Migration and forests in the Peruvian Amazon

A review

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1 Introduction

In a country with 60% forest cover, 94% of which is in the Amazon region, forests play an important role in national debates around the fate of the Peruvian Amazon and whether to promote conservation, economic growth and development, or a balance between them. Both in the past and in present day political discourse, forests have been portrayed as both obstacles to, and potential sources of, development. In parallel, migration to the Peruvian Amazon has swung back and forth from being portrayed as a solution to the 'underdevelopment' of the region to being blamed for forest loss. More recently, concern for biodiversity conservation and climate change mitigation has led to some national policies to promote reductions in deforestation. (e.g. participation in REDD+ (reducing emissions from deforestation and degradation) initiatives; the National Strategy for Forests and Climate Change (MINAM 2016)). At the same time, other policies have created incentives for agricultural expansion that lead to deforestation. Deforestation in the Peruvian Amazon for 2017 was reported as 143,000 ha (Finer et al. 2018).

Much of the discourse around the causes of deforestation in the Peruvian Amazon has centered on swidden agriculture carried out by migrants and other small producers (Dourojeanni 1987; Brack 1997; Watters 1971). For example, MINAM (2014) points to data on the frequency of small-patch-size (<5 ha) deforestation events as evidence that 'migratory agriculture' is the principal cause of deforestation in Peru. However, this narrative is simplistic and fails to address the underlying drivers, both structural and demographic, that encourage migration to the Amazon, and ignores the heterogeneity of the actors linked to these small-scale patches of deforestation (Ravikumar et al. 2017). In addition, it fails to recognize the important role of forests in the livelihoods of migrant households (Porro et al. 2015; Bennett et al. 2018a).

Much of the literature on migrants and migratory agriculture in Peru points to migration from the Andes to the Amazon (e.g. Chirif 2003; Dourojeanni et al. 2010). While there have indeed been waves of Andes–Amazon migration, the patterns are much more complex. From 1988 to 2007, only 40% of the immigrants to the Peruvian Amazon were born in the Andes (Che Piu and Menton 2013). Census data collected by INEI (National Institute of Statistics and Information) shows that many families migrate between Amazonian departments, from the coastal areas to the Amazon or from the Amazon to other regions (INEI 2009; INEI 2018). Ohers maintain cyclical patterns of migration (e.g. Andes–Amazon–Andes, see Collins 1984).

Many of the assumptions surrounding the current narrative on the drivers of deforestation in Peru are based on sparse evidence with a tendency to blame migration, and consequently migrants, for deforestation. This ignores the complexity of migration patterns, the migrants themselves and the different ways in which migrants interact with forests. Blaming migratory agriculture provides no basis for defining policy actions. Understanding the factors that encourage deforestation in some areas and not others would provide a first step to identifying policy actions to address deforestation.

Not all migrants to the Amazon contribute to deforestation, and many develop sustainable agroforestry systems or forest management approaches that do not lead to forest loss on a large scale. Where colonists do deforest land, their behavior is driven by a range of context-dependent incentives and opportunities, rather than personal motivations. These include market access, economic incentives and tenure (in)security, among other factors. As such, oversimplifying of government rhetoric, that characterizes migrants as a homogeneous group and make unfounded assumptions about their relationship with forests, yields policies that are counterproductive

Box 1. Population and migration data

To provide context on population changes in Peru and in the Amazon in particular, we include here census data on rural and urban population growth nationally and in the lowland Amazon regions of Loreto, Madre de Dios, San Martin and Ucayali. To note, Peru is divided into subnational units called regions, previously called departments. It is also divided into 3 main geographical zones, also sometimes called regions: the coast, the highlands/Andes and the jungle/Amazon. The Amazon is further divided into the lowland Amazon (*selva baja*) and the high-altitude Amazon (*selva alta*). Some of the highest sections of San Martín are out of the tropical forest biome, but the majority of the state is within the 'lower Amazon' as classified by Peru. Other states (Amazonas, Cusco, Huánuco, Junín and Pasco) include sections of higher-altitude tropical forest but also include larger expanses of highland (Figure 1). Census data that are freely available are aggregated at region level and thus population dynamics in the high-altitude forest areas are grouped with those of the highlands in those regions.

Broadly speaking, Peru has seen a steady increase in total population since census efforts began in 1940, but that growth is concentrated largely in urban areas (Figure 2).

Figure 1. Map of ecozones in Peru: Coast, highlands, Amazon.

Source: MINAGRI
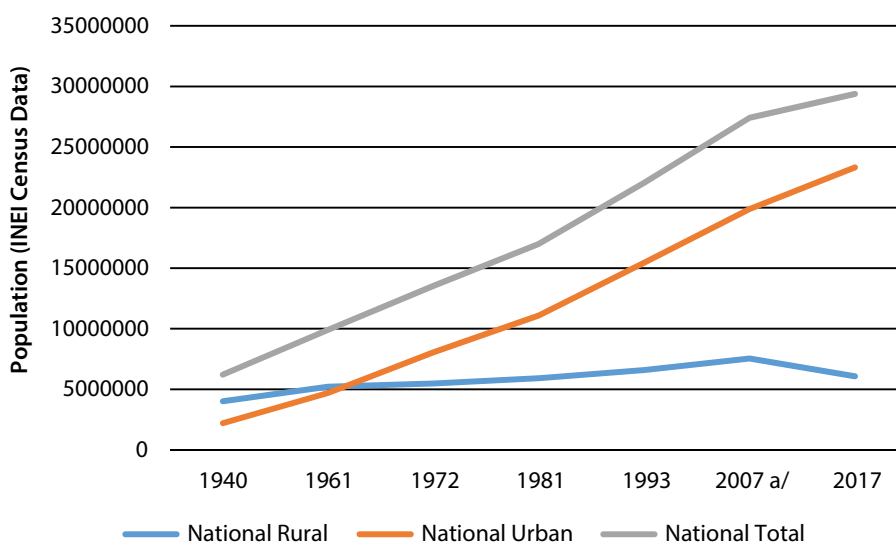
Figure 2. National-level population growth in Peru – urban vs rural

Source: INEI 2018b, INEI 2018c.

Box 1. Continued

Within the Amazonian lowlands, population grew in urban and rural areas in all four regions (Loreto, Madre de Dios, San Martín, Ucayali) until the 1990s. In 2007, rural populations began to decline while urban populations continued to grow (Figures 3, 4, 5, 6).
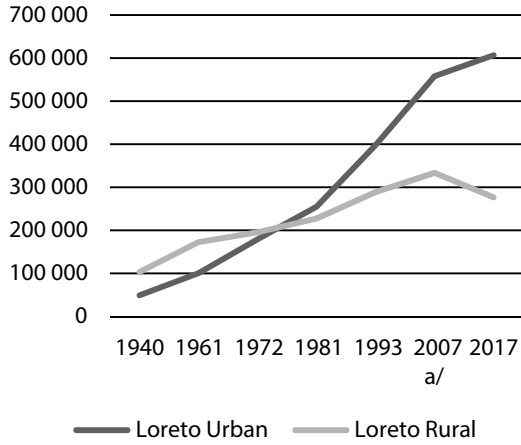
Figure 3. Urban vs rural populations, Loreto.

Source: INEI 2018b, INEI 2018c.
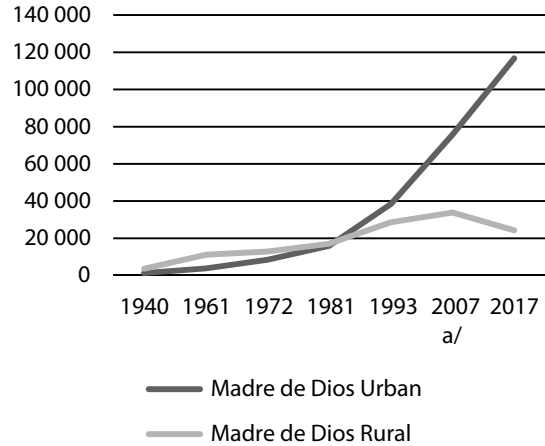
Figure 4. Urban vs rural populations, Madre de Dios.

Source: INEI 2018b, INEI 2018c.
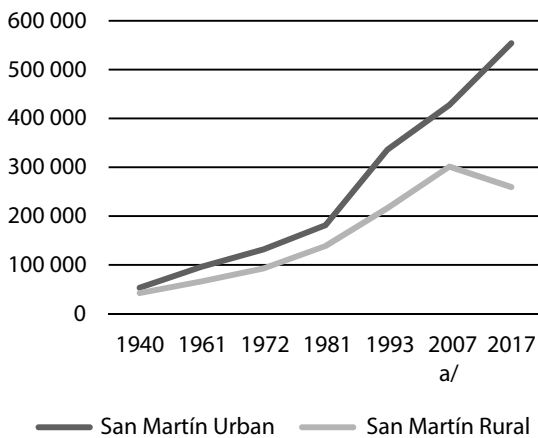
Figure 5. Urban vs rural populations, San Martin.

Source: INEI 2018b, INEI 2018c.
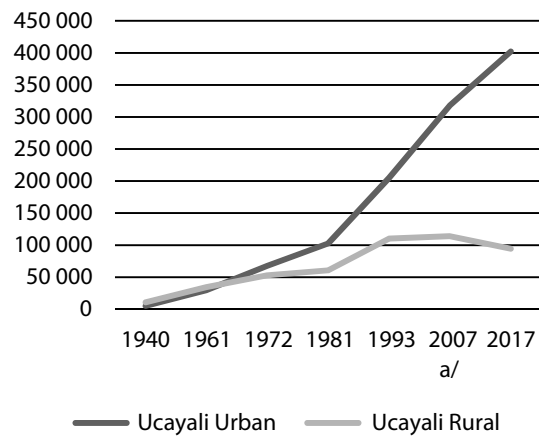
Figure 6. Urban vs rural populations, Ucayali.

Source: INEI 2018b, INEI 2018c.

Box 1. Continued

Overall, while populations in the Lower Amazon regions have increased rapidly since the 1980s, Loreto saw a net-loss in population between 2007 and 2017 (Figure 7). As Figures 3–6 highlight, however, the rural areas are not seeing the same levels of growth. The assertion that population growth in the Amazon leads to deforestation may not be as straightforward as assumed.
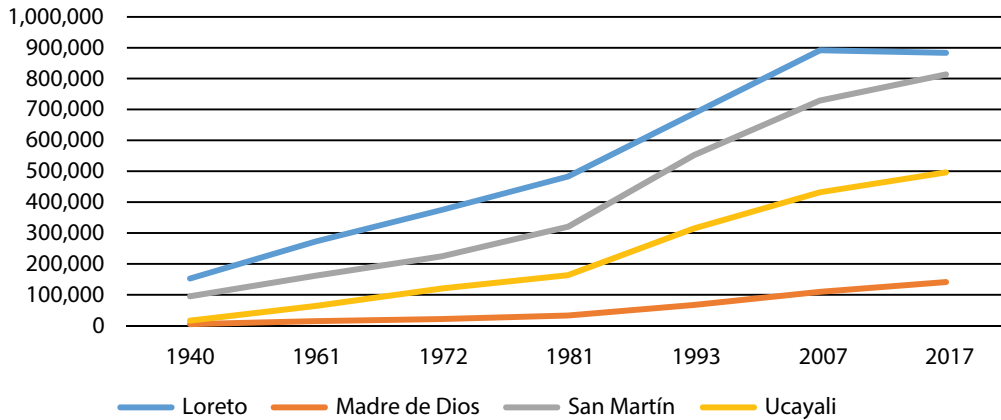
Figure 7. Population growth in Lower Amazon departments 1940–2017.

Box 2. Deforestation hotspots in Peru

Deforestation in the Amazon has varied annually, with rates ranging from 123,000 ha to 177,000 ha in the last decade (Figure 8).
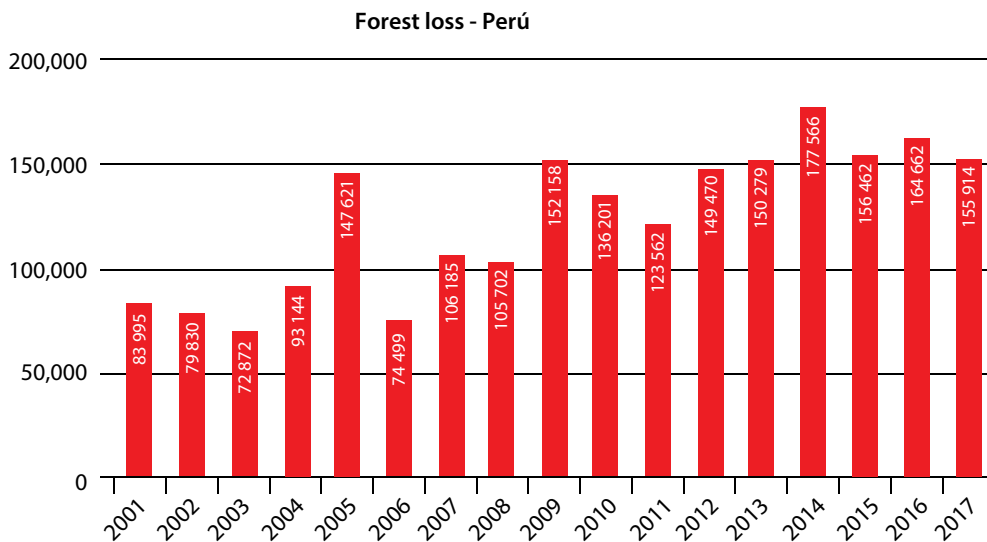
Figure 8. Annual rates of deforestation in Peru, 2001–2017.

Source: MINAM Geobosques).

Box 2. Continued

Currently, the hotspots of deforestation are concentrated along roads, in the gold mining areas of Madre de Dios and linked to oil palm plantations in Ucayali (Finer and Mamani 2018, see Figure 9).
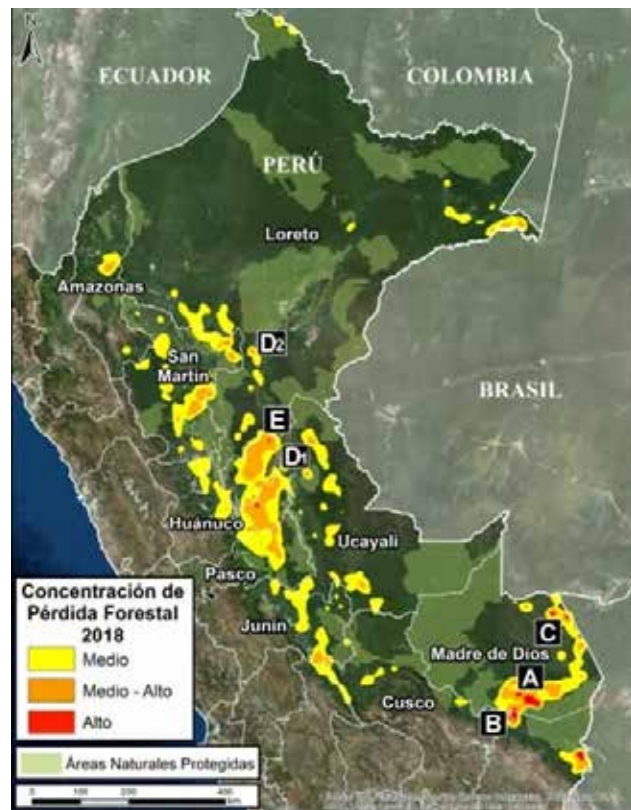
Figure 9. Map of deforestation hotspots in 2018.

Source: Finer and Mamani (2018).

In this paper, we review the literature on the links between migration and forests in the Peruvian Amazon. The literature on these issues in the Brazilian Amazon is extensive, with studies on the characteristics of households that influence deforestation (Perz and Walker 2002; Caldas et al. 2007), the impact of road building on expansion of frontiers (Laurance et al. 2002; Soares-Filho et al. 2004) and the links between national policies and deforestation rates (Browder 1988; Nepstad et al. 2014). Other Amazonian countries have also received attention, including Ecuador (e.g. Rudel et al. 2002; Barbieri et al. 2009) and Bolivia (e.g. Stearman 1978; Thiele 1995; Pacheco and Mertens 2004). For the Peruvian Amazon, the literature is more sparse. Migrants are rarely the main focus of particular studies. Instead, they are mentioned in studies that focus on roads (Mäki et al. 2001), deforestation (Oliveira et al. 2007) or other phenomena. However, here we are able to trace the different factors that influence migration and forests in Peru and how the literature and policy documents portray these links over time. We explore how migration, and related deforestation, have some identifiable characteristics (see Box 1 for background data on population and deforestation). We show that government policy actions contribute to the creation of these conditions and argue that reflecting on these causal interactions embedded in these processes and patterns can provide productive paths to identifying strategies to discouraging deforestation.

2 Drivers of migration – The theory

The drivers of migration have long been a topic of theoretical and empirical study. Ravenstein (1885) wrote about the 'laws of migration,' highlighting 'push' and 'pull' factors. In his work on the theory around the drivers of internal migration, Lee (1966) emphasized the importance of both positive and negative factors associated with the area of origin and the area of destination, intervening obstacles to migration, and 'personal factors'. These obstacles include distance, physical barriers and lack of road access. Personal factors can influence the decision to move or the relative weight given to the push and pull factors. Lee (1966) points to both personality of individuals (e.g. resistance to change vs risk-takers) and life cycles of decision-makers (e.g. dependents can influence the decision to migrate both positively and negatively). According to Bilsborrow's analysis of internal migration in developing countries, "migration is affected by: (a) differences in economic opportunities and living conditions between places (and countries, for international migration); (b) people's awareness of those differences and desire to improve their lives by moving; and (c) their ability to act upon those desires." (Bilsborrow 2002, 77). Although earlier research tended to focus on the characteristics of individual migrants, work in the 1980s emphasized the role of the household in making decisions about migration (De Jong and Gardner 1981) and later emphasis was placed on the community and contextual factors (Wood 1982; Massey 1990). While there is some recognition of the nuances of the complexity of drivers and the social factors influencing decisions of households to migrate, as opposed to migration theories based on assumptions about individuals, the emphasis on these 'push' and 'pull' factors continues.

Carr (2009) identifies four main categories of factors that influence out-migration to rural frontiers in Latin America: demographic, political-economic, socioeconomic and ecological. In this context, out-migration refers to the move from a forest–farm landscape to unoccupied forest areas or 'frontiers'. Demographic factors, particularly those linked to population growth that outstrips the availability of land and employment in the homeland, can lead to out-migration. According to Car (2009), political–economic factors include policies (e.g. credit schemes), political climate (e.g. corruption), land titling, transport and infrastructure, market dynamics and 'trigger' events such as wars. The socioeconomic factors he mentions include attitudes and values (e.g. frontier mentality), individual and household behaviors, technological changes (e.g. intensification) and production factors. The final category, ecological, includes soil quality, topography, droughts and floods, and the availability of forests. These ecological factors can either represent changes in ecological characteristics (e.g. loss of soil fertility linked to erosion), particular ecological disasters (e.g. a severe drought) or the existence of more ecologically favorable conditions in the in-migration zone (e.g. abundance of forest resources). Myers (1997) asserts that many people migrate, either internally or internationally, within Latin America as well as elsewhere, as a result of ecological degradation and are, in effect, 'environmental refugees.'

According to Limachi et al. (2006), who studied migration into the Peruvian Amazon, pull factors in Peru include government policies regarding, for example, road construction, and push factors in the Peruvian Andes include the production and trade of illicit crops, guerrilla group activity, as well as a lack of land, capital and/or security (Limachi et al. 2006). Chirif (2003) argues that the wave of migration of people from the highlands to the *selva* is due, in part, to the loss of lands in the highlands through expropriation by companies and individuals who consolidated lands for large-scale agro-industrial production, and pollution from mining that ruined arable lands.

According to INEI (2009, 35), colonization of the Amazon has been linked to the following push factors, principally in the Andes:
1. The Andean agrarian structure: which includes a lack of land, unequal distribution, and low yields
2. High growth rates of the Andean population which increase the labor force at a rate that cannot be absorbed by agricultural activities

3. The lack of capacity by government agencies to use the agrarian reform process to directly or indirectly benefit the majority of the rural population
4. Urban unemployment".

For Carr (2004), one of the main drivers of in-migration to a particular frontier is the availability of land. Given the low population density in the Peruvian Amazon, and a sense that it was empty land, some felt that its colonization simply required that it be made 'accessible' to colonists (Chirif 2003). As Horna (1976, 422) asserted, "the soaring population growth in Latin America will find a safety valve in the colonization of its virgin lands". A report by INEI (2009) states that the supposed fertility and unlimited arable land in the *Selva* was seen as the national pantry, sparking migration to the region.

Discourse around employment opportunities as drivers of migration are prevalent in the literature on Peru and other countries (see review of literature on developing countries by Lucas 1997). This is particularly the case regarding rural-to-urban migration: e.g. Todaro's hypothesis that urban jobs are more attractive than rural employment has influenced many studies on rural–urban migration (Todaro 1969). According to Lucas (1997), while rural–rural migration may actually outpace rural–urban migration, the dearth of data on these migration patterns means there are few studies of the role of employment or other variables in determining rural–rural migration patterns. A study by Falaris (1979) found that internal migration in Peru was linked primarily to economic opportunities at in-migration hotspots. However, the particular study in question addressed migration to the country's capital (Lima) and not to the Amazon in particular. Another study assessed a 1998 survey of households that had migrated internally in Peru: 24% claimed to have migrated for employment reasons, 30% for family reasons and 30% cited 'other' reasons (Laszlo and Santor 2009). Those authors attribute the high rate of 'other' reasons to those who had migrated due to the armed conflicts linked to the Shining Path.

Migration to the Peruvian Amazon has taken on a wide range of manifestations, with varying causes (both 'push' and 'pull') and peaks and troughs over the last two centuries. While some migration has been 'spontaneous' (where migrants moved there without policies or specific economic incentives that sparked their movement), other instances have been 'directed' through government programs that explicitly brought migrants to the region. The efforts to 'colonize' the Peruvian Amazon have come in waves, encouraged by different political and economic agendas and visions of 'development'. Whether due to push or pull factors, and regardless of origins, the Amazon region has experienced population growth in recent years (Figure 2).

In what follows, we will address some of the key push and pull factors that have been identified in Peru. We frame this in terms of resource scarcity at the place of origin (as per Bilsborrow 2002) and abundance at the location of in-migration (see Table 1).

Table 1. Push and Pull Factors in Peru

Push from the Andes/Coast	Pull to the Amazon
Land scarcity	Land abundance
• Lack of access to farmland	• Relatively cheap, plentiful land available
• Insecure land title	• Land titling initiatives to provide colonists with land title
Limited economic opportunities	Perceptions of better economic opportunities
• High poverty indices	• Economic booms (rubber, gold, oil palm)
• Lack of employment opportunities (population growth > job growth)	• Scarcity of labor (low population density)
Lack of security	More peaceful
• Armed conflict (Shining Path)	• Relative absence of armed conflict in Amazon region
• Illegal crops (coca)	• (Also present but only in some areas)
Colonization projects and policies	Colonization projects and policies
• Targeting of Andean families recruited to participate	• Directed colonization 'special projects'
	• Credit schemes/tax exemptions
	• Expansion of roads/infrastructure

3 Push and pull factors in Peru

3.1 'Push' factors in the Andes: Land scarcity, poverty and conflicts

Historically, the Peruvian highlands have had higher population densities and related land-scarcity than the Amazon. Poverty has been, and continues to be, widespread. These factors are often highlighted as the key motivations and 'push' factors linked to out-migration. In addition to migration linked to the rubber boom 'pull,' the late 19th century saw a wave of Andean migrants move to the Amazon, leaving areas where their lands had been expropriated by companies or where mining had degraded arable lands with pollution through effluents (e.g. areas around Cerro del Pasco) (Chirif 2003).

It is important to note that migration to Amazonian departments in the 19th century included both intra-Amazon migration and in-migration from the highlands and the coast. Before the 1970s, intra-Amazon migration dominated, but this shifted towards an increasing influx of migrants from the Andes such that by the 1990s, half of immigrants came from the Andes (Limachi et al. 2006). "Migration into the Amazon region functioned as a mechanism to resolve land shortage problems in the Andes region." (Limachi et al. 2006, 64).

Increased population in the Andes (linked in part to declines in mortality rates since the 1950s) combined with feudal land systems and a lack of economic opportunities in the region led to poverty and out-migration (Limachi et al. 2006). An earthquake in Ancash in 1970 drove a wave of colonists to the Amazon, many of whom were said to have "no knowledge of the reality of the tropics nor how to undertake agriculture or cattle raising in the Amazon" (Alvarado 2007).

Andes-to-Amazon migration increased in the 1980s and 1990s as agrarian reform ended feudal land systems (and thereby removed long-held constraints to mobility), and as the onset of guerrilla activities brought insecurity to the highlands.

In the 1980s and 1990s, internal migration in Peru spiked due to the armed conflicts linked to the Shining Path, MRTA (Túpac Amaru Revolutionary Movement) and other groups. Up to 600,000 people are estimated to have been 'displaced' during the conflicts, with some heading to the capital city (Lima) and others migrating to the *Selva* (US Committee for Refugees and Immigrants 1999). While some of those displaced by the conflicts have returned home, some estimate that 350,000 have remained in their new homes, either by choice or necessity (due to lack of resources to return to the sierra) (Hampton 2002). However, it is unclear how many of these people remained in the coastal cities and how many migrated to the Amazon.

3.2 Policies 'pulling' migrants to the Amazon

In the 19th century, and earlier, Peru's Amazon region was sparsely populated, remote and poorly integrated into the nation. In the 1840s, the government sought to recruit Europeans to become the 'white settlers' who would bring 'racial improvements' and civilize the region (Chirif 2003). Decree 17 of 1872 established an office in Europe to encourage migration of Europeans to Peru (Schwarz 2012). European migration to Peru was heralded as a means to ´civilize´ the country and a ´magic´ solution to its economic troubles (Marcone 1992). This first wave of 'directed' colonization, however, had limited success in 'occupying' and developing the Peruvian Amazon (Chirif 2003). The rubber boom, which began in the 1870s, set off an urgent need to occupy, defend and develop the region. This was the early period of government efforts to promote migration and colonization of the region.

During the rubber boom from the 1870s through to World War I, settlers came to Loreto and other areas. They coerced indigenous people in the area to work as rubber tappers and communities were relocated into rubber camps – the settlers and the indigenous people mixed and the 'new' communities that formed are known as *ribereños* (Chibnik and de Jong 1989). Rubber brought the first stages of migration to Madre de Dios, which had previously remained relatively isolated (García 1982).

Peru passed a series of laws during this period to support the development and colonization of the region. In 1893, the government passed a law declaring it was of 'public interest' for foreigners to settle in the Amazon (Monterroso et al. 2017). In 1898, the Organic Law of Forest Frontier Lands allowed foreign investors to acquire land in the Amazon through purchase, concession or colonization contracts (Gazzolo 1966). Together with the General Law on Forest Frontier Lands that was passed in 1909 (which allowed for sale and or usufruct lease of lands), the state established clear incentives and rights for migrants to the Amazon. However, these efforts focused more on migration by the 'right' type of settler – those with resources they could invest in the territory and, in particular, rubber barons (see Monterroso et al. 2017). Nevertheless, these rubber barons and wealthy migrants sought cheap sources of labor and the jobs they offered were an additional pull for unskilled migrants.

In the late 1930s/early 1940s, the government began programs that aimed to direct colonization of particular areas of the Amazon by offering credit and land title. In 1938, Peru established two laws that were fundamental for promoting colonization of the Amazon region. The first, Law 8621, allowed for the expropriation of lands located 5 km on either side of newly built roads in the mountainous areas and natural forests to the east of the Andes (e.g. the Amazon). These expropriated lands were to be used for colonization efforts. Later that year, Law 8687 mandated the establishment of colonization projects 20 km to either side of the road that stretched from Huánuco to the Ucayali River. This was to include several nuclei of colonization along the road; the law mandated that the government would oversee the sale and, for workers who did not have the financial means to purchase the lands for themselves, use rights and technical assistance. This law was intended to "put [land] within the reach of those who had no capital beyond their own work" (author's translation from Law 8687). In 1950, yet another colonization project, the Tingo Maria project in Yurimaguas, was mandated (Law 114361).

3.3 The pull of new roads

In the 1960s, just prior to the military coup by Velasco (in 1968), initiatives to build roads and associated colonization projects began. For President Francisco Belaunde (1963–1968), it was imperative to conquer the Amazon region: "Peru must conquer the East just as Americans conquered the west" (Horna 1976, 410). According to Belaunde, "nature is our enemy and nature can be overcome" (Horna 1976, 410). He sought to move beyond the traditional means of transport (e.g. by river and/or foot/animal) to modernize access to the region by building roads. Another reason for the inaccessibility of the Amazon was that the the rivers, which historically formed the basis of transport, flowed east, towards Brazil and Bolivia, thereby further isolating the Amazon region from Peru's principal population and economic centers in the west. The Marginal Highway was not aimed at connecting two points but instead as a 'colonization road' that would "give access to the greatest extension of productive lands" (quoted in Snyder, 1967, 90). Belaunde garnered support for the Marginal Highway (which connects the Amazon to the Andes) and construction began in earnest. As such, the 1960s represented a period of major investment in the principal corridors into the Amazon (Eidt 1962). The transition to 'directed' colonization was seen as a way to "correct the deficiencies of the chaotic spontaneous occupations and try to order, in a planned manner, the exit of the surplus population from Andean communities" (INEI 2009, 36). In the 1960s, there were three major pushes for directed colonization projects to the Amazon, in part in response to the disorder that 'spontaneous' colonization had brought: Tingo-Maria-Tocache-Campanilla (Huanuco and San Martin), Pichari in Cusco and Jenaro Herrera in Loreto (INEI 2009). In Madre de Dios, for example, the Ministry of Defense set up a project near the Brazil border to keep ex-soldiers in the region and protect oil reserves

found along the frontier (Eidt 1962). However, the colonization was not successful due to failure to complete the road that connected the settlement to Puerto Maldonado, the capital city of Madre de Dios (García 1982).

In 1969, under the military rule of Velasco, Peru passed a New Agrarian Reform Law (Law 17716) which aimed to end *latifundio* and redistribute agricultural lands equitably. It followed previous laws and reforms that were much weaker and not implemented with the same enthusiasm as this new agrarian reform law (Eugren 2006). Between 1969 and 1979, 15,826 properties that covered 9 million ha throughout Peru were expropriated and redistributed to 370,000 beneficiaries (Eugren 2006). Many of these farmlands were converted into agricultural cooperatives, particularly in the Andes region. Some areas of the Amazon, including Ucayali, had Agricultural Societies of Social Interest (SAIS) cooperative properties, which focused on collective production of cash crops and cattle (Bennett et al. 2019).

When Bermúdez took office in 1975, he abandoned support for colonization projects that focused on the creation of agricultural cooperatives. Instead, the government set out to colonize the Amazon region via 'Special Projects' aimed at bringing settlers to particular regions. While the Special Projects were said to be intended to focus on increasing agricultural production and providing technical support as well as establishing infrastructure networks and promoting land titling (e.g. PETT - Land Titling and Cadastre Project), many ended up focusing on infrastructure development and served as a means to channel international funding for roads (Loker 1993).

In his analysis of the Interoceanic Highway, Dourojeanni (2006) points to the tendency of road paving (as planned for the Interoceanic Highway at the time of the study) to facilitate land invasions along the highways and migration to urban centers in the Amazon. This is in keeping with the goals of the highway to "favor migration of the poor upper Andean population towards the Amazon lowlands, which have better possibilities of development" (Dourojeanni 2006, 17, citing a presentation by the Vice Minister of Transport).

The case of the Frederico Basadre Highway (which connects Pucallpa to the coast) is one of the key examples used by many actors (researchers and politicians alike) to exemplify the link between roads and migration. Construction of the highway began in the 1940s and was completed in the 1970s. The population of Pucallpa grew by over 5% annually. In the 1990s, 82% of the population of Ucayali lived along that road (Limachi et al. 2006).

3.4 The pull of 'Special Projects', credit schemes and tax breaks

In 1986, under García, Peru launched a three-pronged agricultural development program known as PRESA (*Programa de Reactivación Agropecuaria y Seguridad Alimentaria*) which 1) encouraged peasant communities to form associations, 2) granted land title to the areas around the association and 3) granted access to credit for members of the association to farm on those lands (Coomes 1996). This program is linked to a vast influx of migrants from the Andes who settled in Loreto, Madre de Dios and other Amazonian regions (Alvarez and Naughton-Treves 2003). "Immigrants came by the thousands in response to these opportunities and also to escape political violence in the highlands" (Alvarez and Naughton-Treves 2003, 270). According to Coomes (1996), the PRESA project drew colonists and urban investors to the rural areas around Iquitos, creating a land-rush and competition for land with *ribereño* communities that had been in the area for generations. Of particular importance to forest cover, the interest-free loans from the Agrarian Bank linked to this program required land to be cleared for a particular use in order to receive the credits (Mäki et al. 2001). Loker (1993) saw evidence of the impacts of this requirement in the form of forest clearance for pastures by farmers who did not even own, nor actively intend to purchase, cattle.

In addition to schemes aimed directly at agricultural expansion, the Amazon has received tax exemptions on multiple occasions over the years (e.g. 1965 Law 15600 that granted tax exemption to the Amazon for 15 years, 1998 Investment Promotion Law) (Limachi et al. 2006). All of these sought to increase economic activities in the Amazon and drew industries, and subsequently migrants, to the region. They were built on the premise of transforming land from forests into 'productive' uses.

3.5 The pull of market booms

Many migrants to the Amazon came in response to market booms. First, during the rubber boom, later for timber, and more recently for gold and oil palm. Of particular interest is the population growth in Madre de Dios (29% growth from 2007 to 2017) brought about in part by the paving of the Interoceanic Highway together with a gold rush linked to increasing gold prices (Zegarra et al. 2007). In the case of Madre de Dios, deforestation from artisanal, largely illegal, gold mining has outpaced deforestation from swidden and other agricultural practices (Swenson et al. 2011).

3.6 Coca as push and pull?

Some point to coca cultivation as a driver of deforestation in the Amazon, with two models: the immiseration model and the frontier model. The immiseration model asserts that poverty and lack of viable alternatives lead to deforestation (Rudel and Roper 1997), and since coca is a relatively stable, high-value crop, its expansion in the Amazon is due to its role in attracting poor farmers from the Andes to migrate to the region. Some point to the illegal production of coca leaves leading to economic booms in the Peruvian Amazon, particularly in the main cities such as Iquitos, Pucallpa and Tarapoto (San Roman 1994).

The second model, the frontier model, asserts that the building of roads and other infrastructure enables access and thereby leads to migration into an area and further deforestation (Rudel and Roper 1997). Dávalos et al. (2016) found that much of the coca cultivation in the Peruvian Amazon is linked to previous government initiatives to foster colonization of the region (through road building and settlement projects) and in fact, coca itself was not a main cause of migration to the area under study. According to Chirif (2003), the failure of these colonization projects led to impoverishment of the colonists and created inroads for coca cultivation. In their study of coca cultivation along the Peru–Brazil border, Salisbury and Fagan (2013) highlight that coca cultivation is often cyclical, with original clearing for cultivation often followed by government coca eradication efforts, relocation, growth and then further eradication, which leads to a repetitive cycle and clearing of larger areas of forest.

The Alternative Development Projects (PDAs), with support by the UNODC (United Nations Office on Drugs and Crime), began in the early 1980s in Peru and were aimed at replacing coca cultivation with legal crops and supporting smallholders and communities that 'voluntarily' took part in the projects in making that transition (Veillette et al. 2005). Those who did not volunteer were susceptible to eradication efforts without any support to transition to other crops after their coca crops had been destroyed. As noted above, some of the PDA efforts focused on improving road access in coca-growing valleys, which led to increased deforestation along those roads (CDC-UNALM 2004). In addition, some of the PDA focused on encouraging the expansion of oil palm plantations, which have been linked to deforestation (Guitiérrez-Vélez et al. 2011; Bennett et al. 2018a; Bennett et al. 2018b). While some frame 'alternative development' as a success in some cases (e.g. the 'miracle of San Martin' where proponents point to reductions in poverty and coca eradication, despite many caveats), it has not been universally popular or successful (Cabieses 2010). As Cabieses (2010, 11) quotes a representative of a coca growers' confederation: "For us alternative development means that they plant the projects on a table, cultivate them on a blackboard, harvest them on a computer and then sell them in television adverts."

3.7 Conflicting government policies – The current push/pull dynamics

Unlike the earlier waves of migration to the Amazon that were by and large supported by the government, migration in the 21st century has been met with both support (through infrastructure development policies and agricultural credit schemes) and resistance (e.g. the blame placed on migrants for deforestation in policies focused at reducing deforestation). While migrants are scapegoated for their role in deforestation, very little has been done to discourage migration to the Amazon.

The region of Ucayali is one example of contradictory policies. Oil palm, deemed a 'crop of national interest' in 2000, has been expanding in Ucayali since initial government efforts installed smallholder cultivation projects in the 1990s (Bennett et al. 2018a. By 2015, oil palm covered 25,000 ha, approximately 10,000 ha of which was being farmed by smallholders, and predominantly by households that migrated to Ucayali from the highlands and other parts of the Amazon (see Bennet et al. 2018a. The emphasis on oil palm was linked in part to the creation of 'alternative development' projects that aimed to replace coca cultivation (Bennett et al. 2018a). The *Proinversion* program sought to increase production of palm oil which led to 845 km^2 of oil palm plantations in the Amazon region as of 2015 (Vijay et al. 2018).

Despite promoting oil palm, the Peruvian government has also included Ucayali as one of its foci in combating deforestation under its National Program for Forest Conservation (PNCB) and REDD+ (MINAM 2016) as well as supporting a project for Sustainable Forest Landscape Management under the Forest Investment Programme (FIP). It is unclear how the government intends to reconcile its stated commitments to conservation in Ucayali with continued support for the oil palm industry.

4 Internal migration in Peru – there is more to the story than the data show

As part of the national census, the National Institute for Statistics and Information (INEI) collects data on the birthplace of individuals and uses their current location as an indicator of internal migration. These data, for the Amazon, show different trends of in-migration for different regions (Figure 10): migration to Loreto has been relatively stable while San Martin saw a rapid increase in the 1970s and 1980s and then stabilized in the 1990s and 2000s. Migration to Ucayali has fluctuated and it has steadily increased for Madre de Dios since the 1972 census.

While some people were migrating internally to the Lower Amazon, others were leaving the region. Loreto and San Martin saw the highest rates of out-migration and these continue to grow (Figure 11). The rates for Ucayali have increased slightly, whereas out-migration in Madre de Dios has remained very low over time (Figure 11).
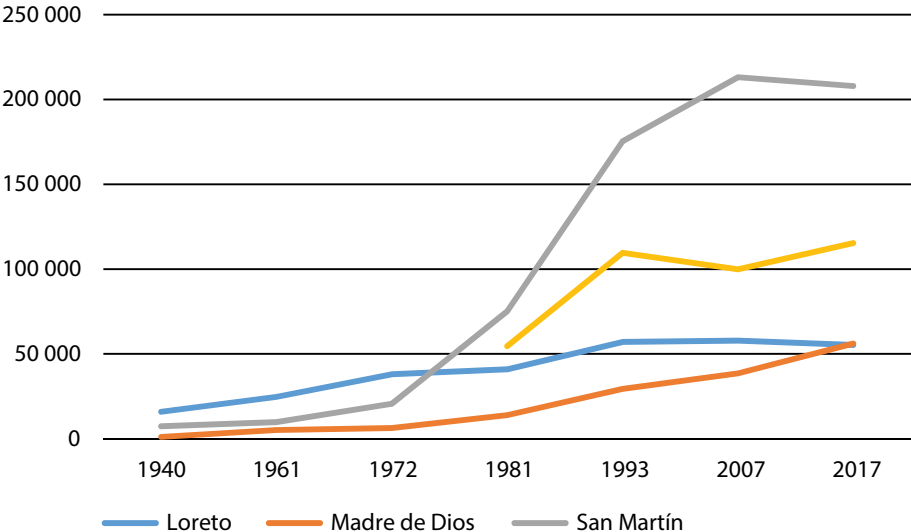

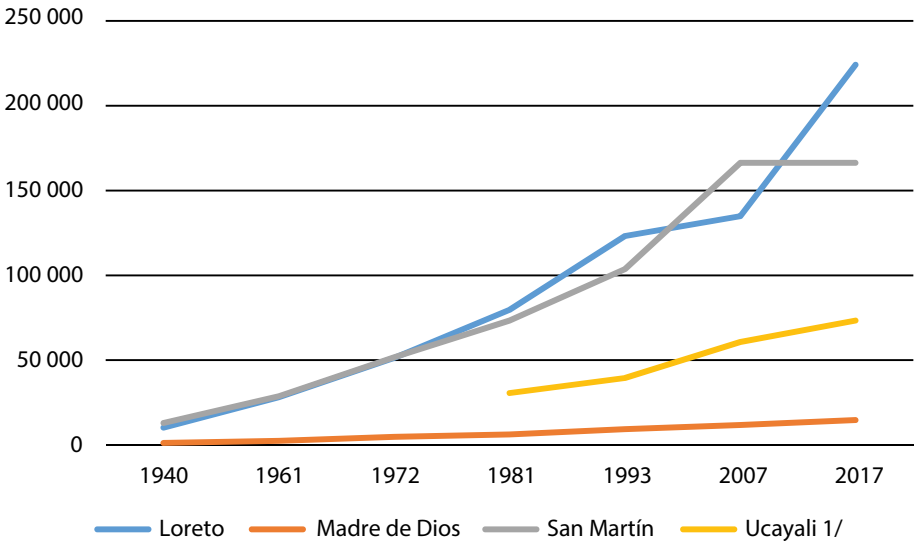**Figure 10. Migration to the Lower Amazon (INEI 2018a statistics).**

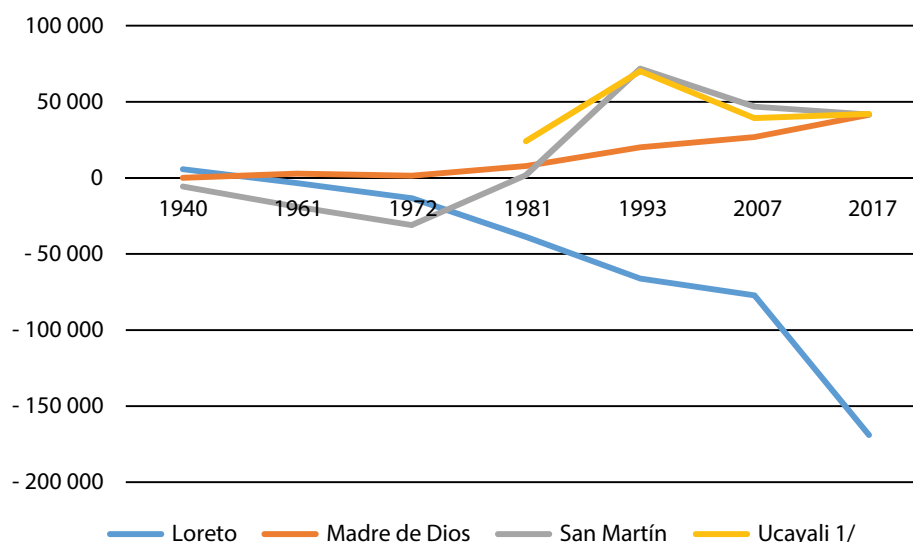**Figure 11. Migrants leaving the Lower Amazon (INEI 2018a statistics).**

Figure 12. Net migration for Lower Amazon (INEI 2018 statistics).

The net-migration rates for the Lower Amazon are revealing in terms of contradicting the narrative on increasing population in the Amazon due to in-migration (see Figure 12). For Loreto, there has been a net loss in population due to migration (more people have left Loreto than moved to Loreto). San Martin saw a net loss in the period 1940–1980 and then a net gain thereafter. For both Madre de Dios and Ucayali, there has been a net gain in population linked to migration.

While the INEI data can show trends in migration patterns, they fail to capture the complexity of the situation. For example, a child born in Cusco who moved to Madre de Dios at the age of 1 year will be classified equally to someone who moved from Cusco to Madre de Dios at the age of 30 years. Their lived experiences are vastly different. The measures will also miss many households that are multi-sited (e.g. work on farms in both Huánuco and Ucayali) or cyclical (move to the Amazon and then back to the Andes). People are often highly mobile and may move to one region immediately after a census, stay for several years and then move back to their homeland before the next census – such people would not be counted as migrants. The forest-related implications of migration to urban areas is also quite different to migration to deforested landscapes, which is again different to migration to rural forest frontiers. Given the complexity of migration and the different potential impacts of said migration on forests, the INEI census data do not capture enough of this heterogeneity to allow us to fully understand these patterns.

4.1 Narratives about Andean vs Amazonian smallholders

"In Peru, colonos (migrants) from impoverished and conflict-ridden parts of the country put pressure on mountain forests, both in terms of their numbers and because of their lack of knowledge about the harmful effects of slash-and-burn agriculture on these sensitive ecosystems" (Meyerson et al. 2007, 185).

Many authors link Andean migrants with environmental degradation. Chirif links this degradation to "poor use of the land by a population who had no knowledge nor experience in how to manage it" (Chirif 2003, 2).

At the same time, there is a broad discourse in Peru that farmers from the *Selva* are less productive than those from the *Sierra* (Brack 1997). One study of the adoption of agricultural policies by farmers (e.g. take-up of incentives for cattle insemination, reforestation, copoazu plantations) in Madre de

Dios found no difference between those of *Sierra* vs *Selva* origins, but that the length of time the smallholder had been present on the farm was positively correlated with policy adoption by farmers of both origins (Chavez et al. 2014). However, in a different study, Chavez and Perz (2012) found that smallholders who lived on land in colonization projects (based on a program that brought colonists from Arequipa and Puno to Madre de Dios in the late 1980s) tended to have larger areas under cultivation and smaller forested areas on their plots. They also tended to have more pasture than those who were born in Madre de Dios.

However, it is important to note that many migrants to Amazonian frontiers are not from the *Sierra*. Many migrate between Amazonian sites or from urban to rural areas. In their study of migration amongst residents in rural areas near Pucallpa, Ichikawa et al. (2014) found that most migrants there were born in the *Selva* and many were from urban areas, particularly the nearby city of Pucallpa. Limachi et al. (2006) found this was the case along the Iquitos–Nauta Highway in Loreto: most of the migrants were coming from within Loreto.

While much of the focus of the literature on migrants from the *Sierra* has focused on settlers, Shanee and Shanee (2016) looked at land-trafficking in the NE Amazon, finding that landless farmers from the *Sierra* who arrived in the region, cleared land to 'improve' it with the intention of selling it to others at a higher price. The investment in land was also aimed at demonstrating landownership – as such, forests are sometimes cleared indiscriminately in order to prove that 'use' as primary forest, whether it is managed or not, is not considered 'improved'. They also pointed to the phenomenon of professional land-traffickers who relied on links to corrupt officials to engage in land speculation. Much has been written about land grabs outside of Peru, particularly in the Brazilian Amazon (Loureiro and Pinto 2005) as well as global patterns of land accumulation (Borras and Franco 2012). Earlier studies have claimed that access to land in Peru was relatively easy compared with Brazil (Imbernon 1999). This interpretation ignores prior occupation by indigenous peoples but also reflects a Peruvian Amazon before the population growth and agricultural expansion of recent years.

4.2 The complexity of migration: cyclical patterns and the urban-rural nexus

Many authors point to trends of urbanization in Latin America and the Amazon. INEI (2001, 32) asserts that "rural zones have traditionally functioned as a place of exodus of people who seek better opportunities (educational, work, health) … and leave the countryside contributing to already increasing populations in the cities." Since the 1970s, there has been net migration to urban areas, with peaks during the period 1985–1995 (which coincides with armed conflicts). While some claim that these processes of urbanization are beneficial to poverty alleviation, Morley (2017) found that almost 3 million people in Peru escaped from rural poverty between 2004 and 2012, and 62% of them remained in the rural sector. Morley (2017) also found that 80% of the increase in rural incomes came from increased wages. Escobal (2001) found that 51% of rural household incomes came from off-farm wages.

While much of the literature points to urbanization in the Amazon, it is important to note the role of urban-to-rural migration (as the example in the section titled "Narratives about Andean vs Amazonian smallholders" about migration from Iquitos to areas along the Iquitos–Nauta road highlights). There are also cyclical patterns of migration and households considered to be multi-site, maintaining smallholdings in rural areas whilst also having homes in urban areas, often within peri-urban settlements (Padoch et al. 2008). These multi-site households and livelihood patterns are important for several reasons. Theories of deforestation drivers assert that urbanization will decrease pressure on forest cover (Lambin et al. 2001), yet the Padoch et al. (2008) study highlights the potential for multi-site households to confound our understanding of these phenomena. While a census might register the household as urban, they may in fact have rural farms and clear forests for cultivation or to demonstrate use, and thus ownership, of the land. As Collins (1986) asserts "The person identified by the social scientist as a peasant one month may be a rural proletarian the next, and a migrant to the

cities during the dry season." (Collins 1986, 655). Historically, Peru has adhered to the 'social function doctrine', which stipulates that the extent to which the state should protect property ownership is linked to the role the property has in meeting social needs (see Ankersen and Ruppert 2006). As such, it is expected that land will be 'used' – forest clearing being one of the quickest and most straightforward means to demonstrate 'use'.

Migration can be cyclical over time. Castillo and Brereton (2018) found that as job opportunities declined in the La Granja in the Andes, many families moved either to urban areas on the coast or rural lands in the lowlands. Often, older members of the family stayed behind to watch the land and property. When opportunities improved, families moved back to the Andes. As such, there is a two-way migratory pattern with fluid networks across different regions. Some studies have shown patterns of cyclical migration from the Andes to the Amazon valleys in times of the Incan empire, and more recently through the migration of Aymara to areas in Bolivia up until the 1930s when the Chaco War (between Bolivia and Paraguay) and agrarian reform ended Peru–Bolivia migration patterns (Chicchón et al. 1995). Migration of Aymara farmers to Tambopata and Inambari first focused on cultivation of coca, shifted to coffee, and then back to coca again when it became more profitable in the 1970s (Chicchón et al. 1995). Collins (1984) showed how cyclical patterns of migration between the highlands and the Amazon allowed small-scale farmers to maintain economic activities in both locations; however, many of these households returned to the highlands and did not settle permanently in the Amazon at that time.

Studies from Brazil have shown similar cyclical patterns and emphasize the importance of a family's ability to maintain resource rights in different locations (in this case, urban and rural), as this can allow them to accrue wealth (Nasuti et al. 2013). MacDonald and Winklerprins (2014) found that many rural migrants to urban centers in Para, Brazil, quickly relocated to peri-urban zones where they could carry out a mixture of wage-labor and subsistence agriculture. In eastern Bolivia, colonist families were observed to settle simultaneously across multiple sites, from peri-urban locations to homesteads on forest frontiers, to take advantage of a range of opportunities and economic niches (Stearman 1978).

These cyclical patterns of migration represent adaptive strategies in response to changing economic conditions. If the government wishes to stem the tide of migration to the Amazon, support for stable economic conditions in non-frontier areas could be more effective than investments in 'alternative' projects to reduce deforestation footprints of migrants.

5 Environmental consequences of migration?

"…unfavourable market integration, high levels of surplus extraction and policies that engender indebtedness…Not only do they perpetuate poverty and underdevelopment but the strategies smallholders adopt to insure their survival under such circumstances are frequently incompatible with sustained, environmentally appropriate land use and lead to [environmental degradation]."(Collins 1986, 1).

Throughout these different waves of migration to the Amazon, there have been different discourses, often based on limited research and evidence, regarding the relationship between migrants and forests, the patterns of land use in the region, and the environmental consequences of migration in terms of forest cover and forest use/degradation.

Alvarez and Naughton-Treves (2003) found that deforestation along roads was linked to national policies (and decreased with austerity cuts) while deforestation along rivers tended to remain constant. Those authors also found that colonists from the highlands tended to concentrate along roads and tended to have more pasture and less forest than Amazon-born smallholders. Bennett et al. (2018a found that smallholder oil palm producers tended to concentrate along roads and showed higher deforestation rates than households located along nearby rivers that cultivated more traditional crops. Southworth et al. (2011) found that for the case of Madre de Dios, roads influenced deforestation rates up to 18 km from the road (whereas they found it was 45 km in Brazil).

Although roads are often blamed for opening up a region to in-migration, there is a complex array of factors that influence whether or not those roads lead to deforestation. As Mäki et al. (2001, 211) point out in their study of the Iquitos–Nauta Highway, the "causes of forest destruction are far more complicated than just direct correlates of road construction and settlement. The actions that take place along a newly built road reflect various societal processes and can be tightly linked with inappropriate land-use planning and lack of control" by the government. One study of changes in forest cover around roads improved under the *Proyecto de Desarrollo Alternativo* (Alternative Development Project) in Huallaga and Aguaytia found that forested areas along the highways increased between 1986 and 1996 (during the peak of armed conflicts in the region) but then decreased by 2001 (CDC-UNALM 2004).

5.1 Colonization policies and deforestation by migrants

Coomes (1996) found that once credit programs ended (e.g. the PRESA program), many of the famers (both *ribereño* and colonist) could no longer afford to work the lands that were far from rivers and/ or roads; thus, the associations became defunct and much of the area converted to secondary forest over the years. Chavez and Perz (2012) found that fluctuations in the rates of deforestation in Madre de Dios were linked to the political regime in power at the time, which mirrored the violent conflicts linked to the Shining Path and other armed groups (forest cover decreased under President Garcia, increased under Fujimori, and decreased again under Toledo).

Although many point to the increase in migration to the Peruvian Amazon as a driver of deforestation in the region, the relationship is not so simple or straightforward. Perz et al. (2005) found that increased population in Amazonian departments did not in fact correspond to increased deforestation in all departments. However, Perz et al. (2013) found that households with origins outside of the *Selva* reported higher percentages of pasture on their farms than those from the *Selva*. Uriarte et al. (2012)

highlight that urbanization, and the loss of populations from rural areas, are actually linked to an increase in fire occurrence and the forest degradation caused by wildfires.

5.2 Scapegoating swidden agriculture and poor farmers

> "Recognition of the links between structural incentives to produce for short-term gain, deterioration of resources, and loss of land by smallholders challenges the simple answers frequently provided to the question of how new tropical lands can best be brought into production."
>
> (Collins 1986, 8)

The narratives around migration in the Peruvian Amazon are often oversimplified. For example, colonists are seen as the key drivers of deforestation with politicians and academics pointing to 'migratory agriculture' without attention to the activities behind small-scale farms and the complex sociopolitical and economic systems that underpin them. Dourojeanni (1976, 4) points to the "tragic process of migratory agriculture, a truly vicious cycle, provoked by poverty that just leads to the creation of even more poverty."

As Padoch and Pinedo-Vasquez (2010, 551) argue, "swiddening has been criticized, condemned, and criminalized everywhere it exists" when in fact it has the potential to be part of a landscape mosaic which promotes cyclical management of forest–farm interfaces and, on longer time horizons, can be sustainable at the landscape scale.

In their review of global changes in swidden systems, Van Vliet et al. (2012) found that most regions have seen a decrease in fallow periods (linked in part to population pressures and limited land), while some case studies have shown an increase in Latin America, with examples from Peru. Padoch et al. (2008) found that the size of annual crop fields had decreased while the age of fallows increased slightly. In his study of colonists and cattle in Ucayali, Loker (1993) found that degradation pressure linked to grazing, led to longer fallow times. He also found that farms had a 'minimum viable size' in order to maintain sustainable farm-fallow cycles that were larger than those granted under the 'directed' colonization schemes.

In reality, a complex web of factors influences the decision to migrate, the destination to which people migrate (urban vs rural, near roads vs near rivers) and the land-use choices migrants undertake upon arrival in rural areas of the tropics. As Collins (Collins 1984, 1986) asserts, recent migrants face an uphill battle for sustainable resource management under policy and economic environments that limit their access to credit and/or surplus that could be reinvested in more productive and long-term sustainable practices. As such, small-scale farmers and recent migrants face structural constraints in the form of a lack of access to credit, land title and commercialization opportunities that could support transitions into more sustainable systems of production.

In many cases, government projects have established 'archipelagos' of small plots of titled land within 'seas' of forests. Within this farm–forest mosaic landscape, households 'pulled' to the region via government policies or 'pushed' there due to limitations in their homelands, are often left to their own devices to farm plots of lands that are not large enough to meet their needs. As such, some government interventions support 'avoided deforestation' without addressing the reality of the limitations of productivity and perverse incentives to deforest land in order to ensure ownership.

6 Conclusions

This literature review highlights not only the complexity of the migrant–forest interface in Peru but also the relative lack of research on these dynamics. Government narratives point to migrants as both the culprits of, and solutions to, the Amazon's problems. On the one hand, the government has promoted colonization of the region as a means to integrate the Amazon into the country and promote agricultural expansion and alleviate pressure on limited land in the Andes. On the other hand, migrants are blamed for deforestation and environmental degradation in the region. There is an element of truth in these discourses. Yet in both cases, they oversimplify the complexity of the reality facing migrants to the Amazon and also underestimate their ability to innovate and, given time, to find ways to sustainably manage their lands. The literature points to clear trends in concentrations of migrants, and deforestation, along roads and highways that have been built as part of the government's 'integration' strategy. Migrants have moved to lands along the roads, due to access to markets and the concentration of colonization projects along roads. In many cases, these projects have failed and the migrants are left to their own devices to maintain themselves and their families. Together with incentives to demonstrate use of the lands as a means to secure land title and/or ownership rights, they often clear forests on their lands. Instead of pointing the finger at migrants and blaming them, the government could focus instead on regional planning that could mitigate road impacts and support sustainable models of production.

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This paper reviews the literature on the links between migration and forests in the Peruvian Amazon. It highlights not only the complexity of the migrant–forest interface in Peru but also the relative lack of research on these dynamics. Historically, official narratives point to migrants as both the culprits of, and solutions to, the Amazon's problems. At times, the government has promoted colonization of the Amazon as a means to integrate the region into the country as well as to encourage agricultural expansion and alleviate pressure on limited land in the Andes. In other periods, migrants are blamed for deforestation and environmental degradation in the region. These discourses oversimplify the complexity of the reality facing migrants to the Amazon and the factors that 'push' them away from their birthplaces and/or 'pull' them to the Amazon. They also treat migrants as a homogenous group, underestimating: the role of migration within the Amazon, the cyclical nature of migration, processes of urbanization and multi-site households, and the diversity of livelihoods migrants pursue upon arrival. A more detailed understanding of migrants, migration and the related conditions and processes driving human mobility in the Amazon should provide a more effective foundation for defining public policy in the region, for example, for the identification of strategies to mitigate the impacts of road construction or to support sustainable models of production in areas occupied by smallholder farm families. This review is intended as a step toward a fuller understanding of these processes by compiling existing information as a point of departure.

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