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

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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, bust 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 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].

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

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).

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                                                                 |
|-------------------------------------------------------------------------|
| • 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                                                                 |
|-------------------------------------------------------------------------|
| • 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 heterogenous 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       | 9     |
| Land purchasing program  | 1        |       | 1    |         |          | 2       | 2     |
| Contract farming         | 1        | 3     | 2    | 1       |          | 7       | 7     |
| Smallholder monocultures| 2        | 9     | 2    | 14      | 3        | 30      |       |
| Smallholder agroforestry | 1        | 3     | 1    | 1       | 7        | 3       | 16    |
| Not specified            | 2        |       |      |         |          | 2       | 2     |

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; Andriesse’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 in northern Laos. Andriesse [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                                | 4                                          | 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 buffalos 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 intercrops [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 | Reported Impacts | Reported Impacts Both |
|------------------|------------------|-----------------------|
| Mostly Positive  | Mostly Negative  | 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 | Reported Impacts | Reported Impacts Both |
|------------------|------------------|-----------------------|
| Mostly Positive  | Mostly Negative  | 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 researchers 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 “Burma*” or “Mekong” or “Yunan” or “Guangxi Zhuang” or “Southeast Asia*” |
| Term/Theme 4 (Outcome) and |
| “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.; Ashfordc, S. The future of planted forests. *Int. For. Rev.* 2020, 22, 65–80. [CrossRef]
7. Korhonen, J.; Nepal, P.; Prestemon, J.P.; Cubbage, 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.; Skoet, 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.; Sibat, 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.; Scones, 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 Strategies. EJOLT 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. Étud. 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.; Adjici, 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. Andriesse, 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.; Heinimann, 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.; Heinimann, A.; Schneider, F.; Jurt, C.; Myint, W.; Zaehringer, 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.; Anghsong, 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.; Ulbrig, 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.; Ubirig, 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 Forêts 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. Dét.* 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. Sriksam, 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. Nippapan, 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.; Saticvipawee, 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.
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; Weltungerhilfe: 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.; Bojö, J. What is environmental income? *Ecol. Econ.* 2005, 55, 37–46. [CrossRef]

117. Bleyer, M.; Knivilä, M.; Horne, P.; Sitoë, 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.; Weitschat, 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 FAO* 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. Filipski, 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.; Jamroenprucksa, 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]

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