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Article

Forest Transitions and Rural Livelihoods: Multiple Pathways of Smallholder Teak Expansion in Northern Laos

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Abstract: Smallholder teak (*Tectona grandis*) plantations have been identified as a potentially valuable component of upland farming systems in northern Laos that can contribute to a "livelihood transition" from subsistence-oriented swidden agriculture to a more commercially-oriented farming system, thereby bringing about a "forest transition" at the landscape scale. In recent years, teak smallholdings have become increasingly prominent in the province of Luang Prabang, especially in villages close to Luang Prabang City. In this paper, we draw on a household survey conducted in five teak-growing villages and case studies of different household types to explore the role that small-scale forestry has played in both livelihood and land-use transitions. Drawing on a classification of forest transitions, we identify three transition pathways that apply in the study villages—the "economic development" pathway, the "smallholder, tree-based, land-use intensification" pathway, and the "state forest policy" pathway. The ability of households to integrate teak into their farming system, manage the woodlots effectively, and maintain ownership until the plantation reaches maturity varies significantly between these pathways. Households with adequate land resources but scarce labor due to the effects of local economic development are better able to establish and hold onto teak woodlots, but less able to adopt beneficial management techniques. Households that are land-constrained are motivated to follow a path of land-used intensification, but need more productive agroforestry systems to sustain incomes over time. Households that are induced to plant teak mainly by land-use

policies that threaten to deprive them of their land, struggle to efficiently manage or hold on to their woodlots in the long term. Thus, even when it is smallholders driving the process of forest transition via piecemeal land-use changes, there is potential for resource-poor households to be excluded from the potential livelihood benefits or to be further impoverished by the transition. We argue that interventions to increase smallholder involvement in the forestry sector need to take explicit account of the initial variation in livelihood platforms and in alternative transition pathways at the household scale in order to pursue more inclusive "forest-and-livelihood" transitions in rural areas.

Keywords: rural livelihoods; forest transitions; smallholders

1. Introduction

In northern Laos, the expansion of smallholder teak (*Tectona grandis*) plantations in the past decade has contributed to a transition from a swidden farming landscape to a forested landscape, in line with the government's policy objectives to eliminate swidden agriculture and increase the nation's total forest cover. Driven by a range of incentives, teak plantations have become increasingly prominent in the province of Luang Prabang, especially in villages close to Luang Prabang City [1]. Both smallholders and urban-based landowners are now involved in small-scale teak plantations, either by planting land they previously used for swidden agriculture or by acquiring existing teak stands. Thus teak planting appears to be contributing to a "forest transition", comparable to forest trends in other parts of the world, but one that is being driven by smallholders rather than large-scale industrial plantations or exclusionary forest conservation measures [2–4]. This case provides an opportunity to assess the dynamics of a smallholder-based approach to forest transition and thus to contribute to the wider debate about the relative merits of small- and large-scale modes of agricultural and rural development [5–9].

The notion of a forest transition refers to a reversal or turnaround from a period of net loss of forest cover in a given landscape or region to a period of net gain, whether through natural regeneration or tree planting. Mather [10] and Mather and Needle [11] describe this transition in many developed countries and attribute it to both economic development and the increasing scarcity value of forest following a long period of deforestation. Scherr and Hazell [12], drawing on induced innovation theory [13,14], also suggest that, in the long run, resource degradation (including deforestation) may be self-correcting as resource scarcity and rising private and social costs from degradation induce the development and use of new agricultural and resource management practices such as tree plantations and agroforestry systems. They argue that rural land-users in both developed and developing countries make dynamic adjustments to increasing resource degradation and scarcity, following a number of different trajectories. The end result can be that rural populations come to depend primarily on resources that have been substantially modified by human management, such as agroforestry systems.

While the various drivers of forest transition appear to be well understood, there is recognition that a wide range of conditions may inhibit the innovative responses, resulting in the delay of rehabilitation efforts or continued degradation [12]. Van Noordwijk *et al*. [15] have identified several policy barriers that may prevent the initiation of the rehabilitation phase, including the lack of recognition of

the goods and services provided by trees planted in agricultural landscapes, absence of use rights to land for tree planting, and barriers to tree utilization. Hence, as with other transitions, the forest transitions should only be viewed as "possible development paths where the direction, size, and speed can be influenced through policy and specific circumstances" ([16]; p. 1136).

Moreover, transition theories have been largely applied to land-use and forest-cover changes at either national or regional scales. However, there is increasing recognition of the importance of interdependencies within and across scales. For example, local reversals can arise from interdependencies with other regions through trade in resources [17]. Lestrelin *et al.* [18] illustrate the importance of re-evaluating forest transitions at the national scale with their analysis of "deforestation leakages" from China and Vietnam moving into areas of Laos. However, these interdependencies also arise at the local scale, with households implementing land-use change through transactions with other households within their own or neighboring villages, or through the use of common land. At the household scale, Meyfroidt *et al.* [19] acknowledge that forest recovery may not always lead to beneficial livelihood outcomes, citing policy-driven transitions, especially in Asia, resulting in forest recovery but at high costs for local populations. This is of particular concern when policies aim to induce or speed up forest transitions in order to achieve environmental outcomes without considering the impact on rural livelihoods within a community, given that households have diverse levels of capacity to adapt to changing circumstances.

In the present context, Newby *et al.* [1] have shown that the boom in teak planting in northern Laos, while contributing to a forest transition at the landscape scale, is accelerating processes of agrarian differentiation, with a small group of better-off farmers and urban-based outsiders capturing the majority of the benefits, while those with the greatest dependence on swidden agriculture are often made worse off through declining access to land. This underscores Hetcht's [20] argument that we must seek to understand how the interactions between regional and local forces, agrarian and non-agrarian livelihoods, formal and informal economies, and national and international processes all interact to produce observed forest trends.

Lambin and Meyfroidt [21] have classified the drivers of land-use transitions into two types: (1) land-use transitions associated with negative feedbacks that arise from a depletion of key resources or a decline in the provision of important ecosystem goods and services; (2) land-use transitions caused by socio-economic change and innovation that take place independently of the state of the ecosystem and follow their own dynamics. They outline how these different kinds of drivers combine to give rise to five forest-transition pathways (acknowledging that the pathways may overlap in practice):

1. The *forest scarcity pathway* occurs where political and economic changes affecting the forest sector arise in response to the adverse impact of deforestation.
2. The *state forest policy pathway* occurs due to national forest policy. This pathway is often motivated by concerns beyond the forest sector, such as modernizing the economy, integrating marginal social groups, promoting tourism or foreign investment by creating a "green" image, or geopolitical interests.
3. The *economic development pathway* occurs where economic growth creates non-farm employment, pulling labor off the land and inducing a reversion to forest. Areas of marginal agricultural land are abandoned to forest regeneration. Farmers may adopt more productive agricultural techniques in core agricultural zones, while farming on

marginal lands becomes increasingly unprofitable. It is labor scarcity rather than forest scarcity that drives this process.

4. The *globalization pathway* includes a number of processes: neo-liberal economic reform, labor out-migration, local manifestations of international conservation ideologies, a growing tourism sector, and land acquisitions by foreigners.
5. The *smallholder*, *tree-based*, *land-use intensification pathway* occurs in marginal regions dominated by smallholder agriculture. A significant increase in tree cover can be associated with the expansion of agroforestry systems, fruit orchards, woodlots, gardens, hedgerows, and secondary successions on abandoned pastures or fallows that are sometimes enriched with valuable species.

Newby *et al.* [1] found that there was large diversity in the livelihoods of households in five teak farming villages of northern Laos. Their analysis showed that teak planting had been more extensive among households with a longer history of settlement, where the household head was older and better educated, where household members had off-farm sources of income, and where the household had access to paddy land and so was more likely to be self-sufficient in rice. For these households, teak planting presented a land-use option that required less labor input and, if managed effectively, could substantially improve household income. At the other extreme, land-constrained households that depended on shifting cultivation for their livelihoods generally need to borrow land for upland rice production on the condition that they maintained the planted teak for the owner. As the area of land under teak expanded, these households had to go further afield to obtain land for upland rice production.

In this paper we build on the analysis of Newby *et al.* [1] through a series of case studies based on a typology of households in the five surveyed villages. The case studies are used to explore the relative importance of the endogenous and exogenous drivers identified by Lambin and Meyfroidt [21] in understanding and evaluating the expansion of small-scale teak plantations in northern Laos. We show that, even at the village scale, these drivers are felt differently, with neighboring households potentially on different forest-transition pathways, with correspondingly different implications for their livelihoods. The analysis shows the importance of understanding these variations when it comes to designing policies and interventions aimed at inducing a forest transition that achieves the multiple objectives of increasing regional forest cover, improving the management of forestry investments, and improving the livelihoods of rural households.

2. Methods

The analysis in this paper builds on the household survey reported in Newby *et al.* [1]. In November 2009, the survey of 127 households was conducted in five teak-growing villages across four districts of Luang Prabang Province (Luang Prabang, Xieng Ngeun, Chomphet, and Nan Districts) to explore differences within and between villages in teak planting and management (Figure 1 and Table 1). This survey sought information regarding each household's composition, settlement and relocation history, cropping and livestock activities, the collection, consumption and sale of non-timber forest products (NTFPs), off-farm and non-farm employment, access to extension services and other sources of information, access to credit, land transactions, rice self-sufficiency, and household assets.

Respondents also ranked activities based on their overall importance to the household, contribution to cash income, and utilisation of household labor. For those households with teak plantations, additional information was sought regarding their tree portfolio and knowledge of silvicultural practices. Some relevant information about each village is presented in Table 1.

Figure 1. Location of case study villages in Luang Prabang Province, northern Laos.

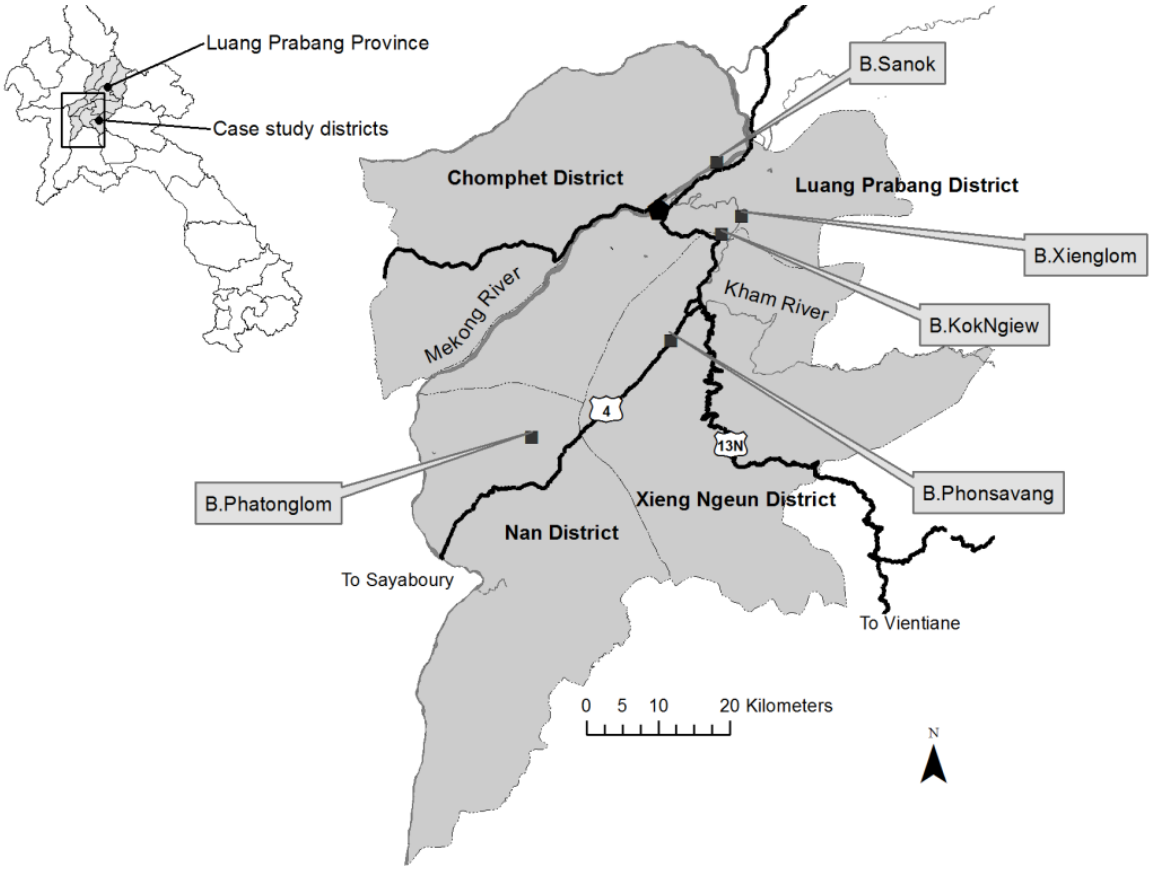

Table 1. Case study villages and households.

Village	Kok Ngiew	Phatong-Lom	Phon-Savang	Sanok	Xienglom
District	Luang Prabang	Nan	Xieng Ngeun	Chomphet	Luang Prabang
Village population	1020	590	446	346	713
Main ethnic groups	Khmu, Lao, Hmong	Khmu	Khmu, Lao	Lao, Hmong	Lao
Distance to market (km)	13	60	21	14 [1]	19
Households in village	191	99	76	65	157
Households surveyed	29	25	25	21	27
Households with teak (%)	79	60	100	71	67
Average no. teak trees	1234	749	2106	1550	2185
Surveyed households with paddy land (%)	38	84	56	24 [2]	56
Surveyed households with river gardens (%)	0	4	4	62	74
Surveyed households with outside employment (%)	62	4	48	29	59

Table 1. *Cont.*

Village	Kok Ngiew	Phatong-Lom	Phon-Savang	Sanok	Xienglom
Surveyed households self-sufficient in rice (%)	38	80	48	5	59
Main upland cash crop	Pineapple	Maize	Jobs tears	Sesame	None [3]

[1] Sanok village is on the right bank of the Mekong. This distance has been calculated assuming that people cross the Mekong at the village and travel to the market by road; however, some farmers bring their produce to Luang Prabang markets by boat; [2] The small area of paddy land is typically not cultivated due to poor yields; [3] Limited cultivation of cash crops occurs in the uplands. Those without access to paddy land or river gardens typically grow upland subsistence crops (such as upland rice) and depend on off-farm employment for cash income.

In this paper we have used the survey data to develop a typology of households across the five villages. This typology is based on: (i) the household's most important activities; (ii) the most important source of cash income; (iii) paddy rice *versus* upland rice cultivation; (iv) rice self-sufficiency; (v) access to cropping and fallow land; and (vi) the size and age of teak plantations. The incidence of household types varied between villages, reflecting the inter-village variation in resource base and livelihood activities (Table 2).

Table 2. Typology of households in case study villages.

Household Type	Name	Selection Criteria				Case Study Village and Number				
		Teak	Paddy Land	Rice Status	Upland Orientation	KN	PL	PV	SN	XL
Type 1a	Paddy farmer	Y	Y	S	Teak Cash crops	1	5			14
Type 1b	Vegetable farmer	Y	Y	SS-D	Teak Cash crops				11	15
Type 2	Upland cash crop farmer	Y	Y	D-SS	Cash crops	2		8	12	
Type 3	Upland dependent household	Y	N	D	Food Cash crops NTFP	3				
Type 4	Agroforestry household	Y	N	D	Cash crops NTFP			9 10		
Type 5a	Non-teak, paddy and upland farmer	N	Y	S	Cash crops Livestock		6			
Type 5b	Non-teak, upland farmer	N	N	D-SS	Food Cash crops Livestock		7			
Type 6	Non-teak, short-fallow swidden farmer	N	N	D	Food	4			13a 13b	16

KN = Kok Ngiew; PL = Phatomlong; PS = Phonsavang; SN = Sanok; XL = Xienglom; Y = Yes; N = No; S = Surplus; D = Deficit; SS = Self-sufficient.

Households classified as Type 1 were families with teak that directed significant household labor into "lowland" cropping systems based on paddy rice (1a) and vegetable gardens (1b). These activities were central to the household's identity and a major source of cash income. There was less household labor directed to upland cropping systems, with the amount of labor utilized in the uplands declining over time. These upland parcels were not directly relied on for household food security but were used for cash crops (pineapples, maize, Job's tears) and often required some hired labor to manage peak

labor demands. Type1 households sometimes leased some of their upland parcels to tenants who utilized them for upland rice or cash crops during the early years of teak establishment.

Type 2 households also had paddy land, but the smaller paddy areas meant they were just self-sufficient or had a rice deficit which was addressed through the sale of upland cash crops. The conversion of upland fields to teak had reduced fallow periods and the ability to collect NTFPs as the transition to woodlots proceeded. After the teak establishment years (2–3 years), the land was removed from all upland cropping with no income generated for these fields until the trees could be harvested.

Type 3 households had similar upland cropping systems to Type 2 households. That is, it was not possible to distinguish between them by looking only at their woodlots. However, these households did not have the buffer of paddy rice production for household consumption. Upland cash crops were the main source of income, which was utilized to purchase rice for household consumption, although in some cases a small area of upland rice was grown during the first year of teak establishment. As land for upland cropping became increasingly limited over time, these households often needed to lease land before they could rely on income from teak. This land was sourced from within their own or neighboring villages, depending on the number of labor-constrained, land-abundant households (Type 1 households or absentee landlords) in their own village who were currently seeking to establish woodlots.

Agroforestry systems were cultivated by Type 4 households. These households directed most of their household labor into their upland fields. Unlike Types 2 and 3, these households managed cash crops, bananas, NTFPs, and teak on the same parcel of land beyond the teak establishment years. There was a wide diversity in the choice of crops and field layouts in these agroforestry systems, with households responding to a range of market signals.

Type 5a households were similar to Type 2 households in that they had paddy rice land, but they had chosen not to plant teak on their upland parcels. The uplands were utilized mainly for the cultivation of cash crops such as maize and Job's tears. However, their upland fields were also important for the grazing of cattle, whereas Type 2 households tended not to have cattle. Type 5b households were similar to 5a but without access to paddy land. That is, they were the non-teak equivalent of Type 3 households. As such, upland rice remained an important food crop, with other cash crops also cultivated in their upland plots. Within the study area, the majority of Type 5a and 5b households were found in Phatonglom village. In this village there were also some local regulations restricting the conversion of the flatter agricultural land close to the roads to woodlots. This regulation was also introduced in some other villages but only after the majority of the land close to the roads and rivers had already been converted to woodlots. Mechanized land preparation was also possible in some of the flatter areas where cash crops were grown in this village, reducing the labor constraints that other household types faced.

Type 6 households had no access to paddy land or river gardens and less access to upland plots than Type 5b households. Upland rice was grown as an important food crop and the shortening of fallow periods meant that they had low and declining yields. Off-farm employment was typically necessary to generate cash income to meet consumption needs.

After households were classified, at least one individual case-study household from the original survey sample was randomly selected to represent each type—17 households in all, referred to as CS1 to 16 in Table 2 and the subsequent discussion. This case-study approach lends itself to understanding

the complex relationships between the range of biophysical environments, farming households, and the socioeconomic and political conditions that influence their land-use decisions. In August 2010, semi-structured interviews and farm walks were conducted with each case-study household to build on the data collected in the household survey. The interviews first established land holdings, tenure, and current land-use of each parcel either owned or utilized by the household. The history of land use was also recorded for each parcel. Often this meant tracking the use of additional parcels of land that the household no longer owned or had allocated to other family members. The iterative process of looking at activities across years and parcels provided a level of detail of the dynamics of land use that could not be captured using a structured survey. Details of other activities recorded in the initial survey such as livestock and outside employment were also confirmed. In addition, the seasonal allocation of labor was obtained using activity calendars, and costs and returns were estimated for key cropping and collection activities.

Almost two years later, in June–July 2012, an additional interview was conducted with each of the case-study households. These interviews focused on changes during the previous two years as well as future plans for each parcel of land and each member of the household. Photographs taken during the first case-study interviews were given to the participants, which provided a useful entry point to discuss changes over the past two years. Not all case study households were available for the second interview due to temporary or permanent migration. The village head (*ni ban*) was also interviewed about changes in the village; however, his observations were mostly based on subjective impressions as village statistics remained out of date.

3. Results

Across the five villages there has been a general trend to "agro-forestation" [22], with smallholders incorporating teak into their farming systems. This has largely involved the establishment of densely stocked small woodlots of around one hectare. Several overlapping influences have induced this overall land-use change. However, there was a spectrum of emerging farming and livelihood systems ranging between the two extremes of absentee urban-based landowners who have acquired teak holdings and rural households that have recently relocated from more remote upland areas and remain highly dependent on swidden agriculture. This spectrum reflected that households had a variety of livelihood platforms and were responding dynamically to different opportunities and constraints as they arose. These included variations in land types and productivity, population growth, access to land, access to markets, non-farm employment opportunities, and ad hoc policy changes. Some of these variations can be seen in Tables 1 and 2.

The case studies revealed that land-use change at the household scale follows different pathways, even for households in the same village occupying adjacent parcels of land. However, these "pathways" are by no means smooth or continuous; the predominant trends are punctuated by unanticipated shocks (such as an illness in the family that created an urgent need for cash or damage to crops and housing caused by flooding) that have significant and long-lasting impacts on households that are often living on the margin. While all of the five pathways identified by Lambin and Meyfroidt [21] and discussed above were evident to some extent, three were clearly distinguishable and relevant to current research and

extension activities: (i) an economic development pathway; (ii) a smallholder intensification pathway; and (iii) a state policy pathway.

While there were some elements of Lambin and Meyfroidt's [21] forest scarcity pathway present, it was not seen as one of the main drivers of the widespread establishment of teak. Although there is indeed strong global demand for teak [23], there is not the same level of local market engagement that has driven other smallholder systems, such as the establishment of eucalyptus and acacia in areas of Vietnam [4]. Moreover, households did not report that they were planting trees to have access to timber for their own construction needs, which was a common reason given by farmers in the central Philippines [24]. However, there are various efforts to improve smallholder linkages with local and global teak markets now that the resource base has been established.

Again, while there are elements of Lambin and Meyfroidt's [21] globalization pathway, it was not seen as one of the main drivers for smallholders planting teak. Nevertheless, globalization is having an impact on local livelihoods through increased employment opportunities. Luang Prabang City is the main tourist destination of Lao PDR and was declared a World Heritage site in 1995. With increasing tourist numbers there has been a significant increase in the demand for food crops (such as fresh vegetables) that is changing the profitability of these farming enterprises. The expanding tourism sector has also contributed to increased local employment opportunities in both the construction and service sectors. However, migration to neighboring countries, as described by Manivong *et al.* [25] and Barney [26] for southern and central Laos, is not common and so is not contributing to labor shortages in the case study villages.

Table 3. Characteristics, opportunities, and constraints of households following different forest transition pathways.

	Economic Development Pathway	**Smallholder Intensification Pathway**	**State Policy Pathway ***
Characteristics of household livelihood system	Access to paddy land and river gardens Labor shortage for upland agricultural activities Non-farm major income sources Strategic sales of land and trees to invest in productive activities Greater ability to allow trees to reach maturity and attain higher value size-classes	Limited access to paddy land and river gardens Land shortages to allow long fallow Some off- and non-farm employment, but labor concentrated on agricultural activities Strategic and some distress sales due to urgent cash needs More likely the sale of trees will occur at minimum merchantable size classes	No paddy land and limited lowland activities Land constraints and short fallow Declining upland yields Non-farm and off-farm income necessary to meet subsistence needs Distressed sales of woodlots due to urgent cash needs
Tree-system of interest/recommended to households	Woodlots	Agroforestry	Small woodlots and boundary plantings Other alternatives to shifting cultivation

Table 3. *Cont.*

	Economic Development Pathway	Smallholder Intensification Pathway	State Policy Pathway *
Research and extension	Spacing of trees for optimal growth and value Thinning and pruning regimes Improved marketing of large tees	Spacing of trees for optimal growth and value Companion cash crops NTFPs Improving tree genetics Marketing of thinnings and small trees	Farm planning—"Think before you plant" Other livelihood alternatives to improve returns to labor
Constraints	Limited labor to manage activities remains an issue Markets for thinning	Limited land Weed control Market uncertainty	Limited land Limited other agricultural activities Labor directed into non-farm to support consumption

***** The external influence of government policies were felt by all households but we only considered households as being on a "state policy pathway" when other factors inducing the transition were absent.

The three main pathways identified are discussed in detail in the following sub-sections, along with a consideration of the reasons for non-adoption of teak woodlots or agroforestry. Table 3 summarizes some of the characteristics of households on the three pathways. The external influence of government policies was felt by all households. Nevertheless, we only considered households as being on a "state policy pathway" when other factors inducing the transition were absent. The table also identifies some of the research and extension issues together with ongoing constraints for each pathway. The results from the surveys and case studies coupled with experimental results (described in Dieters *et al*. [27]) suggest that the potential for teak-based systems to improve the livelihoods of smallholders varied with household resources. As such, extension should be targeted at different households to encourage the adoption of different teak systems: smallholder woodlots, teak-based agroforestry, and boundary or line plantings. These options are expanded on in the following sub-sections.

3.1. Economic Development Pathway

The economic development pathway describes a situation where labor scarcity rather than forest scarcity is the major driver of land-use change. In this setting, however, the labor scarcity is not primarily due to out-migration to take up urban employment as described by Lambin and Meyfroidt [21] but a redeployment of labor to more intensive farm and non-farm income-earning activities such that upland plots become available for tree planting. This labor scarcity is relative to the size of a household's landholdings and the extent of its engagement in other livelihood activities.

Smallholder teak plantations have been identified by government planners as an alternative to swidden agriculture. While establishing teak woodlots may provide an alternative use of land formerly used for swidden, the 2009 survey showed that households that already had more productive alternatives to swidden in terms of the return to labor were more likely to plant teak and on a larger scale. Paddy rice for Type 1a households (Kok Ngiew, Xienglom, Phonsavang, Phathonglom),

river-bank vegetable gardens for Type 1b households (Xienglom and Sanok), and non-farm employment all provided households with alternative uses of labor to swidden agriculture and hence an incentive to plant teak woodlots in their upland fields. For these households, state policies designed to reduce swidden agriculture (such as limiting fallow periods) and encourage sedentary agriculture provided an additional incentive to convert their upland fields to tree-based systems rather than risk having them reallocated to other households in the village.

For households with many other livelihood activities, labor is still a constraint to establishing and maintaining woodlots. Thus case studies in Kok Ngiew (CS1) and Xienglom (CS14) revealed that Type 1 households with alternative uses for their labor often allowed tenant farmers (usually Type 3 and Type 6 households) to cultivate their land during the initial years of teak establishment in return for managing the planted trees, a localized and small-scale form of the "*taungya* system" that has been a common means of teak establishment throughout Asia [3]. This enabled labor-scarce households to establish woodlots with minimal investment of family labor or capital. This practice was also used by absentee landowners who had acquired land in the village and subsequently wanted to establish woodlots.

These interdependencies between households within the study region highlight the importance of scale in considering forest transitions. We suggest that the cross-border "leakages" described by Lestrelin *et al.* [18] also occur at the household scale, with the process allowing some households to make a smoother transition by accessing additional land or accessing additional labor to manage woodlots. Indeed, land-scarce households from several adjacent villages were using upland parcels for rice production from land-abundant households in Xienglom, where a large number of households had both paddy rice and vegetable activities. Returns to vegetable production have improved in recent years with improved road infrastructure, market access, and market demand from the expanding tourism sector. Electrification has also made irrigation with pumps and sprinklers more efficient; hence vegetable production is now a year-round activity for specialist producers who as a consequence have no surplus labor for upland cropping, which provides relatively low returns to labor.

In the short term, this relationship has given tenants (Types 3 and 6) continued access to land, while the landholders (Type 1) have been able to maintain ownership of their upland parcels and build up their area of teak woodlots, with only minimal labor required for maintenance following establishment.

For households with less paddy land or limited access to river gardens (Type 2), managing this land-use adjustment has been more complicated; for these households, income from upland crops and NTFPs collected from fallow fields is still important. That is, the pathway for these households features some elements of both the economic development and intensification pathways over time, depending on how well they had planned the transition. Some case-study households had established teak on a large percentage of their upland parcels and now needed to enter the land market (leasing land from absentee landowners with in-kind labor payments) to bridge the period until their teak could be harvested. Livelihood shocks such as medical emergencies, low prices for cash crops, and crop failure posed a threat to the ability of these households to maintain ownership of the immature teak plantations. In these cases, livelihood diversification into off-farm and non-farm activities was driven by necessity rather than a planned reallocation of labor away from agriculture.

The study revealed that even the case-study household in Kok Ngiew (CS1) with the most land of all case studies had also strategically been borrowing cropping land in neighboring Xienglom,

allowing the household to make a smoother transition. As an aging couple, they were reaping the rewards from this investment, given that they were hoping to stop strenuous upland cropping now that their children were mostly employed in non-farm activities. Similarly, a young case-study farmer in Sanok (CS11) now had limited upland cropping activities and moved into managing vegetable gardens and tree crops. However, he had inherited a large tree portfolio (teak and fruit trees) that was established when land was more abundant. This transition would be difficult to replicate for a young, newly established household (such as CS 13 and 16), starting with a small area of allocated land often far from the village.

In the villages located closer to Luang Prabang City, non-farm activities were a major livelihood component. This included activities such as operating small shops, trading agricultural products, and employment in the large tourism sector. Rural wages have increased significantly in recent years; farmers now earn around 30,000 kip/day (USD 3.75) for agricultural activities such as transplanting paddy rice, or over 50,000 kip/day (USD 6.30) for non-farm laboring. This increase has made the returns to labor for many upland agricultural activities marginal at best when compared to the alternatives. The tourism sector also continues to pull labor, particularly young men and women, out of agricultural activities. Younger members of several case-study households were employed in eco-tourism, while an older case-study farmer (CS12) in Sanok had also recently sold two of his teak plantations (including the land) to an urban investor so that he could purchase a river-boat to take advantage of the increasing tourism opportunities. These strategic sales of plantations to invest in alternative livelihood opportunities are different to distress sales of young woodlots in response to livelihood shocks and the urgent need for cash.

While the economic development pathway has seen widespread establishment of woodlots on former cropping land due to labor scarcity, this has also contributed to the poor on-going management of those stands. Once the trees are established and maintained for a few years, they are largely left to grow, with limited labor dedicated to their management until harvest. Demonstrating the economic benefits of improved management practices such as pruning and thinning remains an important extension priority [23]. A network of demonstration trials has been established to help in this effort by increasing the observability of the impacts of improved management [27], however further extension will be required before adoption is likely by labor-scarce households.

Roshetko *et al.* [3] suggest that households could opportunistically direct small amounts of labor into woodlot management at times when other on-farm and non-farm opportunities are less attractive. Trials have shown the importance of early interventions in the management of teak woodlots, with pre-commercial thinning of established highly-stocked woodlots aged up to 8–10 years of age recommended [27]. Yet, when discussing thinning practices with farmers and village heads, they often expressed a feeling of regret (*siadai*) about removing small trees without being able to obtain some income from them. Hence it may continue to be difficult to get farmers to adopt appropriate thinning regimes in the absence of markets for small logs and alternative products such as charcoal. Furthermore, the survey showed that around 32% of households had started to harvest trees. The common practice is for farmers to remove the large, dominant, fast-growing trees with the highest value when cash is needed to meet important household expenses (weddings or school fees). This practice leaves a woodlot with very slow growth in volume and value.

There is ongoing research into the spacing of trees in woodlots to improve the productivity and value of the woodlots (Table 3). Dieters *et al.* [27] have recommended that farmers reduce the initial stocking of woodlots to limit the production of small-diameter logs. Their recommendation is to increase the initial spacing of teak in smallholder woodlots from the currently recommended 3 × 3 m (1100 stems per ha) to a spacing that provides an initial stocking of between 600 and 800 trees per ha. This recommendation is also based on the assumption that some households with many alternative uses of labor will continue to poorly manage their woodlots and not adopt appropriate thinning regimes. The lower initial density will minimizes some of the problems arising from unmanaged and heavily stocked woodlots.

3.2. Smallholder Intensification Pathway

The smallholder intensification pathway is similar to the economic development pathway in that it is often associated with a reallocation of labor between different land types, for example, a concentration of labor on paddy rice plots in valley bottoms and river gardens, with tree plantations established on steep slopes that had previously been cultivated extensively [28]. However, where access to alternative land types is constrained, complex agroforestry systems have developed on upland plots that feature a portfolio of activities providing a range of income streams over different time horizons.

In Kok Ngiew, the dominant upland cropping system that has emerged for Type 3 households involves pineapples grown as a companion crop with teak, with households managing a staggered build-up of teak over several years in an attempt to maintain cash flow. As noted above, this transition has been easier for Type 2 households with access to paddy land to provide a consumption buffer, particularly given large fluctuations in the pineapple price. The spacing of teak in these systems has still been 3 × 3 m, meaning that after one rotation of pineapples (4 years) there is little potential for ongoing cropping or income from the land until the teak can be harvested. Physically, a parcel of land in Kok Ngiew may look similar for a household on the economic or intensification pathways. However, when you look beyond the woodlot, the drivers of the land-use change and the implications for the household's livelihood can vary dramatically, with the former largely driven by labor scarcity and the latter a result of land scarcity.

It became evident in the course of conducting the case studies that some Type 3 households had underestimated the amount of land they would require to continue generating cash income from cropping activities to meet their consumption needs. This resulted in two tactics—renting land to continue cropping or increasing their use of labor for wage-earning. The adoption of improved agroforestry systems may reduce the risk that Type 3 households sell land through distress sales before the trees reach maturity and end up as labor dependent, non-teak households like those categorized as Type 6.

Access to fallow and forest lands also provides important income through the collection of NTFPs such as broom grass and bamboo shoots. In Phonsavang, agroforestry systems consisting of cash crops (Job's tears (*Coix lacryma-jobi*) and maize), domesticated NTFPs (paper mulberry (*Broussonetia papyrifera*) and broom grass (*Thysanchaena maxima*)), trees (teak and rubber (*Hevea brasilinesis*)), and perennials (bananas) have been developed. These systems continue to evolve in response to

changing market conditions, with returns to family labor remaining an important criterion. Case-study farmers in Phonsavang have reduced the time dedicated to harvesting their paper mulberry due to falling prices, reducing the returns to labor compared to alternatives. At the same time, various bio-fuel crops such as *Jatropha curcas* and *Vernicia fordii* are being promoted and taken up by farmers. In some cases, these smallholder boom crops are being promoted by foreign investors through local extension agents.

The current management of teak trees by these households is also mainly limited to weeding trees during the initial years when companion crops are becoming established. However, unlike many of the teak woodlots belonging to households on an economic development pathway, household workers are frequently in these fields, managing and harvesting other components of the system. For example, Type 4 farmers in Phonsavang spend some time during most weeks harvesting bananas from their agroforestry plots and harvest various NTFPs at different times of the year. Sabastian *et al.* [29] found that households with a greater reliance on farm income and larger areas of trees were more likely to adopt silvicultural practices. While labor is more readily available to adopt recommended teak management practices, demonstrating the benefits of practices such as thinning and pruning remains important as case-study households continue to see all trees as having some future value. This has been exacerbated by the land market for woodlots in which land values are determined by the number of trees, not their productivity.

Preliminary trials of various agroforestry systems with Type 4 households in Phonsavang demonstrate household earnings of up to 1.5 million kip (190 USD) per ha per year from combinations of bananas, paper mulberry, broom grass and Job's tears. Expressed differently, activity budgets developed with the owner of one agroforestry plot estimated a net return to household labor of over 60,000 kip/day—around double the opportunity wage. The seasonal collection of domesticated broom grass provided a return to labor comparable with the off-farm wage. However, these case studies revealed that households remain exposed to both market and production risk from these systems. For example, the returns to production of Job's tears varied between 24,000 kip per labor-day in 2011 and only 15,000 kip per labor-day in 2012.

On-going research is required to improve these systems to allow smallholders with fewer resources (e.g., less land and off-farm income) to take advantage of the longer-term benefits of growing tree crops such as teak (Table 3). These systems have the potential both to deliver incomes throughout the year through the cultivation of companion crops and to successfully establish a well-stocked and actively growing teak system. However, weed control is a major concern of farmers when discussing these alternative systems, particularly in the second and subsequent growing seasons. Furthermore, with wider spacing between trees in these agroforestry systems, it is increasingly important that farmers have access to good genetic material to reduce the potential of poor tree form. Finally, Type 4 households are under more pressure to sell trees earlier, therefore finding markets for both thinnings and small diameter trees will improve the economic performance of these systems.

3.3. State Policy Pathway

Various government policies have acted both to encourage smallholder forestry and to restrict other forms of land use, especially swidden. A major influence on smallholder forestry has been the

Government's Land and Forest Allocation (LFA) Policy [1,30]. As outlined above, many farmers have planted teak on the upland parcels they do not currently need for food crops to retain this land for the future. The land allocation process also created an incentive for households to convert swidden land (that would be classified as "degraded forest land") into woodlots before the implementation of the allocation process in order to secure additional land. Planting teak has also converted the land into an asset that can be used as security for loans or sold to investors.

While the positive impacts of these policies in achieving a forest transition are apparent, particularly for households on an economic development pathway, case studies were also conducted with several households (CS4, CS13, and CS16) whose farming systems were undergoing change primarily due to state policies in the absence of the other factors found in the two pathways described above. These included households that were not teak growers due to inadequate resources to make the transition (CS6 and CS7).

Households in the state policy pathway were upland farmers with limited or no paddy rice that were therefore typically still dependent on upland rice cultivation. They were often newly established or relocated households that had been allocated upland cropping land to manage in a short-rotation system. Typically they were allocated no more than three plots of land, allowing only two years of fallowing. Furthermore, this land tended to be further from the village, often requiring long travel time to the field and to bring produce back to the village.

The three original case-study households in this category were not available for the second interview in 2012 as they were temporarily absent from the village or had relocated in order to find employment. Given that CS13a had migrated closer to the city, an additional interview (CS13b) was conducted with a similar household (young, recently relocated Hmong family with limited allocated land). These households had typically struggled to develop a sustainable upland cropping system, given short fallow periods and declining soil fertility and yields. In some cases land was left fallow to regenerate while household members moved into the non-farm sector. Discussions with village leaders showed that they understood the difficulty for such land-scarce households. One leader described how new families were typically allocated three parcels of land for upland cropping. Those who converted one of these parcels to teak reduced the fallow period to a single year, with pressure from weeds increasing and yields declining. If they had no alternative farm activities, such as paddy rice or vegetable gardens, they had no choice but to find off-farm employment.

Current research aims to investigate whether upland farmers with limited access to land and alternative livelihood activities can follow an agro-forestry intensification pathway or whether tree establishment should be limited to border plantings around upland plots devoted to food crops. There is potential that a system of annual crops, perennials, and domesticated NTFPs may provide income for several years beyond the typical woodlot systems that have been widely adopted. However, there remains a resource threshold which a household needs to exceed if it is to maintain ownership of a complex agroforestry system. As resources decline, more labor must be directed off-farm, which limits the ability of households to establish and maintain these more complex systems.

3.4. Non-Adoption of Smallholder Woodlots or Agroforestry Systems

The non-adoption of smallholder woodlots or agroforestry occurred in four of the five study villages. The highest level of non-adoption was in Phatonglom Village, which is located the greatest distance from Luang Prabang City. As indicated in Table 1, this village also had highest percentage of households with access to paddy land and, as a result, the highest incidence of rice self-sufficiency. However, it also had the lowest percentage of households engaged in off-farm employment, with agriculture remaining the main source of income, particularly the sale of maize.

Ownership of large ruminants, particularly cattle, was common in this village (88% of the original surveyed households), whereas they had been largely removed from the other villages, other than for a few households that still kept buffaloes (less than 25%). The removal of livestock from the other villages resulted from declining access to common grazing land and local regulations aimed at preventing damage to crops. For example, in Phonsavang a decision had been made during the height of the establishment of paper mulberry that livestock were not allowed to be kept in the main area of the village cropping land. Both Type 5 households in Phatonglom (CS6 and CS7) indicated that retaining access to grazing land was important to them and the establishment of woodlots or agroforestry systems was not seen as compatible with these systems. Nevertheless, cattle-raising was also an important activity for the farmer in CS5, who had a teak plot but had managed to exclude cattle during the establishment years with the aid of fencing, but was now grazing the land under the older trees.

The flatter land in Phatonglom also meant that some areas, particularly close to the road and village settlement, were suitable for mechanized land preparation for field crops. However, farmers reported that maize yields were declining due to continuous cropping and limited application of fertilizer. Some households in the original survey had indicated that they planned to establish teak on this land once yields fell to a level that was considered uneconomic.

4. Discussion

The expansion of teak in the study villages, and more generally in northern Laos, has contributed to a significant forest transition, with the area of forested land increasing over the past two decades as smallholders have converted land previously used for swidden agriculture to teak woodlots and agroforestry systems. This conversion of agricultural land to tree-based systems has occurred in the absence of land concessions and large-scale plantations that have driven tree-crop and forest transitions in other parts of Laos and in Southeast Asia more generally [2,31–36]. The case of teak underscores the findings of other studies in the region that, given appropriate conditions, independent and assisted smallholders can be as effective as large-scale private or state entities in developing a range of shrub and tree crops (including tea, rubber, oil palm, coffee, and timber) with significant benefits for broad-based rural development [24,37–40].

However, the predominance of smallholders in the expansion of teak does not mean that all households in a village are benefiting equally from this land-use change. In fact, as Li observes, "smallholder farming has its own problems, not least the new inequalities that arise through the "everyday" processes of accumulation and dispossession among smallholders that roll on relentlessly, despite efforts to prevent them" ([41]; p. 285). The belief that the adoption of commercial tree crops

can lift whole rural populations out of poverty ignores both the initial diversity within these communities and the disequalising processes involved in such a transition [1,42,43]. The early investment in teak woodlots in the study area has accelerated processes of capital accumulation and agrarian differentiation within and between villages. It has also opened up a process whereby smallholder and village control over land and forest resources is being lost through sales of established woodlots to urban-based business interests who thus become, in effect, absentee landlords. The distinction between the economic development, smallholder intensification, and state policy pathways helps us to understand these differential processes of forest transition in northern Laos.

Households with adequate land resources but scarce labor (e.g., Type 1) have been able to gradually build up their teak holdings with little negative impact on their short-term food security or cash flow and considerable long-term increments to their wealth and income. These households have been following the economic development pathway and have successfully incorporated farm forestry into their livelihood portfolios. However, the adoption of improved management practices is urgently needed for these households to realize the full economic potential of their smallholder woodlots. The establishment of teak by such labor-scarce households and the associated poor management of the teak stands have also been observed in Central Java [3]. However, in this case the limited labor availability for silvicultural management has often resulted from household members migrating to work in the cities of Java. While migration was not a common livelihood strategy for households in the study villages of northern Laos, increasing off-farm and non-farm opportunities have reduced labor availability and contributed to rising wages. This provides a major challenge for research and extension agencies to demonstrate the financial benefits of improved management.

Those with less land resources (e.g., Type 3) have had to trade off short-term income for the potential long-term benefits that teak can bring and have been attempting to follow a smallholder intensification pathway. It is apparent that some Type 3 households have already exhausted their own supply of cropping land and will need to rent land to continue growing cash crops and upland rice until their trees reach maturity. However, the availability of land for tenants within a given village is finite, with some households having to go further afield in search of land. While in the short to medium term it may look like these Type 3 households are following an intensification pathway, there will be some who do not successfully make the transition and move backwards to become Type 6 households via the sale of land. Thus, while some households are "left behind" by the teak boom, others are actively impoverished by the transition in land use taking place around them.

Those following the state policy pathway to teak planting are susceptible to both the poor management of those on the economic development pathway and the financial squeeze leading to loss of land resources for those on the smallholder intensification pathway. The development of profitable agroforestry systems with wide spacing of teak and a mix of cash crops and NTFPs has the potential to extend the income generated from a particular parcel of land, enabling land-scarce, labor-dependent households to participate successfully in this forest transition. However, the technical and market barriers to adoption of such agroforestry systems can be formidable [44].

5. Conclusions

The expansion of smallholder teak plantations in northern Laos is contributing to a forest transition in which a swidden landscape is being transformed into one with a higher proportion of tree cover. While this landscape transition is being driven by smallholders rather than large-scale plantations, it is important to be aware of the diverse implications for smallholder livelihoods. The forest transition is the broad-scale manifestation of a complex pattern of household livelihood responses to internal and external drivers. The integration of teak-based production systems into household asset portfolios has the potential to improve the livelihoods of those households that can afford to retain this investment for at least 10–12 years. The analysis has shown that within Luang Prabang Province different household types are adopting various teak-based production systems ranging from woodlots to more complex agroforestry systems. The evolution of these systems follows three of the forest transition pathways described by Lambin and Meyfroidt [21].

For some household types, the forest transition has been driven primarily by local economic development, with labor becoming increasingly scarce for upland cropping, which is now seen as marginal compared to alternative uses of labor. Other households are following a pathway driven by land scarcity and improved market access for a range of products, resulting in the development of more intensive agroforestry systems in their upland parcels. Yet other households have planted teak as a strategic move to retain land in the face of government policies and with little planning about how they will manage the period between establishment and harvest. The case studies demonstrated that two fields can look physically identical but belong to households on very different trajectories, once we look beyond the woodlot to the entire portfolio of livelihood activities.

Understanding these variations is important when designing research and extension activities, to ensure that they are not only directed at improving the economic performance of teak-based agroforestry activities (the plot scale) but are also compatible with the livelihood strategies of target households. Where the factors leading to the adoption of teak systems are consistent with an economic development pathway, the labor-saving prospects of establishing smallholder woodlots have also led to poor management of these systems and reduced their potential economic value. Hence more complex agroforestry systems are not likely to be adopted by households on this pathway. However, it may be possible to develop market incentives for improved silvicultural management of pure teak stands. On the other hand, the adoption of smallholder woodlots by land-scarce households has the potential to lead to problems in the future should they not have other productive livelihood activities once the land is removed from annual cropping. Research and extension activities need to focus on helping these households to follow a smallholder intensification pathway, providing greater returns to their limited landholdings and a more even flow of consumption and income. However, it needs to be recognized that there is a resource threshold which a household must exceed to follow either the economic development or smallholder intensification pathways successfully. Those below this threshold, or at risk of falling below it through distress sales of land, are being excluded from the potential benefits of the forest transition.

Efforts to induce or accelerate a forest transition on a regional or national scale must remain cognizant of these crucial local variations in household and village circumstances so that a forest transition does not occur in a way that is detrimental to rural livelihoods. There is thus a need to look

beyond the woodlot to support more inclusive "forest-and-livelihood" transitions in rural areas such as northern Laos.

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Author Contributions

Jonathan Newby was responsible for developing the methods and conducting case study interviews. He drafted major sections of the article. Rob Cramb was responsible for overseeing the development of methods and providing advice. He contributed to major sections of the article. Somphanh Sakanphet was responsible for field work coordination, translation of interviews, and assisting in the development of household types. His advice was sought throughout the drafting of the article.

Conflicts of Interest

The authors declare no conflict of interest.

References

1. Newby, J.C.; Cramb, R.A.; Sakanphet, S.; McNamara, S. Smallholder teak and agrarian change in northern Laos. *Small-Scale For.* **2012**, *11*, 27–46.
2. Hall, D.; Hirsch, P.; Li, T.M. *Powers of Exclusion: Land Dilemmas in Southeast Asia*; NUS Press: Singapore, 2011.
3. Roshetko, J.M.; Rohadi, D.; Perdana, A.; Sabastian, G.; Nuryartono, N.; Pramono, A.A.; Widyani, N.; Manalu, P.; Fauzi, M.A.; Sumardamto, P.; *et al*. Teak agroforestry systems for livelihood enhancement, industrial timber production, and environmental rehabilitation. *For. Trees Livelihoods* **2013**, *22*, 241–266.
4. Sikor, T. Tree plantations, politics of possession and the absence of land grabs in Vietnam. *J. Peasant Stud.* **2012**, *39*, 1077–1101.
5. Hayami, Y. The peasant in economic modernisation. In *International Agricultural Development*, 3rd ed.; Eicher, C.K., Staatz, J.M., Eds.; Johns Hopkins University Pres: Baltimore, MD, USA, 1998; pp. 300–315.
6. Hayami, Y. Plantation agriculture. In *Handbook of Agricultural Economics*; Evenson, R., Pingali, P., Eds.; North-Holland: Amsterdam, The Netherlands, 2010; Volume 4, pp. 3305–3322.

7. Ellis, F.; Biggs, S. Evolving themes in rural development: 1950s–2000s. *Dev. Policy Rev.* **2001**, *19*, 437–448.
8. Snelder, D.J., Lasco, R.D., Eds. *Smallholder Tree Growing for Rural Development and Environmental Services*; Springer: Dordrecht, The Netherlands, 2008.
9. Eastwood, R.; Lipton, M.; Newell, A. Farm size. In *Handbook of Agricultural Economics*; Evenson, R., Pingali, P., Eds.; North-Holland: Amsterdam, The Netherlands, 2010; Volume. 4, pp. 3323–3397.
10. Mather, A.S. The forest transition. *Area* **1992**, *24*, 367–379.
11. Mather, A.S.; Needle, C.L. The forest transition: A theoretical basis. *Area* **1998**, *30*, 117–124.
12. Scherr, S.; Hazell, P. *Sustainable Agricultural Development Strategies in Fragile Lands*; EPTD Discussion Paper No. 1; International Food Policy Research Institute (IFPRI): Washington, DC, USA, 1994.
13. Boserup, E. *The Conditions of Agricultural Growth*; Allen and Unwin: London, UK, 1965.
14. Ruttan, V.W.; Hayami, Y. Toward a theory of induced institutional innovation. *J. Dev. Stud.* **1984**, *20*, 203–223.
15. Van Noordwijk, M.; Roshetko, J.M.; Murniati; Angeles, M.D.; Suyanto; Fay, C.; Tomich, T.P. Farmer tree planting: Barriers to sustainable forest management. In *Smallholder Tree Growing for Rural Development and Environmental Services: Lessons from Asia—Advances in Agroforestry*; Snelder, D.J., Lasco, R.D., Eds.; Springer: Berlin, Germany, 2008; Volume 5, pp. 427–449.
16. Martens, P., Rotmans, J., Eds. *Transitions in a Globalising World*; Swets & Zeitlinger: Lisse, The Netherlands, 2002; p. 135.
17. Pfaff, A.S.P.; Walker, R. Regional interdependence and forest "transitions": Substitute deforestation limits the relevance of local reversals. *Land Use Policy* **2010**, *27*, 119–129.
18. Lestrelin, G.; Castella, J.C.; Fox, J. Forest transitions in Southeast Asia: Synergies and shortcomings in land-change science and political ecology. In *Land-Change Science and Political Ecology for Sustainability—Synergies and Divergences*; Braanstrom, C., Vadjunec, J., Eds.; Earthscan: London, UK, 2013; pp. 48–65.
19. Meyfroidt, P.; Van Noordwijk, M.; Minang, P.A.; Dewi, S.; Lambin, E.F. *Drivers and Consequences of Tropical Forest Transitions: Options to Bypass Land Degradation?* ASB Policy Brief 25; ASB Partnership for the Tropical Forest Margins: Nairobi, Kenya, 2011.
20. Hetcht, S. The new rurality: Globalization, peasants and the paradoxes of landscapes. *Land Use Policy* **2010**, *27*, 108–118.
21. Lambin, E.F; Meyfroidt, P. Land use transitions: Socio-ecological feedback *versus* socio-economic change. *Land Use Policy* **2010**, *27*, 108–118.
22. Roshetko, J.M.; Lasco, R.D.; Delos Angeles, M.D. Smallholder agroforestry systems for carbon storage. *Mitig. Adap. Strateg. Glob. Chang.* **2007**, *12*, 219–242.
23. Midgley, S.; Blyth, M.; Mounlamai, K.; Midgley, D.; Brown, A. *Towards Improving Profitability of Teak in Integrated Smallholder Farming Systems in Northern Laos*; ACIAR Technical Reports 64; Australian Centre for International Agricultural Research: Canberra, ACT, Australia, 2007.
24. Newby, J.C. Livelihoods, Landscapes and Landcare: Assessing the Economic Impact of a Conservation Farming Program in the Philippine Uplands. Ph.D. Thesis, University of Queensland, Brisbane, QLD, Australia, 2009.

25. Manivong, V.; Cramb, R.A.; Newby, J.C. Rice and remittances: Crop intensification *versus* labour migration in southern Laos. *Human Ecol.* **2014**, 42, 367–379.
26. Barney, K. Land, livelihoods, and remittances: A political ecology of youth out-migration across the Lao-Thai Mekong border. *Crit. Asian Stud.* **2012**, *44*, 57–83.
27. Dieters, M.; Newby, J.; Cramb, R.; Sexton, G.; McNamara, S.; Johnson, M. *Enhancing On-Farm Incomes through Improved Silvicultural. Management of Teak in Luang Prabang Province of Lao PDR*; ACIAR Final Report. Available online: http://aciar.gov.au/files/final_report_fst-2004–057.pdf (accessed on 4 February 2014).
28. Meyfroidt, P.; Lambin, E.F. The causes of the reforestation in Vietnam. *Land Use Policy* **2008**, *25*, 182–197.
29. Sabastian, G.; Kanowski, P.; Race, D.; Williams, E.; Roshetko, J. Household and farm attributes affecting adoption of smallholder timber management practices by tree growers in Gunungkidul region, Indonesia. *Agroforest Syst.* **2014,** *88*, 257–268.
30. Fujita, Y. Institutionalising or decentralising the commons? In *The Politics of Decentralization: Natural Resource Management in Asia*; Wittapayak, C., Vendergeest, P., Eds.; Mekong Press: Chiang Mai, Thailand, 2010; pp. 93–116.
31. Baird, I.G. Land, rubber and people: Rapid agrarian changes and responses in southern Laos. *J. Lao Stud.* **2010**, *1*, 1–47.
32. Cramb, R.A. *A Malaysian Land Grab? The Political Economy of Large-Scale Oil Palm Development in Sarawak*; LDPI Working Paper 50; Land Deal Politics Initiative: The Hague, The Netherlands, 2013.
33. Deininger, K. Challenges posed by the new wave of farmland investment. *J. Peasant Stud.* **2011**, *38*, 217–247.
34. de Koninck, R., Bernard, S., Bissonette, F., Eds. *Borneo Transformed: Agricultural Expansion on the Southeast. Asian Frontier*; NUS Press: Singapore, 2011.
35. McCarthy, J.F.; Cramb, R.A. Policy narratives, landholder engagement, and oil palm expansion on the Malaysian and Indonesian frontiers. *Geogr. J.* **2009**, *175*, 112–123.
36. So, S. *Land Rights in Cambodia: An Unfinished Reform, Asia Pacific Issues*; No. 97; East-West Center, University of Hawaii: Hilo, HI, USA, 2010.
37. Byerlee, D. Are we learning from history? In *The Global Farms Race: Land Grabs*, *Agricultural Investment, and the Scramble for Food Security*; Kugelman, M., Levenstein, S.L., Eds.; Island Press: Washington, DC, USA, 2013; pp. 21–44.
38. Cramb, R.A.; Sujang, P.S. The mouse-deer and the crocodile: Oil palm smallholders and livelihood strategies in Sarawak, Malaysia. *J. Peasant Stud.* **2013**, *40*, 129–154.
39. Manivong, V.; Cramb, R.A. Economics of smallholder rubber expansion in northern Laos. *Agrofor. Syst.* **2008**, *74*, 113–125.
40. Newby, J.C.; Cramb, R.A. Economic impacts of conservation farming in a marginal environment: The case of "Landcare" in the Philippines. *Int. J. Agric. Sustain.* **2011**, *9*, 456–470.
41. Li, T.M. Centring labour in the land grab debate. *J. Peasant Stut.* **2011**, *38*, 281–298.

42. Castella, J.C.; Lestrelin, G.; Hett, C.; Bourgoin, J.; Fitriana, Y.R.; Heinimann, A.; Pfund, J.L. Effects of landscape segregation on livelihood vulnerability: Moving from extensive shifting cultivation to rotational agriculture and natural forests in northern Laos. *Human Ecol.* **2013**, *41*, 63–76.
43. Li, T.M. Local histories, global markets: Cocoa and class in upland Sulawesi. *Dev. Chang.* **2002**, *33*, 415–437.
44. Mercer, D.E. Adoption of agroforestry innovations in the tropics: A review. In *New Vistas in Agroforestry*; Nair, P.K.R., Rao, M.R., Buck, L.E., Eds.; Kluwer Academic Publishers: Dordrecht, The Netherlands, 2004; pp. 311–328.