was limited empirical evidence on the economic returns to farmers from swidden agriculture. Indeed, portraying shifting cultivation as a form of 'underutilising' land opportunities had been done without empirical indicators that described what non-degraded forests or well-utilised land look like, and disregarding the importance of swidden agriculture to farmers' livelihoods (Cramb et al., 2009). The results from one of the case study sites – as presented in the first of the empirical papers – showed that the value of shifting agriculture to households corresponded to 75% of their mean household income in 2016. At US\$1,934, this value was substantially greater than reported previously.

Further, environmental income – which in this study included environmental products (NTFPs and fuelwood from forests, and fish from rivers and ponds) and livestock grazing in forestlands and fallows – averaged 23% of the total annual household income across the four case study villages. This figure, which is consistent with global assessments (Angelsen et al., 2014), helps explain why rural Lao people contest development that compromises the natural capital that largely sustains their livelihoods (Baird, 2017, Kenney-Lazar, 2018).

6.2.3 Economic contribution of tree plantation models to rural livelihoods in Laos

Considering the economic contribution of tree plantations to rural livelihoods, the results in the second empirical paper showed that tree plantations contributed most to livelihoods where plantation models allowed for intercropping by households and where local people were longer employed. In contrast, where contracts to grow trees were not honoured, crops could not be grown jointly, or labour opportunities were limited, returns were not competitive with traditional swidden agriculture. The proportional contribution of annualised income from tree plantations to average total annual household incomes in each village ranged from 1-26%. Correspondingly, plantation-derived income contributed

between 1-17% of the national annual per-capita income target. Further, most households participating in the study preferred multi-stranded livelihood strategies – including through the retention of some swidden, tree plantations and expansion of cash crops – rather than allocating more land to the commercial tree plantation models with which they were familiar.

The relatively higher returns from the independent smallholder model illustrated that agroforestry systems such as that used for yang bong are attractive because of the intermediate returns they generate. This aligns with existing literature that promotes agroforestry plantations as a promising model of rural development in Laos and internationally (Raintree and Warner, 1986, Mercer, 2004, Coe et al., 2014, Grossman, 2015, Phimmavong et al., 2019). The findings also demonstrated that where strong markets exist the expansion of tree-based systems can occur in the absence of (large-scale) land concession plantations (see also Cramb et al., 2017).

6.2.4 Independent smallholder agroforestry and swidden agriculture transitions

Similar to the findings from the systematic literature review, the independent smallholder case in Chapter 5 provided evidence that not all smallholders derived a similar degree of benefits from this agroforestry system. The chapter illustrated that this unequal distribution of benefits was underpinned by prior and emerging inequities in the customary land tenure system (see also Suhardiman et al., 2019). Under such informal arrangements, the expansion of this agroforestry system had exacerbated wealth differentiation within the village and diminished the safety net that ‘common’ forest lands represented for the poorer households.

The case study supports Boserup’s (1965) theory that land scarcity or degradation, consequent primarily to local population increases, catalyses local farmers to restore the productivity of agricultural lands, including through tree planting; although examples of smallholder tree growing also occur at low population densities (Cramb et al., 2009). In that context, a body of literature to which the chapter contributes is that addressing smallholder tree growing and forest transition pathways (e.g. Newby et al., 2014, Lambin and Meyfroidt, 2010). Initially proposed by Mather (1992), the forest transition theory proposed a positive relationship between economic development and increase of forest cover. Rudel et al. (2005) called this explanation ‘the path of economic development’ of the forest transition, to which they added a second pathway: the path of scarcity of forest products. Later, Lambin and Meyfroidt (2010) added three additional paths to complete a unified theoretical framework of the forest transition, one of which is that of productive land intensification by small landowners (the ‘smallholder intensification pathway’). Lambin and Meyfroidt (2010) relate the smallholder intensification pathway to the expansion of plantations for fruit production, or of hedges or the establishment of agroforestry systems “to decrease their vulnerability to economic or environmental shocks and guarantee their livelihood through ecological and economic diversification” (Lambin and Meyfroidt, 2010, p. 110).

However, the further intensification of swidden lands in the case study village is more likely to manifest in non-(agro)forestry outcomes, largely because the higher returns to labour from leasing land for banana plantations. The potential repetition of similar experiences through-out Laos may constrain the prospect of the Lao Government of reaching its national goal of 70% forest cover. Consequently, where access to land is unevenly distributed and markets for agroforestry products are limited or less predictable, company-community collaborations – as in land-sharing concessions – may be preferable.

6.3 Implications for Laos

An explicit aim of this research was to inform national policies aimed at improving the benefits that farmers derive from tree plantations. My multiple case study approach aimed to improve understanding of the association of livelihood outcomes with particular models, rather than to rank models by livelihood outcomes. The approach is consistent with the idea that there is no “single best way” in forestry (Sayer and Elliott, 2005). This implies that no single product or model may be deployed widely to improve the livelihoods of farmers.

A recurrent theme expressed by Lao policy makers, development partners and forestry companies during my fieldwork was the identification of the “best model” in terms of performance for improving livelihoods. This universalist perspective expecting that generalized models will somehow be applicable to all contexts has resonance with what Rigg (2012) has described as a “cookie-cutter” (p. 2) approach to problems. In the context of this research, I would argue that such a ‘cookie-cutter’ approach appealed to companies seeking a model that justified their institutional presence and that they could replicate like a forestry franchise across the landscape. A ‘silver bullet’ – I would argue – was also appealing to Lao authorities aiming to modernise rural landscapes (Lagerqvist et al., 2014) and to control swidden agriculture (Pholsena and Banomyong, 2006). But as this research has confirmed that which some others (Kanowski and Murray, 2008, Rigg, 2012) had already indicated, context matters. Accordingly, efforts to establish tree plantations may need to be different at each village (see also McElwee, 2009). Hence, in creating policies and rolling out programs, special attention to each local context and dynamic policies will be required to foster optimal livelihood outcomes.

A foreseeable challenge to deal with this complexity relates to the decision by the Lao Government to allow the establishment of new tree plantations on PFA-land (Prime Minister's Office, 2018). The establishment of forest plantations in PFA-land aims to help meet national forest cover objectives and to build a critical mass of forest resources to supply a competitive forestry industry. The Lao Government lacks the high investment, scientific knowledge (Barney, 2014) and technological requirements needed to meet these targets. Therefore, a strategy of the Lao Government to attract (or retain) private investors has been to allocate PFA land concessions to plantation companies (Prime Minister's Office, 2018). In that context, for example, the Lao Government recently announced the allocation of a 50-year concession of 2,000 hectares of “unused” PFA-land in Vientiane Province to a

private eucalypt plantation company (Vientiane Times, 2020). The characterisation of land as “unused” in Laos is part of an ongoing strategy “by the Lao Government to attract investors, and by investors to justify their projects” (Lu and Schönweger, 2019, p. 61). The reality, however, might be different, and it is commonplace that these lands are currently used by local people. Indeed, it is not uncommon that land surveys – often led by companies rather than by the granting authorities – take place after concessions are granted (Lu and Schönweger, 2019). This is in part because granting authorities do not have the resources and capacity to do so. In that context, a key issue for the successful development of new tree plantations in PFAs – where over 10% of all Lao households are found (MRLG 2019) – will be that the local benefits generated compare favourably with current land uses. Otherwise, new tree plantations may compromise local livelihoods, foster local dissatisfaction and conflict between local people and companies – as many earlier land concessions in ‘degraded’ land already have – and further discourage investors (Lu and Schönweger, 2019, Stora Enso, 2020).

Although some of these projects have the potential to improve the livelihoods of very poor and vulnerable local people, in part through including strategies for non-exclusive land use and agroforestry plantations, one can also expect difficulties arising from “delegating” responsibility for dealing with this complexity to private companies. Firstly, companies may end up finding small, scattered areas of “unused” land, not all of which might be suitable for tree plantations (Lu and Schönweger, 2019). Secondly, as with any large corporate plantation project, there are risks that some companies will still frame the project with a top-down logic, particularly in the political context of Laos where it is difficult for local people to refuse any high-profile concessionaire (Kenney-Lazar, 2015). Further, despite the Lao Government’s commitments to foster responsible private investment (Global Green Growth Institute, 2019, Ministry of Agriculture and Forestry, 2019), its capacity to enforce companies to comply with the Law and apply minimum standards of CSR is still not apparent (Indufor Taskforce, 2020). In that context, one could expect that the tree plantation sector may continue to develop unevenly, with some companies operating as ‘sustainability enclaves’ (Barney, 2009), aiming for high sustainability standards, and others operating through a range of other, less sustainable, approaches.

A potential way to overcome these challenges would be a re-delineation of the state forest categories so that PFA-land does not overlap with land that farmers currently use. This would be consistent with the 2014 National Assembly’s request to review Forestland categories (Lao National Assembly, 2014, Mekong Region Land Governance, 2019), and with the international paradigms of wider recognition of customary rights and current land uses (Glück et al., 2005). However, the Lao Government is not overly receptive to the idea of rezoning state forest land categories to account for *de facto* local settlements, in part because it may compromise the Government’s long-term goal of 70 percent national forest cover (Mekong Region Land Governance, 2019). A mixed allocation of PFA-land to households for timber production – as in neighbouring Thailand (Barney, 2005) and Vietnam (Sikor, 2012) – and to company land-sharing concessions might offer a way to reconcile state and local

aspirations. In that context, an option for allocation to households could be to follow the approach of the Agricultural Land Reform Office (ALRO) in Thailand (Kaewkallaya et al., 2014), to implement programs with incentives that encourage smallholders to become tree-growing contributors to the realisation of national forest cover goals. These programs could allocate land tenure rights conditional on minimum standards of tree cover retention, yet measures to avoid the potential concentration of land holdings by local elites, as it occurred in Thailand (Barney, 2005), should be considered.

In relation to land-sharing concession-based plantations in PFA-land not currently used by local people, the Lao Government could draw on its existing list of responsible investors with high standards of social responsibility (Earth Systems, 2016). Such company-community collaborations may provide opportunities for both farmers to become smallholders and to companies. The autonomous land-sharing concession case study introduced in chapter four illustrated some of the elements that might underpin a mutually-beneficial company-community partnership – e.g. availability of land for both trees and rice cultivation, and early wage payments. Another benefit not yet discussed in this thesis is that the concession allocation of village land to a plantation company provided ancillary benefits to some (young and migrant) households. This took the form of rice cultivation and cash income from land which households may not have been able to access under customary land tenure arrangements. As chapter five illustrated, in most rural areas of Laos, people’s access to land remains governed predominantly by customary land tenure arrangements. However, customary land tenure is not necessarily equitable between households, or between generations (Barney and van der Meer Simo, 2019). While the case study outcome may have been unintentional, it illustrates that a mix of company land-sharing concessions and allocation to households for timber production might be a better option where there is inequality of land ownership and limited prospects to scale-up smallholder-led agroforestry systems. It may also prove a fruitful opportunity in contexts where local authorities struggle to find land for people who move to villages with limited spare land.

6.4 *Wider implications*

The supply of forest products from natural forests is increasingly scarce (Warman, 2014). In response, the forestry sector is progressively turning to tree plantations to satisfy the increasing demand for forest products. However, competition for available land from other land uses, primarily agriculture, and rural population growth make land use increasingly contested (Payn et al., 2015, Carle et al., 2020). This has implications for the establishment of new tree plantations. While these implications are inter-related, they are sufficiently distinctive to be addressed in different strands of the literature.

One obvious implication is “finding” the land where the new tree plantations will be established. Globally, most tree plantations are established on ‘degraded’ (forest)lands (Evans, 2009). While these areas might be marginal for agricultural purposes, and may indeed have experienced a decline in their environmental integrity (Rigg, 2014), many farmers’ livelihoods are largely dependent on these lands,

particularly for the collection of NTFPs and livestock grazing. The resurgent international scholarship quantifying environmental income (sensu Sjaastad et al., 2005, Angelsen et al., 2014), – with which the results in this thesis are consistent, contributes to improved understanding of the importance of degraded forestlands to many smallholders' livelihoods, which in turn partly explains why many smallholders can persist in rural areas (Rigg et al., 2016, Rigg et al., 2018), for as farmers are NTFP collectors, hunters and fishers too. Further, to improve local livelihoods, the advantages of plantation-based economic development must outweigh the opportunity costs of converting these degraded forestlands. In that context, Chapter 4 of this thesis provides a useful methodology to quantify when that is the case.

Notwithstanding the widely understood phenomenon of out-migration (Rigg, 2007), the apparent choice of many smallholders to stay 'on the land' (Rigg et al., 2016) also implies that tree plantation policies and programs will increasingly need to recognise the wider community values of the rural populations in areas where new tree plantations will be established. Such recognition must include stronger consideration of farmers' aspirations and attributes than have most large-scale corporate-led models (Schirmer, 2007). Traditionally, rural livelihoods have been heavily shaped by attributes of autonomy and self-sufficiency, both in the Global South (Van der Ploeg, 2008, Stock and Forney, 2014, Garrett et al., 2017) and in developed countries (Stock and Forney, 2014). Consistent with these attributes, a recurrent theme expressed by smallholders in my research was their preference for planting trees on "their own" land with "their own" tree spacing and selling "their own" wood to the company independently of other farmers. Their interest in commercial tree-growing is consistent with a historical interest in tree-growing by smallholders globally (Raintree and Warner, 1986, Evans, 2009). Consistent with the literature (Byron, 2001, Sandewall et al., 2015), my findings indicate that smallholder interest drew on the demonstration of economic benefits and secure access to profitable markets. Yet, their hesitation to allocate more land to the establishment of tree plantations confirms the findings in the global literature that building diverse income portfolios is a much preferred strategy for many rural smallholders (Alobo Loison, 2015, Rigg, 2018, Rigg et al., 2018). Nonetheless, context is of central importance to the opportunities of households to retain land. Demographic changes will influence the availability of land and labour in villages and within households, and consequently the choices that households make in relation to livelihood strategies, including their preferred tree plantation models. Further, the assumption of zero opportunity cost of labour in smallholder-led tree plantation models will be tested as labour-based income opportunities grow.

Because smallholder-led tree plantations are often locally well adapted, they also form an alternative mode of rural development to the (often controversial) centralised large-scale concession approach (Bertomeu, 2006, Snelder and Lasco, 2008, Cramb et al., 2017). In addition, because smallholders often plant or keep trees on their farmlands in combination with other non-forestry activities, smallholder tree growing is often associated with agroforestry. The possibility of obtaining

multiple products, most importantly food (Stroesser et al., 2018), from a single parcel of land provides smallholders with greater economic stability (Lasco et al., 2014) while maintaining a certain level of food production (Jerneck and Olsson, 2014, van Noordwijk et al., 2018). These are important benefits because – as with any commercial activity – commercial tree-growing entails risks. These include the potential failure of companies to honour contracts (Baumann, 2000; also Chapter 4 in this thesis), adverse integration in commercial farming through contracts (Little and Watts, 1994, Singh, 2002, Ton et al., 2018), tree-crop market price volatility (Schroth and Ruf, 2014; also Chapter Five in this thesis), uncertain long-term socioeconomic incentives (Le et al., 2014, Li, 2015), and tree-crop damage (Schroth et al., 2000). Three of the four plantation models investigated in Chapter 4 illustrate the possibility to grow food crops jointly with trees.

Notwithstanding the risks associated with tree-growing, future efforts to give farmers a stronger role in tree plantation expansion will need to address structural constraints limiting farmers' access to land. Consistent with a body of literature that is critical of the longstanding trust that customary land tenure provisions are capable of effectively safeguarding land rights of smallholder farmers (White, 2012, Kidido et al., 2017, Kansanga et al., 2018, Chigbu, 2019), my research found that smallholders who had access to more (customary) land were better placed to establish and benefit from tree plantations. Consequently, to support equitable economic development (including inter-generational equity), customary land tenure systems may need to be subject to periodic review and adjustment. Alternatively, where redistributing land that has already been appropriated might not be an option, governments may need to allocate state land to land-poor farmers, as suggested above for prospective plantations PFAs in Laos or experience in Vietnam and Thailand; provided that there are interventions to ameliorate widening gaps in land holdings, as was the case in these two countries (Darr and Uibrig, 2004, Barney, 2005, Clement and Amezaga, 2008, Clement and Amezaga, 2009). Otherwise, the further expansion of smallholder-based tree plantations under customary land tenure provisions (either agroforestry or monoculture plantations, contract-based or not) will continue to exacerbate social differentiation in these communities.

A final implication related to the increasing competition for land is the proposition that, if more can be produced per unit area, more land can be spared for conservation. This strategy of intensification of management and productivity has been associated with both agroforestry systems (Ashley et al., 2006, Jose, 2012) and tree plantations in general (Pirard et al., 2016), particularly in population-dense Asia (Payn et al., 2015). Although this assumption has its logic, my findings that the further intensification of swidden lands in the agroforestry case study village is more likely to manifest in non-(agro)forestry outcomes (see Chapter 5) confirm earlier empirical evidence demonstrating that land sparing benefits rarely result unless effective forest conservation and tree plantation policies are in place (Lambin and Meyfroidt, 2010, Pirard et al., 2016, Rahman et al., 2017).

6.5 Limitations of the research

There are, inevitably, a number of limitations to the research as it was conducted. One possible criticism is that systematic reviews are often associated with the synthesis of quantitative data or experimental results, for which review protocols are well-established; in contrast, there are no clear guidelines for synthesis of qualitative evidence (Macura et al., 2019). Nevertheless, the number of systematic reviews to synthesise qualitatively the evidence from research on the experiences of people affected by ‘environmental’ phenomena in different contexts is growing (ibid). The application of frameworks, as I did with the SLF, has become a common strategy to review and synthesise evidence in the literature. In my case, the five ‘capitals’ of the SLF provided a ‘structure’ against which findings from the papers reviewed were brought together and organised for thematic synthesis (Macura et al., 2019).

A second possible criticism of this research relates to the small empirical evidence base of one case study village per tree plantation model, and the limited number of tree plantation models; and the exclusion of the two dominant tree species in Laos in terms of area planted and policy focus: rubber and teak, respectively. In relation to the tree species selected, I excluded rubber and teak because both these species have been the subject of a substantial body of prior research. Further, my focus was on plantation ‘models’, not tree species. The selected case studies represent the plantation models that the GoL favoured at the time of research (Vientiane Times, 2016). In that context, the case study design adopted enabled an in-depth examination of those models (Bryman, 2012). In relation to the limited representativity from a single village per case study, in designing this research, I followed a *case study logic*, not a *sampling logic* (Small, 2009). This means that my results need to be seen in that context, which may have indeed included exceptional or non-generalised circumstances. Nevertheless, along with the realised contribution to the livelihoods of participating households in my case study villages, the results in Chapter 4 also present the “best case scenario” contributions to livelihoods, as projected by the plantation companies proposing the land-sharing concession and contract farming models. Future research may complement my results and analysis by drawing on a wider range of cases.

A third possible criticism is that the study design did not include collection of data at different years of the plantation cycle. The income results are a snapshot in time against a background of other, including longer-term, changes to livelihoods. While research designs that address these limitations have much merit, they are not suited to the constrained timeline of a PhD study. Nevertheless, the results in Chapter 4 present the proportional contribution of annualised income from tree plantations to average total annual household incomes in each village in the year of fieldwork, which offer one measure of plantation-derived contributions to livelihoods over the full plantation cycle. Future data collection that allows longitudinal estimation of incomes would also be very informative.

A fourth possible criticism to my approach is the lack of ‘control’ villages without tree plantations to establish a livelihood baseline for comparison with plantation villages (see e.g. Phasouysaingam and

Polthane, 2020). Control villages were not included in the study design for various reasons. First, given the high levels of economic, socio-cultural, and landscape diversity in rural Laos, it was concluded that it would be difficult to account for the many confounding (i.e. non-plantation related) factors that also contribute to livelihoods. Secondly, given limited resources, inclusion of control villages would also have restricted the number of plantation models that I could have examined.

6.6 Future research priorities

Public and media views of tree plantations have often been negative. Some schools of thought within forest conservation have vilified tree plantations because they are not natural forests (Carrere and Lohmann, 1996). One reason that such ideas have developed is because of a lack of appreciation of the important role that tree plantations play in supplying an increasing demand for forest products and, in consequence, supporting wider global forest restoration and conservation efforts (Pirard et al., 2016). More research on this important role would contribute to a more nuanced account of tree plantations and illuminate that debate.

Another reason why tree plantations have a negative image is because research has focused on the short-term impacts from, mainly, corporate-led monoculture plantations. While my research has contributed towards improving understanding of how other tree plantation models contribute to the livelihoods of local people, I suggest that more comparative research on tree plantations should be undertaken, to include other countries and other tree plantation models. While it is likely that the preference of local smallholders to establish their own multi-functional tree plantations will apply to most contexts, not all results in this thesis will be equally pertinent. Indeed, this research only includes a small set of the wider range of tree plantation models in which smallholders participate (Cramb et al., 2017). New research could inform how the patterns and sources of benefits of other tree plantation models interact with the livelihoods of smallholders elsewhere. Future comparative studies should consider incomes from tree-growing and investigate the opportunity costs of pre-plantation uses and alternative labor opportunities. This means that those who want to make an informed case for tree plantations should ‘look beyond the woodlot’ (Newby et al., 2014) and situate plantation income within the wider portfolio of livelihood activities. To that end, research funding organisations need to acknowledge that livelihood studies are time- demanding, particularly in countries with complex bureaucracies or when the studies are related to politically sensitive issues.

New opportunities to establish tree plantations without threatening ever-scarcer natural forests are declining. Hence, there is an increasing need to integrate agricultural and forest landscapes to match societal needs, particularly food security (van Noordwijk et al., 2018). However, multi-purpose plantations at commercial scale are still in the early stages of development (Szulecka et al., 2014). I suggest, therefore, that more research is needed on the ecological intensification of tree plantations (Nguyen et al., 2018). Because smallholders are often the engine of innovation and sustainability in

rural areas (Boserup, 1965, Buckles et al., 1998, Reij and Waters-Bayer, 2014), research should put smallholders at the centre of rural transformations, recognising their significant and critical role in agricultural innovation. To that end, researchers may consider long-term farmer-led investigations in which the process of knowledge transfer among smallholders is carried out by smallholders themselves and where researchers' main roles are as facilitators and communicators (Braun et al., 2006, Phillips et al., 2014).

6.7 Final remarks

In conclusion, Rigg (2014), drawing upon the de-agrarianisation thesis, argued that we can no longer assume that rural people in Southeast Asia envisage their futures in the farming sector. While rural people's livelihoods have increasingly drawn on "more than the soil" (*sensu* Rigg (2014)) to assemble a livelihood, the trend towards de-agrarianisation has certainly not meant a complete abandonment of land, as Rigg et al. (2016) discussed. This thesis has argued that the persistence of Lao smallholders draws in important ways on the environmental income that they are able to derive from their community landscapes, including from what are officially designated as 'degraded' lands. In this context, we can expect growing competition for land in rural Laos, between commercial actors and local farmers. Both state and corporate actors involved in the forest plantation sector should look at "*more than the trees*", to understand and help improve farmers' livelihoods in their lived social, economic and landscape contexts.

References

- Adegbihin, J. and Igboanugo, A., 1990. Agroforestry practices in Nigeria, *Agroforestry Systems*, **10**(1): 1-22.
- Alobo Loison, S., 2015. Rural livelihood diversification in sub-Saharan Africa: a literature review, *The Journal of Development Studies*, **51**(9): 1125-1138.
- Alton, C., Bluhm, D. and Sannikone, S., 2005. *Para rubber cultivation in Northern Laos: constraints and chances*, Lao-German Program Rural Development in Mountainous Areas of Northern Lao PDR. GIZ, Vientiane, Lao PDR.
- Andriessse, E., 2014. A comparison of rubber smallholder livelihoods in Cambodia and Laos, *The Southeast Asian Review*, **24**(2): 167-206.
- Andriessse, E. and Choi, W., 2014. Emerging Upstream Rubber Value Chains and Changing Smallholder Livelihoods in Central Laos, *Responsible Development in a Polycentric World Inequality, Citizenship and the Middle Classes. 14th EADI General Conference. 23-26 June 2014*, Bonn.
- Angelsen, A., Jagger, P., Babigumira, R., Belcher, B., Hogarth, N. J., Bauch, S., Börner, J., Smith-Hall, C. and Wunder, S., 2014. Environmental Income and Rural Livelihoods: A Global-Comparative Analysis, *World Development*, **64**, **Supplement 1**: S12-S28.
- Ashley, R., Russell, D. and Swallow, B., 2006. The policy terrain in protected area landscapes: challenges for agroforestry in integrated landscape conservation, *Biodiversity & Conservation*, **15**(2): 663-689.
- Baird, I. G., 2011. Turning land into capital, turning people into labor: primitive accumulation and the arrival of large-scale economic land concessions in the Lao People's Democratic Republic, *New Proposals: Journal of Marxism and Interdisciplinary Inquiry*, **5**(1): 10-26.
- Baird, I. G., 2014. Degraded forest, degraded land and the development of industrial tree plantations in Laos, *Singapore Journal of Tropical Geography*, **35**(3): 328-344.
- Baird, I. G., 2017. Resistance and contingent contestations to large-scale land concessions in southern Laos and northeastern Cambodia, *Land*, **6**(1). Available at: 10.3390/land6010016
- Baird, I. G., 2019. Problems for the plantations: Challenges for large scale land concessions in Laos and Cambodia, *Journal of Agrarian Change*: 1-21. Available at: <https://doi.org/10.1111/joac.12355>
- Baird, I. G. and Vue, P., 2015. The ties that bind: The role of Hmong social networks in developing small-scale rubber cultivation in Laos, *Mobilities*, **12**(1): 136-154.
- Banerjee, M., Prasad, R., Rehman, I. H. and Gill, B., 2016. Induction stoves as an option for clean cooking in rural India, *Energy Policy*, **88**: 159-167.
- Barney, K., 2005. *At the Supply Edge: Thailand's Forest Policies, Plantation Sector and Commodity Export Links with China. China and Forest Trade in the Asia-Pacific Region: Implications for Forests and Livelihoods*, Forest Trends, Washington DC. Available at: <https://www.forest-trends.org/publications/at-the-supply-edge/>
- Barney, K., 2007. *Power, Progress and Impoverishment: Plantations, Hydropower, Ecological Change and Community Transformation in Hinboun District, Lao PDR, a Field Report*, Center for International Forestry Research, Probe International, Rights and Resources Initiative and the York Centre for Asian Research.
- Barney, K., 2009. Laos and the making of a 'relational' resource frontier, *Geographical Journal*, **175**(2): 146-159.
- Barney, K., 2014. Ecological knowledge and the making of plantation concession territories in southern Laos, *Conservation and Society*, **12**(4): 352-363.
- Barney, K. and van der Meer Simo, A., 2019. Forest Land Commons in Laos in the Twenty First Century: Agrarian Capitalism and the 'Non-Commodified Subsistence Guarantee', *Kyoto Review of Southeast Asia*, (25): 6p.
- Barua, S., Lehtonen, P. and Pakkasalo, T., 2014. Plantation vision: potentials, challenges and policy options for global industrial forest plantation development, *International Forestry Review*, **16**(2): 117-127.

- Batra, P. and Pirard, R., 2015. *Is a typology for planted forests feasible, or even relevant?*, Center for International Forestry Research (CIFOR), Bogor, Indonesia.
- Baumann, P., 2000. *Equity and efficiency in contract farming schemes: the experience of agricultural tree crops*, Overseas Development Institute, London.
- Bebbington, A., 2000. Reencountering development: Livelihood transitions and place transformations in the Andes, *Annals of the association of american geographers*, **90**(3): 495-520.
- Belcher, B. and Roberts, M., 2012. Assessing participatory photography as a method to understand local perspectives on environment and development in northern Lao PDR., *Forests, Trees and Livelihoods*, **21**(3): 145-157.
- Bertomeu, M., 2006. Financial Evaluation of Smallholder Timber-based Agroforestry Systems in Claveria, Northern Mindanao, the Philippines, *Small-scale Forest Economics, Management and Policy*, **5**(1): 57-82.
- Boer, K., 2019. *Advancing enhanced wood manufacturing industries in Laos and Australia: Luang Prabang Province Teak Inventory*, Australian Centre for International Agricultural Research, Canberra.
- Boonkird, S., Fernandes, E. and Nair, P., 1984. Forest villages: an agroforestry approach to rehabilitating forest land degraded by shifting cultivation in Thailand, *Agroforestry Systems*, **2**(2): 87-102.
- Borras Jr, S. M., Franco, J. C., Isakson, S. R., Levidow, L. and Vervest, P., 2016. The rise of flex crops and commodities: implications for research, *Journal of Peasant Studies*, **43**: 93–115.
- Boserup, E., 1965. *The Conditions of Agricultural Growth*, Aldine, Chicago.
- Boy, E., Bruce, N., Smith, K. R. and Hernandez, R., 2000. Fuel efficiency of an improved wood-burning stove in rural Guatemala: implications for health, environment and development, *Energy for Sustainable Development*, **4**(2): 23-31.
- Braun, A., Jiggins, J., Röling, N., van den Berg, H. and Snijders, P., 2006. *A global survey and review of farmer field school experiences*, International Livestock Research Institute (ILRI), Wageningen.
- Broegaard, R. B., Rasmussen, L. V., Dawson, N., Mertz, O., Vongvisouk, T. and Grogan, K., 2017. Wild food collection and nutrition under commercial agriculture expansion in agriculture-forest landscapes, *Forest Policy and Economics*, **84**: 92-101.
- Brown, C., 2000. *The global outlook for future wood supply from forest plantations*, FAO, Rome.
- Bryant, R. L., 1994. Shifting the cultivator: The politics of teak regeneration in colonial Burma, *Modern Asian Studies*, **28**(2): 225-250.
- Bryant, R. L., 1996. Romancing colonial forestry: The discourse of forestry as progress' in British Burma, *Geographical Journal*: 169-178.
- Bryman, A., 2012. *Social Research Methods*, Oxford University Press, New York.
- Buckles, D., Triomphe, B. and Sain, G., 1998. *Cover crops in hillside agriculture: farmer innovation with Mucuna*, International Development Research Centre and the International Maize and Wheat Improvement Center, Ottawa and Mexico.
- Byron, N., 2001. Keys to smallholder forestry, *Forests, Trees and Livelihoods*, **11**(4): 279-294.
- Carle, J., Duval, A. and Ashford, S., 2020. The future of planted forests, *International Forestry Review*, **22**(1): 65-80.
- Carrere, R. and Lohmann, L., 1996. *Pulping the South: Industrial tree plantations and the world paper economy*, Zed Books, London, UK.
- Chambon, B., Ruf, F., Kongmanee, C. and Anghong, S., 2016. Can the cocoa cycle model explain the continuous growth of the rubber (*Hevea brasiliensis*) sector for more than a century in Thailand?, *Journal of Rural Studies*, **44**: 187-197. Available at: [10.1016/j.jrurstud.2016.02.003](https://doi.org/10.1016/j.jrurstud.2016.02.003)
- Chigbu, U. E., 2019. Anatomy of women's landlessness in the patrilineal customary land tenure systems of sub-Saharan Africa and a policy pathway, *Land Use Policy*, **86**: 126-135.
- Clement, F. and Amezaga, J. M., 2008. Linking reforestation policies with land use change in northern Vietnam: Why local factors matter, *Geoforum*, **39**(1): 265-277.
- Clement, F. and Amezaga, J. M., 2009. Afforestation and forestry land allocation in northern Vietnam: analysing the gap between policy intentions and outcomes, *Land Use Policy*, **26**(2): 458-470.

- Coe, R., Sinclair, F. and Barrios, E., 2014. Scaling up agroforestry requires research 'in' rather than 'for' development, *Current Opinion in Environmental Sustainability*, **6**: 73-77.
- Cossalter, C. and Pye-Smith, C., 2003. Fast-wood forestry, *Myths and Realities CIFOR, Jakarta, Indonesia*.
- Cramb, R., Colfer, C. J. P., Dressler, W., Laungaramsri, P., Le, Q. T., Mulyoutami, E., Peluso, N. L. and Wadley, R. L., 2009. Swidden transformations and rural livelihoods in Southeast Asia, *Human Ecology*, **37**(3): 323-346.
- Cramb, R., Manivong, V., Newby, J. C., Sothorn, K. and Sibat, P. S., 2017. Alternatives to land grabbing: exploring conditions for smallholder inclusion in agricultural commodity chains in Southeast Asia, *The Journal of Peasant Studies*, **44**(4): 939-967.
- Cramb, R., Purcell, T. and Ho, T. C. S., 2004. Participatory assessment of rural livelihoods in the Central Highlands of Vietnam., *Agricultural Systems*, **81**(3): 255-272.
- D'Amato, D., Rekola, M., Wan, M., Cai, D. and Toppinen, A., 2017. Effects of industrial plantations on ecosystem services and livelihoods: Perspectives of rural communities in China, *Land Use Policy*, **63**: 266-278.
- Darr, D. and Uibrig, H., 2004. Promotion of farm forestry in Laos enhances creation of individual land property, *Asia Pacific Journal of Rural Development*, **14**(2): 39-51.
- Daviau, S., 2010. Conducting fieldwork with Tarieng communities in southern Laos: Negotiating discursive spaces between neoliberal dogmas and Lao socialist ideology, *Asia Pacific Viewpoint*, **51**(2): 193-205.
- Del Lungo, A., Ball, J. and Carle, J., 2006. *Global planted forests thematic study: Results and analysis*, FAO, Rome.
- Department of Forestry, 2018a. *Basic Study for Updating the Forestry Strategy 2020. Forestry Sector Indicator Survey 2018* Ministry of Agriculture and Forestry of the Lao PDR, Vientiane.
- Department of Forestry, 2018b. *Lao PDR's Forest Reference Emission Level and Forest Reference Level for REDD+ Results Payment under the UNFCCC*, Ministry of Agriculture and Forestry of the Lao PDR, Vientiane.
- Department of Forestry, 2018c. *Plantation statistics Lao PDR. VALTIP 3 Workshop*, Ministry of Agriculture and Forestry of the Lao PDR, Luang Prabang.
- Dwyer, M., Polack, E. and So, S., 2015. 'Better-practice' Concessions? Some Lessons from Cambodia's Leopard Skin Landscape, *International Development Policy | Revue internationale de politique de développement*, **6**(6).
- Earth Systems, 2016. *Lao PDR Eucalypt Sector Discussion Paper, Towards Sustainable Forest Management: An Industry Perspective*, Vientiane.
- Evans, J., 1992. *Plantation forestry in the tropics: tree planting for industrial, social, environmental, and agroforestry purposes*, Oxford University Press,
- Evans, J., 2009. 'The history of tree planting and planted forests', in Evans, J. (ed) *Planted forests: uses, impacts and sustainability*, FAO and CAB International, Rome, pp. 5-22.
- Evans, J., Carle, J. and Del Lungo, A., 2009. 'The question of definitions', in Evans, J. (ed) *Planted Forests. Uses, Impacts and Sustainability*, FAO and CAB International, Rome, pp. 23-32.
- FAO, IFAD, UNCTAD Secretariat and World Bank Group, 2010. *Principles for responsible agricultural investment that respects rights, livelihoods and resources: a discussion note prepared by FAO, IFAD, the UNCTAD Secretariat and the World Bank Group to contribute to an ongoing global dialogue*, UN, Geneva.
- Farley, K. A., 2007. Grasslands to tree plantations: forest transition in the Andes of Ecuador, *Annals of the association of american geographers*, **97**(4): 755-771.
- Faruqi, S., Wu, A., Brolis, E., Ortega, A. A. and Batista, A., 2018. *The business of planting trees: a growing investment opportunity*, World Resources Institute, Washington.
- Foppes, J. and Ketphanh, S., 2000. *Forest extraction or cultivation? Local solutions from Lao PDR, workshop on the evolution and sustainability of "intermediate systems" of forest management*, FOREASIA,
- Fox, J., Fujita, Y., Ngidang, D., Peluso, N., Potter, L., Sakuntaladewi, N., Sturgeon, J. and Thomas, D., 2009. Policies, political-economy, and swidden in Southeast Asia, *Human Ecology*, **37**(3): 305-322.

- Friis, C. and Nielsen, J. Ø., 2016. Small-scale land acquisitions, large-scale implications: Exploring the case of Chinese banana investments in Northern Laos, *Land Use Policy*, **57**: 117-129.
- Friis, C., Reenberg, A., Heinimann, A. and Schönweger, O., 2016. Changing local land systems: Implications of a Chinese rubber plantation in Nambak District, Lao PDR, *Singapore Journal of Tropical Geography*, **37**(1): 25-42. Available at: 10.1111/sjtg.12137
- Garrett, R. D., Gardner, T. A., Morello, T. F., Marchand, S., Barlow, J., de Blas, D. E., Ferreira, J., Lees, A. C. and Parry, L., 2017. Explaining the persistence of low income and environmentally degrading land uses in the Brazilian Amazon, *Ecology and Society*, **22**(3).
- Gerber, J. F., 2011. Conflicts over industrial tree plantations in the South: Who, how and why?, *Global Environmental Change*, **21**(1): 165-176.
- Ghazoul, J., Bugalho, M. and Keenan, R., 2019. Plantations take economic pressure off natural forests, *Nature*, **570**(7761): 307-308.
- Global Green Growth Institute, 2019. *GGGI Laos Private Sector Engagement Workshop in Climate Change and Green Growth*, Global Green Growth Institute. Available at: <https://gggi.org/gggi-laos-private-sector-engagement-workshop-in-climate-change-and-green-growth/> (accessed 15 October).
- Glück, P., Rayner, J. and Cashore, B., 2005. 'Changes in the governance of forest resources', in Mery, G., Alfaro, R., Kanninen, M. and Lobovikov, M. (eds), *Forests in the Global Balance – Changing Paradigms*, Vol. World Series Volume, International Union of Forest Research Organizations (IUFRO), Helsinki, pp. 318.
- Government of Lao PDR, 2005. *Forestry Strategy to the year 2020 of the Lao PDR*, Ministry of Agriculture and Forestry, Vientiane.
- Grossman, J. J., 2015. Eucalypts in agroforestry, reforestation, and smallholders' conceptions of "nativeness": a multiple case study of plantation owners in eastern Paraguay, *Small-scale Forestry*, **14**(1): 39-57.
- Gustafsson, J., 2017. 'Single case studies vs. multiple case studies: A comparative study', Academy of Business, Engineering and Science, Halmstad University, Halmstad, Sweden.
- Hall, R., Scoones, I. and Tsikata, D., 2017. Plantations, outgrowers and commercial farming in Africa: agricultural commercialisation and implications for agrarian change, *The Journal of Peasant Studies*, **44**(3): 515-537.
- Hansen, P. K., Sodarak, H. and Savathvong, S., 2007. 'Teak production by shifting cultivators in Northern Lao PDR.', in Cairns, M. (ed) *Voices from the forest: Integrating indigenous knowledge into sustainable upland farming*, Resources for the Future, Washington DC, pp. 414-424.
- IFC, 2018. *IFC Partners with Mekong Timber Plantations Limited to Strengthen Forest Plantation Sustainability in Lao PDR*, International Finance Corporation. Available at: <https://ifcextapps.ifc.org/IFCExt/Pressroom/IFCPressRoom.nsf/0/FB4123EAF9599086852582B10013B951> (accessed 24 October 2020).
- Indufor Taskforce, 2020. *Creating wealth and building national assets. Development of sustainable plantation sector in Laos: Opportunities for an expanded wood processing industry and overcoming barriers*, Vientiane.
- Jerneck, A. and Olsson, L., 2014. Food first! Theorising assets and actors in agroforestry: risk evaders, opportunity seekers and 'the food imperative' in sub-Saharan Africa, *International Journal of Agricultural Sustainability*, **12**(1): 1-22.
- Jose, S., 2012. Agroforestry for conserving and enhancing biodiversity, *Agroforestry Systems*, **85**(1): 1-8.
- Jurgensen, C., Kollert, W. and Lebedys, A., 2014. *Assessment of industrial roundwood production from planted forests*, FAO, Rome, Italy. Available at: <http://www.fao.org/3/a-i3384e.pdf>
- Kaewkallaya, N., Shrestha, R. P. and Tibkaew, A. P., 2014. Effect of agricultural land reform development project on rural livelihood: experience from Thailand, *IJERD*, **5**(1): 20-25.
- Kanowski, P., 2005. *Intensively managed planted forests*, The Forests Dialogue. Yale University, Connecticut, USA. Available at: <https://theforestdialogue.org>
- Kanowski, P. and Murray, H., 2008. *Intensively-managed planted forests: towards best practice*, The Forests Dialogue. Yale University, Connecticut, USA. Available at: <https://theforestdialogue.org>

- Kansanga, M., Andersen, P., Atuoye, K. and Mason-Renton, S., 2018. Contested commons: Agricultural modernization, tenure ambiguities and intra-familial land grabbing in Ghana., *Land Use Policy*, **75**: 215-224.
- Keenan, R. J., Reams, G. A., Achard, F., de Freitas, J. V., Grainger, A. and Lindquist, E., 2015. Dynamics of global forest area: Results from the FAO Global Forest Resources Assessment 2015, *Forest Ecology and Management*, **352**: 9-20.
- Kenney-Lazar, M., 2012. Plantation rubber, land grabbing and social-property transformation in southern Laos, *The Journal of Peasant Studies*, **39**(3): 1017. Available at: 10.1080/03066150.2012.674942
- Kenney-Lazar, M., 2015. *Authoritarian resource governance and emerging peasant resistance in the context of Sino-Vietnamese Tree Plantations, Southeastern Laos*,
- Kenney-Lazar, M., 2018. Governing Dispossession: Relational Land Grabbing in Laos., *Annals of the American Association of Geographers*, **108**(3): 679-694.
- Khamphone, B. and Sato, N., 2011. Effectiveness of rubber plantation on villagers' livelihood improvement in the northern part of Laos, *Journal of the Faculty of Agriculture, Kyushu University*, **56**(1): 185-191.
- Khamzina, A., Lamers, J. P. and Vlek, P. L., 2012. 'Conversion of degraded cropland to tree plantations for ecosystem and livelihood benefits', in *Cotton, water, salts and soums*, Springer, pp. 235-248.
- Kidido, J. K., Bugri, J. T. and Kasanga, R. K., 2017. Dynamics of youth access to agricultural land under the customary tenure regime in the Techiman traditional area of Ghana., *Land Use Policy*, **60**: 254-266.
- Koch, S., 2017. The struggle over Lao PDR's forests: New opportunities for improved forest governance?, *Pacific Geographies*, (47).
- Lagerqvist, Y. F., Woollacott, L., Phasouysaingam, A. and Souliyavong, S., 2014. Resource Development and the Perpetuation of Poverty in Rural Laos, *Australian Geographer*, **45**(3): 407-417. Available at: 10.1080/00049182.2014.930006
- Lambin, E. F. and Meyfroidt, P., 2010. Land use transitions: Socio-ecological feedback versus socio-economic change, *Land Use Policy*, **27**(2): 108-118.
- Lao National Assembly, 2014. *Lao National Assembly Cabinet Office Notice 273. Review/consideration, for endorsement, of the three forestry categories (Protection Forest, Conservation Forest and Production Forest (unofficial translation)*, Vientiane.
- Lasco, R. D., Delfino, R. J. P. and Espaldon, M. L. O., 2014. Agroforestry systems: helping smallholders adapt to climate risks while mitigating climate change, *Wiley Interdisciplinary Reviews: Climate Change*, **5**(6): 825-833.
- Le, H. D., Smith, C. and Herbohn, J., 2014. What drives the success of reforestation projects in tropical developing countries? The case of the Philippines, *Global Environmental Change*, **24**: 334-348.
- Lestrelin, G., Castella, J.-C. and Bourgoin, J., 2012. Territorialising sustainable development: The politics of land-use planning in Laos, *Journal of Contemporary Asia*, **42**(4): 581-602.
- Li, T., 2015. Transnational farmland investment: A risky business, *Journal of Agrarian Change*, **15**(4): 560-568.
- Little, P. D. and Watts, M., 1994. *Living under contract: contract farming and agrarian transformation in sub-Saharan Africa*, University of Wisconsin Press, Wisconsin.
- Lu, J. and Schönweger, O., 2019. Great expectations: Chinese investment in Laos and the myth of empty land, *Territory, Politics, Governance*, **7**(1): 61-78.
- MacDicken, K. and Vergara, N., 1990. *Agroforestry, Classification and Management*, Wiley Interscience., New York.
- Macura, B., Suškevičs, M., Garside, R., Hannes, K., Rees, R. and Rodela, R., 2019. Systematic reviews of qualitative evidence for environmental policy and management: an overview of different methodological options, *Environmental Evidence*, **8**(1): 1-11.
- Magee, B., 1973. *Popper*, Fontana Modern Masters, Fontana.
- Malkamäki, A., D'Amato, D., Hogarth, N. J., Kanninen, M., Pirard, R., Toppinen, A. and Zhou, W., 2018. A systematic review of the socio-economic impacts of large-scale tree plantations, worldwide, *Global Environmental Change*, **53**: 90-103.

- Manivong, V. and Cramb, R., 2008. Economics of smallholder rubber expansion in Northern Laos, *Agroforestry Systems*, **74**(2): 113-125. Available at: 10.1007/s10457-008-9136-3
- Mather, A. S., 1992. The forest transition, *Area*, **24**(4): 367-379.
- McElwee, P., 2009. Reforesting "bare hills" in Vietnam: Social and environmental consequences of the 5 million hectare reforestation program, *Ambio*, **38**(6): 325-333. Available at: 10.1579/08-R-520.1
- Mekong Region Land Governance, 2019. *Land Tenure Security in 70 percent Forestland Policy of the Lao PDR, Discussion Note Series #6*, Mekong Region Land Governance, Vientiane, Lao PDR.
- Mercer, D. E., 2004. Adoption of agroforestry innovations in the tropics: a review, *Agroforestry Systems*, **61**(1-3): 311-328.
- Midgley, S., Stevens, P. and Arnold, R., 2017. Hidden assets: Asia's smallholder wood resources and their contribution to supply chains of commercial wood., *Australian Forestry*, **80**(1): 10-25.
- Ministry of Agriculture and Forestry, 2010. *Strategy for Agricultural Development 2011 to 2020*, Ministry of Agriculture and Forestry of the Lao PDR, Vientiane.
- Ministry of Agriculture and Forestry, 2019. *Guidelines on the implementation of the order No. 09/PM, regarding Intensification on Land Use Management for Industrial Tree Plantations and Other Crops Nationwide*, Ministry of Agriculture and Forestry of the Lao PDR, Vientiane.
- Morrison, E. and Bass, S., 1992. 'What about the people?', in Sargent, C. and Bass, S. (eds), *Plantation politics: forest plantations in development*, Earthscan Publications Ltd, London, pp. 92-120.
- Nair, R., 1993. *An Introduction to Agroforestry*, Kluwer Academic Publishers, London.
- Nawir, A., Kassa, H., Sandewall, M., Dore, D., Campbell, B., Ohlsson, B. and Bekele, M., 2007. Stimulating smallholder tree planting-lessons from Africa and Asia, *Unasylva-FAO*, **58**(3): 53.
- New Generation Plantations Platform, 2016. *NGP Study Tour - Laos 2016 - Letters from Laos*, media release, Available at: <http://newgenerationplantations.org/en/studytours/9> (accessed 17 April 2017).
- Newby, J., Cramb, R. and Sakanphet, S., 2014. Forest transitions and rural livelihoods: multiple pathways of smallholder teak expansion in Northern Laos, *Land*, **3**(2): 482-503.
- Newby, J., Cramb, R., Sakanphet, S. and McNamara, S., 2012. Smallholder teak and agrarian change in northern Laos, *Small-scale Forestry*, **11**(1): 27-46.
- Nguyen, H., Herbohn, J., Lamb, D., Clendenning, J. and Meadows, J., 2018. A synthesis of the available evidence to guide the design of mixed-species forest plantings for smallholder and community forestry, *Small-scale Forestry*, **17**(1): 105-123.
- O'Brien, M., 2016. 'Timber consumption and sustainable forest use: Assessing the EU's current and expected consumption of global timber in relation to the global capacity for sustainable supply', PhD, Faculty of Civil and Environmental Engineering, Kassel University Press GmbH, Kassel.
- Olawoye, O. O., 1975. THE AGRI-SILVICULTURAL SYSTEM IN NIGERIA, *The Commonwealth Forestry Review*, **54**(3/4 (161-2)): 229-236. Available at: <http://www.jstor.org/stable/42604438>
- Overbeek, W. W., Kröger, M. M. and Gerber, J.-F. J., 2012. *An overview of industrial tree plantation conflicts in the global South: conflicts, trends, and resistance struggles. EJOLT Report No. 3, 100 p.*, Environmental Justice Organisations, Liabilities and Trade, Retrieved from <http://hdl.handle.net/1765/95586>.
- Payn, T., Carnus, J.-M., Freer-Smith, P., Kimberley, M., Kollert, W., Liu, S., Orazio, C., Rodriguez, L., Silva, L. N. and Wingfield, M. J., 2015. Changes in planted forests and future global implications, *Forest Ecology and Management*, **352**: 57-67.
- Petit, P., 2013. 'The backstage of ethnography as ethnography of the state: Coping with officials in the Lao People's Democratic Republic. In Turner, S. (ed) *Red stamps and gold stars: Fieldwork in upland Socialist Asia*, UBC Press, Vancouver, pp. 143-164.
- Phasouysaingam, A. and Polthanee, A., 2020. Impact of changing of swidden-based farming to rubber-based farming on socio-economic performance in Luang Namtha province, Lao PDR, *KKU International Journal of Humanities and Social Sciences*, **10**(2): 29-56.

- Phillips, D., Waddington, H. and White, H., 2014. Better targeting of farmers as a channel for poverty reduction: A systematic review of farmer field schools targeting, *Development Studies Research. An Open Access Journal*, **1**(1): 113-136.
- Phimmavong, S., Maraseni, T. N., Keenan, R. J. and Cockfield, G., 2019. Financial returns from collaborative investment models of Eucalyptus agroforestry plantations in Lao PDR, *Land Use Policy*, **87**: 104060.
- Phimmavong, S., Ozarska, B., Midgley, S. and Keenan, R., 2009. Forest and plantation development in Laos: history, development and impact for rural communities, *International Forestry Review*, **11**(4): 501-513.
- Pholsena, V. and Banomyong, R., 2006. *Laos: from buffer state to crossroads?*, Mekong Press, Chaing Mai, Thailand.
- Pirard, R., Dal Secco, L. and Warman, R., 2016. Do timber plantations contribute to forest conservation?, *Environmental Science & Policy*, **57**: 122-130.
- Prime Minister's Office, 2018. *Prime Minister Order nr. 9 on the enhancement of governance in the use of concession lands for industrial tree plantations and the plantations of other crops within the country*, Government of Lao PDR, Vientiane, Lao PDR.
- Prowse, M., 2008. *Locating and extending livelihoods research*, Brooks World Poverty Institute, Manchester.
- Rahman, S. A., Jacobsen, J. B., Healey, J. R., Roshetko, J. M. and Sunderland, T., 2017. Finding alternatives to swidden agriculture: does agroforestry improve livelihood options and reduce pressure on existing forest?, *Agroforestry Systems*, **91**(1): 185-199.
- Raintree, J. B. and Warner, K., 1986. Agroforestry pathways for the intensification of shifting cultivation., *Agroforestry Systems*, **4**(1): 39-54.
- Ramcilovik-Suominen, S. and Nathan, I., 2020. REDD+ policy translation and storylines in Laos, *Journal of Political Ecology*, **27**(1): 436-455.
- Reij, C. and Waters-Bayer, A., 2014. *Farmer Innovation in Africa: A Source of Inspiration for Agricultural Development*, Earthscan from Routledge, New York.
- Rigg, J., 2006a. Forests, marketization, livelihoods and the poor in the Lao PDR, *Land Degradation and Development*, **17**(2): 123-133.
- Rigg, J., 2006b. Land, farming, livelihoods, and poverty: rethinking the links in the rural South, *World Development*, **34**(1): 180-202.
- Rigg, J., 2007. Moving lives: migration and livelihoods in the Lao PDR, *Population, Space and Place*, **13**(3): 163-178.
- Rigg, J., 2012. *Unplanned development: tracking change in South-East Asia*, Zed Books Ltd., London.
- Rigg, J., 2014. *More than the Soil: Rural Change in Southeast Asia*, Routledge, London and New York.
- Rigg, J., 2018. Rethinking Asian poverty in a time of Asian prosperity, *Asia Pacific Viewpoint*, **59**(2): 159-172.
- Rigg, J., Salamanca, A., Phongsiri, M. and Sripun, M., 2018. More farmers, less farming? Understanding the truncated agrarian transition in Thailand, *World Development*, **107**: 327-337.
- Rigg, J., Salamanca, A. and Thompson, E. C., 2016. The puzzle of East and Southeast Asia's persistent smallholder, *Journal of Rural Studies*, **43**: 118-133.
- Robins, L., 2008. 'Get Real: Making Capacity Building Meaningful', PhD by compilation, The Fenner School of Environment and Society, The Australian National University, Canberra.
- Roder, W., Keoboualapha, B. and Manivanh, V., 1995. Teak (*Tectona grandis*), fruit trees and other perennials used by hill farmers of northern Laos, *Agroforestry Systems*, **29**(1): 47-60.
- Rudel, T. K., Coomes, O. T., Moran, E., Achard, F., Angelsen, A., Xu, J. and Lambin, E., 2005. Forest transitions: towards a global understanding of land use change, *Global environmental change*, **15**(1): 23-31.
- Russell, A., Foppes, J., Ketphanh, S., Vongphasouvanh, S., Rafanoharana, S., Locatelli, B., Sihanat, L., Phonephanom, P., Louangsouvanh, K. and Nakondiege, N., 2013. *An Analysis of Ecosystem Services of Dry Dipterocarp Forests in Savannakhet Province, Lao PDR*, Program on Forests (PROFOR), Washington DC.

- Sandewall, M., Kassa, H., Wu, S., Khoa, P., He, Y. and Ohlsson, B., 2015. Policies to promote household based plantation forestry and their impacts on livelihoods and the environment: cases from Ethiopia, China, Vietnam and Sweden, *International Forestry Review*, **17**(1): 98-111.
- Sayer, J. and Elliott, C., 2005. 'Reinventing forestry for the 21st century', in Mery, G., Alfaro, R., Kanninen, M. and Lobovikov, M. (eds), *Forests in the Global Balance – Changing Paradigms*, Vol. World Series Volume, International Union of Forest Research Organizations (IUFRO), Helsinki, pp. 318.
- Schirmer, J., 2007. Plantations and social conflict: exploring the differences between small-scale and large-scale plantation forestry, *Small-scale Forestry*, **6**(1): 19-33. Available at: [10.1007/s11842-007-9001-7](https://doi.org/10.1007/s11842-007-9001-7)
- Schönweger, O., 2012. *Concessions and leases in the Lao PDR*, Universität Bern,
- Schroth, G., Krauss, U., Gasparotto, L., Aguilar, J. D. and Vohland, K., 2000. Pests and diseases in agroforestry systems of the humid tropics, *Agroforestry Systems*, **50**(3): 199-241.
- Schroth, G. and Ruf, F., 2014. Farmer strategies for tree crop diversification in the humid tropics. A review, *Agronomy for sustainable development*, **34**(1): 139-154.
- Seymour, F., 2020. Seeing the forests as well as the (trillion) trees in corporate climate strategies, *One Earth*, **2**(5): 390-393.
- Sikor, T., 2012. Tree plantations, politics of possession and the absence of land grabs in Vietnam, *The Journal of Peasant Studies*, **39**(3-4): 1077-1101.
- Silva, L. N., Freer-Smith, P. and Madsen, P., 2019. Production, restoration, mitigation: a new generation of plantations, *New Forests*, **50**(2): 153-168.
- Singh, S., 2002. Contracting out solutions: Political economy of contract farming in the Indian Punjab, *World Development*, **30**(9): 1621-1638.
- Sjaastad, E., Angelsen, A., Vedeld, P. and Bojö, J., 2005. What is environmental income?, *Ecological Economics*, **55**(1): 37-46. Available at: [10.1016/j.ecolecon.2005.05.006](https://doi.org/10.1016/j.ecolecon.2005.05.006)
- Sloan, S. and Sayer, J. A., 2015. Forest Resources Assessment of 2015 shows positive global trends but forest loss and degradation persist in poor tropical countries, *Forest Ecology and Management*, **352**: 134-145.
- Small, M. L., 2009. How many cases do I need?' On science and the logic of case selection in field-based research, *Ethnography*, **10**(1): 5-38.
- Smalley, R., 2013. *Plantations, contract farming and commercial farming areas in Africa: A comparative review*. LACA Working paper 55. Available at www.future-agricultures.org.
- Smith, H., Barney, K., Byron, N., van der Meer Simo, A., Keenan, R. and Vongkhamso, V., 2017. *Tree plantations in Lao PDR: policy framework and review*, Component Report, ACIAR Project ADP/2014/047: Improving policies for forest plantations to balance smallholder, industry and environmental needs in Lao PDR and Vietnam. Project Working Paper 1, Canberra.
- Smith, H., Lu, J., To, P. X., Mienmany, S. and Soukphaxay, K., 2020. *Rubber Plantation Value Chains in Laos: Opportunities and Constraints in Policy, Legality and Wood Processing* ACIAR project FST/2016/151 - Advancing enhanced wood manufacturing industries in Laos and Australia and Forest Trends, Canberra.
- Snelder, D. and Lasco, R., 2008. 'Smallholder tree growing in South and Southeast Asia', in *Smallholder tree growing for rural development and environmental services*, Springer, pp. 3-33.
- Stanistreet, D., Hyseni, L., Bashin, M., Sadumah, I., Pope, D., Sage, M. and Bruce, N., 2015. The role of mixed methods in improved cookstove research, *Journal of health communication*, **20**(sup1): 84-93.
- Stock, P. V. and Forney, J., 2014. Farmer autonomy and the farming self, *Journal of Rural Studies*, **36**: 160-171.
- Stora Enso, 2020. *Stora Enso to downsize plantation operations in Laos*, Available at: <https://www.storaenso.com/en/sustainability/latest-updates-and-stories/stora-enso-to-downsize-plantation-operations-in-laos> (accessed 26 October 2020).

- Stroesser, L., Penot, E., Michel, I., Tongkaemkaew, U. and Chambon, B., 2018. Income diversification for rubber farmers through agroforestry practices, *Revue internationale des études du développement*, (3): 117-145.
- Stuart-Fox, M., 1995. The French in Laos, 1887-1945, *Modern Asian Studies*, **29**(1): 111-139.
- Sturgeon, J., 2012. Cross-border rubber cultivation between China and Laos: Regionalization by Akha and Tai rubber farmers, *Singapore Journal of Tropical Geography* **34**: 70-85.
- Suhardiman, D., Keovilignavong, O. and Kenney-Lazar, M., 2019. The territorial politics of land use planning in Laos, *Land Use Policy*, **83**: 346-356.
- Szulecka, J., Pretzsch, J. and Seccob, L., 2014. Paradigms in tropical forest plantations: a critical reflection on historical shifts in plantation approaches, *International Forestry Review*, **16**(2): 128-143.
- Ton, G., Vellema, W., Desiere, S., Weituschat, S. and D'Haese, M., 2018. Contract farming for improving smallholder incomes: What can we learn from effectiveness studies?, *World Development*, **104**: 46-64.
- Turner, S., 2013. *Red stamps and gold stars: Fieldwork dilemmas in upland socialist Asia*, UBC Press, Vancouver.
- van der Meer Simo, A., Kanowski, P. and Barney, K., 2019. Revealing environmental income in rural livelihoods: evidence from four villages in Lao PDR., *Forests, Trees and Livelihoods*, **28**(1): 16-33.
- van der Meer Simo, A., Kanowski, P. and Barney, K., 2020a. Economic returns to households participating in different models of commercial tree plantations in Lao PDR., *International Forestry Review*, **22**(1): 132-152.
- van der Meer Simo, A., Kanowski, P. and Barney, K., 2020b. The role of agroforestry in swidden transitions: a case study in the context of customary land tenure in Central Lao PDR, *Agroforestry Systems*, **94**(5): 1929-1944. Available at: [10.1007/s10457-020-00515-4](https://doi.org/10.1007/s10457-020-00515-4)
- van der Ploeg, J. D., 2008. *The new peasantries: struggles for autonomy and sustainability in an era of empire and globalization*, Routledge, London.
- van Noordwijk, M., Duguma, L. A., Dewi, S., Leimona, B., Catacutan, D. C., Lusiana, B., Öborn, I., Hairiah, K. and Minang, P. A., 2018. SDG synergy between agriculture and forestry in the food, energy, water and income nexus: reinventing agroforestry?, *Current Opinion in Environmental Sustainability*, **34**: 33-42.
- Vientiane Times, 2016. Government Gives Green Light for Two Eucalyptus Operators, *Vientiane Times*, Available at: <http://www.nationmultimedia.com/aec/Govt-gives-green-light-for-two-eucalyptus-operator-30282947.html> (accessed 3 August 2020).
- Vientiane Times, 2020. Government grants land concession for industrial tree plantation project in Vientiane province, *Vientiane Times*, Available at: <http://vientianetimes.org.la> (accessed 3 August 2020).
- Vongvisouk, T. and Dwyer, M., 2016. Falling rubber prices in northern Laos: local responses and policy options, *Helvetas: Zürich, Switzerland*: 1-59.
- Warman, R. D., 2014. Global wood production from natural forests has peaked, *Biodiversity and conservation*, **23**(5): 1063-1078.
- White, B., 2012. Agriculture and the generation problem: rural youth, employment and the future of farming, *IDS Bulletin*, **43**(6): 9-19.
- World Bank, 2017. *Lao Economic Monitor. Challenges in promoting more inclusive growth and shared prosperity*, World Bank Group, Washington.
- World Bank, 2019. *Partnerships and Opportunities for a New Green Forest Economy in Lao PDR: Sustaining Forest Landscapes and Livelihood*, Washington.
- WWF, 2012. *Living forests report chapter 4: forests and wood products*, WWF International, Gland. Available at: <https://www.worldwildlife.org/publications/wwf-s-living-forest-report-chapter-4-forests-and-wood-products> (accessed 30 August 2020).
- Yin, R., 2003. *Case study research: Design and methods*, Sage Publications, Thousand Oaks (US), London, New Delhi.

Annex 1: Detailed synopsis of methodology

The data collection process of this study – as illustrated in Figure 2 of Chapter 3; page 42 – followed an extended case study approach between May 2016 and January 2017. The extended case method is an ethnographic-derived method characterised by continuous participant observation, dialogue, and reflexivity (Prowse, 2008). This is only possible when researchers have the opportunity to stay in the field for long periods of time, a condition that PhD students often have the privilege to meet. As with any research involving human participants at the ANU, I sought approval from ANU’s Human Ethics Committee to ensure that my research methods met appropriate ethical standards (Protocol No. 2015/819). Further, as required from all foreign researchers in Laos (I was born and raised in Spain and I am currently based at the ANU), my research methodology needed to receive approval from the relevant Lao authorities (Daviau, 2010; Turner, 2013). This was possible through the participation of the National University of Laos (NUoL) in the ACIAR project to which my research contributed. As such, initial approvals were provided by the Lao Ministry of Education, and subsequently by relevant Provincial and District Offices and village heads.

In each case study village, the village head authorised me and two to three Lao students from the Faculty of Forestry of the NUoL (hereafter, the ‘research team’) to stay for approximately six consecutive weeks in each village. Such a privilege enabled the research team to participate in the day-to-day life of the informants (Daviau, 2010). The inclusion of Lao students in the research team was mainly intended to overcome my language and cultural barriers. Indeed, although I had lived 16 months in Laos in between 2009-2010, and I have fair Lao language skills, there are too many spoken and unspoken language and cultural aspects that I would have missed had I collected data by myself. On reflection, they also helped to “place” the research “outside” the tree plantation companies and the Lao authorities. Indeed, an important consideration when preparing for this research was to reassure informants of the research objectivity, which the longer presence in the field unequivocally allowed us to stress. As such, the term ‘students’ was commonly used at the start of most of our (formal and informal) conversations with informants. At the same time, the data collection also benefited significantly from the participation of one Lao member of the research team in Broegaard *et al.*’s (2017) examination of wild food collection and contribution to the diet of three villages in Northern Laos. This team member highlighted the superiority of using collection diaries versus the use of questionnaires to investigate the contribution of natural capital to livelihoods (see below). More generally, this extended presence was also critical to cross-check and validate information as well as to provide leads into arising areas of inquiry.

In addition to giving authorisation to overnight in the villages, village heads or their deputies assisted in classifying households into wealth categories – i.e. poor, middle, and wealthy households – to enable insights into the value of environmental income to different socioeconomic groups (Cramb *et*

al., 2004). Based on this information, the research team used wealth-based stratified random sampling and targeted 25 households in each village for household level data gathering. Soon after the selection of households, the research team met with the selected households of the village, the village head, and the village elders to introduce the background of the research, the research objectives, and the different activities intended to collect data: the completion of NTFP collection diaries (Broegaard *et al.*, 2017), fuelwood substitution activities, open-ended photo-elicitation (Belcher and Roberts, 2012), and household socioeconomic structured questionnaires, as discussed further below. Based on the participants' right to withdraw participation at any time throughout the research – as established by the ANU's research protocol – three of the 100 selected households declined participation.

At the second meeting, the research team invited participants to a second meeting to elaborate a community timeline and a community map. Through the community timeline activity, the researchers encouraged informants to identify major events in the community's history. To develop the community map, the research team first provided informants a map on paper that included the boundaries of the village, as well as the roads that crossed the village. The research team then asked informants to point out the approximate location of their livelihood activities and main landscape features. This map allowed the research team to cross check data provided at different stages of the fieldwork as well to note salient features of dialogues with informants (Daviau, 2010). Consequently, the original map evolved into a sketch map constructed in collaboration with informants. At the end of the second group meeting, the research team invited informants to further participate in the aforementioned variety of activities. Because photo-elicitation and the completion of NTFP collection diaries are very time consuming, the research team asked households contribute through participating in one or the other. This also helped us to reduce what Daviau (2010) defines as 'forced participation'.

A total of 51 households opted for the collection diaries which provide the bulk of data presented in Chapter 3. These 51 households received 250,000 LAK (US\$ 30) for the completion of collection diaries over a two-week period and their participation in the household survey questionnaire (see below). No other cash payments were made to these households, but the researchers did bring household gifts and snacks for households' participation in all group discussions and paid for meals during village stays. Researchers bought charcoal and cooking stoves for households that helped with the fuelwood substitution quasi-experiment (see below).

The study contributed to village funds as a gesture of gratitude for permitting the research team to overnight in villages. To that end, the research team asked participants of the first group discussion in each village to discuss what a fair payment might include and nominate a communal need that the research team might help fulfil through it. This contribution differed between villages, reflecting the wishes in each village, and ranged between 840,000 LAK (US\$ 103) and 2,800,000 LAK (US\$ 345). Throughout this contribution, the study supported the construction of a communal toilet in one village,

the installation of sound equipment in a second village, the upgrade of a racing boat in a third village, and the purchase of fruit trees for a communal orchard in the fourth village.

Focus group enumeration of NTFP and aquatic products

Data collection included group discussions in which males and females from selected households, encompassing all wealth categories, enumerated all the products that they remembered collecting from the environment over the course of a year. To make this task easier for our informants, the research team divided households into smaller groups that narrowed their discussion on specific products – e.g. plants, insects, mushrooms, wildlife, and fish. Towards the end of the discussion, groups exchanged lists with each other and, where appropriate, added products that other groups had enumerated. The discussions continued by asking informants to describe the selling prices of the products per local selling units (e.g. bags, baskets, handfuls). When there were multiple price units, informants recorded prices for each. Finally, the research team invited participants to keep logbooks (collection diaries) of all the products gathered by all members of their household over a two-week period, starting from the day after the discussion. The research team asked participants in the discussion to nominate someone (preferably young, to ensure literacy) in their household to take responsibility for the completion of NTFP collection diaries.

Collection diaries

Fifty-one households (10 to 14 households per village) completed collection diaries with the names and quantities of terrestrial and aquatic products that they collected over a two-week period. The lead author opted for this method because prior fieldwork to pre-test our survey questionnaires had shown difficulties capturing the full wealth of wild vegetables and other plants that households consume, due to memory lapse and questioning fatigue.

Researchers visited all participating households every evening during the two recording weeks, and helped participants to record the products collected, the quantity taken, the location of collection, and whether these products were consumed within the household, given to other people, or sold – either in the village or in the market. This resulted in 714 recording visits over the whole fieldwork period. Researchers sought to engage all members of the household when visiting in the evening. However, one household member was ‘responsible’ for filling in the collection diaries and cross check daily harvests with the rest of the household members. In addition to data collection, visits turned out to be very productive for other purposes. We created rapport with our informants, sometimes facilitated by participatory intoxication (Petit, 2012). We also obtained a greater level of detail, as the products that had been collected during the day were often shown, discussed, and even eaten together during these visits.

Fuelwood consumption

Informants were not able to provide a cash value for the fuelwood that they collect from forests and fallow lands, and there was no evidence of fuelwood trade originating in the case study villages.

The estimation of the value of household fuelwood consumption thus required an alternative method. This estimate was made by giving forty-seven participating households (12 to 13 households per village) a cook stove and two bags of charcoal with which to substitute fuelwood until all the charcoal was consumed. The method assumes that households use fuelwood to avoid costs associated with other sources of energy, of which charcoal being the most accessible. The distribution of cook stoves is widely used by development projects aiming to reduce forest degradation and to improve human livelihoods (Banerjee *et al.*, 2016; Boy *et al.*, 2000; Stanistreet *et al.*, 2015). Research in that context has also quantified changes in fuel sources and its effects on household savings (Banerjee *et al.*, 2016), in “with and without” cook stove situations. In this case, the number of charcoal bags that households would consume on an annual basis was estimated *pro rata* from the total number of days for which the supplied charcoal lasted. The annual value of fuelwood to households was estimated by multiplying the projected annual number of charcoal bags by the normal price of charcoal bag at the closest selling point to the household.

Photo-elicitation

Photo-elicitation is a participatory action research methodology, in which informants take photographs of aspects that reflect their community and livelihoods (Belcher and Roberts, 2012). The same forty-seven households (12 to 13 households per village) that agreed to participate in the fuelwood consumption activity agreed to contribute to the study through photo-elicitation too. To this end, the research team lent a digital camera to a member of each participating household (often a young member) who volunteered to take pictures for two to three days. At the end of that period, the research team projected the pictures taken on a laptop screen while asking the household volunteer to reflect on each of the pictures that he/she had taken. This proved to be an effective way to create knowledge about personal and community issues, particularly from the perspective of the village youth. At the end of each interview, the respective household volunteer nominated three pictures that entered a competition among participating households for the “best”, “most representative of the village” and “most representative of livelihoods” picture. All nominated pictures were printed, framed, and gifted to the participating households the evening before the research team departed the village. As such, the selection of the winning pictures turned into an opportunity for the research team to thank and say good-bye to everyone in the village, as well as for the village to wish the research team safe travels in life.

Survey questionnaires

All participating households agreed on a date and time during the six-week stay in the village when the research team visited them to complete a semi-structured questionnaire on household demographics, income sources, expenditure, livelihoods assets, and perceptions of well-being (see Table A1). During the survey, the research team also asked questions on the quantity of rice grown, bought, sold, consumed, and borrowed over the course of a year, and weighed the daily household rice consumption on two different days. The reason for this is that Lao land-based livelihood systems are deeply

influenced by the cultural and social significance of rice, which is arguably the dietary preference of all households and for which sufficiency is both a desired household livelihood outcome and a national priority.

Where possible, the research team asked men and women from the same household to answer the questionnaire. However, in most cases in the village in Nong district, the male of the household provided most of the answers. Nevertheless, by staying in each village for six consecutive weeks, the research team was able to establish positive and constructive relationships with informants, which facilitated ongoing observations and discussions with both men and women. This also allowed the research team to keep the completion of the questionnaires under one hour and 'informal' in nature. Because, in most cases, the research team interacted with households several times before the completion of the questionnaires, rather than representing a primary or stand-alone research method, the questionnaires became an additional opportunity to validate and enhance the quality of earlier information. Validation was also enabled by recording the answers of several interviewees close to each other on the same questionnaire template.

Participatory observation

As mentioned above, participatory observation is a characteristic of the extended case study methodology intended to support the broader objective to understand people's modes of living. In a similar spirit, researchers "helped" informants to collect products from the field and rivers (Daviau, 2010). As such, participatory observation helped particularly to gain a further understanding of the products that households gathered from the environment, which the research team was able to observe and discuss about with informants on their way to and from their fields.

Throughout the fieldwork, participatory observation also allowed the research team to identify activities that participants may have (intentionally or unintentionally) failed to record, describe, or showcase during the fieldwork. For example, the research team observed a substantial wood trade in one of the four case study villages. These observations enabled this study to represent the informants' livelihoods as well as was possible.

Table A1 Survey questionnaire template

Household interview and date		
Household identification code		
Wealth ranking (1 = wealthy, 2 = middle, 3 = poor)		
HUMAN CAPITAL		
# of household members		
Respondent (M = male, F = female, B = both)		
# of adults		
# of children		
# of males		
# of females		
# of people with primary education		
# of people with secondary education		
Who is the person with highest level education? (1 = household head (M), 2 household head (W), 3 = both, 4 = one of the children, 5 = no formal education, 99 = other answer (name))		
Years since household formed		
Was the household head born in village? (0 = no, 1 = yes)		
Years since the household head has lived in the village		
Does the household head belong to largest ethnic group? (0 = no, 1 = yes)		
Do household members profess any religion? (0 = no, 1 = yes (name))		
MATERIAL ASSETS		
# cars		
# of pick-up trucks		
# of tractors		
# small tractors ('lot tai')		
# of motorcycles		
# of mobile phones		
# of rice mills		
LAND ASSETS		
# of paddy fields owned in 2015 (estimate surface)		
Is any of it located outside the village?		
# of upland fields owned in 2015 (estimate surface)		
Is any of it located outside the village?		
Other agricultural crops cultivated in 2015 (ask to locate on the map and indicate when did they clear and cultivate this field last)		
Does the household have a veggie garden (estimate surface)		
Does the household have a fishpond? (ask to locate it on the map)		

# of tree plantations owned (estimate surface; ask number or tree planted)		
Did household participate in the company's plantation in 2015? (0 = no, 1 = yes; (help estimate number of lanes/trees planted))		
Did household participate in the company's plantation in 2016? (0 = no, 1 = yes;(help estimate number of lanes/trees planted))		
Does the household own any grazeland? (estimate extension)		
Does the household own any other type of land not cultivated?		
MAIN SOURCES OF INCOME		
Sales of rice (# of bags; bag type)		
Sales of agricultural cash crops (help estimate)		
Sales of livestock (help estimate)		
Sales of fish		
Sales from shop		
Sales from handicrafts		
Does the household receive remittances? (0 = no, 1 = yes; help estimate)		
Payments for work in the tree plantation (help estimate number of days worked; check with company data)		
Payments from helping others (e.g. clearing land, weeding, planting)		
Payments from working for other companies (help estimate number of days worked)		
Payments from renting land to others from the village of from outside the village		
Payments from renting shop or house to others		
Payments from selling others' livestock (trade)		
Payments from selling charcoal		
Payments from selling wood		
LIVESTOCK		
# of buffaloes owned		
# of buffaloes sold in last 12 months (help estimate amount and recall prices)		
# of cows owned		
# of cows sold in last 12 months (help estimate amount and recall prices)		
# of pigs owned		
# of pigs sold in last 12 months (help estimate amount and recall prices)		
# of goats owned		
# of goats sold in last 12 months (help estimate amount and recall prices)		

# of chicken owned		
# of chicken sold in last 12 months (help estimate amount and recall prices)		
# of fish sold in last 12 months (help estimate amount and recall prices)		
# of frogs sold in last 12 months (help estimate amount and recall prices)		
CREDIT AND LOANS		
Does the household have a loan currently? (0 = no, 1 = yes)		
If so, ask the amount and loan provider		
If so, ask about repayment conditions		
RICE EXPERIENCES		
# of months that the household does not enough rice (e.g. buy rice)		
# of bags bought in non-sufficient months		
# of kg/bag		
Main source of income to buy rice		
Help estimate the daily consumption of rice		
Are there months in which you eat less rice? If so, name.		
# of bags of rice (pheuak) collected from upland fields ('hai') in 2015		
# of kg/bag		
# of bags of rice (pheuak) collected from the tree plantation in 2015		
# of kg/bag		
# of bags of rice (pheuak) collected from the paddy field ('na') in 2015		
# of kg/bag		
Did the household receive rice from others? (0 = no 1 = yes; if yes write # of bags)		
Did the household gift rice to others? (0 = no, 1 = yes; if yes write # of bags)		
SOCIAL CAPITAL		
Is any member of the household member of any association? (0 = no, 1 = yes; if yes write the name of the association)		
If you needed 500.000 LAK tomorrow, would you be able to access this money? (0 = no, 1 = yes; if yes write from whom, e.g. relatives, friends, an institution, someone else)		
Are there any government employees in the household?		
Are there any government employees in the household?		
OVERALL PLANTATION EFFECTS		
Positive 1 (name)		
Positive 2 (name)		
Negative 1 (name)		

Negative 2 (name)		
Do you want more tree plantations in village? (0 = no, 1 = yes, 2 = it depends, 3 = up to others)		
If 1, 2 or 3, ask them to describe where, what type, etc.		
If not, ask them to explain why not		
OVERALL LIVELIHOOD STATUS COMPARED TO 5 YEARS AGO (0 = worse, 1 = same, 2 = better)		
Main reason (name)		
Other reason (name)		
Is there any crisis of major problem that someone in the household experienced in the last years? (e.g. loss of livestock, debts, loss of land, etc.) (0 = no, 1= yes; if so, help them to word)		