



Revisiting forest transition explanations: The role of “push” factors and adaptation strategies in forest expansion in northern Phetchabun, Thailand

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ABSTRACT

Researchers and policy makers are increasingly looking at the drivers of forest recovery (or forest transition) for inspiration in their search for win-win solutions to deforestation. However, causal generalizations regarding forest transitions are subject to significant problems. First, forest transition theory (FTT), at least in its simplest renditions, tends to emphasize socially benign processes and fails to pay sufficient attention to the causal role—and social impacts—of negative (push) dynamics. Second, we have yet to understand when and why forest transition drivers sometimes lead to outcomes other than forest transition (e.g., further deforestation). Of particular relevance is the paucity of work analyzing the capacity of actors to counter drivers of forest transitions through adaptation and resistance strategies. These problems can lead to overly optimistic views of the causes and consequences of forest transitions, and this hinders the search for contextually sensitive policy prescriptions compatible with social justice and sustainable development. Using process tracing, this paper presents analysis of the causes of reduced deforestation in the 1980s, and forest expansion in the 1990s and early 2000s, in rain-fed maize farming areas of northern Phetchabun, Thailand. From the perspective of past and current land users, forest expansion mainly occurred following distress-driven land abandonment and land confiscation rather than private afforestation. Increasing economic opportunities induced wealthier farmers (with access to paddy fields) to shift their attention to irrigated cultivation, but this had more indirect and contradictory effects on non-wealthy farmers. Most forest expansion thus appeared to be the result of “push” causal dynamics, to which some farmers were unable to respond or adapt. Adaptation and resistance strategies are discussed, including pluriactivity and political activism.

1. Introduction

Over the last three decades, researchers have proposed that development, however defined, could first lead to environmental degradation, but then would contribute to ecological replenishment. This idea is notably found in the literature on environmental Kuznets curves and on forest transition (Perz, 2007a). This paper focuses on the notion of forest transition, a concept designating a sustained shift from net deforestation to the (partial) recovery of forest or forest-like cover. Net forest expansions have been documented at a national or subnational scale in developed, transition, and developing economies (e.g., Kuemmerle et al., 2011; Mather, 2001; Meyfroidt and Lambin, 2008a). Policy makers and researchers increasingly use forest transitions and their presumed causes to support policy prescriptions or to determine reference emission levels in future REDD+ (reducing emissions from

deforestation and forest degradation) schemes (e.g., Angelsen, 2009; Angelsen and Rudel, 2013; Köthke et al., 2014; Leischner et al., 2010). In order to produce and implement policy prescriptions compatible with environmental, economic, and social objectives, it is crucial to have robust, contextually sensitive, and theoretical generalizations of the socio-ecological causes and consequences of forest transitions.

Several important theoretical propositions have been made. In line with neoclassical economics, some have proposed a meta-theoretical framework whereby forest transitions result from absolute forest scarcity and/or the actions of rational political and economic actors shifting between agriculture and forest land uses according to expected economic and environmental benefits (Angelsen, 2007; Barbier et al., 2010; Grainger, 1995). Other contributions have focused on providing typologies of forest transition pathways. Mather et al. (e.g., Mather, 2001; Mather and Fairbairn, 2000) distinguished a “passive” or “nat-

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ural¹ economic development model from a more “active”, state-centered, crisis-response model. In the first case, forces such as the shift from (semi-) subsistence to market-oriented agriculture, national and international agricultural market integration, industrialization, and differential agricultural intensification lead to shifts in forest use and reductions in farmland, thus opening the way for forest expansion. In the second case, scientists, policy makers, and politicians who perceive an immediate environmental, economic, or geopolitical crisis from deforestation respond vigorously with conservation and reforestation measures. Mather and Needle (1998) also discussed how land abandonment and forest transitions could be explained by a general process of learning, whereby farmers discover which fields are the most productive and concentrate their efforts accordingly. This process would be reinforced by the emergence and development of agricultural markets and modern technologies. Rudel et al. (2005) typology resembles Mather’s, but emphasizes market dynamics and relegates state actions to a facilitating role. This typology distinguishes forest scarcity and economic development pathways by associating a type of forestation (plantations or natural regeneration on abandoned fields) with, respectively, rising forest value due to timber scarcity and growing, more lucrative, opportunities outside of agriculture that “pull” farmers and farm workers off the land. This creates labor scarcity, which then “pushes” farmers to abandon land and leads to natural regrowth. Lambin and Meyfroidt (2010) added three pathways, namely: (1) a “state forest policy pathway” where the motivation underlying forest policy shifts can lie outside the realm of forest management per se (e.g., controlling border regions or ethnic minorities); (2) a very broad “globalization pathway”, which encapsulates the multifaceted ways in which international trade, tourism, migration, and diffusion of values and theories can favor forest regrowth (including via deforestation leakages); and (3) an ambiguous² “smallholder, tree-based land use intensification pathway”.

Despite significant empirical and theoretical work, a clear and widely accepted forest transition theory has yet to emerge (Angelsen and Rudel, 2013; Mather, 2004, 2007), and critics have identified several problems or ambiguities in forest transition research and its use in policy discussions. For example, it is not clear if forest transition theory deterministically implies that forest transitions will occur in all countries and regions, as some critics have argued (Klooster, 2003; Mansfield et al., 2010; Perz, 2007b). While generally rejected (AFD, 2011; Angelsen et al., 2009 p. 15; Meyfroidt and Lambin, 2011; Walker, 2008),³ this universal, teleological reasoning is at least implicit in some policy documents and academic papers. This is notably the case when authors locate regions or countries on a single forest transition curve (Angelsen, 2007 p.32; Redo et al., 2012; The Commission on Climate and Tropical Forests, 2009) and argue for the use of this position in the calculation of reference carbon emissions as part of a future REDD + scheme (Angelsen et al., 2009 p. 15–16; Köthke et al., 2014).

My aim in this paper is to draw attention to two areas where empirical and theoretical work on forest transitions could and should be improved in order to produce more robust and context-sensitive causal

generalizations and policy prescriptions. As such, I focus on two interrelated problems. First, forest transition literature has paid insufficient attention to the potential role of negative (push) causes of forest transitions and their potentially negative, immediate social repercussions.⁴ As a result, at times the literature appears overly optimistic. One example concerns the explanation of agricultural land abandonment, which can lead to natural regrowth. That said, several empirical and theoretical papers explicitly explain land abandonment through *both* push and pull factors linked to economic development, globalization, or other dynamics (e.g., Rudel et al., 2000, 2005; Calvo-Alvarado et al., 2009; Lambin and Meyfroidt, 2010). However, contrary to work conducted within other traditions, such as peasant studies, empirical forest transition studies have rarely (directly) focused on the role—and social consequences—of push factors in reducing farm profitability, increasing debt, preventing pluriactive livelihoods (which can “subsidize” farming in marginal areas), and in forcing people to seek alternative livelihoods and abandon farming (but see Clement and Amezaga, 2008 and Section 6). Moreover, in their presentation of forest transition theory, several recent studies explain land abandonment as primarily or uniquely the result of pull factors, which attract farmers to non-farm work, or to a learning process which leads people to concentrate agricultural activities on better land (He et al., 2014; Jeon et al., 2014; Meyfroidt and Lambin, 2008b; Miyamoto et al., 2014). In these studies (as well as others, e.g., Mather and Needle, 1998; Mather, 2007), the language used does imply the presence of economic push dynamics (e.g., unprofitability and bankruptcy), yet these dynamics are not directly and explicitly discussed. As a result, forest transition literature can give the impression that agricultural abandonment is a smooth, “natural” (dixit Mather, 2001, p. 48), and distress-free process caused by farmers adopting better-paying occupations, and a quasi-natural concentration of agriculture in areas most suitable for modern, intensive, and commercial farming (Mansfield et al., 2010). This lack of sustained attention to push factors also leaves unexplored the possibility that—at least in some contexts—push dynamics are necessary for long-term and large-scale land abandonment. A second example concerns the nature of conservation and reforestation activities. Contrary to similar work in political ecology, forest transition research rarely discusses the role of violence and coercion by the state and other actors in “creating” new forests, notably through population displacement, land confiscation, and other forms of economic displacements.⁵ Notable exceptions include Mather et al. (1999) and Mather (2001), who mention the role of violence, dispossession, and conflicts in modern forest expansion in France. Importantly, Mather (2001, p. 48) suggested that the absence of resistance in Denmark as opposed to France could be explained by the Danish government’s decision to make “some provision for the ‘dispossessed’ at the time of enclosure [...]”. This is one of the few instances where the presence and strength of resistance was analyzed in the context of the forest transition. Mather (2007, p. 500) further suggested that “authoritarian and technocratic systems may be better placed to” achieve and consolidate a forest transition.

The second problem addressed in this paper relates to the fact that theorization efforts have generally relied on broad and potentially universal processes such as globalization, development, and agricultural intensification. While it is well known that the nature, magnitude, and direction of these effects (i.e., the reduction, stabilization, or increase of forest cover) are context-dependent, we have yet to specify the conditions of validity of key causal generalizations (Angelsen and Kaimowitz, 2001; Angelsen and Rudel, 2013; Gray and Bilsborrow, 2014; Mather, 2004). This lack of theoretical precision has

¹ The idea that agrarian transitions or structural economic changes lead ‘naturally’ to certain outcomes is not unique to the forest transition literature. See for example Hazell and Rahman’s (2014) description of a “natural economic transition towards larger farms over the development process” (p. 3, cited in Rigg et al., 2018).

² The key distinction with other paths seems to be lie in (a) the form of forestation (mainly agroforestry systems—but also including natural regeneration on abandoned land), (b) the absence of massive outmigration, and (c) the continued use of newly forested land.

³ Indeed, authors noted net reforestation did not occur in some developed countries or that reforestation was sometimes followed by another phase of deforestation (Acheson, 2008; Drummond and Loveland, 2010; Jeon et al., 2014; Mather et al., 1999; Pagnutti et al., 2013; Ramankutty et al., 2010; Rudel et al., 2005; Yeo and Huang, 2013).

⁴ Environmental consequences have, however, been critically analyzed (e.g., Robson, 2010; Putz and Romero, 2014; Otero et al., 2015).

⁵ Economic displacement refers to restrictions of access to resources and place that impede the pursuit of one’s livelihood (Cernea, 2005; Schmidt-Soltan and Brockington, 2007).

several repercussions, including difficulty in devising contextually sensitive policy options and in explaining patterns other than forest transitions (e.g., delayed, reversed, or non-existent forest transition; but see Lambin and Meyfroidt, 2010; Angelsen and Rudel, 2013; Pagnutti et al., 2013, and Newman et al., 2018). A promising avenue is to direct attention towards specific factors and processes that can delay or counteract drivers of forest transition. Political activism and resistance, agricultural innovations, cultural attachment to farming, pluriactivity, and other dynamics deriving from the flexible nature of rural livelihoods can (but do not necessarily) counteract drivers of land abandonment and forest transition. This can lead to successful adaptations to changing social, economic, and political conditions (e.g., Gray and Bilsborrow, 2014). These dynamics have been abundantly discussed in peasant studies and in the francophone literature on land abandonment (or *déprise agricole*; e.g., Jean, 1985, 1993), but are rarely directly analyzed in forest transition research.⁶ As one reviewer remarked, these micro-processes (particularly pluriactivity) can theoretically encourage land abandonment and forest transitions. It is therefore crucial to examine under which conditions these factors foster or limit forest transitions.

In this study, I analyzed a previously undocumented case of forest expansion in northern Phetchabun, Thailand. A prolonged period of agricultural expansion and deforestation was followed in the 1990s and early 2000s by geographically differentiated trends. This included agricultural decline and forest expansion in non-irrigated upland areas previously devoted primarily to rain-fed commercial maize cultivation (Leblond and Pham, 2014). This exploratory case study is informed by work in political ecology and relies on extensive fieldwork in which emphasis was placed on documenting the land users' logic of actions, which were then analyzed using process tracing and progressive contextualization. Contrary to common discourses on forest transitions, I argue that forest expansion in the uplands⁷ of northern Phetchabun was largely the result of interacting negative (push) dynamics and unequally successful adaptation strategies. Declining profitability of maize cultivation progressively led to land abandonment, where adaptation strategies proved unsuccessful. In a context of increased conservation pressure, land abandonment facilitated conservation-induced land confiscations and projects. Pull factors, such as growing opportunities in the lowlands, did not directly lead to land abandonment, except for some well-off individuals with access to lowland paddy fields. Instead, such pull factors helped farmers cope with the direct impacts of land confiscations or declining upland farm profitability. As such, the capacity of farmers to engage with a pluriactive livelihood helped minimize or delay land abandonment.

The paper is divided as follows: Section 2 discusses the nature and causes of modern forest cover change in Thailand; the methodology and study sites are introduced in Section 3; key results regarding the diminution of deforestation and the emergence of reforestation in northern Phetchabun are discussed in Section 4 and Section 5, respectively; lastly, Section 6 reviews the main contributions of the study.

2. Modern forest cover change in Thailand

The penetration of colonial powers in mainland Southeast Asia and the signature of key treaties with Western countries in the 19th century

⁶ The possibility that pluriactivity (or occupational multiplicity) could offset, in some contexts, drivers of land abandonment is nevertheless briefly mentioned in Rudel et al. (2002) and Newman et al. (2018). The latter paper also hypothesized that the 'high importance placed on land ownership' (p. 405) in Jamaica could help explain the absence of land abandonment and reforestation in their study area. Also, the link between place attachment and land abandonment was analyzed in a paper coauthored by a prominent figure of forest transition research (Hinojosa et al., 2016)

⁷ The uplands are here defined as an intermediate elevation zone, between 250 and 800 m above sea level (see below).

led to profound geopolitical, societal, and land use changes in Thailand (formerly Siam). Overall, deforestation proceeded relatively slowly from the 1850s to the 1950s (Fig. 1). Agricultural expansion, the main proximate cause of deforestation, was mostly concentrated on land deemed appropriate for wet-rice cultivation. In relatively isolated areas this largely following the traditional pattern of land appropriation (*jab jong*), mostly for subsistence purposes, with little influence from other actors. However, economic treaties, high international demand for rice, and greater market integration in the Chao Phraya delta, and along canals and railways, led to growing commercial cultivation of rice and other less important commercial crops such as rubber in the South. The state, investors, and merchants contributed to—and in some instances led—the process of agricultural expansion and land appropriation through land settlement projects and the granting of land concessions (Feeny, 1988; Hirsch, 1987, 1990; Phongpaichit and Baker, 2002; Rigg, 1987).

Several factors contributed to the acceleration of deforestation and agricultural expansion after the Second World War. These included: (1) rapid rural population growth, especially in frontier regions, brought by migration, declining infant mortality, and a short-term increase in fertility in land-abundant frontier regions (Carmichael, 2008, 2011; Vanlandingham and Hirschman, 2001); (2) increased "pressure of needs" in formerly remote areas whereby farmers wished to improve their socio-economic conditions through increased cash income (Rigg, 1987); (3) a vent-for-surplus pattern of agricultural expansion following the sudden realization of the economic potential of upland forests for cash crop production (Fuglie, 1991); (4) the geopolitical context of the Cold War, which explains the importance given by governments and military actors to development and national security objectives and the resulting undermining of *de jure* forest policies that banned deforestation (Hirsch, 1987); and (5) fewer constraints on deforestation and agricultural expansion. The loss of constraints was linked to increased logging activities, rapid road construction (itself linked to geopolitics and logging activities), and the greater presence of entrepreneurs spearheading, financing, or otherwise facilitating agricultural expansion in rural areas (Hirsch, 1987; Leblond and Pham, 2014; Lohmann, 1993; Rigg, 1993).

The end of the Cold War and the economic boom of 1985–1996 led to major societal changes. With regard to forest cover, deforestation rates declined in the 1990s. Since 1998, forest cover changes have been complex and are subject to controversy. Various remote sensing sources report successions of net deforestation and forestation. Many observers deny the existence of net forest expansion, in particular between 1998 and 2000 when surveys show that forest area increased by 7 million ha. For many political actors (but see Gershkovich, 2014; Online Reporters, 2017), this apparent forest expansion is a methodological artifact—an interpretation that was, however, criticized by Leblond and Pham (2014). They reported accounts of political interference in data production and reporting, and showed through a simulation that methodological changes between 1998 and 2000 could only explain part of the reported reforestation. They also showed mounting evidence of net forest expansion in various areas including northern Phetchabun. Nevertheless, there is little doubt that deforestation persists in some areas.

Reduced deforestation rates and forest expansion in Thailand remain largely understudied (but see Grainger, 2004; Grainger et al., 2003). Nevertheless, the following key points regarding proximate (points 1 and 2) and underlying causes (points 3 to 5) can be made. First, the primary proximate cause of deforestation has been considerably reduced; although localized agricultural expansion persisted, total farmland area underwent a small or modest decline in the 1990s, at least until around 2010 (Leblond, 2008, 2014).⁸ Also, logging of

⁸ For reasons that Office of Agricultural Economics (OAE) officials have been unable to explain, the OAE revised its estimate of total farmland area up in the

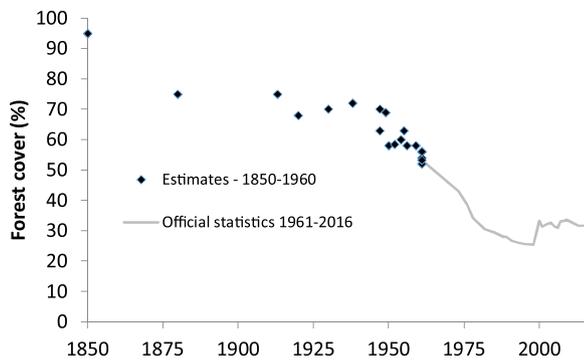


Fig. 1. Evolution of Thailand's forest cover, 1850–2016 [based on Leblond (2011); Leblond and Pham (2014), the Royal Forest Department (RFD (n.d.)), and the Department of National Parks, Wildlife and Plant Conservation (DNP (n.d.)); see original sources for detailed discussions of the methodological approaches involved and for alternative estimates].

inland natural forests was reduced during parts of the 1980s and then banned in 1989.⁹ Given the (reportedly) selective nature of most logging activities and the paucity of available studies, the direct impacts of the logging ban cannot be assessed. Indirectly, it meant that a major force facilitating agricultural expansion disappeared. Second, state and private plantations contributed to these positive forest trends,¹⁰ but these are unlikely to cover more than 2 million ha of the detected forest cover. Since 2000, remote sensing and ground sampling surveys have detected between 0.35 and 1.3 million ha of state and private plantations (FCPF, 2013; Leblond, 2011). According to official forest statistics, state-sponsored reforestation represented 1.27 million ha between 1906 and 2006, of which 497,844 ha were planted between 1990 and 2006.¹¹ By January 2011, 168,099 ha of private plantations were registered, but registration is non-mandatory for non-reserved species such as eucalyptus, and is often avoided by owners (Pragtong, Suwanarat, and Sharma, 2012). Eucalyptus plantations reportedly grew from 0.097 million ha in 1987 to 0.4–0.5 million ha in the late 1990s and early 2000s (Barney, 2005; Ubukata, 2009).¹²

Third, economic growth within and especially outside agriculture was rapid, particularly during the 1985–1996 economic boom. Agricultural growth combined with increased reliance of farming households upon off-farm revenues (through pluriactivity) led to marked economic improvements and reduced poverty in rural areas (e.g., Cherdchuchai and Otsuka, 2006). Although average yields in Thailand remained low compared to neighboring countries, yields of several crops have improved over the last few decades, particularly in core agricultural areas characterized by land scarcity, access to irrigation, and good soils (De Koninck and Rousseau, 2012; Kermel-Torrès,

(footnote continued)

early 2010s.

⁹ A partial logging ban was put in place between 1979 and 1983 in over half of the concession areas, apparently to preserve the resource (Usher, 2009). The yearly exploited area declined from 671,048 ha in 1976–1980 to less than 350,000 ha in the 1980s (FAO, 2004). Illegal logging in natural forests is still a problem, but often takes the form of highly selective cutting of precious species.

¹⁰ All forest plantation figures follow official Thai definitions of forests. These exclude rubber, fruit trees, and other plantations mainly managed for agricultural purposes.

¹¹ Note that: (1) these statistics do not compensate for the low rate of survival (Mungkinding and Castrén 1999), replanting of plantation areas, and fake plantations (i.e., only established on paper; pers. obs.); (2) some plantations were established at the expense of natural forests; and (3) some plantations cannot be classified as forests due to their small size or peculiar shape (e.g., a single row of trees along a road).

¹² Points 2 and 3 of the previous footnote apply. In 2013, Thai forest authorities decided to exclude eucalyptus plantations from their definition of forest cover. The extent to which this could be done in reality is unclear.

2004). The impacts of these changes on crop prices remain unknown. Importantly, an agricultural malaise emerged in the 1980s and 1990s (Poapongsakorn et al., 2006; Siamwalla, 1996); land scarcity induced by the closing of the agricultural frontier limited the ability of farmers to increase production and revenues by expanding fields. Declining and sometimes negative profitability has been noted for rice (Butso and Isvilanonda, 2010; Molle, 2007), maize (Anonymous, 2002; Ekasingh et al., 2003, 2004; Ly et al., 2008; Singzon and Shivakoti, 2010; Beaulieu, 2017), cassava (Kono et al., 1994), and other crops (Latt and Roth, 2015; Nirathron, 2008; Schreinemachers et al., 2009). This situation reportedly results from soil erosion, weed and water management problems, declining prices of low-value crops from the late 1970s to around 2005, and increased production costs particularly in terms of labor. Labor scarcity can be linked to a reduction in population growth since the 1970s, and both push and pull factors leading more farmers or their children seeking employment in the non-farming sector. Young people increasingly see agriculture as a dirty, low-status, and financially insecure occupation compared to waged labor (Grandstaff et al., 2008; Latt and Roth, 2015; Rigg et al., 2004; Rigg and Nattapoolwat, 2001). The number of young people enrolled in the agricultural workforce is declining and the agricultural population is aging (Bryant and Gray, 2005; Grandstaff et al., 2008; Rerkasem, 2015; Siamwalla, 1999). While these economic and demographic changes led to a deagrarianization of the countryside in many regions, it apparently did not lead to massive, permanent rural outmigration. Urbanization figures remain low compared to Malaysia, the Philippines, and Indonesia (De Koninck and Rousseau, 2012),¹³ and many rural people (including young individuals) remain attached to full-time or part-time farming and village life (Rigg et al., 2014). Overall, the reduction of farmland areas has not been intensively studied, except in urbanizing areas where it is largely caused by land conversion (Leblond, 2008). Land abandonment is sometimes reported (Hirsch, 2011; Kiatpathomchai et al., 2008; Rigg, 2001, 2003a; Srisawalak-Nabangchang and Wonghanchao, 2000), which might have led to forest regrowth in some cases (Attwater, 1999; Kono et al., 1994). However, attachment to agriculture and rice farming, adaptation strategies (i.e., pluriactivity, shifting crops or cropping practices, use of foreign labor, and successful lobbying for price support policies), and recent increases in crop prices have allowed farming to persist—even in instances of negative profitability (Barnaud et al., 2007; Poapongsakorn et al., 2006; Vandergeest et al., 2011).

Lastly, the 1980s saw a major shift in forest policies in favor of the closing of the agricultural frontier, forest conservation, and reforestation. Apart from the 1989 logging ban, this took the form of: (1) greater enforcement of forest laws, particularly in upper watersheds and in protected areas (PAs); (2) the continued demarcation of PAs; and (3) increased use of force and coercion to evict so-called forest encroachers in order to establish uninhabited PAs or industrial, short-rotation tree plantations for pulp and paper (Leblond, 2010). In a context of partial democratization, resistance by local population and NGOs in the 1990s and early 2000s undermined efforts to establish large-scale plantations (Barney, 2005) and might partly explain the decline in conservation-induced population displacements (Leblond, 2010; Walker and Farrelly, 2008). Many uncertainties remain regarding the net impact and causes of conservation since the 1980s. Increased conservation pressure led to the (partial) closing of the agricultural frontier as the establishment of new hamlets, clearing of land adjacent to existing villages, and the continuation of rotational shifting cultivation became more difficult. Also, PAs established in the North and Northeast between 1961 and 1985 significantly reduced the amount of forest cleared between 1973 and 2000 (Ferraro et al., 2011; Sims, 2008). The conservation turn of the 1980s could be seen as the result of the (partial) democratization of

¹³ Although improvements have been made, Thai official statistics underestimate the urban population (Alkema et al., 2013; Rigg, 2003b).

the country, rising environmentalism, heightened fears of deforestation-induced water scarcity and floods, and the support of influential actors (e.g., the royal family, military, middle-class and upper-class “dark green” NGOs) for coerced conservation and a stricter enforcement of forest laws (Grainger, 2004). While this optimistic narrative fits well within forest transition literature, it neglects important idiosyncratic factors, such as the role of national security concerns and discourses (Vandergest, 1996; Leblond, 2011).

3. Methodology and region of study

3.1. Methodology

This research examines the proximate and underlying causes of forest cover change in the Pasak Valley and the surrounding hills of the Lom Kao, Lom Sak, and Khao Kho districts in northern Phetchabun Province. Located in Thailand’s maize belt, this region reportedly exhibits both reforestation (the dominant trend) and deforestation as well as a reduction of farm holding land. At the same time, it contains a variety of topographic zones, ethnic groups, and legal forests. This suggested that the region could be undergoing a forest transition, and that comparison through time and space could be used to study the complex processes involved in both deforestation and reforestation. Leblond and Pham (2014) found that following rapid deforestation from the 1960s to the 1980s in upland and highland areas of northern Phetchabun, the 1990s and early 2000s were characterized by net forest expansion, particularly in upland areas, followed by the partial return of deforestation, again mostly in upland areas. This article focuses on the proximate and underlying causes of the shift from rapid deforestation to reforestation.

Adopting a critical realist epistemology (Maxwell, 2011), I used process tracing—an increasingly popular approach in qualitative and mixed methods social science (Bennett, 2010; Blatter and Haverland, 2012; Little, 1998). Process tracing shares some similarities with other approaches in case study research (Blaikie and Brookfield, 1987; Vayda, 1983); contrary to quantitative variable-oriented approaches, it aims at producing and evaluating causal claims through the rich documentation and localization in time and space of the specific actions, actors, contextual factors, and processes (pathways) that allowed, favored, or worked against the emergence of the phenomenon of interest. Similar to other qualitative techniques, process tracing does not lend itself to statistical generalizations, but can nevertheless lead to analytic generalizations and can identify new hypotheses to be evaluated (Yin, 2009; Young et al., 2006).

Core fieldwork activities were conducted between January and July 2007, and between January and March 2008. This focused on, but was not limited to, three main study zones called Lom Kao East (LKE), Khao Kho North (KKN), and Khao Kho South (KKS; Fig. 2). These zones were chosen following the analysis of statistical and cartographic data, a series of field visits, and interviews with elected village or sub-district representatives, teachers, and forest officials. Zones were specifically selected to include: (1) major areas where historical and recent forest decline and expansion had been reported; and (2) legal forest land generally associated with low, medium, and high *de facto* conservation pressure, namely non-demarcated *de jure* forest land, National Forest Reserves (NFRs), and PAs. Land occupation of any *de jure* forests is prohibited and can lead to severe fines or prison sentences. However, significant differences exist in terms of forest policy implementation, specifically: (1) the location and implementation criteria in non-demarcated legal forests are ambiguous;¹⁴ (2) resources allocated to

policing are generally greater for PAs than for NFRs and non-demarcated forests¹⁵ and (3) officials and politicians are generally more forgiving of land occupation in non-demarcated forests or NFRs than in PAs.

In each study zone, sites where recent deforestation or reforestation has been reported were visited and photographed, and the first wave of semi-structured interviews with direct actors was conducted. Direct actors included a variety of current and past land users. They had diverse combinations of livelihoods within and outside of agriculture (i.e., maize, rice, tamarind, tobacco, ginger, and cabbage farmers; livestock owners; owners of rubber, teak, or eucalyptus plantations; farm laborers, loggers, and merchants). Direct actors included people whose agricultural land had: (1) ceased to be used for agriculture (and sometimes reforested); (2) remained in cultivation; and (3) been abandoned, reforested, and then reclaimed for maize cultivation or rubber plantations. Direct actors interviewed included both local residents and non-residents of various ranks and wealth in society. Initial general interviews with direct actors aimed at reconstructing the land history of the site, providing important contextual information, documenting and elaborating hypotheses regarding the reasons for recent forest cover and agricultural changes, and comparing them with historical processes of forest and agricultural change.

The following research strategies were implemented in order to assess hypotheses produced in the first step, corroborate information provided by direct actors, trace causal pathways through time, space, and social networks, and explore alternative explanations; first, results were compared or supplemented with historical and contemporary information obtained from academic and non-academic sources (e.g., Riethmüller, 1988, government statistics, newspaper articles, and government reports or theses on reforestation projects, land use change, and soil erosion in KKS, KKN, or LKE or the region in general); second, semi-structured interviews were conducted with “indirect actors” mentioned in interviews, or who could be presumed to play a role in local land use changes. These indirect actors included local agricultural and forestry entrepreneurs, elected representatives, influential local people, and officials at the district (Lom Kao, Lom Sak, and Khao Kho), provincial, regional, and national level. These officials worked in numerous state organizations involved in local administration and policing as well as in forest, land, agriculture, land reform, irrigation, rubber plantation, water, and ethnic minority affairs; third, in order to validate information, resolve data discrepancies, or better understand a specific event or process, further (general and probing) interviews with direct and indirect actors were conducted until data saturation and triangulation were achieved. These probing interviews focused on specific processes, projects, or conflicts. Particular attention was directed to land users impacted by—or officials involved in—key forest conservation and reforestation projects.

In order to evaluate the extent to which the dynamics observed were exceptional or representative of trends found elsewhere, exploratory visits and interviews were conducted in areas beyond the core research zone in northern Phetchabun, Phitsanulok, and Loei provinces. For the same reason, results were compared with other studies and were discussed with other researchers in Bangkok, Khon Kaen, Phitsanulok, and Chiang Mai. Although fieldwork was concentrated at mid-elevations (i.e., the uplands), dynamics occurring in the lowlands and highlands were also documented through observations, interviews, and analysis of secondary sources. Overall, 221 direct or indirect actors were interviewed, some on several occasions. Semi-structured interviews were generally conducted in Central Thai.¹⁶ Different interview scripts were

(footnote continued)

is not a stream headwater or a forest (Ratanakhon, 1979, p. 48).”

¹⁵ Since the early 2000s, PAs are under the responsibility of the resource-rich DNP, while other inland legal forest land is under the jurisdiction of the RFD.

¹⁶ When possible and desired by the interviewee, interviews were also be

¹⁴ To be precise, land occupation in non-demarcated legal forests is prohibited on hills, mountains, and within the lowest 40 m at the foot of a hill or mountain. Also, “[p]ermission [to acquire unoccupied land under the Land Code] will not be granted for hill land unless it is well suited for cultivation and

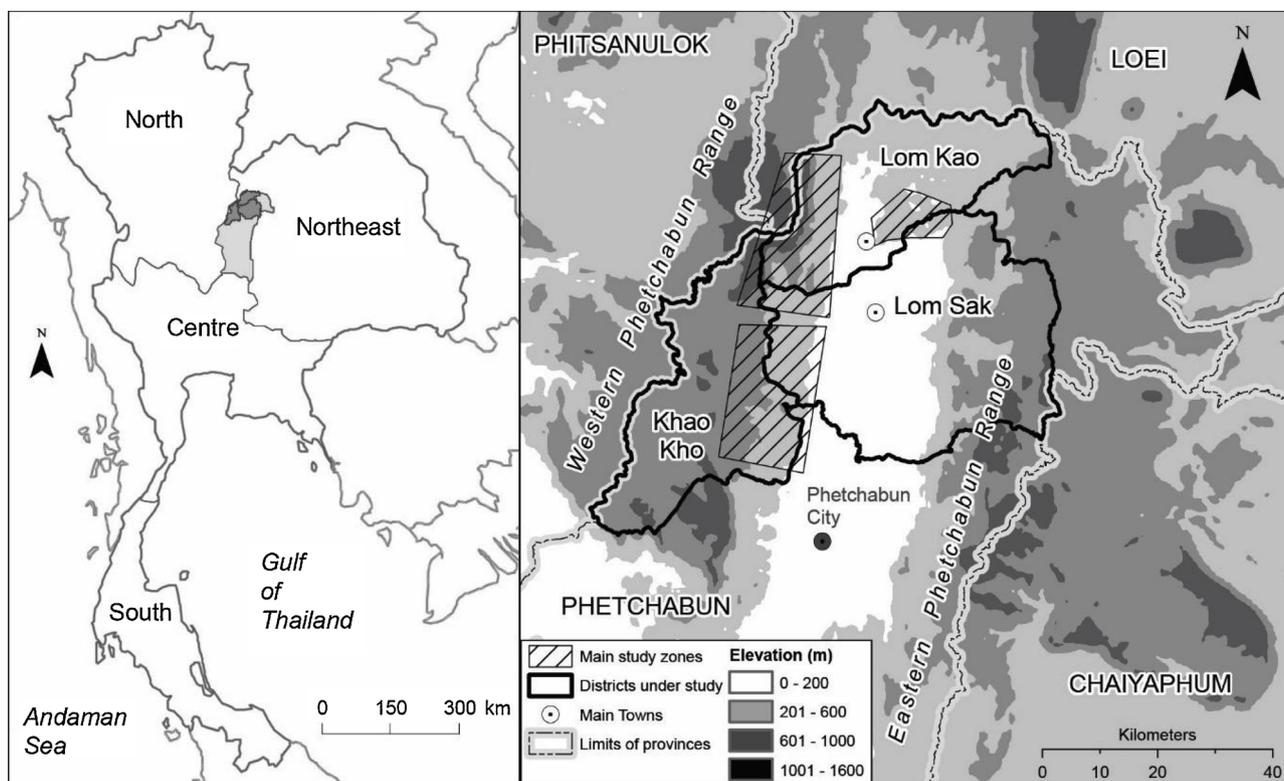


Fig. 2. Districts and main study zones in northern Phetchabun, Thailand [based on Leblond and Pham (2014); Digital Chart of the World; and Thailand’s DNP].

used depending on the type of individual (e.g., farmer, plantation owner, merchant, forest official etc.) and the nature of the interview (e.g., determining general land use history, or probing on the processes leading to land abandonment etc.).

Methodological limitations should be noted. First, research is exploratory and qualitatively oriented. It aimed at elucidating causal mechanisms, but not at quantifying their impacts. Second, research activities were constrained by resource conflicts, and the difficulty in establishing trust with all involved parties given both time constraints and the idiosyncrasies of fieldwork.¹⁷ There were also some restrictions to access due to the presence, at the time of fieldwork, of a Hmong refugee camp close to KKN. These factors partly limited attempts to expand the core area of research further into the Western and Eastern Phetchabun Mountains. Third, while several plantation owners were interviewed, some large-scale rubber investors involved in the illegal clearing of 10–20 years old secondary forests and land grabbing conflicts could not be identified or interviewed. Data were nevertheless acquired from employees, former land users, and people involved in these schemes or inquiries into these cases. Fourth, efforts to interview former land users who migrated away from—or never resided in—the region were only partly successful. In parts of KKN and KKS, interviewees had sometimes limited information on former neighbors, thus preventing their identification. This reflected a form of land appropriation where land users came from multiple localities, sometimes tens or hundreds of kilometers away, and spent limited time in their fields. It also suggested that a “sense of community” among land users was

(footnote continued)

conducted in Lao Lum (a local dialect), Lao Isan, or Northern Thai. In these cases, research assistants were used for translation.

¹⁷ For example, in one area, I was able to successfully interview officials and farmers (lowlanders and ethnic minorities), but was unable to gain much information from groups reportedly involved in large-scale livestock husbandry. This might be partly explained by the fact that some of these actors were encountered while accompanying and observing an intimidating forest patrol.

sometimes absent. Lastly, while process tracing excelled at documenting immediate, geographically constrained causal relationships, it proved difficult where numerous local and non-local actors were involved (e.g., when distal causes of maize price trends were being assessed). In such cases, secondary sources were used to help assess causal relationships wherever possible.

3.2. Geography and history of the study region

Three broad elevation zones can be distinguished in the study region. First, the lowlands [less than 250 m above sea level (asl)] consist mainly of the lower reaches of the Pasak River valley (20–30 km wide and between 140 and 170 m asl). This zone has distinct rainy and dry seasons with an average annual rainfall of 1000–1100 mm, which is somewhat less than the hills to the north and in the highlands of the Eastern and Western Phetchabun ranges (1200–1500 mm; Caisip et al., 1987; Polous, 2010; Sapkota, 2008). The lowlands harbor two small regional market towns, Lom Sak and Lom Kao, and are fairly densely populated (100–200 inhabitants per km²) mostly by Lao Lom.¹⁸ This zone has never been subject to significant forest conservation efforts. From the 1850s to the 1950s, deforestation and agricultural expansion mostly took place in sites deemed appropriate for wet-rice cultivation through traditional *jap jong* practices of land appropriation, with villagers enlarging existing villages and creating new ones at a pace dictated by labor availability. High costs of transportation and forest diseases limited commercial cultivation and in-migration (Central Statistical Office, 1952; Kakizaki, 2005; Keyes, 1987). This changed following the Second World War when farmers rapidly claimed remaining forested areas on terraces for subsistence and commercial cultivation. Improvements in irrigation and market integration led to significant agricultural intensification and diversification from the

¹⁸ Lao Lom (autonym) have linguistic and historical links with populations residing in Luang Phrabang, Laos. Like other lowland ethnic Tai populations, they specialized in wet-rice cultivation.

1970s onwards (Riethmüller, 1988).

The valley bottom is encircled by the second elevation zone, the uplands (250–800 m asl). This first row of hills and cliffs interspersed with dissected valleys is part of the Eastern and Western Phetchabun Ranges. Soil quality varies and irrigation is almost entirely absent. This formerly forested zone was opened-up in the 1960s by logging, military operations, and road construction. Lowlanders and entrepreneurs (including land speculators) quickly followed and cleared the land mostly for maize cultivation (sometimes combined with mung bean cultivation). Contrary to more diversified agriculture in the lowlands and highlands, the uplands were—and largely remain—characterized by a high degree of specialization in maize cultivation, as is common in upland areas of Thailand's maize belt. Land users came from both neighboring and distant communities, sometimes dozens of kilometers away. Given the low labor requirements of maize cultivation, farmers could combine upland cultivation with their previous occupations. In general, local farmers with access to lowland (paddy) fields considered upland farming a supplementary source of cash income. They continued to reside in the lowlands and only stayed in their upland field huts for short periods of time. As a result, only a few upland hamlets were formed in this zone.¹⁹ Since the 1980s, conservation pressure increased, but was unequally distributed as the uplands include: (1) non-demarcated legal forests (the western LKE study zone) where land tenure policy is ambiguous; (2) NFRs demarcated mostly in the 1980s; and (3) PAs demarcated from the 1990s onwards. Large portions of the KKN and KKS study area are now included in Khao Kho National Park, a PA declared in 2012 following 12 years' of surveys and negotiations (Fig. 3). The uplands are now covered by a mix of fields, agricultural and silvicultural plantations, and secondary forests.

The third elevation zone, located further west in the western Phetchabun Range, is the highland zone (800–1600 m asl). Here, upland ethnic minorities slowly settled from the late 19th century and practiced shifting cultivation (including growing opium). During the Cold War, the Thai state built a major east–west strategic highway from Phitsanulok to Lom Sak, which attracted investors and lowland farmers. In 1967–1968, security forces attempted to relocate all Hmong settlements to an area north of the highway, justified by geopolitical and environmental motives. Conflicts rapidly erupted and 90% of the Hmong population joined forces with the Communist Party of Thailand (McCoy, 1971; Mottin, 1980). The latter established two strongholds in remote forested terrain about 25 km south and north of the highway. After unsuccessful aerial bombings and ground offensives, the Thai military decided to deny communists hiding grounds and communication routes by building roads and encouraging agricultural expansion by loyal peasants, in particular close to the southern communist camp (Anonymous, 1985; Chitbundid et al., 2004; Riethmüller, 1988). While only a narrow band (2 km) along roads was officially meant to be cleared, lowland farmers and speculators quickly claimed land further away. Following the demise of communist forces, the highlands have been subject to important conservation and reforestation as well as rural development projects, leading to both land confiscation, tourism development, and agricultural diversification and intensification. The highlands thus exhibit a mix of agricultural use (i.e., fields, agricultural plantations, and pastures), tree plantations, remnants of old-growth forests, and secondary forests. Today, this area is permanently populated by both lowlanders and ethnic minorities, mainly Hmong (approximately 40 inhabitants per km²).

Since the 1980s, policies and projects accelerating the issuance of land titles were implemented outside ecologically or geopolitically sensitive areas. This focused on Thailand's urban and core agricultural areas. As a result, interviewed farmers generally held full titles (or near full titles) for lowland fields, but only tax certificates (and sometimes

not) for upland or highland fields. Although holding such receipts can informally influence the course of land conflicts, they have no standing in court.

4. Reduction of proximate causes of deforestation

From the 1980s to around 2005, both minor and major proximate causes of deforestation (or forest degradation) were limited in extent or declined. The destruction or loss of logging records and maps by authorities and entrepreneurs made it impossible to determine if the 1989 logging ban led directly to a reduction of deforestation in the study region. However, it reduced forest degradation and made agricultural expansion more difficult in remote areas. Also, small dams constructed at the mouth of three rivers in KKN and southeast of LKE led to limited secondary forest destruction. Two dams in KKN were built as a direct result of destructive floods in August 2001, which killed more than 136 people in lowland villages (Parnwell et al., 2003).

More importantly, agricultural expansion dynamics were radically transformed. Farmland area increased in Northern Phetchabun at a rate of 4.3% and 2.7% per year during the periods 1963–1978 and 1978–1993, respectively (including in the Nam Nao district; Leblond, 2011). Between 1993 and 2003, although agricultural expansion persisted in the Nam Nao district (outside of the study region), farm holding areas declined by 1.0% per year in the combined districts of Lom Kao, Lom Sak, and Khao Kho (see Supplemental Information, Table 1).²⁰ According to agricultural statistics and the Royal Thai Survey Department land use maps, newly cleared areas in the 1960s to 1980s were devoted to rice and upland field crops, but the decline of farmland areas mostly affected upland field crops (Leblond, 2011). This evolution broadly reflects trends at the provincial level. Interviews suggest that within the three study zones, farmers stopped claiming and clearing new land through *jap jong* in the middle or at the end of the 1980s. Except for well-off interviewees, farmers did not explain this change as a direct result of positive (pull) factors such as greater opportunities for non-farming activities or cultivation in the lowlands. There was and remains a large body of land-poor or landless farmers—whose upland fields were confiscated in the 1980s and 1990s—who would like to increase their access to land but are prevented from doing so by external factors. These factors were either non-existent prior to the 1980s or could then be circumvented. As emphasized in Graingerös (1995), Barbier et al. (2011) theoretical work, an absolute scarcity of good arable land emerged in the lowlands and in LKE. While some areas were never claimed or used for agricultural purposes (e.g., the central hills in LKE), these are essentially rocky and steep areas used by various communities as sources of timber and non-timber products. Land scarcity also took the form of a *relative* (i.e., policy-induced) exhaustion of free and arable land. According to upland and highland farmers, good land remained in the uplands and highlands of northern Phetchabun, for example in the southern portion of what is now Khao Kho National Park (southwest of KKS). However, remaining good land was claimed by other actors, most importantly forest authorities or royal officials, and/or lay away from roads. Farmers responded to this land scarcity in various ways, including by acquiring or renting land within the region or in land-abundant areas.²¹

²⁰ This decline was fastest in Lom Kao district (1.5% per yr).

²¹ In a manner reminiscent of racialized forest discourses (Vandergeest, 2003), a forestry official suggested that decreasing engagement with agricultural expansion and land abandonment by ethnic Tais in remote areas was linked to development-induced cultural changes. As life and work in the lowlands became easier, lowland ethnic Tais would have become more reluctant to experience the difficult life of the frontier. He contrasted this with Hmong who, according to him, remained willing to travel long distances and experience these difficult conditions. I cannot prove or disprove this interpretation. However, interviews confirm that some Hmong farmers are renting land hundreds of kilometers away in remote areas for ginger cultivation and that some older

¹⁹ However, villages can be found in the hills and narrow valleys north of the LKE study zone, outside of the main study area.

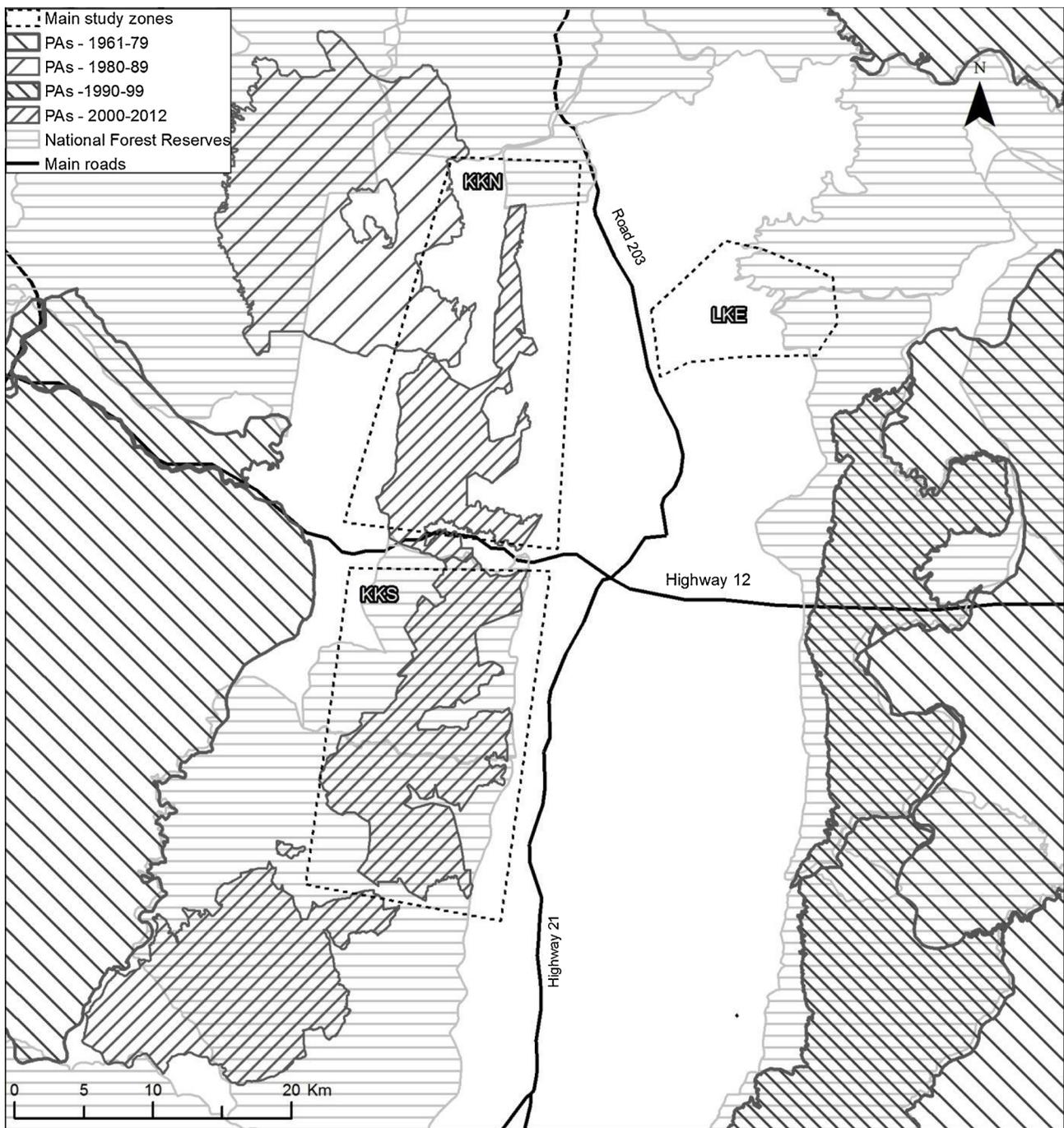


Fig. 3. Main study zones, NFRs, and PAs created by 1979, 1989, 1999, and 2012 in northern Phetchabun Province (KKS, KKN, and LKE refer to the main study zones Khao Kho South, Khao Kho North, and Lom Kao East, respectively); only Khao Kho National Park was created between 2000 and 2012 in the region, composed of three zones; non-demarcated legal forest land exists in western LKE and in KKN, but could not be mapped; KKN was erroneously considered a NFR by forest officials and some villagers; based on data from the RFD and the DNP, and Digital Chart of the World).

The emergence of policy-induced land scarcity signaled a major shift in the broader socio-political context. In the 1960s and 1970s, these legal and geographic obstacles could be overcome with the help of a loose deforestation coalition. Security officials, influential political actors, and entrepreneurs effectively protected “encroachers” from prosecution, or financed the construction of logging or security roads

(footnote continued)

ethnic Tais emphasized the physical and legal hardships associated with accessing and cultivating remote plots (in particular after tractors were banned and access roads deteriorated).

through forested areas. However, in the 1980s and 1990s, this coalition largely dissolved and support for agricultural expansion and road construction in forested areas diminished (e.g., Grainger, 2004; Phongpaichit and Baker, 2002). Moreover, from the 1980s onwards, forest authorities rapidly demarcated legal forests in the uplands and highlands of the region (see Leblond, 2011). Conservation pressure also increased through an intensified (but unequal) enforcement of forest laws, and through the creation of conservation and reforestation projects (see Section 5.3). The geopolitical, economic, and political causes of the dissolution of the deforestation coalition—and its partial replacement by a conservation coalition—are treated elsewhere (Leblond,

Table 1
Main cases of land confiscation linked to conservation practices in northern Phetchabun, 1980–2008 [data are based on fieldwork; the Midas Agronomics Company (1991); Marghescu (1996); Data center of the NGO Coordinating Committee on Development-Ian., 2005); NHRC (2005, 2006, n.d.); The Nation (2005); Wongruang (2005); Srisura (2006); Pintopdaeng (2010); Wipatayotin (2010); "Villagers of Ban Rong Kasom in their right in encroachment allegations (in Thai)" (2010); and Senakan (n.d.)].

Case	Location ¹	Source of conservation pressure	Legal status of the land ²	Land confiscation period	Population affected ³	Plantations		Notes
						Period	Area (ha)	
(1) Nam Khek Watershed Royal Development Project	Within and west of KKS	Reforestation project	NDLF and NFR	Mid 1980s	Ethn. min. (majority or entirely) Tais	1984–2002	1,600	Involved the military, and royal project and symbols
(2) Eastern Pasak Watershed Forest Office Plantation Project	LKE (eastern portion) and east of LKE	Reforestation project	NFR	–	Tais	1979–1994	760	Involved royal symbols; no compensation
(3) Thung Salaeng Luang National Park	Northern part of the park, 20 km west of KKN	PA management	PA	End of 1980s	Ethn. min. (480 hmong households)	–	–	Compensation (land); population displacement likely
(4) Reforestation of Denuded Forest Lands in Khao Kho Project (FAO/UNEP) and the Khao Kho Forest Development Project ²	KKS and west/southwest of KKS	Reforestation project	NFR	Early 1990s	Tais mainly	1991–	9,008	Involved military and royal symbols; eviction of former land users (no compensation); land and house allocation for 150 new occupants along the roads; some plantations failed
(5) Petroleum Authority of Thailand Permanent Afforestation Project in Honor of the King's Golden Jubilee	East and southeast of LKE	Reforestation project	NFR	1995–1996	Tais	1995–1996	1,719	Involved paramilitary and royal symbolism; no compensation or population displacement
(6) Collaboration between locals and the Royal Forest Department (RFD)	Western portion of KKN	Village chief, villagers, and the RFD	NDLF (ambiguous) ⁴	c.1995	Tais	–	–	Indirect land confiscation through land use practice restrictions
(7) Phu Phadaeng Wildlife Sanctuary & New Forest Village Project ⁵	Eastern Phetchabun range (close to road 12)	PA management and project	PA	2002–2010	Tais	–	–	Population displacement with some compensation (land for housing); use of police and royal symbolism
(8) Nam Chun Nam Ko Watersheds Restoration Project and Khao Kho National Park	KKN (and KKS) ⁶	Reforestation project and PA creation	NDLF (ambiguous) ⁴ becomes PA	2001–2010 (and the end of 1990s) ⁶	Tais & ethn. min. (Hmong)	2001–2010	5,564	Limited population displacement; military, paramilitary, and royal symbolism was involved

¹see Fig. 3 for the locations of KKS (Khao Kho South), KKN (Khao Kho North), and LKE (Lom Kao East).

²NFR: National Forest Reserve; PA: protected area; NDLF: non-demarkated legal forests.

³ Ethn. min.: upland ethnic minorities, such as Hmong.

⁴ From the 1960s to the early 2000s, KKN was lent to the Public Welfare Department which, however, failed to allocate the land to upland ethnic minorities. The land was then taken back by forest authorities to be reforested. Prior to the demarcation of Khao Kho National Park, it was legally an ordinary forest, but many believed it was a NFR.

⁵The New Forest Village Project (*krongkan muuban phaen mat*) was created in honor of the Queen. Descriptions of its nature are contradictory.

⁶An infructuous attempt at land confiscation apparently occurred in KKS in the 1990s as part of efforts to establish Khao Kho National Park.

2011).

5. Proximate causes of forest expansion

Focusing on forest expansion occurring on formerly cultivated land, I suggest three main types of forest expansion occurred in the study region over the last three decades. This typology is based on the perspectives of former or current land users and his or her motives, constraints, and opportunities. These three types of forest expansion involve natural regeneration or afforestation following: (1) voluntary land conversion to tree plantations by private individuals and companies, mostly from a profit-maximization perspective; (2) (partial) land abandonment as a defensive strategy to avoid income loss; and (3) land confiscation by state authorities followed by forestation. Each of these is discussed in the following sections.

5.1. Voluntary conversion to forest cover

As mentioned in Section 2, this paper adopts the Thai definition of forest and thus excludes rubber plantations from types of forest cover. Voluntary conversion of agricultural land to forest cover was the least important form of forest expansion and will be only briefly discussed. As natural forests cannot be privately or communally owned in Thailand (Lakanavichian, 2006), this type of forest expansion only took the form of private tree plantations (mainly teak, and to a lesser extent eucalyptus and pine).²² Private plantations are located in the lowlands or in legal forests where forest law enforcement is limited. Three converging sources suggest the area of private plantations increased in the 1990s and 2000s, reaching 1000 to 3000 ha in the three districts. First, between 1993 and 2006/2007, 1328 ha of private teak plantations were registered as part of a Royal Forest Department (RFD) project.²³ Second, agricultural censuses report 386 ha and 1060 ha of plantations were owned by local farm households in 1993 and 2003, respectively. Lastly, although deriving from different methodologies, Land Development Department land use maps suggest that private tree plantations covered 416 ha in 2002, 2528 ha in 2007, and 2871 ha in 2009. RFD registration data, as well as interviews, suggest that tree plantations became more common during the boom years (1986–1997) and were financed by upper and middle-class individuals residing in the region or elsewhere, notably Bangkok. Interviewing some forest plantation owners proved difficult, in particular with regards to two actors who operated large (by local standards) silvicultural plantations.²⁴ While interviewing these actors would have been useful for this research, I was able to gain such information through interviews with other actors (i.e., employees, neighbors, former land users, and officials). Although diverse motivations were documented (e.g., esthetic value and prestige), it appears reasonable to conclude that economic motivations (i.e., profit maximization, land speculation etc.) were also important motives. State subsidies also helped motivate owners of small plantations to plant trees.

5.2. Land abandonment

Here, land abandonment refers to a shift away from traditional or recent land-use practices, where land ceases to be used either for

agriculture or other rural economic activity (Baudry, 1991). Under favorable ecological conditions, natural forest regeneration can occur. This definition excludes rotational shifting cultivation systems, as they necessarily involve short-term forest regrowth.

Land abandonment was largely absent from lowland and highland zones but constituted a major type of forest expansion in the uplands zone. It was concentrated in non-irrigated areas previously devoted to maize cultivation and sometimes tamarind cultivation. It resulted from the adoption of a strategy aimed at avoiding the economic risks associated with particular agricultural activities—mainly rain-fed maize cultivation—that are subject to important natural and human risks (e.g., drought, pests, and price fluctuations), and for which profitability had declined and become more uncertain due to a price-cost squeeze. At the same time, major adaptation strategies led to increased need for cash investments, and thus to greater financial risks. These economic problems were experienced by many who held sloped land, while rain-fed farming in flat inter-montane valley bottoms apparently remained profitable.

5.2.1. Causes of land abandonment

The process of abandonment was slow and it involved several cycles of temporary land abandonment and reclamation (i.e., renewed cultivation). Several farmers explained that after a bad year, which left them badly indebted, they decided to interrupt cultivation for one year and focused their energy on non-farming endeavors to repay their debt and maintain a socially satisfactory level of income. As such, farmers only wished to temporarily halt cultivation to replenish the soil or wait for better prices. It was only after several infructuous attempts to make a profit in maize cultivation that some decided to abandon maize farming for a longer period. In the 1980s and 1990s, some farmers were able to rent out or sell their land to other maize farmers or economic actors who established tree plantations or built secondary residences. In many other cases, the land was simply left fallow. It is unclear to what extent this was due to personal preferences or declining demand for rain-fed farmland, for which profitable utilization was difficult to identify, at least prior to around 2007.²⁵ In many instances, secondary forest regrowth attracted the attention of conservation officers who then restricted former and potential new land users from reclaiming fallowed fields.

Three main economic and ecological factors were invoked by interviewees to explain the deteriorations of rain-fed maize farming from the 1980s to 2007. First, crop prices declined from their height in the 1970s and then fluctuated at relatively modest levels until 2007 (Fig. 4; see footnote 25). Second, labor costs rapidly increased from the 1980s onwards. This was the result of several factors, namely: (1) the progressive replacement of exchange labor arrangements, under which cash disbursements are almost nil, by wage labor;²⁶ (2) the rapid increase in daily wages rates above inflation (Fig. 5); and (3) the reduction of the available agricultural workforce within the family due to reduced family sizes, increased importance of education, and heightened rejection by young family members of agricultural work and livelihoods. Other production or transportation costs also increased due to a greater use of commercial inputs (e.g., fertilizers and seeds), rising prices per unit consumed (e.g., fuel and seeds), and feedback effects in remote areas with a limited number of farmers. In the latter case, as the number of farmers and the area cultivated declined, production costs

²² The Thai state has yet to formally recognize community forests and delegate management towards communities. Indeed, community forests exist in the region, but their establishment or expansion did not appear to play an important role at the time of study.

²³ These figures do not take into account the possibility (largely confirmed elsewhere) that some of these plantations were later converted back to agriculture or other land uses (Appanah et al., 2012).

²⁴ One was a Thai company with, presumably, legal plantations in the lowlands zone. The other actor(s) operated what appeared to be an illegal plantation in LKE reportedly linked to military personnel.

²⁵ Rising maize prices and growing interest in rubber plantations since approximately 2007 led many local and non-local farmers or investors to rent or acquire formerly abandoned farmland.

²⁶ Exchange labor arrangements did not entirely disappear in the study region and elsewhere in Thailand (Rakyutidham, 2009; Walker, 2012). A return to exchange labor represents one form of adaptation to the cost-price squeeze. Also, wage labor existed in the region prior to the 1980s, but it was generally restricted to large-scale maize farmers who relied on hired labor gangs—often from the Northeast.

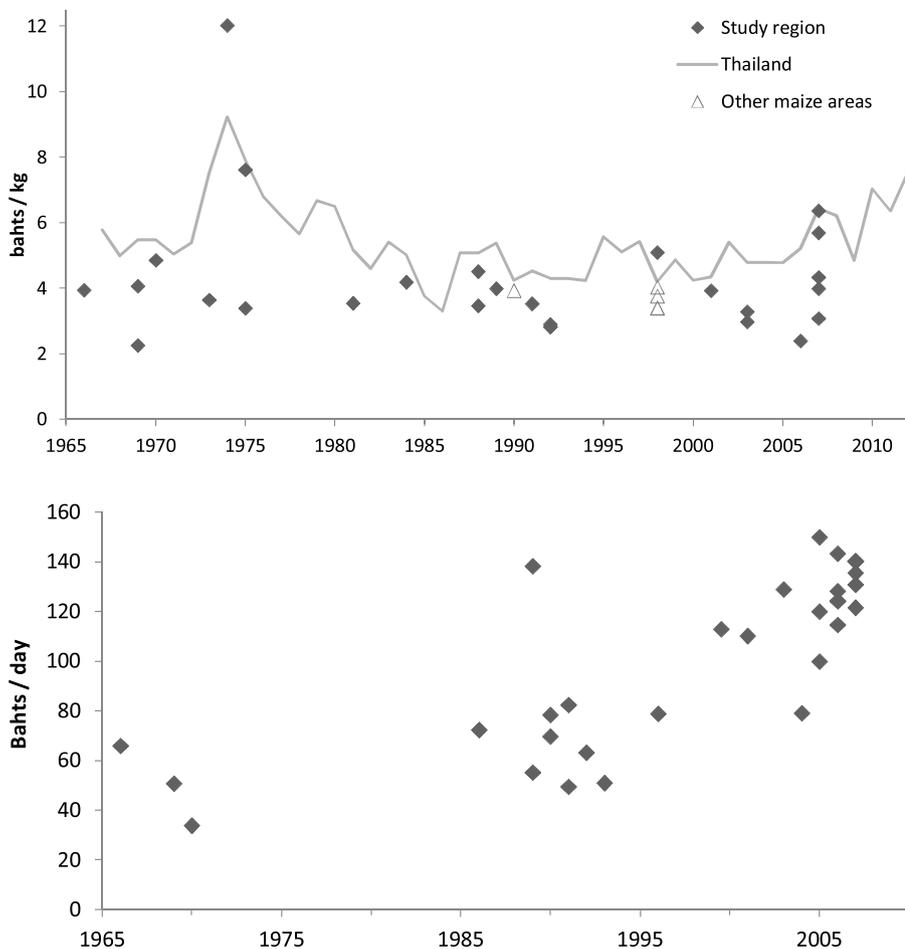


Fig. 4. Changes in the maize farm-gate price in the study region, in other maize-growing areas, and in Thailand for the period 1966–2012 [assuming a constant 2005 value; data sources were as follows: for the study region = fieldwork interviews, Wattanutchariya and Kao-ian (1984); Krishnamra (1991); Klaisomboon et al. (1992), and Vargas Roja (2004); for other maize areas = Ekasing et al. (2003) and Wattanutchariya et al. (1991); for Thailand = Office of Agricultural Economic (various editions), and Konjing (1976). Inflation corrections were based on the national consumer price index of the World Development Indicators (January 22, 2014). Recent increases in maize prices led to the partial reclamation of abandoned farmland].

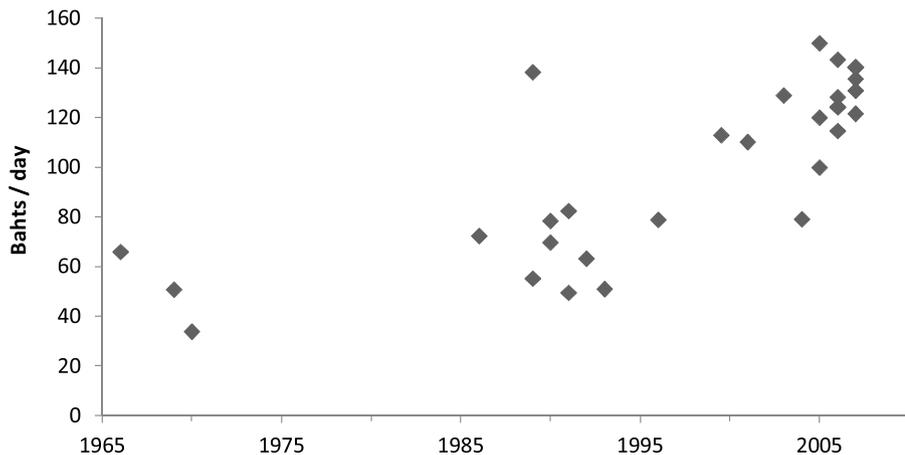


Fig. 5. Changes in daily agricultural wages in the study region, 1966–2008 [assuming a constant 2005 value; data from fieldwork interviews (2007–2008), Adebajo (1989); Krishnamra (1991), Sivarajah (1991), and Klaisomboon et al. (1992). Data for the 1960s and 1970s refer to non-agricultural daily wages due to the importance of exchange labor in agriculture during this period. Other data refer to wages paid by and to ethnic Tais for harvesting maize. Inflation was corrected based on the national consumer price index of the World Development Indicators (January 22, 2014)].

for remaining farmers increased, thus potentially leading to further abandonment. This, in turn, is caused by increased crop destruction by pests unless costly fences are erected, the sharing of road maintenance costs among fewer households, and increased costs of services offered on farms by middlemen (e.g., threshing, transportation, and land preparation). The latter costs increased due to the reduction of the volume of production in the area, or because of increased risks of arrest and seizure of farm equipment. In fact, interviews with farmers, police, and RFD officers suggested that, at least outside PAs, forest officers did not prevent the clearing of young fallows located within a largely agricultural landscape. However, when located within a largely forested landscape, such clearings were more likely to be considered illegal (and the land effectively seized). This unequal enforcement is due both to the attitude of the foresters and of lowland forest volunteers²⁷ and villagers who are more likely to tip-off authorities in these circumstances.

The third factor contributing to the reduction in maize farming, which several farmers from the three study zones referred to, was land degradation and insufficient yields. Studies in the region’s uplands document 45–56% yield declines since the first year of cultivation for fields in which fertilizers or fallows were not used (Klaisomboon et al., 1992; Krishnamra, 1991; Palmer, 1989). The causes of this decline remain unclear as they could involve soil erosion—a phenomenon well documented in the region (Patanakanog et al., 2004)—or difficulty in managing weeds in the face of labor scarcity and increased wages (Guy

Trébul, 2011, pers. comm.).

5.2.2. Adaptation strategies

These trends did not lead directly and uniformly to land abandonment. Various household-level adaptation strategies were documented. First, similar to what happened in the lowlands and highlands, numerous upland farmers increased agricultural investments to augment production or reduce labor costs. They adopted higher-yielding public seeds in the 1980s and then costlier hybrid commercial seeds, which need to be repurchased every year. To reap the benefits of the latter and counteract declining yields, they also adopted or increased use chemical fertilizers. Some also experimented with herbicides.²⁸ These changes reportedly ameliorated the situation for several farmers, particularly in the lowlands and highlands. Their success in the rain-fed upland areas was, however, limited by political (conservation pressure) and geographic obstacles in establishing irrigation infrastructure and in using farm machinery.

Second, farmers attempted to shift to other agricultural land uses. Again, the success of this was highly unequal between households and areas. In the highlands and the lowlands, better agroecological conditions (i.e., deeper soils, higher rainfall, and a shorter dry period), the development of irrigation infrastructure by state and local actors, and the promotion of various alternative crops allowed the successful diversification of commercial agriculture towards tobacco, fruit trees,

²⁷ Forest volunteers can receive payments in exchange for their denunciations. These denunciations seemed to be absent from cohesive communities who are highly dependent upon upland and highland cultivation or the use of fallows, but were documented in differentiated lowland communities subject to internal conflicts.

²⁸ Little changes in the use of machinery were documented. Tractors were already widely used in the 1980s for land preparation. Contrary to lowland rice farming where mechanical harvesting made significant headways, manual maize harvesting remained the norm in the region (as in the country in general; Kittiyopas, 2004).

cabbage, and other more profitable crops. In contrast, in the upland zone of KKS and LKE, attempts at irrigation made by state projects or private individuals failed or were blocked by foresters. Also, in the context of high specialization towards maize, water insecurity, and lack of state support, the potential for diversification in the uplands was perceived as limited, at least prior to the rubber boom. Two diversification strategies nevertheless emerged; as tamarind prices were growing in the 1980s, well-off farmers converted maize fields into tamarind plantations (Klaisomboon et al., 1992; Palmer, 1989). However, tamarind plantations sometimes failed and were abandoned. Problems cited included the sudden drop of tamarind prices in the 1990s, high seedling mortality, and low production. Also, as maize farming was declining in some valleys of KKN, livestock husbandry emerged as an important activity. This involved investors hiring lowlanders or Hmong to tend to their cattle. Since the early 2000s, foresters have attempted to stop this activity in the Khao Kho and Phu Hin Rong Kla National Parks.

The third strategy involved the return to less costly maize farming practices, including the use of traditional or non-hybrid seeds, family or exchange labor, manual soil preparation, and fallows when low conservation pressure allowed it. The last strategy is widespread and is often used in conjunction with the other strategies. Farmers increasingly combined on-farm and off-farm income gained locally or in urban centers. By their own account, pluriactivity reduced vulnerability to economic risks through lower borrowing needs (i.e., reduced exposure to debt risks), and improved capacity to cope and adapt (e.g., via financing agricultural investments). As such, land abandonment was reduced or delayed and the immediate socio-economic impacts of land confiscation (as discussed in Section 6.2) were attenuated.²⁹

5.3. Land confiscation

The third type of forest expansion occurred when land users were forced to stop cultivation by an external political decision, when the land was then afforested or subject to natural regeneration. Efforts to confiscate and afforest land came within a general context of increased conservation pressure in the region from the 1980s onwards. However, given the long history of ambiguous and contradictory forest laws, farmers did not stop cultivating land simply because a new NFR or PA was declared or because it was (now) deemed illegal. Confiscating land, planting trees, and/or ensuring natural regeneration is a difficult and costly task and is thus associated with specific circumstances. Outside PAs, it mostly occurred as part of localized forest or military projects or when forest officials were pressured or tipped-off about illegal activities.³⁰ It also occurred when forest authorities attempted to create PAs or “clear” them of their inhabitants.

With the exception of the attempt to forcefully relocate Hmong in 1968, no significant land confiscation project occurred in northern Phetchabun prior to the early 1980s. This changed markedly following the end of the communist insurgency in the early 1980s. Forest regrowth on confiscated land was documented in upland or highland portions of all three study zones and their surroundings, but was absent from the western part of LKE, which is simply a non-demarcated legal forest. Overall, eight major cases of forest expansion following land confiscation were found in the study region (summarized in Table 1). Seven were led by state agencies (both forest and military) and one involved cooperation between civil actors and officials of a RFD (case 6

²⁹ Interviews were largely conducted with individuals who did not permanently migrate out of the region. The possibility that pluriactivity also served as springboard towards permanent outmigration for some individuals cannot therefore be ruled out, which possibly facilitated land abandonment and reforestation (see Section 6.3).

³⁰ See case no. 6 in the main text. Another (potential) example of land confiscation was documented in LKE, where villagers denounced the establishment of large rubber plantations over secondary forests growing on former maize fields in 2006–2007.

in Table 1).

The emergence of cases of land confiscations can be interpreted in light of objectives mentioned in the forest scarcity path. All cases were at least in-part motivated or publicly justified by the wish to replenish timber resources (case 2 in Table 1) or to counter (perceived) heightened risks of flooding or river and canal siltation in the lowlands (all cases in Table 1). For example, the Nam Chun Nam Ko project (case 8 in Table 1) was created after deadly floods in 2001. Conservation officers used this project to enlarge the area targeted for the establishment of Khao Kho National Park. However, forest scarcity was not the whole story. First, the changing geopolitical situation played an important role—it reduced the fear that strict conservation policies would fuel the insurgency. It also led to key, early geopolitical or environmental decisions which not only involved enhanced forest management efforts, but also increased control over former communists and communist areas. These decisions included the construction of a Royal Palace in the southern communist camp, whose surroundings became the focus of reforestation and development projects (cases 1 and 4 in Table 1). This was also the focus for the creation of Phu Hin Rong Kla National Park in the early 1980s, which surrounds the former northern communist camp. These early cases—partly motivated by geopolitical motives—appear particularly important given that they were implemented against populations who were still highly involved in agriculture. Authorities thus used a high level of coercion and intimidation. In doing so, they demonstrated the will of the state to better control forests. Second, in the 1980s and 1990s, forest authorities re-centered their activities from logging management to forest conservation and reforestation (Vandergest, 1996). As a result, the prestige and budget of the institution, as well as personal gains deriving from corrupt practices or the possibility of career advancement, became increasingly linked to forest conservation and reforestation activities and their success.³¹ Third, the creation and “success” of land confiscation also depended on the degree of local, national, and international resistance it faced and the capacity of authorities to use silencing strategies.

In response, some people agreed—albeit reluctantly—to leave the land without much resistance. This occurred in cases backed by powerful political forces (both military local influential figures) or, in more recent cases, when the targeted population was small and without political connections. For example, a young mother explained how she had agreed to move out of a PA because she had no hope that foresters would eventually allow road improvements to her small, isolated hamlet. She reasoned that her move would allow her children a better life, at least in terms of better access to schooling. Others expressed despair and resignation when seeing how their elected officials (residing in the lowlands) actively supported projects that involved the loss of their fields and sometimes their habitation (cases 6 and 8 in Table 1). However, confiscating land was not always an easy task; when faced with serious resistance, forest and military authorities used both aggressive strategies (i.e., threats, intimidation, arrests, destruction of property, the killing of cattle, and death threats) as well as a more accommodating attitude (i.e., informal arrangements, compensation, and reductions in the area confiscated). They also associated their projects with royal wishes and royal symbolism. In the Thai context, this strategy is extremely powerful in silencing dissent or increasing acquiescence given the immense respect the King enjoys, and the laws and taboos protecting the royal family and their representatives. Even in these cases, efforts to evict villagers or to reforest land sometimes

³¹ For example, a forest employee mentioned that only half of the reportedly planted area in one project was actually planted. A senior local official acknowledged misallocating project funds. Another mentioned that he wished to be rapidly transferred to a central location, and to do so he had to maximize the area that was confiscated and subject to direct conservation control. No direct evidence was found that state projects served to pay for promotions or transfer, a practice nonetheless well known in Thailand.

failed; some plantations were sabotaged, some villagers refused to move, or contacted NGOs and petitioned local authorities, politicians, the King, and the National Human Rights Commission. In the context of greater—albeit imperfect—democratization between 1992 and the coup of 2006 (and under the 1997 constitution in particular), this political opposition proved effective in slowing large-scale conservation and reforestation efforts. For example, Leblond (2011) discusses how the election of local representatives opposed to the loss of an area in KKN slowed down the establishment of Khao Kho National Park.

Clearly, land confiscation and ensuing forest protection and reforestation efforts contributed to forest regrowth. It is, however, difficult to estimate the magnitude of these phenomena. Five state projects reportedly involved the establishment of 18,651 ha of tree plantations in the three districts. This represents 57.6% of the reported reforested area between 1995 and 2004. While impressive, this figure should be treated with caution. Planted area statistics are partly inflated, either because plantations were destroyed through sabotage or natural processes, or because some plots that were officially reforested were not subject to afforestation efforts. More importantly, land abandonment and underlying processes facilitated land confiscation in various ways. First, secondary forests growing on abandoned field attracted the attention of foresters and changed their attitude towards the land. In fact, the emergence of secondary forests in KKN and KKS facilitated the creation of Khao Kho National Park by helping to establish the ecological value of the area (a prerequisite for PA establishment). Second, project (and plantation) areas were comprised of fields already in the process of abandonment, particularly during the 1990s and early 2000s. In these instances, state interventions did not create new forests—a particularly difficult task to do—but rather rendered permanent what could have been temporary cessations of cultivation. Third, the declining profitability of rain-fed maize farming and the ensuing land abandonment altered power relations between remaining upland farmers and officials (and allies) wishing to reforest the land. For example, land abandonment in the 1980s and 1990s led to an important reduction in the population in a small hamlet in KKN. Reduced numbers of upland members likely made the area an easier target for a subsequent reforestation project (case 8 in Table 1). In another case in KKN (case 6 in Table 1), influential members of a lowland community lost interest in their upland fields due to the deterioration of upland maize farming and enhanced returns from paddy fields, thus they focused their energy on rice cultivation and other lowland occupations. At the same time, they started to see upland maize farming as a source of siltation in their lowland irrigation canals. This led to severe intra-community conflicts as members of one group collaborated with forest authorities to restrict the use of machinery (1990s) and to support state projects (case 8 in Table 1) that led to the eviction of other, generally poorer groups from their upland fields, for whom upland cultivation remained economically important.

6. Discussion and conclusion

Following decades of deforestation, northern Phetchabun exhibited net forest regrowth in the 1990s and early 2000s in upland areas devoted predominantly to rain-fed maize cultivation. Process tracing allowed the identification of three main types of forest expansion based on the logic of action of direct actors. Forest expansion mainly occurred following distress-driven land abandonment and land confiscation, while private afforestation (excluding rubber plantations) proved of more limited importance. Fieldwork suggested that outside areas subject to significant conservation pressure, part of the recent reforestation was lost to agricultural re-expansion (i.e., reclaiming of formerly abandoned fields) by local and non-local maize and rubber cultivators. The following discussion summarizes the main results of the research with respect to existing forest transition literature.

6.1. “Pull” and “push” factors in forest transitions

Several empirical studies have highlighted the importance of “push factors” in forest expansion. These have noted, for example, the role of land confiscation, disrupting forest policies, and deteriorating agricultural profitability in explaining agricultural retreat and forest regrowth (Calvo-Alvarado et al., 2009; Clement and Amezaga, 2008, 2009; Daniels, 2010; Dionne, 1994; Garcia-Barrios et al., 2009; Mather, 2001; Mather et al., 1999). Even the apparently largely voluntary “Grain for Green” program in China can involve a certain level of coercion (He, 2014). The case of northern Phetchabun provides further evidence of the importance of both pull and push factors and, as such, helps produce a more nuanced understanding of the social causes and consequences of forest transitions.

From the perspective of northern Phetchabun upland land users, reduced clearing and increased forest cover has largely resulted from increased constraints and “negative” (push) dynamics. Reduced clearing mainly resulted from increased difficulty of finding and accessing new land, itself linked to increased conservation efforts and the dissolution of a deforestation coalition. Increased forest cover mainly followed distress-driven land abandonment, to avoid further economic losses and land confiscation by state authorities. Land confiscations were often implemented through the use of force, violence, and intimidation and without adequate compensation or support for evictees. As a result, land abandonment and land confiscation were often experienced negatively as they were associated with the loss of important economic assets and the need to search for alternative livelihoods. While private afforestation was documented, this was a minor phenomenon. Its emergence was apparently facilitated by the deterioration of maize farming profitability, which led to informal distress-driven land transactions to individuals who had established tree plantations. Limited access to some local or non-local buyers prevented a complete analysis of their motivations. It nevertheless seems that tree plantations were established for a variety of economic and non-economic reasons. Economic reasons included increasing their *de facto* tenure security and reaping benefits from land speculation and logging.

As expected in the economic development path, increased economic opportunities outside upland agriculture affected land users, but it did so in ways more complex than commonly assumed. In the first decades of forest expansion, wealthier actors appeared most responsive to pull factors in ways predicted by forest transition causal claims. Combined with upland cultivation profitability problems, increased income opportunities outside upland agriculture led some richer farmers (with access to paddy fields) to shift their livelihoods to more lucrative endeavors in lowland agriculture and businesses. The same dynamics could explain why indirect actors involved in the deforestation coalition became less inclined to lead, finance, or protect illegal agricultural expansion activities.

Non-wealthy upland farmers did not abandon farming or farmland simply due to increased economic opportunities outside upland agriculture. Economic change and increased opportunities nevertheless had an impact on land use decisions, although mostly through indirect processes. First, the dissolution of the deforestation coalition partly resulted from the changing political economic conditions (Leblond, 2011). Its dissolution meant the disappearance of dynamics that previously helped agricultural expansion in legal forests and protected farmers against forest law enforcement. Second, as seen elsewhere in Thailand, the demographic transition—as well as the combined effect of increased economic opportunities outside agriculture and the growing negative perception of agricultural work—have affected education and livelihood choices by younger individuals. This has reduced the availability of family labor for many of the interviewees. These factors have likely contributed to the considerable decline in the number of young adults in Phetchabun Province as well as in Lom Sak and Lom Kao districts since the 1990s (although not in Khao Kho district; see Supplemental Information Table 3.1 and Table 3.2). Similarly, the total and

young adult population active in agriculture has declined at the provincial level since 1990 (Supplementary Information Table 4)³². Over time, these trends could make it harder to find younger individuals to whom to transfer or sale less productive farmland. This could lead to a form of land abandonment (and potentially forest expansion), well known in developed countries, associated with a low-demand for farmland. Third, more economic opportunities helped reduce the immediate negative livelihood impacts of—and potentially the level of resistance to—land confiscation or land abandonment. This causal relationship is somewhat similar to Matherös (2001) hypothesis that links state compensation during enclosure to the absence of resistance to resource dispossession in Denmark. Fourth, as discussed in Section 6.2, increased economic opportunities sometimes helped farmers resist or delay farm abandonment.

6.2. Adaptation and political resistance to forest transition drivers

Forest transition theory needs to avoid teleological and quasi-universal causal claims. As such, conditions of validity of causal generalizations must be specified. I argue that doing so requires researchers to direct their attention not only to cases and drivers of forest transitions, but also towards how, in what contexts, and with what effects actors (attempt to) counter or adapt to drivers of forest transitions. Indeed, processes leading to land abandonment or land confiscation are not necessarily passively accepted by land users; diverse forms of household-level or collective adaptation strategies and political resistance can be found in northern Phetchabun and elsewhere.

In response to widespread price-cost squeeze problems emerging in the 1980s, northern Phetchabun farmers experimented with agricultural and non-agricultural household-level adaptation strategies. In the former case, alternative crops or cultivation practices were tried and attempts were made to increase access to water. These efforts were only partly successful in preventing land abandonment in Phetchabun's rain-fed uplands. Through complex causal relationships, land abandonment fostered further abandonment through increased cost of production, and facilitated land confiscation and the creation of PAs. Also, increased conservation pressure heightened profitability problems for farmers in legal forests and limited their adaptive capacity. As such, and in a similar way to reports elsewhere (Clement and Amezaga, 2008; Dionne, 1994; Douglass, 1971; Drudy, 1978; Robson, 2010), causes of forest expansion changed through time and involved circular, cumulative causation dynamics. However, adaptation efforts have proved successful in both lowland and highland areas, as in many other regions of the country (Poapongsakorn et al., 2006; Rerkasem, 2015). The successes of adaptation strategies outside of the uplands zones of the study region and in similar areas could partly explain why, despite dire predictions, Thai agriculture has shown such great resilience (Poapongsakorn et al., 2006; Rerkasem, 2015).

Another household-level dynamic, pluriactivity, has played a crucial role in the survival and development of family farms during the agrarian transition, not only in Thailand but also in several other developed and developing countries (Brookfield, 2008; Rigg et al., 2016, 2018). In Phetchabun and Thailand, the capacity of Thai farmers to maintain their pluriactive livelihoods and increase off-farm revenues played a crucial role in improving rural economic conditions, delaying land abandonment and maintaining agricultural production despite emerging constraints and sometimes negative profitability (Barnaud, 2004; Barnaud et al., 2007; Coxhead and Southgate, 2000). Indeed, it seems some farmers used off-farm income to “subsidize” barely

profitable or non-profitable rice farming (Barnaud et al., 2007; Vandergeest, 2009, pers. comm.). The importance of pluriactivity and the nature of its impact were presumably facilitated by several factors including: high population density and connectivity between rural and urban areas; an informal labor market in rural and urban areas able to accommodate short-term employment, for example in construction; and the persistence of a cultural attachment to farming (in particular rice farming), village life, and supporting parents through remittance despite the negative perceptions of farming (Hirsch, 2011; Rigg et al., 2014; Vandergeest et al., 2011). A further illustration of the capacity of pluriactivity to counter land abandonment drivers comes from a counter-example in which reduced capacity to pursue pluriactive livelihoods contributed to land abandonment. In the province of Quebec, Canada, farming households outside core agricultural areas were generally dependent upon seasonal employment in industry, particularly logging. Following the Second World War, logging companies pushed for the mechanization and professionalization of their industry in order to reduce labor costs and to conduct forest operations over longer periods, including during the agricultural season. Increasingly, part-time farmers had to choose between traditional, “unmodern” agricultural livelihoods and more secure employment in industry (Fortin and Gosselin, 1960; Jean, 1985; Dionne, 1994). As such, FT theorization efforts must refer not only to increased off-farm opportunities but also to the capacity and willingness of farming households to combine on-farm and off-farm income through pluriactive livelihoods. Further attention to the mode of integration of off-farm opportunities in farming livelihoods, as well as the cultural context in which this takes place (e.g., attachment to land), should help to understand the conditions under which these opportunities and their revenues encourage agricultural exits and forest transitions, and when this might have the opposite effect (see Aguilar-Støen et al., 2011; Angelsen and Rudel, 2013; Gray and Bilsborrow, 2014).

Drivers of forest transition, in particular those leading to land confiscation and land abandonment, can be offset by collective political resistance. In this case study, and in other instances within and outside of Thailand, local- and national-level political resistance has, at times, limited land confiscation and reforestation activities (Brockington and Igoe, 2006; Jean, 1985; Mather et al., 1999). The partial democratization of Thai politics, and the emergence of NGOs and civil society movements fighting for tenure security in legal forests, acted to limit land confiscation and village evictions in the 1990s and the early 2000s (Kurashima and Jamroenprucksas, 2005; Leblond, 2010; Walker and Farrelly, 2008).³³

Similarly, the effects of drivers of land abandonment can be, at times, limited by electoral politics and collective political action, through their influence upon agricultural policies for example. While this phenomenon was not directly documented during fieldwork in Phetchabun, it is likely to be relevant to understand recent or future land abandonment and forest trends in Thailand. Indeed, various farmers' organizations and NGOs denounced problems of indebtedness and declining farm profitability during the short 1973–1976 democratic period and since the 1980s (Baker, 2000; Phatharathananunth, 2006; Walker, 2012). Over time, political actors have responded to these pressures and electoral opportunities. As a result, Thai agricultural policies have progressively shifted away from farm taxation to increased protection and support to farmers, in particular rice farmers (Hayami, 2007; Walker, 2012; Walker, 2014). Farm support measures have become an important component of Thai politics as illustrated by the current political crisis. One political group associated with Thaksin

³² District-level data on the economically active population were not available. Also, provincial-level trends do not necessarily represent what has happened in northern Phetchabun. Agricultural conditions and changes in northern Phetchabun tend to differ from those found in central and southern Phetchabun (Leblond, 2011).

³³ However, the current military government in charge since the 2014 coup attempts to reshape rural land uses and livelihoods while limiting freedom of speech and political dissent (Areerat, 2014; The Nation, 2014a). This pleases strict preservationist forest officers who can more easily arrest and evict farmers and investors (Areerat, 2014).

Shinawatra was in power in 2001–2006, 2008, and 2011–2014. It introduced costly direct financial support to farmers, such as the 2001–2003 debt moratorium and crop-pledging schemes, providing above-market crop prices for rice and progressively for less important crops. In the case of maize, above-market maize prices were only been introduced in late 2008 (Chienthong, 2014), after the completion of the fieldwork. Anti-Thaksin actors have vehemently denounced these measures as financially unsustainable and corrupt schemes that disrupt market mechanisms and thus allow the perpetuation of unproductive farming practices (Anonymous, 2009; The Nation, 2011). Testament to the political importance of farmers' income problems, anti-Thaksin actors have nevertheless largely continued to provide direct financial support to farmers when they took control of the government (2006–2007, 2009–2011, and since 2014). In fact, while the current military government of General Prayuth harshly criticizes populist policies and enforces severe limitations on free speech and political gatherings, it still offers direct financial support, at least to important constituents such as rice farmers (“BAAC budgets Bt10 bn to pay down farmers’ informal debts, 2014; The Nation, 2014b, 2014c, 2014d; Online reporters, 2014; Payment of rice farming subsidy begins October 20, 2014; Saengpassa, 2014; Siripunyawit, 2014; Soongrueang, 2014). Relatively little is known about the precise impacts of these policies on farmers, however (but see Poapongsakorn and Pantakua, 2014; Rerkasem, 2015), and especially on land abandonment and forest cover trends. Arguably, and as deplored by some neoliberal critics, these policies allow less productive farmers to remain active (Let prawn farmers sink or swim, 2003; Siripunyawit, 2014). Given the political salience of farmers' income problems, the deep cultural attachment to agriculture (in particular rice cultivation), and the intimate links between family agriculture and the legitimacy of Thai rulers and the royal family, the Thai government is likely to continue to support large and influential farming constituents such as rice farmers and, by extension, limit distress-driven land abandonment—at least outside of protected forests.

The shift from net taxation to net support of farmers in Thailand is not exceptional. In middle-to-high-income countries where the cultural, economic, and political importance of agriculture and cultivated landscapes is high, the deterioration of rural livelihoods and the existence or threat of large-scale land abandonment have often led to the creation of agricultural policies supporting farm income (Anderson, 2010; Hayami, 2007; Rudel, 2001). Although often observed, this shift is far from universal or exempt of significant variations resulting from idiosyncratic historical, sociological, and political factors (Swinnen, 2009). Agricultural policy shifts encouraging land abandonment and forest transitions have thus been noted in Latin American countries subject to structural adjustments (Calvo-Alvarado et al., 2009; Daniels, 2010; Hecht et al., 2006; Kull et al., 2007; Roy Chowdhury, 2010). In another instance, during the 1950s and 1960s in Quebec, Canada, market-oriented farmers and modernization-inspired policy makers pushed for and obtained food and agricultural policies that favored the protection and development of market-oriented (“modern”) farms in core agricultural areas. These policies also encouraged the disappearance or modernization of subsistence-oriented and small-scale agricultural production in marginal and more recently settled areas (Morisset, 1987). In this particular case and period, social activism contributed to changes in agricultural policies that encouraged land and farm abandonment where bureaucrats believed the emergence of modern commercial agriculture was impossible, but limited this in other areas with better agroecological potential (Jean, 1985; Morisset, 1987).

6.3. Lessons for forest transition theory

Researchers and policy makers are looking to forest transitions for inspiration in the design of forest and climate-change policies. However, sound policies must rest upon a firm empirical understanding of historical and on-going cases of forest transitions as well as robust

causal generalizations. Furthermore, the validity of such generalizations need to be clearly established and their social consequences well understood. Despite some exceptions (see the previous discussion of Mather's work in Section 1), forest transitions remain associated with optimistic causal discourses in which forest transitions mainly result from development and market dynamics pulling people away from farming as well as from progressive, violence-free, forest policy inciting actors to limit agricultural expansion and concentrate farming in the most productive areas. However, this is not the whole story. In this paper, I have proposed that the search for sound empirical explanations of forest transitions (and their absence) demands for greater attention to be directed at “negative” dynamics that push or force farmers off the land. I also argued that empirical and theoretical forest transition research must include factors and dynamics limiting or offsetting drivers of forest transitions. In all cases, in order to design policies compatible with social justice and sustainable development, researchers should aim at elucidating the circumstances under which causal processes operate, and the immediate and long-term social consequences this can have. Failure to do so might lead to an erroneously optimistic view of the social causes and consequences of forest transitions, policy prescriptions maladapted to the local context and social justice imperatives, and incapacity to understand circumstances under which forest expansion can be expected.

This paper highlights how push dynamics—rather than pull factors—were the main *immediate* factors explaining the initial retreat of agriculture and forest expansion in northern Phetchabun. I further argue that, in some contexts including northern Phetchabun, these push dynamics appear necessary for significant, long-term forest expansion to occur. These claims might surprise those who point out the possibility that methodological limitations could have led to an underestimation of the role of pull factors. Indeed, the research material reported in this paper mostly derived from interviews with farmers who remained full-time or part-time residents in the region, or who at least visited their relatives and friends during the fieldwork period. In contrast, it was difficult to identify and contact two groups of actors: (1) former land users who never resided in the region, interacted little with the local population, and only stayed for short periods of time; and (2) farmers who stopped farming in the region and permanently migrated away. However, I contend, for the following reasons, that while these limitations do exist, they are unlikely to significantly impair conclusions regarding the central importance of push factors in the *emergence* of forest expansion in northern Phetchabun.

First, there are no reasonable grounds to suspect that the actors “missing” from the sample outnumbered those that were successfully interviewed. The first group of missing actors (former land owners that never resided in the region) were largely absent from LKE and were only found in some parts of the other study areas. The second group (farmers that permanently migrated away) were only important in one hamlet in KKS, which itself had an unrepresentative history.³⁴ Furthermore, it appears that the total population and number of farm holdings did not decline prior to, or during, the first years of farmland abandonment and forest expansion. According to available census data, and keeping in mind data reliability concerns,³⁵ the reduction of farmland area in the study region (at the district level) started between 1993 and 2003, while the total population and number of farms continued to increase during the 1990s (see Supplementary Information

³⁴ This was one of the (re)settlement hamlets created as part of Case 4 in Table 1 and was abandoned by part of the population soon after its creation due to failures in key promised infrastructure. Land and housing was apparently allocated in-part to well-connected individuals who had little interest in living and cultivating the land there.

³⁵ I used NSO census data, which are broadly in accordance with Office of Agricultural Economics data. Both sources are subject to problems, including a history (and suspicion of continued use) of “armchair surveys” and a reliance on informed guesses by local officials.

Table 1; note that central and southern Phetchabun districts exhibited a different evolution). The picture since 2000 is harder to determine due to poor data availability. Nevertheless, it appears that between 2000 and 2010 the population continued to increase in Lom Kao (4.4%), Khao Kho (19%), and Nam Nao (5.2%), while a modest decline occurred in Lom Sak (−0.73%) and a greater decline occurred in southern and central districts (see Supplementary Information Table 2.1 and Table 2.2).

Second, it is unlikely that push dynamics, which had such an important impact for the interviewees, did not affect “missing” actors. As one reviewer suggested, push dynamics could play an important role in the decision to stop farming and migrate, while pull factors could play a more important role in explaining the destination of migration (urban or rural)³⁶ and the type of occupation chosen. Further, Rigg et al. (2016, 2018) have discussed what some consider the “natural” or expected effects of economic development and industrialization on rural exodus, land abandonment, land concentration, and the reduction in the number of farms. They have shown that this expected relationship is not realized in Thailand and many other countries. In other words, what might seem surprising in other contexts (e.g., Latin America) is not so surprising in a Southeast and East Asian context.

Third, and most importantly, even if “missing” actors represented a large share of former land users, and even if they had all abandoned farming solely due to pull dynamics, this would not affect conclusions regarding the importance—and necessity—of push factors. This is due to the combination of two key contextual factors in northern Phetchabun; first, a significant number of land-poor or land-hungry farmers attached to a farming livelihood are notably present, not exclusively, in highland ethnic minority communities; second, legal and cultural obstacles to maintaining formal and informal tenure security over abandoned land and natural forests are significant. In cases such as northern Phetchabun, where these two contextual factors apply, significant retreat of agriculture followed by forestation can only occur if important push factors are present. In northern Phetchabun, push factors took the form of deteriorating upland farming profitability, limited scope to find profitable alternative land use practices, and increased conservation pressure. In the absence of these push factors, it is likely that other actors would still have perceived upland farming as a feasible and profitable agricultural activity and would have subsequently bought, rented, or otherwise gained access to abandoned land (e.g., through traditional *jap jong* land appropriation practices). This conclusion is supported by the behavior of Hmong and other highland ethnic minorities, who have been found to rent or otherwise gain access to fallowed land at lower elevation in the region as well as in distal upland and highland areas (e.g. [Security force sent to probe forest clash, 2015](#)). Outside PAs the recent increase in maize prices and the emergence of a rubber industry boom has led to agricultural re-expansion (i.e., reclamation of previously abandoned land) by local and non-local actors. This has led to a partial loss of secondary forests in western LKE area. Similarly, it was found that private tree plantations (excluding rubber) played a minor role in upland forest expansion. This is at least in part due to the illegal nature of most land occupations in the uplands zone, and the administrative and legal obstacles to exploiting tree plantations in such conditions (see [Appanah et al., 2012](#)). Clearly, in the case of northern Phetchabun, *de jure* and *de facto* tenure policy over fields, tree plantations, and natural forests affect the prospect for forest transitions in complex ways.

Further work is needed to explain why forest expansion occurred in the northern Phetchabun uplands but was less prevalent in lowland and

highland zones. I suggest that such difference is at least partly explained by contextual factors, which increased the influence of push factors and reduced the capacity or willingness of actors to adapt and resist to them. Some of these contextual factors are well-known in the forest transition literature (e.g., lower agroecological potential, greater difficulty in mechanizing farm operations, greater distance from main roads or village areas, high rates of soil erosion, perceptions of highly negative impacts of upland farming on lowland villages and farming areas, and higher conservation pressure). Other contextual factors likely to reduce the willingness or capacity of farmers to adapt and resist are, however, less well researched. These include factors that lead to a relatively low attachment to the land, such as a short history of cultivation, and the perception of upland fields as a source of supplemental income and not as a central component of farming livelihoods. Moreover, resistance to push factors could have been diminished by both the specific pattern of colonization, in which upland farmers came from various villages and districts and often failed to create social cohesion, as well as the emergence of a schism in some uplands areas between poorer households dependent upon upland farming and powerful farmers seeing upland farming as a threat to their lowland agricultural activities. Also, a history of specialization in one crop likely limited the knowledge of alternative land uses. Lastly, the fact that maize farming remained profitable elsewhere, and upland maize farmers had limited political importance compared to other farming groups, likely limited the pressure on governments to help maize farmers in difficulty—at least prior to the fieldwork described here.

The late Alexander Mather once said that the role of researchers was to help states foster forest transitions.³⁷ However, when forest expansion is driven by—and dependent upon—push factors such as the use of coercive and violent forest policies, the social implications of forest transitions can be incompatible with sustainable development and social justice imperatives. As noted by a reviewer and implied by [Mather \(2007\)](#), these coercive policies are likely to be more prevalent under authoritarian regimes and/or in geopolitically sensitive contexts. Instruments such as payments for environmental services, allowing private ownership of natural forests, and reducing obstacles to exploiting tree plantations could help foster forest transitions that are not dependent on farm foreclosure or land confiscation. However, these policies presuppose high formal and informal tenure security of peripheral agricultural land. In Thailand, and in similar contexts characterized by a long history of corruption and significant numbers of actors interested in appropriating more land, improving tenure security in the periphery could facilitate land appropriation of forested land and hence lead to further deforestation. Thus, there is a great need to identify ways to facilitate (natural) forest expansion through less negative dynamics, but at the same time without encouraging agricultural expansion in remaining forest areas ([Angelsen and Rudel, 2013](#)). There is a strong current in Thailand that argues for greater devolution of management power at the local level, and greater reliance on partial collective property rights over natural forests and agricultural land in legal forests. As this approach remains controversial in Thailand, further research is needed to evaluate the conditions under which it would be politically feasible and that would lead to the desired outcomes.

Declarations of interest

None.

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³⁶ It would be wrong to assume that all migrants move to urban settings. This work suggests that a large number of farmers in northern Lom Kao district sold their land to investors and moved further into the forest in neighboring Nam Nao district, where deforestation continued at least into the 1990s and early 2000s.

³⁷ Opening address at a panel on forest transitions, 6th Open Meeting of the Human Dimensions of Global Environmental Change Research Community, October 8–13, 2005, Bonn, Germany.

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Appendix A. Supplementary data

Supplementary material related to this article can be found, in the online version, at doi:<https://doi.org/10.1016/j.landusepol.2019.01.035>.

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