



Forest Dynamics in the Peruvian Amazon: Understanding Processes of Change

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Abstract

The Peruvian government seeks to stop deforestation in its primary forest in the Amazon. It alleges that the main culprit of deforestation is smallholders who practice swidden farming. However, this is a simplified view, concealing the main reasons for deforestation and the complexity of land use changes. By studying land and forest use through the lens of the indigenous Kechwa-Lamas people, who live along forest covered mountain slopes in the region San Martín, we attempt to show the complex and intertwined reasons for deforestation, as well as how the indigenous people try to cope with this development. We identify and discuss three “ideal” types of land use—the swidden and tree based systems of the Kechwa-Lamas people, agricultural intensification practices (particularly perennial cash crops), and state conservation approaches. In practice these uses overlap spatially and have synergistic and antagonistic aspects. Kechwa-Lamas may clear land for tree cash crops, but they also manage forests and seek to conserve them for particular needs. Migrants from the Andes clear forests to plant perennial crops, penetrating the ancestral territories of the Kechwa-Lamas, while large scale capital intensive agriculture often intrudes into primary forest and jeopardizes existing subsistence systems. The opening up of forest areas in San Martín and its gradual integration into the nation’s market economy, together with the local government’s division of the region into zones intended for different purposes, have had both intended and unintended consequences. There is a need to develop a more nuanced understanding of the forms and complexity of forests and their transitions, particularly where secondary and managed forests replace previous rainforest areas. The findings draw on field observations and interviews with households, key NGO informants and a detailed case study of 13 Kechwa-Lamas villages.

Keywords Forest transition · Swidden farming · Agrarian change · Forest conservation · Land rights · San Martín · Secondary forest

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Introduction

Peru has the fourth largest area of primary tropical forest in the world (FAO 2010). During the 15th Conference of Parties (COP 15) of the UNFCCC (United Nations Framework Convention on Climate Change) in Copenhagen in 2009, the Peruvian government committed itself to stop deforestation of primary forest in its Amazon regions by 2021. Deforestation of the Peruvian Amazon started in the 1940s, but a major expansion of the agricultural frontier occurred in the 1980s with subsidised colonization projects, market support and road development (Alvarez and Naughton-Treves 2003; Chávez et al. 2014; Coomes 1996; Limachi et al. 2006), attracting large numbers of settlers. Further in-migration has continued, driven by people fleeing violence in the Andes, promotion of tree crops, land titling and a continuation of large road projects (Bennett et al. 2018; Chávez et al. 2014).

With such deliberate efforts to develop and make the Amazon accessible for settlement it is not surprising that smallholders have been a major cause of deforestation (Suárez de Freitas Calmet 2016). By 2000 it was estimated that seven million ha of Peru's Amazon forest had been lost (MINAM 2009), amounting to an annual deforestation rate of about 123,000 ha (Hansen et al. 2013). However, understanding of the more recent drivers behind deforestation in the Peruvian Amazon remains limited (Robiglio et al. 2014). The national government argues that swidden farming is responsible for around 80% of the deforestation (MINAG 2002).

However, the claim is not well supported by data (Ravikumar et al. 2016) and the term swidden farming is muddled, lumping together two distinct processes of land and forest use (Ravikumar et al. 2016). The first process is fallow driven swidden systems, practiced by indigenous groups and other long term Amazonian populations, that does not generally lead to permanent conversion of forest to agricultural land (Padoch and Pinedo-Vasquez 2010; Ravikumar et al. 2016). The second is a more complete forest clearance for intensified agricultural use (monocultures, pasture, plantations), largely practiced by recent migrants (Bennett et al. 2018).

Moreover, the official view of swidden farmers as the main cause of deforestation overlooks the role of government agricultural policies and programmes in driving land use changes. A number of studies point to the effects of agrarian policies on forests in the Peruvian Amazon (Alvarez and Naughton-Treves 2003; Bennett et al. 2018; Chávez et al. 2014; Coomes et al. 2017; Gutiérrez-Vélez et al. 2011). As well as promoting intensified cash cropping to replace swidden agriculture, the Peruvian government has invested heavily in forest conservation programs. But the wider evidence points to the role of non-forest policies and processes in being central to driving shifts in deforestation rates (Hecht 2014), suggesting that efforts to strengthen the forest boundaries will not have the expected impacts on forest conservation.

In contrast to Southeast Asia and the Brazilian Amazon, where long term changes in swidden land uses and forests areas have been driven by agrarian

transition, market penetration and regulation of land and forest use for several decades (Dressler et al. 2017; Piketty et al. 2015), such changes in the Peruvian Amazon are more recent, incomplete and less understood. Moreover, the lessons from Southeast Asia related to the negative effects of such changes on livelihood security and ecosystem services (Dressler et al. 2017), raise major concerns for the outcomes of processes of change that can be discerned in the Peruvian Amazon. The drivers of land use changes may differ between Southeast Asia (Dressler et al. 2017) and the Peruvian Amazon case, most notably in terms of the role of population increase and the emerging role of forest conservation in Peru.

This research adds to debates on land-use transition and policy practices, particularly those related to forest transition (Angelsen and Rudel 2013; Lambin and Meyfroidt 2010; Mather 1990; Perz and Skole 2003; Rudel et al. 2005), and those analysing the messy empirical reality of development as an immanent process of social change (Cowen and Shenton 1998; Hecht 2014; Mertz et al. 2017). In the latter debate, land use change outcomes reflect other complex dynamics that have their own logic, drivers, momentum and effects. Included within these immanent processes are demographic change, structural and political shifts and economic change, driven by the logic of markets and capitalism. While goal oriented interventions striving for change, such as forest conservation, are usually shaped by such processes, these intentional interventions also have wider and often unintended effects on other processes (Alvarez and Naughton-Treves 2003; Bennett et al. 2018; Chávez et al. 2014; Dressler et al. 2017; Hecht 2014; van Vliet et al. 2012). Equally immanent processes such as increasing population density (Boserup 1965), can be a driver for intensification.

This paper offers an exploration of the idea of diverse land-use transitions through investigating three ‘ideal’ types of land use observed in the Peruvian region of San Martín and their differing implications for forest change. The notion of ‘ideal’ follows Burger (1976) in being a construction and reflection of an approximate reality through the selection and emphasis of specific features of forest change. Here three contrasting ‘ideal’ land use types—the swidden and tree based systems (Coomes et al. 2017; de Jong 2001; Padoch and Pinedo-Vasquez 2010; Pokorny 2013) of the indigenous Kechwa-Lamas people, agricultural intensification practices (annual and perennial cash crops) and state conservation approaches—in reality overlap spatially and interact with both synergistic and antagonistic effects. This inquiry, built on a detailed examination of the pressures being brought to bear on indigenous swidden systems, brings into question the very idea of what a forest is (Kohn 2013; Thompson and Warburton 1985), the inherent contradictions between development and conservation, the unintended consequences of policy intentions and their perverse effects in a context where land rights are not secure. As will become clear, there is an ongoing struggle over land rights and control unfolding at the forest frontier (Peluso and Lund 2011), raising fundamental questions for the Kechwa-Lamas about property, citizenship and rights (c.f. Lund 2016). New interplays between environmental and social processes are emerging in the San Martín landscape, as well as in the larger Peruvian Amazon, that needs to be addressed in policy and research.

Map of the north-eastern part of San Martín with the Kechwa-Lamas study villages marked

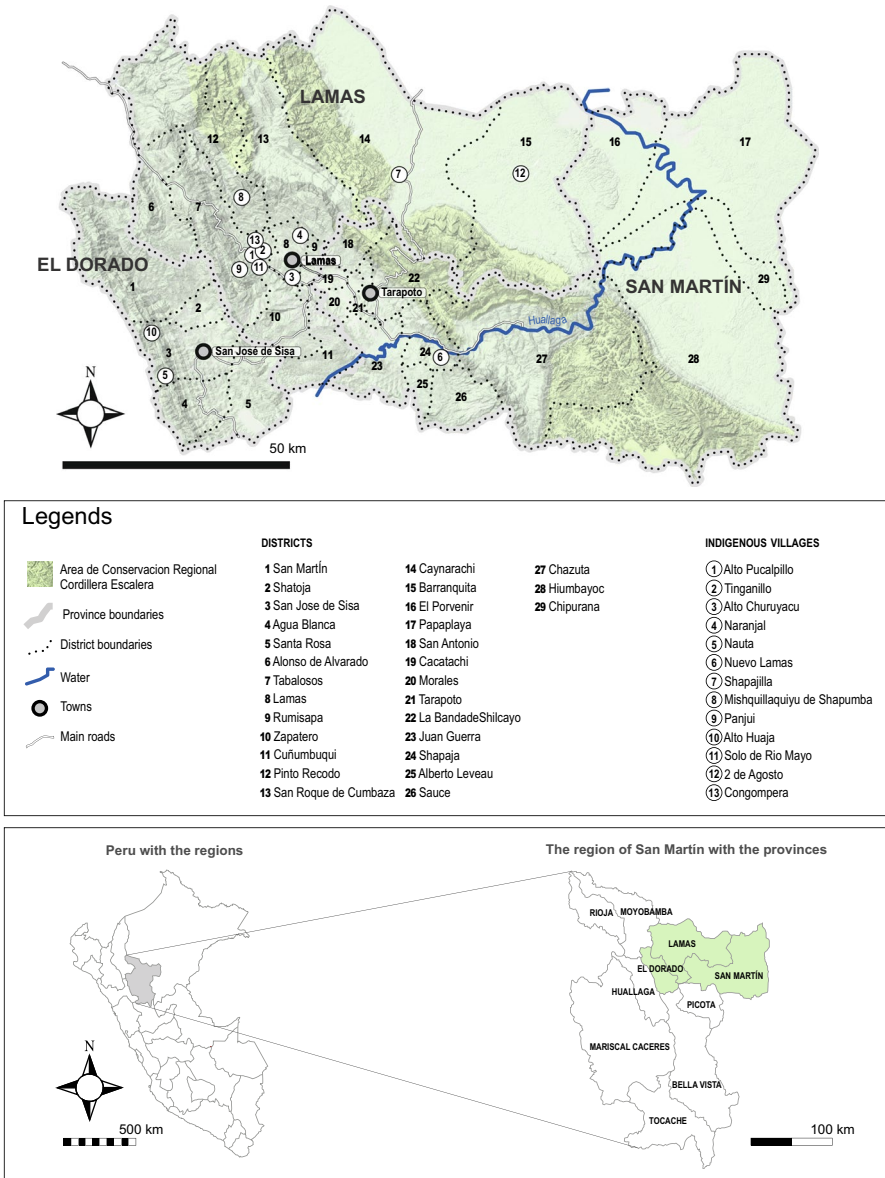


Fig. 1 Map of the north-eastern San Martín, showing the Kechwa-Lamas study villages

The Context

San Martín is located in Peru at the foothills of the Andes (Fig. 1). It was relatively inaccessible until the construction of a highway in the 1960s (Limachi et al. 2006).

By the 1980s, coca was a significant cash crop leading to large scale in-migration and landscape changes through forest clearance (INEI 1997). In the 1990s, the increasing coca production and the activities of the *Movimiento Revolucionario Túpac Amaru* (MRTA) guerrilla group, led to a strong military presence in San Martín, which continued for more than a decade. The level of violence in rural areas limited land clearance for a period, but as the situation stabilised deforestation again increased. By 2000, an estimated 1,644,577 ha, some 30% of the San Martín province, had been deforested (INEI 2016). A further 278,115 ha were lost by 2011 (MINAM and MINAGRI 2016). A large part of San Martín forests, including the forest fallows of swidden systems, are now secondary forest.

As part of the national processes of decentralizing the Peruvian state in 2002, the San Martín government assumed responsibility for agricultural development strategies, managing the road network and forest policy. The *Nueva Amazonia* party, the regional government from 2007 to 2015, had a vision of forest conservation and agricultural intensification. Smallholder coffee and cocoa production increased as the road network was expanded, as well as production of staple crops such as maize, rice, plantain, cassava, beans, vegetables and fruits. Many farmers, who cultivated flatter areas, also leased land to temporary papaya croppers. An agro-industrial frontier pushed further into the landscape, generating tensions between the forest based swidden practices of the Kechwa-Lamas people, expansionist tree crop commercial agriculture and annual crop intensification. Forest conservation policies have been part of the strategy to regulate these dynamics, e.g. by means of areas of protected forest.

In addition to the Kechwa-Lamas, there are two other groups of smallholders in San Martín, the Mestizo and Andean migrant farmers. The Mestizo farmers are local non-indigenous people of mixed ancestry, who arrived in the nineteenth century, adopting many of the Kechwa-Lamas land management practises (sometimes referred to as riverine people in Peruvian literature). The presence of Andean migrant farmers are more recent and their move to the area has intensified competition for agricultural land. Their numbers have grown from about 9% of the region's population in 1972 to around 50% of the estimated 750,000 people in San Martín (Paz y Esperanza 2015). Driven out of the Andes by lack of land and economic opportunities, the migrant farmers have been attracted by the opportunities of the Amazon region. There is also a steady flow of farmers from San Martín, migrating in search for new land to forest areas, such as the neighbouring Ucayali region (Ichikawa et al. 2014). The cumulative clearance of forests for perennial crop cultivation has been linked by several observers to the increasing migrant population (Bennett et al. 2018; Kowler et al. 2016; Ravikumar et al. 2016; Rengifo Vásquez 2007).

Methods

This paper emerged from a series of interviews with Kechwa-Lamas households between 2012 and 2013 on forestry and agricultural land uses in relation to ecosystem service management. It became clear from discussions with key informants and field observations that external pressures from commercial agriculture

and conservation initiatives were shaping their future land use options. This led to a wider inquiry building on 20 years of research in San Martín on the dynamics of smallholder land use change (Marquardt Arévalo 2008, Marquardt et al. 2013a, b). Interviews and direct fields observation were supplemented with relevant secondary sources. The research has been done in close collaboration with the Waman Wasi nongovernmental organisation, which has worked in Kechwa-Lamas villages for more than a decade. Colleagues of Waman Wasi, many of whom are Kechwa-Lamas people, have played a central role in the interviews, acted as key informants and engaged in the analysis of the findings.

For the interviews, Kechwa-Lamas villages were purposively selected to cover a spectrum of forestry and agrarian transitions. For analytical purposes the findings are discussed in relation to three different types of landscape: forest, intermediate and agriculture (Table 1). The basis for this groupings was an assessment of the dominant vegetation type (primary, mature and young secondary forest), farm sizes and agricultural land uses. Key features of the 13 study villages are presented below, summarising the contrasts between and within these three clusters of villages, with respect to forest access rights and other factors. Their location are shown in Fig. 1.

Forty-six semi-structured interviews were held with Kechwa-Lamas households in the 13 villages, some purposively selected for leadership roles, others at random. The interviews were conducted with both spouses if possible, otherwise with just one of the couple. The interviews focused on land use changes, e.g. in agricultural activities, the relation between subsistence and commercial activities, on and off farming incomes, forest and secondary vegetation use, water sources, traditional institutions related to access to labour and land, land governance and conflicts over land rights. The interviews were held in Spanish by KM and ÖB, lasted between 30 and 90 min and took place around the homestead or in the fields of the farmers. These were supplemented with field and forest walks, together with groups of farmers, as well as participatory observations during stays in the villages.

A detailed case study was carried out in one particular village: Alto Huaja. The village was selected due to a conflict concerning how the inhabitants should protect and manage the village's forest area (for more details see Egerlid 2015; Egerlid et al. 2016). The village study allowed observation and discussion on the competing land uses.

In addition we undertook semi-structured key informant interviews in the region (see Table 2). We also reviewed local and regional documents, studies and reports related to the agricultural and forestry development in San Martín, in order to situate the villagers' interviews in a larger regional context.

Findings

Ideal Type 1, Kechwa-Lamas Swidden and Tree Based Systems

The Kechwa-Lamas, the largest of San Martín's indigenous groups, have a population of about 23,000 individuals, living in approximately 180 villages on the forest covered mountain slopes. As a semi-migratory people they have used their

Table 1 Level of forest access, farm size and production, forest and fallow status in the three landscape types; forest, intermediate and agricultural

Landscape type	Farm size range	Main cash crop	Level of subsistence production	Forest and tree use	Fallow status
Forest (close access to forest)	20–40 ha	Cocoa Coffee Maize	40–90%	Swidden farming. Consumption of forest products and hunting	Primary forest and mature secondary forest. Fallow periods around 10–12 years
Intermediate (distant access to forest)	10–20 ha	Cocoa Coffee Maize Citric	40–90%	Swidden farming with some fallow management Limited hunting and forest product collection	Mature and younger secondary forest. Fallow periods around 6–8 years
Agricultural (no access to forest)	1–10 ha	Maize Cotton Sacha inchi Cocoa Jatropha	40–70%	Swidden farming with active fallow management	Young secondary forest, fallow periods around 2–4 years. Active in-sowing of the fallow in the crop field as a soil fertility strategy practiced by some farmers

Table 2 Kind of interviews and number of interviews

Actors interviewed	No. of interviews
Household interviews	46 semi-structured in-depth interviews Accompanied with field and forest walks and participatory observations
Participation in village meetings	4
Regional NGOs	6
Government authorities	4
Indigenous organisations	2
National researchers	2
Total	64

customary forest territories to provide them with construction material, medicinal plants and land for agricultural production, moving over large distances to hunt. They have long practised swidden fallow agriculture in the forests and this remains the core of their production system today.

Customarily, they selectively clear about 0.5 ha of forest vegetation, burn the vegetation and prepare the land for crop production. The mixed fields of subsistence food crops, combined with cash crops, lead to considerable agro-diversity (Marquardt Arévalo 2008). Annual crop cultivation continues for a few years, but the shift from field to fallow is gradual and some crops (e.g. some plantain and cassava varieties) remain within the fallow. The fallow will be left for up to 15 years before it is cleared again. In this form, swidden farming can be viewed as a form of agroforestry and managed forest landscape, in which trees and crops are intimately interspersed over time rather than space (Pfund et al. 2011).

The Kechwa-Lamas, lacking secure land titles, have progressively been pushed off the best farming areas in the flat lands by waves of newcomers and forced to move further uphill. The Mestizos have established more intensive crop systems, for example intensive commercial food crop production on the flat surroundings of the city of Tarapoto. The more recent Andean migrants have been active in pushing the frontiers of cultivation by clearing forests to grow perennial crops of cocoa and coffee, as well as engaging in rice cropping and cattle raising for a growing market (Asociación Rural Amazónica Andina Choba Choba 2016; Rengifo Vásquez 2007).

Variability and Dynamics of Change

As competition for land has increased in San Martín, the Kechwa-Lamas' swidden system has changed and differentiated. This variability appears to be underpinned by differences in the quantity and quality of forest land that can be used for crop production. Drawing on field observations it is possible to identify villages in three types of landscapes, each type having certain common characteristics. The first are those villages that are located close to relatively large, intact primary forest areas

(Cluster I, Table 3) and the households make significant use of the forests for living and hunting. The relatively large farm sizes, 20–40 ha, make swidden farming practices relatively viable. Farmers can select what secondary forests to open up, leaving the forest fallows to recover (10–12 years) and strategically rotate the agricultural production on their land. Good soil quality allows perennial tree crops to be a significant component of the cropping system. Farmers achieve relatively high crop productivity with relatively low labour input, as the weed burden is low.

In the landscapes where access to primary forest is more limited, there is a second group of villages (Cluster II, Table 3). As compared to cluster I villages the regeneration of forest fallows over shorter time periods (5–6 years) have created more of a mosaic landscape with patches of forest, fallows of different ages and agricultural fields. Access to secondary forest in relatively good condition also allows swidden practices and perennial tree crop cultivation, such as coffee and cocoa.

The third cluster of villages exist in a settled agricultural landscape and the swidden system has become difficult to practice. These study villages are located on the deforested slopes around Lamas, the town which is a centre for the Kechwa-Lamas people. The slopes have a long history of producing coffee, cotton and maize for sale, in combination with subsistence farming. Farm sizes are small (1–10 ha), and young and limited forest areas make the swidden practice of rotation between field and forest fallows problematic. Some households now seek to manage and improve the fallow vegetation by actively sowing suitable trees in their fields to improve the soil fertility (Marquardt et al. 2013b). High labour inputs are required because of the high weed burden and crop productivity is low. Accordingly, subsistence needs are met for only part of the year. Family members work other farms and also engage in off-farm labour. Forest products are restricted to those that can be found in young secondary forests.

The condition of these three clusters of villages could be seen as being consistent with the response of the regional government to deforestation (perennial crops in combination with conservation areas). However, such a view does not address the effects of other processes, such as settlement by migrants, the expansion of perennial crops and the development of agricultural plantations, leading to competing land claims. These are key drivers for clearance of forests, which forest conservation boundaries are unlikely to stop. Neither does such a view provide insights to what a forest recovering might look like in a swidden farming landscape, where secondary forest is part of the farming system. Is it just to abstain from deforestation or is it something more?

Interaction of Forest and Agricultural Intensification Processes

Processes of social and economic modernization and the unintended consequences of government policies continue to marginalise the Kechwa-Lamas practices (Waman Wasi 2009), formal government policies have also restricted the indigenous people's access to ancestral forest lands. Kechwa-Lamas are at present trying to protect their villages and ancestral forest territories by obtaining legal titles. The only route available to them is to obtain communal forest titles; to achieve this aim they need to become recognised as a legal indigenous community and obtain a so called

Table 3 Summary of key features of the 13 study villages

Village name	Native com. status	Forest area claimed	Overlap or bordering with conservation area	Communal forest title status	Current cash crop production
<i>Cluster I: villages with close access to forest</i>					
Nuevo Lamas	Yes	2700 ha	Yes –within ACR	Recently got a title but only 20% of what they had applied for and of this 95% is as user concession (forest owned by the state but the village has user rights)	Production focus on coffee and cocoa
Shapajilla	Yes	1600 ha	Yes –within ACR	Applied, no decision	Production focus on maize and cocoa
Alto Huaja	Yes	4800 ha	Yes –within ACR	Applied, no decision	Production focus on cocoa and maize
2 de Agosto	Yes	900 ha	Yes –within ZoCRE (Palometa Bar-ranquita)	Applied, no decision	Production focus on cocoa. Large scale oil palm surrounds the village
<i>Cluster II: villages with distant access to forest</i>					
Panjuí	Yes	No, only fallow land	–	–	Production focused on coffee
Nauta	Yes	No, only fallow land and small areas of conserved forest	–	–	Production focused on maize and cocoa
Mish de Shap	Yes	No, only fallow areas	–	–	Production focused on cocoa
Naranjal	Yes	Not determined their territory area yet	Yes –within ACR	Applied, no decision	Production focused on cocoa, coffee and citrus
<i>Cluster III: villages settled in agricultural areas</i>					
Solo	Yes	Not determined their territory area yet	Yes –within ACR	Applied and refused	Production focused on maize, cotton and sachá inchi
Alto Churuyacu (Moloshó and Valisho)	Yes	Not determined their territory area yet	Yes –within ACR	Applied and refused	Production focused on maize, cotton, sachá inchi and cocoa
Alto Pucapillo	Yes	Not determined their territory area yet	Yes –within ACR	Applied and refused	Production focused on maize, cotton and sachá inchi

Table 3 (continued)

Village name	Native com. status	Forest area claimed	Overlap or bordering with conservation area	Communal forest title status	Current cash crop production
Tinganillo	No	-	-	-	Production focused on maize, cotton and sachá inchi
Congompera	Yes	Not determined their territory area yet	Yes -within ACR	Applied and refused	Production focused on maize and sachá inchi

comunidad nativa status. Seventy-two of the Kechwa-Lamas villages in San Martín have now achieved this status. Although a law (Decree-Law 22175) implemented in the 1970s, guarantees a recognised *comunidad nativa* the right to land title and property rights for communal forest territory, full authority is only granted for agricultural land and not for forests (Baldovino 2010). Only user rights are offered for the forest areas. The law regards agriculture and forestry land use as exclusive categories, which is contrary to Kechwa-Lamas' customary practices. However, the awarding of communal forest land rights has largely been withheld from indigenous communities in San Martín. Only 16 Kechwa-Lamas villages have so far obtained titles to communal forest areas.

The number of villages seeking and gaining *comunidades nativas* status has been increasing steadily, particularly since 2006, due to increased pressure to obtain land in the region and the fears of losing forest rights. But they have not received communal forest titles as stipulated by law and only one title has been granted since 1997 (Nuevo Lamas, see Table 3). Two possible routes to secure rights over traditional forest areas remain. The ideal is to achieve a communal forest title that confers rights of use and exclusion. Considering the enormous difficulty to get a communal forest title, many Kechwa-Lamas villages have started to regard a conservation concession as a more practical alternative (Egerlid et al. 2016). Forest concession rights are easier to gain, but those rights are time bound and confer only certain rights of use.

All but one of the study villages (Tinganillo) have gained the status of *comunidad nativa*. The *comunidades nativas* were not given communal forest titles and have made a second application for these. Nuevo Lamas has recently (2016/2017) been given a title to their communal forest area, but only to about 20% of the area applied for. Three other villages with large areas of forest land (Cluster I in Table 3) have applications that have been pending for several years. In the case of the second cluster (distant forest), only one has applied and is still awaiting a decision. All those that applied were rejected in the third cluster (no forest). As Table 3 shows, all of the communal forest title claims lie within created or proposed conservation areas designated by the regional government.

Ideal Type 2, Agro-intensification

When *Nueva Amazonia* came to power they prioritised the production of what they termed 'flag crops', including coffee, cocoa and oil palm (Gobierno Regional de San Martín 2008), to make the region a "leader in export production" (Gobierno Regional de San Martín 2018). This focus on agricultural intensification and commercialisation built on the earlier annual cash crop expansions of rice, maize and cotton. Thus the emergence of commodity agriculture has been driven by market expansion and supported by government policy in relation to inputs and marketing.

Between 1995 and 2010 coffee production increased by 75% and the area tripled to an estimated area of 102,101 ha (Table 4), making San Martín the largest coffee producer in Peru in 2015 (INEI 2011; Gobierno Regional de San Martín 2017a, b). Cocoa, which prior to 2000 was a minor crop, has increased in area by more than twenty times, reaching 52,484 ha. In part this development has been

Table 4 Harvested hectares of major agricultural crops in San Martín, 2000, 2005, 2010 and 2015 (INEI 2011; Gobierno Regional de San Martín 2017a, b)

Crop	Kind of crop	2000	2005	2010	2015
Rice	Mainly cash crop, some production for home consumption	47,730	77,390	83,856	89,848
Plantain	Food crop but also sold cash crop	15,485	22,527	31,975	28,905
Beans	Food crop but also sold cash crop	3482	4208	4039	4047
Cassava	Food crop but also sold cash crop	3432	4990	5361	6599
Maize	Mainly cash crop, some production for home consumption	48,976	71,579	64,804	54,488
Coffee	Cash crop	27,132/29,526 ^a	36,662/43,280 ^a	58,037/69,869 ^a	90,880/102,101 ^a
Cocoa	Cash crop	1916/3515 ^a	4182/9903 ^a	22,555/31,181 ^a	45,703/52,484 ^a
Palm oil	Cash crop	7207/13,389 ^a	7200/16,149 ^a	10,010/26,103 ^a	10,356/29,033 ^a

For the permanent crops (cacao, coffee and palm oil) the areas planted but not yet in production are also presented as projection of the agricultural development in the region

^aPlanted but no yet in production

driven by a move by farmers from coffee when prices have been low, and by an outbreak of the coffee fungus disease ‘la roya’ (*Hemileia vastatrix*) in San Martín in 2013.

The belief in an intensified agricultural sector, driving an agrarian transition out of subsistence agriculture and promoting growth, has been central to regional politics. However, deforestation has also been a political issue and perennial crops have been presented as a possible ‘solution’, consistent with the view that it is swidden agriculture that is primarily responsible for forest loss. Establishing permanent tree crop fields, such as coffee and cocoa, were seen to reduce the need for opening up new lands, thus helping to stabilize the forest boundary. This fits with an agricultural modernisation explanation of forest transition, arguing that perennial cash crops will push subsistence agriculture into commodity agriculture, and that perennial tree crops will reduce the imperative for swidden practices. The combination of both processes have been seen to reduce the use of forests, steering local land use options and thereby indirectly encouraged outmigration from rural areas (Dressler et al. 2017).

The majority of San Martín farmers are small-scale, with 50 per cent having access to less than 10 ha (INEI 1994). To understand the effects of commercialisation of agriculture on forests, attention to three groups of actors needs to be considered: large scale plantation agriculture, migrant tree crop cultivation and the move of Kechwa-Lamas smallholders into tree crops.

Variability

Kowler et al. (2016) estimates that large scale plantation agriculture only covers some 0.5% of San Martín’s total area and is small in comparison to the total cash crop area. The 7400 ha of oil palm, the major estate crop, is likely to expand and another 13,000 ha will come into production within 10 years (Kowler et al. 2016). This is concentrated in the lowland areas where mechanisation is possible. It is likely that the plantation area will significantly expand (Kowler et al. 2016), and this may have consequences for forests and smallholders with uncertain land titles (EIA 2015; Gutiérrez-Vélez et al. 2011).

The second group of actors is Andean migrants, but there is little systematic information on them. However, it is widely believed that it is the profitability of coffee and cocoa, combined with the availability of land, that attracts them to the region and they obtain land through the clearance of forests. Evidence from the case study villages discussed below, is consistent with this understanding. Thus instead of reducing or halting deforestation, it seems like the expansion of coffee and cocoa is contributing to it.

The third group of actors are the Kechwa-Lamas. In the eight study villages in Cluster I and II, the interviewed farmers reported that they had expanded their coffee and cocoa production. Land that has been continuously cultivated is generally unsuitable for cocoa and coffee cropping. In Cluster III villages, the Kechwa-Lamas farmers therefore plant a variety of annual cash crops, mixed with subsistence ones.

What are the Effects on Forest and Other Land Use Types?

The hope that intensified perennial cash cropping would halt deforestation and stabilise the agricultural frontier does not appear to be happening. In none of the study villages did cocoa and coffee fields actually replace the subsistence swidden fields. These fields were first cleared from forest and food crops were planted as before, but then gradually small cocoa and coffee seedlings were interplanted. With their growth there was a closing of the tree canopy, a decline in food production and a conversion of the field into permanent agroforestry. This led to a decline in labour needs for the tree crops, and a new swidden field was opened if the household had more land, thus repeating the process. The two different phases of a field (the subsistence and the perennial cash crop phases) play fundamentally different roles in the households' livelihoods. Most households stated that they would not establish perennial cash crops on all their land, as meeting subsistence needs was central to their security. Permanent fields under coffee and cocoa fields may therefore interrupt the swidden fallow cycle in certain fields, but not necessarily stop farmers from opening up new ones or abandoning swidden farming. Rather, there is an intensification of land use as the amount of land under production increases and less is under forest fallow.

The spread of coffee and cocoa has also led to increasing competition for land, particularly between the Kechwa-Lamas and the Andean migrants. The example of Panjui village illustrates how the rapid coffee expansion has happened in the frontier landscape (Cluster II). The village used to be in a forest relatively close to a larger mestizo village (San Miguel). Up until 1995 (when visited by the first author) the village grew coffee in a relatively extensive manner around the village. Migrant farmers started to arrive in organised groups in search of land for coffee production and formed two new villages (Nuevo Continente and Nueva Unión), which have gained secure tenure. With increased competition for land, the Kechwa-Lamas farmers started to intensify their coffee production to secure their land areas. With this increase in coffee fields, the forest frontier rapidly retreated. According to Panjui informants this led to violent conflicts over land use with the migrants, including kidnappings, armed threats, police interventions and court cases. The situation calmed down when Panjui received its status of *comunidad nativa* in 2011, giving them rights to settle conflicts within their territory and from then on buying and selling of land had to be agreed by the village council, thus reducing migrants' interest in and opportunities for settling in the village.

With respect to the estate sector in the lowlands, there is evidence that its expansion in the Peruvian Amazon has often taken place in primary forest and smallholder land (EIA 2015; Gutiérrez-Vélez et al. 2011). Oil palm companies have apparently managed to obtain land when land designated as forest areas was converted into land designated for agricultural use in San Martín (EIA 2015; Kowler et al. 2016). The study village 2 de Agosto, borders directly to a corporate oil palm plantation and is surrounded by oil palms. Many migrants and indigenous people growing cocoa had earlier settled in the area. The 2 de Agosto informants commented on how the oil palm company had continuously expanded its plantations, sometimes through purchase of smallholders' land, under allegedly adverse terms. With increased

Table 5 Main forest conservation categories discussed in the paper

Titled native community— <i>comunidad nativa</i> ^a with communal forest title
Area for ecosystem conservation and recovery (ZoCRE)
Conservation concession
Natural area for protection (ANP), which includes:
National conservation area (e.g. National parks)
Regional protected areas (e.g. Cordillera Escalera, ACR)

Please note this is not a complete list of all the conservation categories in San Martín

^a*Comunidad Nativa*—a legally recognised indigenous community with land title of their agricultural land areas. Comunidades nativas with recognised forest territories are called ‘titled comunidades nativas’

competition for land in these flat areas, many smallholders have sold their land and moved to new frontier areas.

Idea Type 3: Forest Conservation Incentives

San Martín’s deforestation started before that of Peru’s other Amazonian regions, largely due to an early wave of migrants in the 1960s and larger numbers of settler arriving in the 1980–1990s (Limachi et al. 2006). By 2005 it was one of the most deforested of Peru’s Amazonian regions. When the *Nueva Amazonia* ran for the regional government in 2007 it strongly promoted forest conservation to halt deforestation. The province was zoned through an Ecological Economic Zoning (ZEE) project, which indicated what was considered as optimal land uses. The ZEE process assessed and demarcated 70% (2.5 million ha) of the regional territory as suited for different sorts of forest conservation. For the main forest conservation categories discussed below, see Table 5.

The justification of assessing (and setting a target) at a level as high as 70% appears to have been determined largely as a response to a target set by the National Forest Conservation Program for Climate Change Mitigation. To reach the target, different categories of forest conservation areas are to be coupled. A map of the San Martín protection and ecological conservation areas, issued by the regional environmental authority in 2016 (Gobierno Regional de San Martín 2016), shows that the category Natural Areas for Protection (ANP), is the largest forest conservation category in the region. The ANPs are areas considered to have high conservation values, containing most of the primary forest area, and they cover some 1.07 million ha. National parks (of which the largest are Cordillera Azul and Rio Abiseo), and the disputed (see below) Cordillera Escalera regional protected area (about 147,000 ha) are included in this category.¹ A new land use category called ZoCRE, (Area for

¹ Article 3 of the Law of Natural Protected Areas, approved by Law No. 26834, and Article 5 of its Regulations, approved by Supreme Decree No. 038-2001-AG establish that the protected natural areas of regional administration are called Regional Conservation Areas (ACR in Spanish acronym), which complement the National System of Natural Protected Areas (SINANPE) conformed on areas that have a significant ecological and regional importance. The number 1.07 million ha is the total area of protected natural areas (national and regional) in San Martín.

Ecosystem Conservation and Recovery) was also created by the regional government. By 2013 there were 18 ZoCREs covering 428,800 ha (Kowler et al. 2016) and a similar number are proposed as future ZoCREs. Finally, there is a category of conservation concessions, which currently cover 467,450 ha, while 283,000 ha are still awaiting approval (Kowler et al. 2016). Anyone can apply for a concession of conservation purposes and there are currently 12 conservation concessions under private administration (Kowler et al. 2016). However, the conservation area of Cordillera Escalera and the ZoCREs largely overlap with the areas considered to be ancestral territories by Kechwa-Lamas, and are in different stages of claim to be categorized as community territories (Table 3).

Forest Conservation Categories: Maps and Practices

The 2016 regional governmental map (Gobierno Regional de San Martín 2016) represents the forest landscape of San Martín as the conservation planners would like to see it: aiming for natural protected areas where there is no settlement, ZoCRE zones where land use rights are strongly circumscribed and concessions areas where forest management practices would be allowed under regulation. None of these forest conservation categories would allow for agricultural uses. As noted, most of the primary forest lies within the natural protected areas (including both national and regional designations), suggesting that most of the remaining forest areas in the region is secondary forests. But this ideal of how land should be used bears little relation to what is found on the ground. Powerful actors have been able to get forest land classified for conservation re-designated as agricultural land (i.e. oil palm production, Kowler et al. 2016). Migrant villages have been able to obtain legal tenure and the provision of schools and electricity in the Cordillera Escalera (see Table 5). Elsewhere migrants have expanded into primary forest areas and remain without legal title.

The ZoCRE, which is the most recent added conservation category and largely focused on secondary forest areas, affects the Kechwa-Lamas people in particular. It has been designed by the regional government as a means to secure the forest in areas where indigenous villages have not been able to secure a communal forest title, but in practice it also means resisting customary tenure (personal communication, Luis Romero Rengifo, 30/01/18).

Negotiating Forest Policies

The *comunidad nativa* law (Decree-Law 22175) allows the Kechwa-Lamas people to claim territorial rights for their ancestral forest areas. One of the most disputed areas for territorial rights in the region is the Cordillera Escalera regional conservation area (ACR). The Cordillera Escalera is a major source of water for the region's largest town, Tarapoto, but it is also the ancestral forest lands of the Kechwa-Lamas people. Forty-two villages (personal communication, Luis Romero Rengifo, 16/12/16) have claimed land, ranging from 120 to 50,000 ha, inside the ACR, far exceeding the 147,000 ha of the ACR. But the Regional Government has been slow to address these claims despite the law, claiming it is for budgetary and technical reasons, including difficulties of travelling to remote areas to do the

necessary measurements. Reflecting a long history of marginalization, the Kechwa-Lamas villages face geographic and bureaucratic obstacles to accessing government offices and raising land tenure issues. In addition there are demanding technical requirements to comply with the regulations. Bureaucratic procedures are difficult to navigate without a certain level of expertise. So communities have connected to a network of actors who are brokers or intermediaries. These include indigenous federations, NGOs and representatives of state institutions, all of whom claim to work in the interest of the communities and respect their rights to autonomy. But these actors also pursue their own interests, and their views on what is best for the communities do not always coincide with each other (Egerlid 2015).

The example of the village Alto Huaja shows how several actors competed to influence an indigenous community over forest governance. Alto Huaja was struggling to gain a communal forest title, navigating between regional forest conservation politics and the web of alliances that existed among the actors that work with forest conservation and indigenous peoples' land rights in San Martín (see Egerlid 2015; Egerlid et al. 2016). Two external NGOs promoted different approaches, one pushing for forest concessions, the other for communal forest title. The former was more aligned with the party *Nueva Amazonia*, while the other, arguing for communal forest titles, were in opposition to the regional government. As a result, the village split into two: Centro Poblado Huaja and Comunidad Nativa Alto Huaja, which took different positions with respect to the forest governance arrangements that they sought. The polarization between different interests was partly driven by the approaches promoted by the external NGOs. Thus, as the Alto Huaja case indicates, the Kechwa-Lamas' opportunities to maintain control of their ancestral forest areas may become increasingly connected to their ability to behave as 'conservators' or 'ecological natives', under license for forest areas.

Discussion

Through representing the Kechwa-Lamas' swidden system, agricultural intensification and forest conservation as three ideal land use types, their key characteristics can be identified. On the ground the boundaries between these ideal types are not so easy to discern, the practices are not complementary and they do not have discrete actors. Not only do the Kechwa-Lamas clear land for tree cash crops, but they also manage forests and seek to conserve them for particular needs; migrants may clear forests to plant perennial crops penetrating the territories of the Kechwas-Lamas, and estate agriculture may intrude into primary forest and root out existing subsistence systems. Contradictory processes in relation to land use transitions and securing forest boundaries are at play and could be seen as the unintended consequences of deliberate action.

The opening up of the Peruvian Amazon and the construction of roads has triggered several long term, irrepressible processes. One is smallholder migration, attracted by land availability and market opportunities, followed by large scale capital intensive agricultural land interests. A second is the progressive marginalisation and retreat of indigenous and mestizo smallholder swidden farming land uses, as

previous forest based subsistence practices have come under pressure. Third, these processes have been fuelled by a rising population and increasing competition for land, leading to a push back of the forest boundary. Government policy of agricultural intensification and the promotion of cash crops have played a facilitative role and contributed to this development. The San Martín administration is now seeking to put a break on these expansionist processes by establishing a forest boundary through conservation. These are not easily reconcilable objectives and the regional government faces considerable challenges.

It is far from clear that the San Martín regional government has the bureaucratic resources and capacity to impose its conservation model or police its forest boundaries in the conservation areas. It is widely reported, for example, although data is scarce, that it has had limited ability to reduce the clearance of forests carried out by the increasing number of migrants. This reflects a situation where land control in and around the forests have not been established and an increased competition for land, e.g. the cases of Panjui and 2 de Agosto mentioned earlier in this paper. Even in those cases where the land control does exist, it has not been fully respected and responded to by the regional government (e.g. the case of the migrant villages within the Cordillera Escalera regional conservation area). It is a situation where the state has not obtained recognition of its authority, land boundaries and property rights remain insecure and are contested (Egerlid et al. 2016), creating inequalities, territorial claims and political struggles of recognition operating simultaneously (Lund 2016). According to national law Kechwa-Lamas has certain legal land use rights as an indigenous people, but they have not been able to pursue them (e.g. to gain land title for community forest territories). The regional government has denied the Kechwa-Lamas community forest territories through bureaucratic delays, in an attempt to designate these populations as responsible for the conservation of the forests on the government's behalf and on its terms. But the government's imagination of what a forest is differs strongly from how the Kechwa-Lamas perceive them.

Underlying this contention over rights and responsibilities for forests are differing views of what constitutes desirable and productive land use development and the very nature of what a forest is. A civil servant of the Regional Government, an Andean migrant farmer and a Kechwa-Lamas smallholder would provide different answers to these questions. They would also have sharply different views on how forests should be used and managed and for whom; pointing to the deeply political question of how land use is to be understood, what is forest change and development and what are desirable forest transitions.

In its aspiration to develop the Amazon, the Peruvian government assumes a clear division between agricultural and forest land uses. In swidden land use systems, however, forest and agriculture cannot be separated without a serious loss of functionality for both (van Noordwijk et al. 2015). There is also a strong tendency to disregard secondary forest as not being proper forest, even though elsewhere secondary forest regeneration is driving forest recovery (Hecht 2014). Sears et al. (2018) note how Peruvian forest policy seeks to differentiate between trees naturally generated in a swidden fallow from plantation trees, with only the plantation trees being legally recognised as a tree that can be sold. Yet there is a wider body of evidence from Asia showing that long fallow swidden land use systems (defined as fallowing phases longer than 5 years

(Dressler et al. 2017)) can deliver both conservation, livelihoods and agro-ecologically productive systems, particularly in contrast to monocultures, permanent perennial crops and intensive short-fallow land uses (Mertz et al. 2017; Fox et al. 2014; Dressler et al. 2017) that are expanding rapidly in San Martín, both among migrant and Kechwa-Lamas smallholders.

How might we respond in our thinking and approach to this if, as we suggest, a forest conservation policy route is unlikely to be the answer to deforestation. One way is to take a broader view of the nature of transitions and how forests are defined. Perz and Skole (2003) have suggested that there is really no single long run forest transition, but that forest change processes should be understood as periodic short-run transition episodes, running in parallel, sometimes in synergy and at other times not. Hecht's concept of a 'working landscape' (and the 'social landscape of swidden' by Coomes et al. 2017) is also useful here. Working landscapes are those created by ecological forces, socio-economic dynamics, shifting agricultural practices and urbanisation processes (Hecht 2014). Van Noordwijk et al. (2015) argue that ever changing landscapes are an immanent characteristic of forest transitions linked to swidden agriculture.

We need to rethink our image of what forests are and should be and move away from forests as purely biological entities to inhabited landscapes. In order to be able to protect forest areas a more nuanced approach to the complexity and variety of forest forms is needed. Hecht's advocacy (2014) of a landscape approach, where secondary and managed forests (e.g. fallows) are also considered as important land use categories beside primary forests, recognises that these categories have potential for forest regeneration and are not simply a by-product of deforestation (Sloan 2016). Tree based intensification systems are not always recognised as they occur at different intensities of management and are based on local knowledge and labour systems rather, than specific equipment. They can also be spatially diffuse (e.g. fallows, fields and forest as in the Kechwa-Lamas case), allowing multiple and flexible uses of land (Hecht 2014). The improved fallows (i.e. planted forest fallows) practiced by some Kechwa-Lamas farmers, exemplifies 'invisible' intensification processes (Marquardt et al. 2013b). Fallow vegetation now totally dominates large parts of the San Martín landscape and this secondary regeneration may be a significant form of recovery (Kowler et al. 2016; MINAM 2009). But their dynamics and drivers are not well known and are not recognised by the regional authorities.

In sum it is possible to discern in the dynamics of land use in San Martín potential elements of diverse routes of forest transition—through intensification, smallholder tree based land use systems, government forest policy and globalisation. However, these processes, both immanent and by design, are in some respects contradictory and have led to adverse outcomes. In a context where the state has not fully established its authority and land rights are not secure, immanent processes rather than intentional policy are likely to be the most significant player (Lund 2016).

Conclusion

Supporting forest transition processes in a dynamic, inhabited Amazonian landscape requires a broad understanding of different types of forest vegetation, integrated agricultural and forest land uses and acceptance of the inherently dynamic nature of swidden production systems. This argument does not contradict the need to protect Amazonian forest areas. But actively managed, livelihood generating, forests and farming land use systems are also important components that can safeguard forests. Forest conservation measures rarely achieve expected outcomes (Blackman et al. 2017). The fact that large parts of these proposed conservation areas lie outside the actual control of the state requires the involvement of the forest villages in their management. The conservation of primary forest will not be enough to maintain the fundamental system functions of the Amazon landscape. To reach the necessary scale of vegetation cover, conservation of primary forest must be combined with forest recovery efforts by the people who live there (Chazdon 2014; Hecht et al. 2016).

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Compliance with Ethical Standards

Conflict of interest The authors declare that they have no conflict of interest.

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