



Land formalization – The new magic bullet in counternarcotics? A case study of coca cultivation and tenure (in)formality from Colombia



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ABSTRACT

Both policymakers and scholars have suggested that informal land tenure contributes to the perpetuation of illicit drug crop cultivation and, conversely, that land formalization programs serve counternarcotics aims. This article examines some of the key causal mechanisms said to underlie the posited relationship between land tenure (in)formality and the cultivation of crops used for illicit drug production. Our analysis is grounded in the context of Puerto Asís, Colombia – one of the most important coca-producing municipalities in a country that produces the majority of the world's cocaine. The case study is based on extensive fieldwork in Puerto Asís, including in-depth interviews with peasants who cultivate(d) coca, community leaders and local officials. We found: (i) that informal and semiformal institutions provide a *basic* level of land tenure security for both those with and without state-recognized property titles; (ii) that peasants invest considerable amounts of money and labor in their farms and community infrastructures, despite lacking formal land titles; (iii) that coca cultivation itself is a comparatively costly investment, with eighteen months minimum before payback; (iv) that peasants' access to credit is not conditioned on them having a formal land title; (v) that bank loans do not make people less dependent on coca cultivation; and that (vi) farmers find it difficult to survive with legal livelihoods and thus permanently exit the coca economy for a long list of reasons, which are not addressed via land titling and registration programs. These findings are contrary to popular policy narratives. We conclude that formal titles are an important tool for Colombian peasant farmers to defend their land against powerful external actors but will not necessarily serve the purposes commonly presented in the literature on illicit drugs.

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1. Introduction

“With land formalization, the replanting of coca is zero per cent” (Agencia Nacional de Tierras, 2018a). This is the striking headline of an article on the Colombian National Land Agency webpage, praising the Formalize to Substitute counternarcotics program. The article provides no details about the “zero per cent” claim, which sounds (and probably is) too good to be true.

The Colombian government launched Formalize to Substitute in 2016, in alliance with the United Nations Office on Drugs and Crime (UNODC). The program is part of wider efforts to ensure that Colombia's *campesinos* (peasant farmers) have legal rights to the lands they cultivate, but specifically “focalizes land formalization activities in territories with illicit crops” (UNODC, 2016). According

to Emilio Archila, the Presidential Advisor for Stabilization and Consolidation, “Formalize to Substitute is absolutely magical, because a family, once they have the title for their land, can access credit [...] but also that person doesn't return to [coca] cultivation, ever again” (Semana TV, 2020, 40:00 min). Similarly, the former Director of the National Land Agency, claimed that land formalization is “the best motivation and stimulus so that families maintain their plots free of coca” (Agencia Nacional de Tierras, 2018a). Notwithstanding the popularity of the idea that land formalization reduces illicit crop cultivation, understanding of how tenure (in)formality influences people's decisions to grow these crops is limited.

This article contributes to nascent discussions on the relationship between property rights and illicit crop production through an analysis of evidence from Puerto Asís, Putumayo – a major coca-producing area in southern Colombia. We use fieldwork observations, interviews and survey data to scrutinize the most popular rationale for incorporating land formalization into

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counternarcotics policy, which focuses on encouraging and enabling investment in licit livelihoods. So far as we know, this is the first systematic *qualitative* case study of the relationship between illicit drug crop cultivation and land tenure (in)formality.

Our key case-study findings can be summarized as follows. First, informal/semiformal tenure systems in Puerto Asís work *relatively* well and local institutions provide a *basic* level of tenure security for landholders, regardless of whether they have a state-recognized title. Second, many of the peasants we interviewed have invested considerable amounts of money and labor in their farms and community infrastructures, despite lacking formal land titles. And, contrary to what is often implied, coca cultivation itself is a comparatively costly investment, with eighteen months minimum before payback. Third, access to formal credit did not make research participants less dependent on illicit crops. In any case, peasants' access to credit is not unavoidably conditioned on them having a formal land title. Fourth, prior attempts to shift to licit livelihoods typically failed due to poor harvests, because people could not find buyers for their legal produce or because earnings from sales barely covered the costs of production/transportation. As explained below, all of these findings have implications for common claims about the relationship between tenure (in)formality and illicit crop cultivation.

We recognize that our analysis is limited to coca production (which is different to opium-poppy and marijuana) in a single municipality, and that our findings cannot necessarily be extrapolated to other places. Nevertheless, the evidence we provide challenges generalizations and assumptions common in drug policy discourses, revealing – at the very least – the problem with decontextualized designs and interventions. Furthermore, as detailed in later sections, previous research from other parts of the world bolsters some of the broader propositions (e.g., land formalization does not necessarily increase credit access/uptake) that form our argument. Thus, our conclusions build upon wider rural development scholarship, which drug policy specialists have apparently overlooked.

The subsequent section examines the rationales for incorporating land formalization into counternarcotics policy, providing an overview of the scant literature on the topic. We then introduce our case study context and methods (section 3), before using our findings to explore three basic issues at the heart of the discussion on property rights and illicit crop cultivation: tenure security (section 4), investment (dis)incentives (section 5), and credit access/uptake (section 6). In the final discussion (section 7), we argue that land formalization – on its own or even combined with superficial substitution projects – is not likely to reduce dependence on coca cultivation in Puerto Asís, but is imperative for other reasons.

2. Land formalization and counternarcotics policy: an overview of the literature

Land formalization has been promoted both as a standalone counternarcotics strategy,¹ and as a complement to punitive measures and Alternative Development initiatives. Overall, the drug policy literature refers to at least six rationales (some independent and some tied to other tactics) for incorporating land formalization into counternarcotics policy. A single policy or program may be based on

¹ For example, an evaluation of the Forest Ranger Families initiative in Colombia concluded: “land titling could prove more effective than Alternative Development programs themselves, since people are less likely to cultivate illicit [crops] on their own land” (2012 study cited in Garzón & Riveros, 2018, p. 14). And though – in theory – Colombia's Formalize to Substitute program is linked with Alternative Development (AD) projects, in practice there has been little or no coordination between the two (Garzón & Riveros, 2018, p. 15; see also Peña et al, 2019, 97).

more than one of the rationales outlined in the paragraphs that follow.

First, in some contexts, access to a formal land title has been made conditional on eradication of illicit crops (on Peru, see Kernaghan, 2017, p. 656; on Colombia, see Garzón & Riveros, 2018, p. 15; Peña et al, 2019, pp. 96–97). Thus, a simple rationale for incorporating land formalization into drug policy is that the state's control over peoples' access to statutory property rights can be used to incentivize eradication through reward and punishment (see also Garzón & Riveros, 2018, p. 17). We have not encountered any texts that explicitly evaluate or recommend conditional titling as a counternarcotics strategy in and of itself.

Second, some countries' (e.g., Peru and Colombia) laws allow for confiscation – via asset forfeiture proceedings – of land used for the cultivation of illicit crops (Mason & Company, 1995, pp. 143, 145; Peña et al, 2019). A number of observers suggest that the threat of confiscation deters the (re-)planting of illicit crops, in particular if the farmer has been granted a formal title, because this means she/he has more to lose (Garzón & Riveros, 2018, p. 13; Muñoz-Mora et al., 2018; Samper-Strouss 2019, cited in Peña et al, 2019, 98). The underlying idea is that titling serves drug control because it makes the threat of confiscation more powerful. We have not come across any texts that evaluate the effectiveness of such confiscatory policies, nor any that *directly* and *openly* defend them (see Muñoz-Mora et al., 2018), presumably because of the socially regressive implications, given that those who cultivate illicit crops are typically marginalized smallholders (for a critique of this policy, see Peña et al, 2019).

Third, land formalization (including updating registries and cadasters), if done well, can facilitate access to information relevant for improving the design and implementation of illicit crop substitution or Alternative Development programs. It may also serve monitoring or surveillance, and thus law enforcement purposes, as in the case of Bolivia – discussed below (Grimmelmann et al., 2017, p. 103).

Fourth, programs and projects run by governments or NGOs may disbar applicants without formal land titles. In this sense, formalization efforts could improve access to different forms of assistance (including subsidies and support that have nothing to do with drug control), which in turn could help farmers establish licit ventures (Garzón & Riveros, 2018, p. 17; Ojeda, 2011, p. 6; Colombian policymaker, cited in Peña et al, 2019, 108; UNODC, 2015, p.107).

Fifth, some argue that having a formal property title encourages people to stay put, for example by increasing feelings of responsibility and attachment to place. This is relevant to counternarcotics aims given that people often respond to forced eradication by migrating and replanting elsewhere, and that coca and opium-poppy growers are thought to be particularly footloose (Garzón & Riveros, 2018, pp. 13, 14; UNODC, 2016; UNODC, 2015, pp. 79, 100, 106–107, 110).²

Sixth and finally, the most popular rationale for linking land formalization to drug control is that the former is said to encourage and enable investments in licit agricultural ventures. More specifically, ensuring farmers have formal property titles for their lands is said to (a) increase tenure security, thereby (b) improving incentives for long-term investments, and to (c) facilitate access to investment credit (see e.g., Grimmelmann et al., 2017; UNODC, 2015, pp. 105–107; Garzón & Riveros, 2018; Muñoz-Mora et al., 2018). This rationale builds on a more general argument about

² Ramírez's book (2011) provides a forceful critique of this “distorted representation [of Putumayo's coca farmers] as rootless migrants looking for a fortune in easy money in order to return to their regions of origin” (p. 122). It also offers important insights into how such assumptions have shaped government discourse and practice in Colombia.

the economic benefits of land titling and registration programs (e.g., Feder & Feeney, 1991; Besley, 1995; Soto, 2001; Deininger, 2003; for a critical overview of this argument, see Sjaastad & Cousins, 2009; Bromley, 2009; Lawson-Remer, 2014; for Colombia, see Acero & Parada, 2019). Since this rationale is the focus of the article, we provide further details about the underlying assumptions and claims.

(a) The investment rationale is partially reliant on the assumption that tenure informality translates into tenure insecurity and that vulnerability to land loss is reduced when people have formal property titles. (b) It logically follows that people without titles avoid making large long-term investments for fear of losing time and money due to dispossession and, conversely, that clearly defined formal property rights incentivize investment. Thus, tenure informality is thought to be one reason coca and opium-poppy cultivators don't shift to licit crops with large investment outlays and timeframes (Mejía, 2015, p. 13; Grimmelmann et al., 2017, pp. 77, 88, 100; Muñoz-Mora et al., 2018, p. 270; Anderson, 2018, pp. 7, 15). The other side of this argument is that opium-poppy and coca are particularly suitable crops for farmers without formal land rights because the investments required to establish them are comparatively small, and because they do not take long to produce (Holmes et al., 2018, pp. 123, 129; Grimmelmann et al., 2017, pp. 88, 98; Anderson, 2018, p. 7). (c) Finally, the credit component of the investment rationale assumes that an additional reason poppy and coca growers don't shift to legal economies is because they lack capital to invest and that land formalization will facilitate access to investment capital through previously unobtainable loans (see Grimmelmann et al., 2017, p. 103; Garzón & Riveros, 2018, pp. 14, 17; UNODC, 2015, 2016).

Despite growing interest in land formalization as a counternarcotics tool, few have scrutinized the various rationales used to advocate for such policies/programs and there is very little research on the relationship between tenure (in)formality and illicit crop cultivation (UNODC, 2015, p. 105; Garzón & Riveros, 2018, pp. 13–14). Nonetheless, the literature suggests that counternarcotics success stories involved land titling and registration.

Thailand's illicit drug policies are widely considered to be exemplary and, according to Anderson, the formalization of land rights was central to their success. Formal ownership, he claims, improved tenure security and thus stimulated investment in alternative long-term crops like coffee (2018, p. 7; 2017, p. 54). Unfortunately, he does not elucidate the basis for this claim. In any case, Anderson does not attribute the marked decline of opium-poppy cultivation in Thailand to a single factor. Notably, the Thai government also invested heavily in roads, and guaranteed purchase of the farmers' legal substitute produce at minimum (often subsidized) prices (Anderson, 2018, pp. 6–7, 15; 2017, pp. 53–54).

Grimmelmann et al. (2017), whose publication (unlike Anderson's) is specifically about the land-drugs nexus, describe an Alternative Development program implemented in the San Martín region of Peru, which included formalizing the vast majority of farmers' land rights. According to the authors, in the wake of this program, economic and social wellbeing in the region improved, while coca cultivation fell. They suggest this was partially a result of "the land registration [component of the] programme [which] is acknowledged to be one of the main incentives for smallholder farmers to switch to alternative crops" (Grimmelmann et al., 2017, p. 99). However, they do not explain how or why this worked.

These same authors highlight the role of land formalization in Bolivia's coca control program. Titling and registration (combined with a coca producer enrollment and associated database) facilitated the social-control component of the program by making it easier to determine ownership of a particular coca plot and thus verify compliance with the cultivation ceiling (Grimmelmann

et al., 2017, pp. 100–102; see also Mortensen & Gutierrez, 2019, p. 68; Grisaffi & Ledebur, 2016, p. 11).

The final publication considered in this review, by Muñoz-Mora et al. (2018), is the first to concentrate exclusively on the question of whether and how tenure (in)formality affects illicit crop cultivation. Their quantitative analyses of 192 municipalities in Colombia (from 2000 to 2009) indicate that "a one-standard-deviation increase in the formality index for small landowners is associated with a decrease in the share of municipal area allocated to coca crops of 0.101 percentage points" (p. 269). According to the authors, this means that on average, "the formalization of one additional hectare of land [...] is associated with a decrease of approximately 1.4 ha of land allocated to coca" (p. 269).

Nevertheless, the authors do not explain clearly what accounts for the decline they observed in the land area used for coca: land formalization *or* land formalization *combined with* forced eradication and Alternative Development (AD) programs. In some places, they present land formalization as an *alternative* to forced eradication (Muñoz-Mora et al., 2018, p. 282), yet in others they present formalization as a *complement* to conventional counternarcotics policies. For example: "attempts to reduce coca crops with the implementation of Plan Colombia [which included forced eradication and AD programs] were more effective in those municipalities with more formalized land property rights" (*ibid*). In sum, they leave the reader with unanswered questions regarding their findings and the arguments they derive from these.

Muñoz-Mora et al. (2018) provide two potential explanations for the observed relationship between land formalization (plus Plan Colombia?) and coca cultivation. One is that formal titleholders "have more to lose" than their counterparts without state-recognized property rights and hence are more likely to give up coca to avoid punitive land confiscation (Muñoz-Mora et al., 2018, pp. 269, 274). They call this the "deterrence mechanism". The authors' second explanation is that the War on Drugs improved the "institutional environment" and the "rule of law" (concepts they do not define) and that smallholders with legal land titles benefitted more because they could "use the land more in this setting, become more visible, and take better advantage of alternative programs" (Muñoz-Mora et al., 2018, p. 268). They also affirm that formalization comes with "positive externalities" such as "higher productivity, investment, social capital" and access to credit (*ibid*, pp. 269, 273–274). They call this "the substitution mechanism", which is confusing given that in this context substitution - the replacement of coca with licit crops - is an outcome rather than a mechanism.

Muñoz-Mora et al. (2018) do not offer convincing evidence for either of these posited causal mechanisms. While there is no attempt to "test" the "deterrence mechanism" at all, they do claim to "test" the "substitution mechanism" by analyzing the relationship between land formalization and the planting of new coffee crops (often a substitute for coca) within a given municipality (*ibid*, pp. 278, 281). The test was fruitful in the sense that they did find a positive association. Nevertheless, it is unclear why this should be treated as evidence for the poorly defined "substitution mechanism". The link between coffee planting and formalization could also be an outcome of the "deterrence mechanism": fearing confiscation of their newly titled lands, farmers replace their coca with coffee. More plausibly, the link has nothing to do with coca. In general, Muñoz-Mora et al. (2018) do not provide empirical analyses to support their claim that "improved land rights create micro-economic incentives to change risk-taking behavior" (2018, p. 274).

In conclusion, the drugs literature refers to at least six rationales for incorporating land formalization into counternarcotics policy but supporting evidence is weak. We contribute to filling this

evidence gap by presenting a case study from a key coca-producing area of Colombia, focused specifically on the causal mechanisms that underlie the investment rationale. As explained below, we did not find evidence to support this rationale. Thus, our case study challenges the generalizability of key causal mechanisms that the literature suggests account for the alleged relationship between tenure (in)formality and drug crop cultivation. We see our contribution as another brick in an edifice of theory and evidence that must be constructed collectively. To what extent, under what conditions, and how or through which mechanisms land titling and registration can contribute to drug-control policy are still open questions – a fact ignored by policy makers who treat land formalization as a magic bullet.

3. A case study of Puerto Asís

3.1. Case study context and relevance

Puerto Asís is located in the department (akin to a state or province) of Putumayo, in an area of the Amazon basin shared between Colombia, Ecuador and Peru (see Fig. 1; see Table 1 for basic demographic and further geographical information). The Amazonian lowlands of Putumayo are relatively isolated from the rest of Colombia, far from Bogotá and the more populous central Andean region. It was only in the second half of the 20th century that Putumayo started to be recognized as a political/administrative entity, distinct from the rest of the Amazon territory, following increased settlement in the region.

The colonization of lower Putumayo was driven by lack of access to land in nearby departments (Nariño, Cauca and Huila), high levels of civil war violence elsewhere in the country (especially in the 1940s and 1950s), and various economic booms, centered on: quina bark (late 1800s), rubber (early 1900s), timber and rare animal skins (circa 1950s–1960s), oil (1960s–1970s), and coca (1980s–1990s). Oil and coca were particularly important ‘pull factors’ and remain the dominant economic sectors of Puerto Asís

and other lowland municipalities of Putumayo to date (Ramírez, 2011; CNMH, 2015).

It is important to note that, despite increased settlement in the municipality, infrastructure and public services in Puerto Asís are still deficient and in some rural areas non-existent. This is one among several contextual factors that has hindered coca substitution. It also affects land prices in the municipality, which remain relatively low – a fact that most certainly influences the tenure dynamics discussed in subsequent sections.

Puerto Asís is a good example of a “classical” coca growing territory (see Gootenberg & Dávalos, 2018) for several reasons. First, as noted above, it is an area of recent colonization where settlers arrived to expand the agricultural frontier – as also happened in the Chapare region of Bolivia and the Upper Huallaga Valley of Peru. Second, commercial coca cultivation emerged relatively early in Puerto Asís (compared to other parts of Colombia) and coca has remained the most important cash crop in the municipality since the 1980s, providing a livelihood for farmers on the margins of mainstream development processes. Third, for more than forty years, guerrilla groups (especially the former FARC-EP) held considerable influence over the area, disputing the sovereignty and legitimacy of the Colombian state. More generally, the illicit drug economy in Puerto Asís interlinks with violence wrought by state forces, drug trafficking organizations, anti-subversive paramilitaries, and left-wing guerrillas. Finally, because of its centrality in the coca economy and the armed conflict, Puerto Asís has also been at the center of counterinsurgency and counternarcotics policies, including the infamous Plan Colombia, which combined militarized anti-drug strategies with Alternative Development programs (see CNMH, 2015; Tate, 2015; Ramírez, 2011, 2010). Thus, in the world of illicit drug production, Puerto Asís may be considered what Mahoney & Goertz call a “substantively important case” with “special normative interest” (2012, p. 185).

3.2. Case study approach and methods

The research underpinning this article was part of a four-year multi-institutional project entitled “Drugs & (dis)order: building sustainable peacetime economies in the aftermath of war”. The project pursued various strands of inquiry in Afghanistan, Colombia and Myanmar, with the broad aim of better understanding the links between illicit drug economies, development and conflict/peacebuilding in these countries’ borderlands. The Universidad Nacional / Colombia country team, of which we were part, focused on four borderlands: Puerto Asís, Tumaco, Catatumbo and the Sierra Nevada of Santa Marta. The purpose of this case selection was to cover various sea and land borders and different coca histories: the emergence of illicit drug crop production before, with or after the arrival of non-state armed groups and in early and late phases of Colombia’s cocaine production trajectory. While the first three areas remain important drug-production hotspots, the Sierra Nevada experienced early marijuana and coca booms, but currently has very low levels of illicit crop cultivation (see UNODC-SIMCI data).



Fig. 1. Map showing the location of Puerto Asís, Putumayo.

Table 1
Puerto Asís: basic geographic and demographic information.

Population	Total	67,211 inhabitants
	Density	25.75 inhab/km ²
	Rural	26,662 (39.67%)
	Urban	40,549 (60.33%)
Area	Total	2,610 km ²
Municipal public services - per cent of homes connected	Water (urban and rural)	17.4%
	Sewerage (urban and rural)	51.7%
	Electricity (rural only)	28.0%
Distance from Puerto Asís town to Mocoa, the department's capital		90 km
Weather		Tropical - humid

Sources: Departamento Nacional de Planeación (DNP), 2020; Ministerio del Trabajo & PNUD, 2013.

Given the difficulty of building deep contextual knowledge (in terms of time, but also access, especially in conflict-affected zones), most project field researchers focused on just one or two of the four areas listed above. We – the three authors of this article – were part of the Puerto Asís sub-team. Between us, we have visited the municipality fourteen times, for the work carried out within the Drugs & (dis)order project (2018–2020), as well as for previous research (2015). During these visits, we conducted more than 100 individual and group interviews, observed dozens of meetings, engaged in countless informal conversations, and learned through simple but vital experiences such as walking around villages and farms with the people we interviewed (we visited at least 18 different rural subdistricts or *veredas*). Our contextual knowledge of Puerto Asís has clear advantages in terms of “within-case analysis” (see e.g., Mahoney & Goertz, 2012, pp. 184–185), specifically aimed at understanding the real-life dynamics of land tenure, the coca economy and the relationship between the two.

All three of us had prior interests in the political economy of land and we tended to ask related questions during our dialogues with coca producers. This raised further questions, as their stories and views about land tenure often did not conform to mainstream narratives, nor to some of our own expectations. Eventually, we decided to pursue these issues more systematically.

We started by conducting a literature review on ‘the land-drugs nexus’ or, more accurately, nexuses. This literature review helped us devise what we call the ‘land questionnaire’ (LQ, see [supplement 1](#)) – a guide for conducting semi-structured interviews. Thus, we used a “theory-first approach” (Yin, 2003, p. 32); we developed various questions on the basis of existing propositions. Those questions relevant to this article were aimed at examining some of the key causal mechanisms that are said to account for the posited relationship between tenure (in)formality and illicit drug crop cultivation, namely:

- Land formalization reduces illicit drug crop production by increasing access to credit, which enables investment in alternative licit livelihoods.
- Tenure informality contributes to the perpetuation of illicit drug crop economies because it prevents people from accessing credit and lack of investment capital is one of the main reasons people don’t invest in licit livelihoods.
- Land formalization reduces coca production by improving perceptions of tenure security, which in turn encourages investment in long-term licit livelihoods.
- Tenure informality contributes to the perpetuation of illicit drug crop economies because it implies tenure insecurity, which in turn discourages long-term high-cost investments in licit projects and favors continued dependence on illicit crops, which are said to be short-term and have small investment outlays.

Qualitative case study research is uniquely well suited to studying causal mechanisms since it entails explaining within context (Bennett & Elman, 2006; Mahoney & Goertz, 2012; Sayer, 2010). We have labelled Puerto Asís a ‘case’ because we believe there is sufficient similarity of context (shaping causal processes) within the municipality to consider it a ‘case’. Nevertheless, our ‘case’ study is made up of households/individuals from different subdistricts, who could be considered ‘cases’ in their own right. In brief, our “within-case-analysis” covers more than a dozen individual cases, as well as broader or more contextual “causal process-observations” (see Mahoney & Goertz, 2012, pp. 10–11, 90; see also Bennett & Elman, 2006).

We identified participants through purposive rather than probability sampling. In the earlier stages of our research, we contacted local Community Action Board or JAC leaders who we found via offi-

cial public listings. These community organizers have a privileged knowledge of local socio-economic dynamics. Therefore, we considered it appropriate to turn to them as a first source of information. We then used a snowball strategy to reach other interviewees, including farmers who did not have leadership roles. We deliberately sought to interview farmers from different rural sub-districts with the aim of identifying contextual issues at the local level or sub-municipal spatial variation. For the LQ interviews, specifically, we contacted social leaders and farmers who we met during previous fieldwork trips and – to a lesser extent – their friends/neighbors. We knew these interviews would work best with acquaintances, given the length and detail of the questionnaire and some people’s reluctance to speak openly about illicit activities.

Our original intention was to conduct 30–40 semi-structured (LQ) interviews centered specifically on land and coca. However, due to the pandemic, we were only able to do 15 LQ interviews. As an imperfect solution, we selected a further 20 interview transcripts from our archive that answer at least some questions posed in our land questionnaire. Taken together, these 35 interviews involved at least 50 interviewees, the vast majority of who were coca growers (*cocaleros*) at the time or had been in the past. In addition to including a mixture of current and former *cocaleros*, we also sought to include both farmers with and without formal land titles, and interviewees from various sub-districts. At least 23 of the interviewees were also community organizers (JAC president, vice-president or secretary) or social leaders more broadly (e.g., members of regional movements and organizations). In the case of JAC leaders, it is part of their job to be aware of which JAC affiliates lack a land title, who owes contributions to community infrastructure, or boundary disputes between neighbors – to name just a few examples. In this sense, interviewing one JAC president might give you more insight than interviewing four farmers who have never had such a leadership role. Finally, we included an additional 10 interviews with government functionaries, for a total of 45 interviews. Among other things, these interviews helped us to cross-check the information that farmers shared with us. We provide a table with basic information about interviews/interviewees in [Appendix 1](#); an Excel file ([supplement 2](#)) contains further details.

We used open coding to search for basic patterns but also any anomalies in terms of farmers’ views and stories pertaining to specific topics, like credit and investment. We also used different triangulation techniques to ensure the reliability and validity of our findings. First, we critically evaluated each other’s empirical analyses and claims (“investigator triangulation”, Rothbauer, 2012). Second, we asked the interviewees additional questions to ensure we understood their responses properly and to iron out any apparent contradictions. We also found interviewing couples or small groups of neighbors to be advantageous because the interviewees sometimes corrected one-another or discussed things amongst themselves (“within method triangulation”, Denzin, 1978). Third, we were careful to ensure that farmer interviewees were from various rural sub-districts and would often ask different people about the same things. Fourth and finally, we triangulated some key information with survey results, fieldwork observations, government documents, written consultations with specialists and secondary sources.

4. Tenure (in)formality and (in)security in context

In order to explore the relationship between illicit crop cultivation and tenure (in)formality, it is necessary to first understand what the latter actually means in the Colombian context and how it manifests in the *cocalero* world specifically. In Puerto Asís, *campesinos*’ views and understandings of tenure (in)formality are heterogenous, occasionally ambiguous, and do not always coincide

with those held by researchers or officials. Furthermore, government entities and functionaries themselves often bestow informal or semiformal documents and procedures with validity, directly and indirectly, reinforcing the ambiguity of property rules. Finally, tenure informality – as conventionally defined – does not necessarily imply insecurity (as is well-established in the rural development literature; see, e.g., Fitzpatrick, 2006; Trebilcock & Veel, 2008; Goldstein & Udry, 2008; Deininger, & Feder, 2009; Ho, 2014). Many peasants in Puerto Asís express confidence in local institutions, which provide some protection (albeit imperfect) of their land rights. As shown in subsequent sections, these findings have implications for the arguments and assumptions that underlie the use of land formalization as a counternarcotics strategy.

4.1. The dynamics of tenure (in)formality in Puerto Asís

Under Colombian law, only three types of documents confer full and formal property rights over land: public deeds, adjudication resolutions and – in certain instances – judicial sentences. These documents must be registered with the Office of Public Instruments to be considered official proof of ownership. Most peasants in Colombia do not hold such registered documents. According to government estimates, 54.31% of farms in the country are not covered by up-to-date formal titles; in Puerto Asís, the figure is even higher, reaching 87% (UPRA, n.d.). A detailed examination of the multiple reasons for these high levels of informality is beyond the scope of this paper. We discuss just four factors (which often overlap and combine), with the broader aim of showing how land tenure works in practice in Puerto Asís.

First, the relative efficacy of informal and semi-formal land tenure systems may reduce the real and perceived need for official property documents. As explained below, certificates of possession and purchase/sales agreements (*cartas compraventa*) are often used in lieu of formal titles, while Community Action Boards and local inspectors (*inspectores de policía*) provide inhabitants with a degree of tenure security regardless of whether the central state recognizes them as legal owners of their farms.

Second, significant areas of land in Puerto Asís remain untitled and thus are legally classified as *baldíos* or public lands. Notably, the state itself does not have reliable data on this (DNP & Misión Rural, 2014). Technically, the only way to acquire statutory rights over these public lands is to request an adjudication resolution from the National Land Agency (formerly INCODER and before that INCORA); by law, judges are not supposed to pass sentences that recognize property rights through prescription, nor can notaries draw up public deeds for such lands. Many peasants are interested in formalizing their land ownership and hence do apply for titles.³ But they sometimes have to wait years for a reply (LQ2, LQ3, LQ4, LQ6; see also Peña & Zuleta, 2018) and/or their request may be rejected (LQ5, I7*, I18).⁴ In such cases, purchase/sales agreements are the second-best and only option, whether in the interim or long-term.

A third factor behind informality is the cost and difficulty of formal land transactions (LQ15, LQ14). Both buyer and seller might prefer oral agreements or to notarize written purchase/sales agreements, a simpler and cheaper process. In this way, plots once formalized through titling are brought back into the informal realm through off-the-record transactions. Once this has happened, it is

³ The tables in [appendices 2 and 3](#) provide partial answers to the question of why some *campesinos* apply for titles while others do not. It is also worth mentioning that most interviewees who applied took advantage of a titling process organized by government entities or local community leaders (LQ1, LQ2, LQ3, LQ7, LQ14, LQ12, LQ13, I5, I6, I7). In other words, they responded to an opportunity and did not have to master the determination to confront government bureaucracy on their own.

⁴ We use the * to indicate when an interviewee is referring to a generality or to something that happened to a friend or neighbor, rather than their own experience.

very difficult for a subsequent buyer to acquire a deed; this could involve, for example, tracking down the original titleholder (who may be deceased) and a legal procedure to ‘clean’ the ownership of the plot (LQ1*, LQ10, LQ11).

Fourth and finally, some peasants are unaware of legal property rules, misunderstand them, or hold different views about how they work based on experience rather than written laws. For example, one woman said that most people in her community have “formal titles” because they purchased lots (through purchase/sales agreements) that had been broken off from a larger farm with an original adjudication resolution (I8). Poor communication of the law and/or lack of access to information is part of the problem. But the paragraphs that follow show how some apparent misunderstandings are actually grounded in the real-world functioning of Colombia’s complex and contradictory property system.

As noted already, *campesinos* in Puerto Asís often acquire land through written purchase/sales agreements (LQ1, LQ11, LQ12, I5, I10, I17), which many also get authenticated by a notary for an additional sense of formality (LQ2, LQ3, LQ4, LQ5, LQ6, LQ13, LQ14).⁵ People typically see this as a procedure with legal force that allows them to act as legitimate owners of the land. For example: “[I went to the Notary Office] to secure the land [...] because an authenticated purchase/sale agreement is almost like a deed; one could even say that it is a deed because it has a lot of validity” (LQ4). Another man, from a different area of the municipality, insisted that notarized purchase/sales agreements confer legal property rights (I19).

These are perfectly reasonable views since, in practice, government entities themselves bestow purchase/sales agreements with value. For example, the state-owned Agrarian Bank has accepted these agreements as evidence of land tenure (more on this in section 6), as have the institutions in charge of titling (*Agencia Nacional de Tierras*, 2018b, p.1), and the recent National Crop Substitution Program – PNIS (DAPRE, 2019). These agreements may even be used to defend a land claim in court.⁶ Thus, it is unsurprising that peasants give formal and solemn value to documents that do not technically bestow full property rights under Colombian law.

Such de-facto or practical understandings of land ownership are widespread. In a survey of PNIS participants, conducted in Puerto Asís in 2019, 83% of farmers (101 of 121 surveyed) self-identified as “property owners”. Nevertheless, just 53 of those 101 (44%) said that their name appears on the ‘certificate of freedom and tradition’ for their farm (*Observatorio de Restitución y Regulación de Derechos de Propiedad Agraria*, 2019) – an essential criterion of tenure formality in Colombia, from an official perspective.⁷ Surveys applied in other parts of Colombia (Garzón & Riveros, 2018, p. 8) show this phenomenon is not peculiar to Puerto Asís.

The preceding paragraphs indicate that state officials and *campesinos* often have divergent notions of property rights.

⁵ Arguably, this use of notarized purchase/sales agreements actually represents a significant cultural and historical shift towards more ‘formal’ land transactions, though they are not technically formal in the eyes of the state. According to our interviewees, oral agreements used to be more common because there was more “trust” or “respect” and people’s “word still had value”; in some cases, oral agreements are still used, especially when the transaction is between neighbors or acquaintances (LQ1, LQ2, LQ3, LQ4, LQ6, LQ7, LQ15). In this sense, the mere act of putting an agreement into writing is itself seen as comparatively formal; getting the agreement authenticated by a notary is one step further in this shift towards formality.

⁶ The Colombian Supreme Court has recognized that contracts or purchase agreements are “fair titles” that serve to prove possession or occupation of the land but do not confer full property rights. See, for example: *Supreme Court of Justice*, Civil Cassation Chamber, Case No. SS-4128931030022000-00050-01, 14 April 2009, Judge Jaime Arrubla.

⁷ This certificate is issued by the Office of Public Instruments and contains legal information about the property, such as the name(s) of the owner(s) and details of any land-use agreements or mortgages that affect the asset.

Notwithstanding this divergence, some farmers are aware that only public deeds or adjudication resolutions provide full guarantees of ownership (LQ1, LQ2, LQ9, LQ14). This shows that views of land ownership and tenure formality are heterogeneous and ambiguous in rural Colombia. Some believe that purchase/sales agreements are equivalent to formal titles; many know they are not but use them anyway because in practice they serve similar purposes; others seek a public deed or adjudication resolution precisely because they view other documents as inferior.

4.2. Tenure security on the ground

As implied above, *campesinos* make do in a context characterized by - what is conventionally defined as - high levels of tenure informality. They buy, sell, rent, exploit and invest in farms that do not have state-recognized titles. This indicates that informal/semi-formal land tenure institutions generate a minimum level of trust. In Puerto Asís, Community Action Boards or JACs (*Juntas de Acción Comunal*) are fundamental to local tenure security (though it is important to note that the ability of the JACs to provide tenure security varies).⁸ Even those who have official property documents typically rely on the JACs.

JACs are social and civic non-profit organizations, formed by the inhabitants of a rural subdistrict or urban neighborhood, who join efforts and resources to solve the problems of their community. They were first institutionalized in 1958 and are now recognized in Colombian law as the basic cell of “participatory democracy” (Law 743 of 2002) through which organized citizens may design and implement local development plans (for a more detailed history of the JACs, see [Gutiérrez, 2007, p. 85](#)). In some rural areas, they also have a de facto role in land tenure relations.

Many JACs - unlike the municipal authorities - keep records of land tenure/residency within their respective rural subdistricts (LQ1, LQ2, LQ5, I17, F8). This enables them to certify inhabitants’ land rights through ‘certificates of possession’ (*certificados de sana posesión*) which can be used, for example, to access agricultural and financial services. Legally, the Mayor’s Office is the entity authorized to issue these certificates, but in practice municipal authorities rely on the knowledge and intervention (e.g., signatures or letters) of the Boards. The fact that people often approach their Board directly to obtain this certificate is telling (LQ1, LQ5, LQ7, LQ15).

This close-up knowledge of local land tenure also makes the JACs the primary mediators in related disputes. Indeed, most Boards have a ‘committee of cohabitation and conciliation’ to resolve local conflicts. Consider the following anecdote: a widow whose husband had purchased land (via an oral agreement) from a man who subsequently died was under threat of being evicted by the seller’s heirs who claimed rights over the farm. The Board intervened and got the heirs to recognize the widow’s rights over part of the land (15 of 60 ha) on the basis that she had lived there for more than 10 years (LQ1*, LQ8). More commonly, disputes are over property boundaries (LQ1, LQ2, LQ3, LQ15). In these cases, too, the Board becomes a “mediator”, ensuring “respectful dialogue” between the parties (I17). Sometimes, the Board calls on “older” inhabitants or village “founders” to testify, as they are presumed to know the history of the community and tenure relations (I17, LQ7).

JACs are not legally recognized as having conflict resolution powers. Nevertheless, many rural inhabitants turn to them to

resolve local land disputes, and decisions made by the Board are generally respected by the community (LQ1, LQ2, LQ3, LQ5, LQ15). On occasions when the JAC is unable to resolve a problem, people turn to municipal authorities, such as the local inspectors (LQ5, LQ3, LQ15).⁹ Even in these cases, Boards and community leaders (in particular, the JAC presidents) usually still play a vital role, since government functionaries rely on their knowledge of the community and tenure history/relations (F8, LQ7).

In sum, Community Action Boards often keep records of ownership; issue or back certificates of possession that are accepted by third parties; are regularly called upon to resolve local land disputes; and provide information to municipal authorities. In this way, the JACs *usually* provide *some degree* of land tenure security to their affiliates, including those who do not have formal state-recognized titles (LQ1, LQ2, LQ5, LQ11).¹⁰ We have placed emphasis on the qualifiers ‘usually’ and ‘to some degree’ because the capacity of the JACs may vary across space and time, and even strong JACs may be unable to counteract certain forms of tenure insecurity, especially those associated with powerful actors like oil companies, armed groups and the state itself, as explained in the final section (7) below.

5. Land tenure (in)formality, investment and (il)licit crop cultivation

In this section, we explore the links between tenure (in)formality, landholder investment, and (il)licit crop cultivation in Puerto Asís. We focus specifically on the idea that farmers without formal titles tend to refrain from making large long-term investments and that this, in turn, contributes to the perpetuation of coca cultivation, which is deemed a particularly convenient crop for farmers with (allegedly) insecure land holdings. The paragraphs that follow show this argument to be problematic on a number of levels.

5.1. Investment incentives and perceptions of tenure (in)formality and (in)security

The first thing to recognize is that the posited relationship between (in)formal tenure and investment depends on *perceptions*. According to the line of reasoning described earlier, people invest more when they have a formal property title for their land because they *perceive* it to be safer to do so and vice versa: they may not invest if they do not have such documents because they *feel* insecure. However, as explained above, the relationship between tenure (in)formality and (in)security - both objective and subjective - is not as linear and simple as is often supposed. This claim, which is well-supported by the rural development literature more broadly (e.g., [Fitzpatrick, 2006](#); [Trebilcock & Veel, 2008](#); [Goldstein & Udry, 2008](#); [Deininger, & Feder, 2009](#); [Ho, 2014](#)), clearly has implications for the popular idea that formalizing land ownership improves investment incentives.

Let us consider the most extreme example first. Recall that *some* peasants believe (for good reasons) that notarized purchase/sales agreements confer full and formal land rights, though technically

⁹ Before the demobilization of the FARC-EP in 2017, inhabitants sometimes called upon this rebel group to intervene in land conflicts (conduct an investigation and enforce a solution), in particular when the interested parties refused to accept the mediation or decision of the JAC (LQ2, LQ5, LQ7, LQ12, LQ14, I7).

¹⁰ The informal/semi-formal tenure institutions examined in this section reveal the limitations of the customary versus statutory tenure binary. These institutions are neither technically part of the statutory system, as explained in the main text above, nor ‘traditional’ and ‘customary’ in the strict sense. They were built relatively recently, starting around the 1950s, by mestizo peasant settlers, through their interactions with one another and with local government authorities, as well as rebel groups. This is something worth exploring further in future research. (Thank you to Patrick Meehan for pointing this out to us.)

⁸ Some JACs are better organized than others. For example, one interviewee told us that inhabitants no longer inform the JAC about their land transactions, which makes it difficult for the Board to arbitrate when a conflict arises (LQ7). It is also important to note that the JACs offer protection to their affiliates (those who make regular contributions and participate in collective labor events) but in some rural subdistricts not everyone is affiliated (LQ1, LQ2, LQ5).

they do not. We cannot assume that a lack of formally recognized property rights has deterred this group from making large long-term investments in their land, since they do not consider themselves to lack these rights in the first place. Conversely, participation in a formalization program is not likely to significantly change this group's perception of their own tenure security and thereby inspire them to invest more. The survey results provided in the preceding section suggest this group may be significant in number. However, let us suppose that many of those who described themselves as 'proprietors' or 'owners' are aware that they lack formal titles in the eyes of the state. Even so, because tenure informality - as conventionally defined - does not necessarily imply that people perceive their tenure to be insecure, the idea that coca farmers are discouraged from investing in long-term licit crops due to a lack of official land titles remains a problematic generalization.

We are not arguing that tenure (in)formality never affects investment incentives, much less that it doesn't matter. Indeed, one interviewee - a community leader whose work includes advocating for land formalization - stated that her family may not have devoted as much work and money to their farm had they been unable to secure a title because "there is always that fear that someone else could take it" (LQ1). In another case, a woman who invested in planting 5,000 cedar trees is - according to the farm administrator - extremely concerned that she could lose everything at any moment because she lacks a formal title (LQ10). As demonstrated by previous research, the relationship between formalized property rights and investment is heterogeneous (for a systematic review of various studies see Lawry et al., 2017). The evidence indicates that formalization very often has positive effects on investment (e.g., Lawry et al., 2017; Bambio & Bouayad Agha, 2018; Goldstein et al., 2018; Smith, 2004). However, in certain contexts, the effects are comparatively weaker and, in some cases, non-existent, among other reasons because informal or customary arrangements already provided tenure security (Lawry et al., 2017; Sitko et al., 2014; van den Brink, Bromley, & Cochrane, 1994; Brasselle et al., 2002; Chimhowu & Woodhouse, 2006; Trebilcock & Veel, 2008). While property rights scholars tend to highlight differences between continents and countries (e.g., Deininger & Feder, 2009; Sjaastad & Cousins, 2009; Lawry et al., 2017), our research indicates potential for marked individual or household diversity (see also Fort, 2008; Goldstein et al., 2018) and within-country or sub-national variation. For example, our findings are most certainly influenced by the fact that the JACs are relatively strong in Puerto Asís; perceptions of tenure (in)security are likely to be different in other parts of the country where the opposite is true.

5.2. Investments despite tenure informality

Illustrating the points made in the preceding paragraphs, many of our interviewees invested significant amounts of labor-time and money in their farms and communities, despite not having title deeds or *before* receiving an adjudication resolution from the state. Evidently, they saw other forms of tenure security, such as that provided by the JACs, as sufficient protection. Here we provide just a few examples.

One man estimated spending \$15–18 million Colombian pesos or COP, equivalent to 29–34 months of minimum wage earnings (M.M.W.) in the late 2000s, establishing and maintaining 1 hectare (ha) of black pepper.¹¹ He used some of the earnings from his pep-

per crop (est. \$2–3 million COP or 6 M.M.W.) to plant 2 ha of cacao. He lost both crops due to the government's anti-drug aerial fumigation campaigns. Later, he also invested about \$10 million COP (20 M.M.W.) in 2 ha of improved pasture with wire fencing. All of these investments were made *before* 2020, when he received a title for a small segment of his farm. We asked him whether he worried about investing in land that he did not technically own. He said "no", explaining: "I knew that [land] was mine and, you know, the community is in charge and the JAC is the primordial government of a *vereda* [...] I never saw a reason to be worried" (LQ2).

A couple from the same rural sub-district took out a \$7 million COP (14 M.M.W.) loan with the Agrarian Bank (despite not having a land title) to plant 1.5 ha of cacao and borrowed another \$5 million COP (9 M.M.W.) from a family member to plant 0.5 ha of black pepper. They were forced to abandon both these crops. After five years investing labor time and additional money in the cacao, they never made any returns; the trees looked healthy, but the fruits were dry and black inside. Meanwhile, the price of black pepper fell to \$5000 COP (roughly equivalent to €1.65 in the late 2000s) per kilo, just when they started producing. This same couple also established circa 20 ha of improved pasture for cattle, which they estimated cost about \$3 million COP *per* ha or \$60 million (116 M.M.W.) total. In addition, they constructed a new house and, along with five neighbors, paid for the digging of a dirt road (each family put in \$1.5 million COP or 1.8 M.M.W. in 2019) to improve access to their farm. They too made all of these investments *before* 2020, when they received an adjudication resolution for part of their land (LQ3).

A farmer from a different area of Puerto Asís said he built up his farm over 30 years, investing little by little. He now has 12 ha of natural and improved cattle pasture with solar-powered electric fencing, as well as chicken coups and pig sties, and 1 km of gravel road. Much of this, including the road, he established *before* receiving a land title in the mid-2000s. "Weren't you afraid of investing in a farm without a title?", we asked. "No, once you have pastures, if they belong to you, then why would you - no [...] I knew well the origins of the lands, they were first occupied as *baldíos* by my own father, who sold to an uncle, and that uncle sold to a brother, and that brother sold to me, so I knew where the lands came from" (LQ4).

Most of the people we interviewed showed immense dedication not only to their farms but also to the *veredas* of which they are part. They have invested countless sums of money and days of work in building village schools (LQ3, LQ6, I6), community meeting halls (LQ1, LQ4, LQ5, LQ6), footpaths (LQ2, LQ3, LQ4, I6, I16), dirt roads (LQ2, LQ3, LQ4, LQ5, LQ6, LQ7, LQ13) and bridges (LQ2, LQ3, I16). Such local infrastructure is constructed and maintained through *mingas* or collective labor events, plus monetary and in-kind contributions, coordinated by the JACs. Many made/make these investments even though they are/were not official property owners (e.g., LQ2, LQ3, LQ5).

Summing up, *campesinos* in Puerto Asís show remarkable willingness to invest in their farms and community infrastructure, despite not having formal property rights. Arguably, this is because informal and semiformal arrangements provide some degree of tenure security. It is noteworthy that many of the people we interviewed indeed suffered investment losses, but due to production and market problems, as well as government counternarcotics operations - not because of tenure informality.

5.3. Coca cultivation: a relatively high-cost and high-risk endeavor

The other side of the argument - that coca growers are deterred from investing in long-term licit projects because they lack formal titles - is that coca is an "ideal crop" for those with "vague land

¹¹ We have used the monthly minimum wage figure to give the reader a better idea of what the sums in pesos actually mean to peasant farmers in Colombia, many of whom earn less than the legal minimum wage. We have done our best to adjust figures so that they correspond to the year or approximate time period in question, but actual values may vary.

Table 2
Investment outlays and timeframes for various commercial crops grown in Puerto Asís.¹

	est. cost of establishing 1 ha (initial investment, not including regular production or harvesting costs)	est. time until (first) harvest	est. time between harvests
Coca	2.4–5 million COP ²	8–12 months (LQ1, I1, LQ3, LQ5)	Every 60–90 days, depending on variety (LQ5, LQ1, LQ3)
Cacao	2–3 million COP (LQ2) 5 million COP (LQ3) 4.9–6.7 million COP (Finagro, 2017, 2018a)	18 months (LQ2, LQ3) ³ 24 months (Finagro, 2017, 2018a)	Every 3 months (LQ15) Cacao typically has two annual production peaks, one much larger than the other, but can also provide continual smaller harvests throughout the year, depending on zone and crop management. ⁴
Black pepper	15–18 million COP (LQ2) 8–10 million (LQ3) 20 million (LQ7) 15.1 million COP (Guerra, 2019, pp. 42–43)	12–24 months (LQ2, LQ3) 20 months (Valdivieso, 2000) 24 months (Guerra, 2019, pp. 21)	Every 15–20 days (LQ2) Every 3–4 months or 3 times a year, each harvest lasts 1.5 months and picking is done every 15 days (LQ15) Every 20 days (Guerra, 2019, pp. 37)
Pasture (for cattle, improved and enclosed)	3 million COP (LQ3) 4.37 million - not including transport of posts for enclosures nor seeds (LQ1) 5 million COP (LQ2) 4.11 million COP - a comprehensive but non- regionally specific estimate (CIAT, 2018, pp.12–12)	Grazing can begin 90–120 days, or 3–4 months, after planting (CIAT, 2018, p. 8) But it is typically only profitable to sell cattle of more than 2– 3 years (LQ2). Cattle reared for meat have a “cycle” of about 36 months (Finagro, 2018c)	N/A
Maize	NOTE: these estimates do not include the costs of acquiring cattle. 2–2.5 million COP (CPGA, 2020) 1.12 million COP (Finagro, 2018b)	4 months (CPGA, 2020) 5 months (Finagro, 2018b)	N/A Note: maize is an “annual” or short-term crop and must be replanted after each harvest.

Please note: much of the data is specific to other regions of Colombia (FINAGRO) or general (Agronet, CIAT), as up-to-date and reliable information for/ from lower Putumayo is unavailable.

¹ Coffee, which is sometimes compared to coca as a substitute crop, is not grown in Puerto Asís due to agro-ecological conditions in the municipality, and thus is not included in the table.

² This range is based on various estimates: 3.2 million, including the costs of hiring day laborers to help prepare and plant the land, plus “cheap” seeds and chemicals (LQ1); 3 million, if one already has the seeds (LQ2); 4.5 million, including the cost of the seeds, wages and food (farm-owners are usually expected to provide meals) for day laborers (LQ3); 2.4 million just for seeds and wages, not including chemical inputs (LQ5); 5 million, including the costs of clearing the land, the seeds, wages and food for day laborers, plus fertilizers (I1).

³ The estimated times between planting and first harvest for cacao provided by our interviewees are lower than the ‘standards’ quoted online. We consulted with Leonardo Peláez Buitrago (September 2020), a specialist in cacao; he explained that grafted saplings do start bearing fruit about 18 months after planting, but trees don’t reach full production until 4–6 years.

⁴ Tellingly, it is difficult to find information specific to Puerto Asís. This information was provided by the agronomist Leonardo Peláez Buitrago via personal communication.

tenure” (Holmes et al., 2018, p. 123). This claim is also problematic for a number of reasons.

First, it is simply not true that “[c]oca grows naturally with minimal investment” (*ibid.*). To establish a coca crop, “first you have to prepare the land, then you have to plant, then you have to clean. And the cleaning is consecutive; if you want your crop to grow well, you have to keep it clean, because *el monte* [natural foliage] grows really fast. So, it demands a lot of work” (LQ1). It’s not cheap either. Our interviewees calculated that establishing a single hectare of coca requires between \$2.4 and \$5 million COP (LQ1, LQ2, LQ3, LQ5, I1), equivalent to between 2.9 and 6 M.M.W. in 2019, depending on whether or not they have to buy the seeds. These amounts may seem small to an outsider but are considerable from the perspective of peasant farmers. According to one ex-cultivator, planting coca “demands a lot of investment, and even more now that things are so expensive [...] And one starts to recover just a little bit of the work put in, maybe, by the third harvest” (LQ7).

Second, the assumption behind the above claim – that coca is an “ideal” crop for those with “vague land tenure” – is that people without formal land titles face a higher risk of dispossession and thus choose to cultivate crops that require comparatively smaller investment outlays and timeframes. But the investments required for coca production are higher than those required for many short-term crops (such as maize – LQ1, LQ8) and are comparable to those required for many long-term licit ventures, with the exception of

black pepper, which is particularly costly (see Table 2). And while it is certainly true that one among many reasons people grow coca is that it provides *relatively* rapid returns, coca is not a short-term crop. The same coca plant can remain commercially productive for between 12 and 15 years (LQ9) and farmers have to wait *at least* eight months (some interviewees said 12 months) before the first harvest, which is very small.¹² It typically takes 18–24 months (after planting) for them to recover their initial investment (LQ1, I1, LQ3). Thereafter, coca provides *regular* returns since leaves can be harvested every two to three months. But this doesn’t detract from the fact that coca farmers are vulnerable to significant investment loss, especially during the first two years.

Third and finally, the investment risks associated with coca production are augmented by its illegality. As one ex-cultivator explained: “That is the risk with coca. If they burn your laboratory where you’re processing, if they take your gasoline, if they fumigate [your crop], then you lose all that investment” (LQ1). Indeed, countless farmers in Puerto Asís have been left in financial ruin following forced eradication.

¹² Estimates of the first harvest vary from 15 (LQ3) to 70 (LQ5) *arrobos* (12.5 kilos) per hectare. In the early stages, production increases harvest by harvest – for example, from 50 *arrobos* of leaves per ha, to 100 at the second harvest, to 150 at the third (I1). Eventually, these productivity gains flatline. *Arrobos* per hectare are unlikely to increase above 400.

To reiterate: it is difficult to sustain the argument that coca is a comparatively convenient crop for farmers without formal property rights on the grounds that it involves small investment outlays and timeframes and thus low monetary risks.

6. Access to credit in the coca world

In this section we examine issues surrounding access to credit. As noted above, many drug policy experts claim that land formalization may serve counternarcotics aims by increasing access to credit, which in turn enables farmers to invest in licit livelihoods. This claim, which is often taken for granted, is problematic for at least four reasons.

First, peasants' access to credit is not necessarily conditioned on the formalization of land ownership (Linh et al., 2019; Menkhoff et al., 2010). In the case of Colombia specifically, the government's Agricultural Guarantee Fund (*Fondo Agropecuario de Garantías*) may back as much as 80% of small farmers' debts, enabling them to take out loans without presenting a property title as collateral (F1; Finagro, n.d). According to an employee of the Agrarian Bank in Puerto Asís,¹³ the loan application process in his institution is relatively simple: the applicant must present proof that she/he is a landholder, a national ID card, and meet with the Bank's commercial advisor who collects information on the project for which the loan is sought. If the applicant does not have a title deed or adjudication resolution, she/he can present a certificate of possession or a lease contract instead (F1; see also Banco Agrario, 2012). This, he explained, is especially important in Putumayo because "most properties do not have a deed. So, they have a purchase/sales agreement, and that is where we work together with the Juntas [Community Action Boards], which certify the producer's possession of the land" (F1).¹⁴

Some coca growers in Puerto Asís have indeed taken out loans to invest in licit ventures, such as cattle ranching or black pepper and cacao production, without using their farms as collateral (see appendix 4 for data from interviews). Drawing from the survey referred to earlier, 17 of the 68 farmers (or 25%) who did not have a formal land title had borrowed money, mostly from the Agrarian Bank. In comparison, 21 of 53 farmers (or 39.6%) who reported having statutory property rights took out loans; however, we do not know whether or not they actually used their land titles as collateral (*Observatorio de Restitución y Regulación de Derechos de Propiedad Agraria*, 2019).

This leads us to another problem with the investment rationale for land formalization. As evinced by research from various parts of the world, providing farmers with formal property titles does not necessarily increase their credit access/uptake (Carter & Olinto, 2003; Chimhowu & Woodhouse, 2006; Migot-Adholla et al., 1991; Trebilcock & Veel, 2008; Van Tassel, 2004; Lawry et al., 2017). There are several other possible obstacles to credit access or explanations for low uptake, such as rural credit market structures that promote concentration of access to the benefit of large landowners (Carter & Olinto, 2003; for Colombia see Gutiérrez & Marín, 2016) and the risk-averse behavior of peasants (Van Tassel, 2004; Chimhowu & Woodhouse, 2006; Trebilcock & Veel, 2008).

In the case of coca growers in Puerto Asís, our field work revealed several important obstacles to credit access and reasons

for low uptake. While the government's guarantee fund reduces some barriers (mainly the land title or collateral barrier), informational and physical obstacles remain. As the employee of the Agrarian Bank in Puerto Asís acknowledged, many small farmers are unaware of the services provided by the bank, and the bank cannot easily reach them: "There are people who find it quite difficult to come to the bank, who have a farm 4, 5 or even 6 hours away, by river or by trail, so it is very complicated" (F1). Poor internet and phone signal compounds access problems. Interviewees conveyed a number of other issues, such as confusing information about the bank's programs; excessive paperwork; loans that do not meet their requirements; exploitation by intermediaries; and bank officials' tendency to give preference to the well-off and their reluctance to serve *campesinos*, even refusing to give them an appointment (I20, LQ2, LQ4, LQ5, I10).

But what people mentioned repeatedly is the trouble they have repaying loans with legal income sources. According to one interviewee, getting credit is "easy", but paying for it is not (LQ13). Often the peasants' bank-funded agricultural projects fail due to a lack of buyers or low prices for their produce, high transport or intermediary costs, climatic events or poor-quality land, government aerial spraying of their crops/pastures, or taxation by armed groups – making it difficult or impossible to repay the debt (LQ2, LQ3, LQ5, LQ13, LQ14, I1, I20). That is why many peasants are "afraid of banks" (LQ12). Even if they seek credit and have a formal land title, many prefer to use other documents (purchase/sales agreements and certificates of possession) in their loan applications and not to use their farms as collateral (see appendix 4).

Following on from the above, the formalization of land tenure does not necessarily lead to an increase in the willingness of illicit crop growers to take out credit because licit livelihoods are so precarious. Consider the following fragment from an interview with a man who recently received a title for his farm:

(Interviewer: so, you've never taken out a loan?) No, and I am not planning to because I am scared of those banks [...] they say] that the first two years are 'dead' [a grace period] but that's a lie [...] there are people in my *vereda* who are really in debt. (Interviewer: but with the title you received, do you think you will take out a loan?) How can I explain it - maybe if one has an income with which to pay, okay, but if not [...] the bank has taken a lot of lands because of that [...] When the voluntary eradication [programs] arrived there were [projects for] black pepper and cacao crops, cattle ranching, and fish farming. And people took out loans with the bank - loans of \$20 million, for example, for [aquaculture] ponds. But, when it came down to it, when they sold the cachama [a type of fish], everywhere was inundated with cachama. The same with black pepper. [...] Also] cacao, black pepper that was lost due to the fumigation [...] a lot of people were left bankrupt because of those credits (LQ2)

From this we derive our third point of contention: access to formal credit does not necessarily make peasants less dependent on illicit crops. In fact, as evidence from the field illustrates, it may be the case that borrowing makes people *more* dependent on coca. Several interviewees told us that they had to resort to coca money to pay back the loan they had taken out to plant cacao or black pepper.¹⁵ One man joked that coca keeps the banks in Puerto Asís afloat (LQ15). The following account is illustrative:

I took out [a loan] of about \$15 million to plant cacao. I planted two hectares of cacao, but cacao doesn't give results. If I had waited for the cacao to pay, I never would have paid. [...] Fortunately, I didn't invest it all in cacao. I invested in cattle and coca

¹³ The state-owned Agrarian Bank, which is designed to provide financial services to the rural sector, is the most important bank in the Colombian countryside; as of 2013, it accounted for 96% of loans to small producers (DNP & Misión para la Transformación del Campo, 2014).

¹⁴ The importance of the JAC's land certification role within this special credit system was corroborated by an official from the Ministry of the Interior, charged with overseeing the Community Action Boards at the national level (F8).

¹⁵ Farrel (1998) shows something similar for the Bolivian case.

[too]. If I hadn't had the cattle and hadn't invested in coca, I wouldn't have paid [the loan. . .] There are people who invested in 4 or 5 ha of cacao and they were not able to pay (LQ14).

Finally, the credit argument is based on an assumption that one of the main obstacles to substitution is *cocaleros'* lack of investment capital – hence the presumed need for bank loans.¹⁶ But participation in the coca economy has actually enabled many peasants to save and invest. Though Colombia's *cocaleros* are certainly not wealthy, their modest incomes are slightly higher than those of other peasants, permitting them to fund their children's education, construct community and farm infrastructure, and acquire assets such as vehicles and homes in town (Gutiérrez, 2020). Notably, some have used their coca incomes to invest in legal agricultural ventures, mostly cattle ranching, allowing them to gradually reduce their dependence on coca production (LQ1, LQ7, LQ11, I1, I9).

However, as indicated above, people are reluctant to invest in licit projects other than cattle ranching, and to give up coca entirely, precisely because they know these projects are unlikely to provide a reliable basic income. Supposing that most coca growers lack investment capital or lack *sufficient* funds (the latter being likely) to establish a legal enterprise, access to credit would only solve *one* item on a long list of impediments. In fact, unless other issues are tackled, a rise in borrowing could create more problems than it solves, perhaps even contributing to impoverishment and land loss, if people use their property titles as collateral.

7. Discussion: alternative rationales for land formalization

The preceding sections questioned generalizations about the benefits of land formalization, specifically as a counternarcotics tool, and in particular those benefits related to the investment rationale, which posits that formalizing property rights will foment and facilitate investment in licit livelihoods by improving tenure security and access to credit. And yet, one of the recurring demands of peasant populations in Colombia, including those in Puerto Asís, is precisely the formalization of land rights (LQ1, LQ4, I16). Many are aware that informal and semi-formal land tenure systems have limitations – in particular, when it comes to negotiating with or defending against powerful external actors and in the case of conflicts *between* rural subdistricts or different communities.

In terms of the latter, not all land disputes can be solved through local mechanisms. While indigenous *cabildos*, Afro community councils and (mestizo) peasant JACs are often very effective at resolving land disputes *within* the communities they govern, they do not have the authority and impartiality necessary to resolve conflicts *between* communities – for example, over the boundaries of collective ethnic territories, such as those described by interviewees (I6, I7, I16). Ideally, state entities would act as a disinterested arbiter between these different local authorities and the communities they represent, though unfortunately this doesn't always happen in practice.¹⁷

In addition to limitations in terms of conflict resolution between communities, informal and semi-formal land tenure insti-

tutions may also be inadequate protection against dispossession by powerful external actors. Of course, not even a formal title can fully safeguard against involuntary land loss. Nevertheless, on the whole, those with adjudication resolutions and deeds are in a better position than their counterparts without such documents. Notably, some agrarian leaders in Puerto Asís used titling applications preemptively to stop a regional business elite from accumulating more land in their area via coercive tactics. Also, a number of interviewees reported that they sought formal titles for their lands to defend against the government itself, armed actors, elites and companies – most prominently, oil industry firms (see Appendix 2).

In Puerto Asís, one of the most significant threats of land loss (total or partial/direct or indirect) comes from the oil industry. Under Colombian law, all oil ventures are classified as 'projects of public utility and social interest', meaning that the state can expropriate land or force owners to give up use rights for these investments. In this sense, formalization will not protect people in Puerto Asís from one of the most critical menaces to their land tenure security. Still, having a formal title does improve people's bargaining power, especially in terms of obtaining compensation from the oil companies.

Summing up, although the formalization of property rights is not an automatic guarantee for achieving increased investment in legal livelihoods, it is in the Colombian context an important tool for the defense of rural populations' land rights and may help prevent and resolve territorial disputes that cannot be easily addressed by community-level authorities. Our concern is that these potential formalization benefits may be jeopardized by interventions focused on suppressing illicit crop cultivation. For example, when titling and registration fails to produce the expected counternarcotics results, can we expect funding to be cut – or worse still – the state to confiscate peasants' land shortly after granting them titles? Furthermore, treating land formalization like a magic bullet may distract from other rural development needs in drug-producing areas.

Land formalization, on its own, or even combined with superficial substitution projects that don't address underlying structural problems, is unlikely to significantly reduce dependence on coca production in Puerto Asís. It's worth recalling that 53 of the 121 farmers/PNIS signatories that participated in the 2019 survey conducted by our research team reported that their names *do* appear on the 'certificate of freedom and tradition' for their farm. If this self-reporting is accurate, that means around 40% of those surveyed already had a formal land title when they eradicated under the PNIS program, implying that they continued cultivating or (re) replanted coca after their land rights had been formalized. Our interview research corroborates this: *all* interviewees (11) who have a formal property title (and for whom we have relevant data) continued with, initiated or returned to coca production after receiving it (see supplement 2). This is sufficient grounds to question the zero-replanting figure touted by government functionaries in Colombia.

As explained by our interviewees, previous attempts to shift to licit livelihoods have failed, among other reasons, because they could not find outlets to sell their legal produce or because earnings from these sales were so meagre (due to low prices, high transport costs or cuts taken by intermediaries) they barely covered the costs of production, let alone their families' basic needs. Their stories highlight the want for things like quality long-term rural extension services and the construction of diverse marketing or distribution channels. It is noteworthy that not a single one of our interviewees listed tenure insecurity or lack of access to credit as an obstacle to participation in legal agricultural economies (see appendix 5). Let us suppose, for the sake of argument, that land formalization does meaningfully change people's perceptions of tenure security and that it does improve credit access. Many other

¹⁶ A quantitative study by Dávalos and Dávalos (2020) found smallholder households with access to formal credit are less likely to cultivate coca. However, the authors do not explore the mechanisms behind this correlation, which may signal something else altogether.

¹⁷ For example, peasant leaders in Valle del Guamuez expressed dissatisfaction with the way state authorities have handled the territorial overlap between their communities' farms and indigenous territories. According to one interviewee, the authorities did not investigate or attempt to clarify the boundaries. Instead, they simply recommended that the *campesino* families whose farms are alleged to lie within indigenous territory seek new plots of land elsewhere, on their own account and with their own money (I16).

problems need to be resolved in order for peasant farmers in Puerto Asís to shift away from coca cultivation.

8. Conclusion

Some observers rightly question policymakers' focus on attacking illicit drug supply, in particular at crop production level (e.g., Rydell & Everingham, 1994; Kramer et al. 2014; Buxton 2015). Such interventions, even when 'successful' locally, apparently do not reduce global drug use in the medium to long run – the alleged aim of counternarcotics policy (see, e.g., IDPC, 2018). Nevertheless, in this article we left these larger vital questions aside and engaged with the mainstream drug policy literature on its own terms, focusing on the addition of land formalization to the counternarcotics arsenal.

We problematized several arguments favoring the use of land formalization as a counternarcotics strategy, specifically those linked to the investment rationale. Evidence from one of Colombia's most important coca-producing municipalities shows that many of these arguments stem from an inadequate understanding of the world in which *cocaleros* are immersed. Thus, we conclude that giving people formal property titles for their farms is not the magic bullet some observers have made it out to be. Our objective, however, was not to deny the need for land formalization in regions with illicit crops. On the contrary, we consider that these programs are important, but not for the reasons stated in the drug policy literature.

More broadly, our work unveils two things. First, it is essential for drug specialists to engage with research on rural development and agrarian political economy. Some of the points we put forward above are already known within these fields. So, it's surprising that several claims addressed in this article are still treated as universal truisms by many. Second, farmers should be invited to participate in the design and implementation of relevant policies and programs. If policymakers really want to overcome the disconnect between their assumptions and the reality of the coca-growing regions, they must listen to the voices of the main stakeholders.

Declarations of interest

None.

Data statement

Given the sensitive nature of the issues addressed in this study, interviewees –specifically former and current coca producers– were promised anonymity. Interview transcripts are difficult to fully anonymize; for this reason, we are unable to share them at present. Nevertheless, we have provided some data tables, as appendices and annexes, that draw on these interviews.

Author credit

All three authors of this article were involved in the conceptualization, data collection, data analysis, writing and revisions.

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Appendix 1. - Table with basic interview information

NOTE: exact interview locations and other details are not disclosed to maintain anonymity.

Interview Code	Interview Date (M/D/Y)	Interview Location (municipality)	Number of People/ Interviewees	Interviewee (s) Gender	Interviewee Description
<i>All interviews with the prefix "LQ" were semi-structured (around a land questionnaire) conversations with farmers, currently or previously involved in Putumayo's coca economy.</i>					
LQ1	Feb 6 2020	Puerto Asís	1	F	Farmer, social org leader, JAC president, ex-coca producer
LQ2	Feb 7 2020	Puerto Asís	1	M	Farmer, JAC vice-president, coca producer
LQ3	Feb 8 2020	Puerto Asís	2	F/M	Farmers (couple), ex-coca producers
LQ4	Feb 8 2020	Puerto Asís	1	M	Farmer, ex-coca producer
LQ5	Mar 5 2020	Puerto Asís	1	M	Farmer, coca producer
LQ6	Mar 7 2020	Puerto Asís	1	M	Farmer, Afro community leader, ex-coca producer
LQ7	Mar 8 2020	Puerto Asís	1	F	JAC president, ex-coca producer
LQ8	Mar 10 2020	Puerto Asís	1	F	Elderly farmer, ex-coca producer
LQ9	Mar 10 2020	Puerto Asís	2	F/M	Farmers (couple), ex-coca producers
LQ10	Mar 10 2020	Puerto Asís	1	M	Farm administrator, ex-coca picker
LQ11	Mar 10 2020	Puerto Asís	2	F/M	Farmers (couple), ex-coca producers
LQ12	Mar 12 2020	Puerto Asís	2	F/M	Elderly farmers (couple), ex-coca producers
LQ13	Mar 12 2020	Puerto Asís	1	M	Elderly farmer, ex-coca producer
LQ14	Mar 12 2020	Puerto Asís	1	M	Farmer, coca producer
LQ15	Mar 13 2020	Puerto Asís	1	M	Farmer, coca producer
<i>All interviews with the prefix "I" were relatively open-ended conversations (though we had topics of interest, we did not have a list of specific questions) with inhabitants, mainly farmers, of the region.</i>					
I1	Sept 26 2019	Puerto Asís	1	M	Farmer, JAC vice-president, coca producer
I2	Aug 5 2018	Puerto Asís	1	F/M	Farmers (couple), JAC president and secretary
I3	July 1 2019	Puerto Asís	1	M	Retired farmer

(continued)

Interview Code	Interview Date (M/D/Y)	Interview Location (municipality)	Number of People/Interviewees	Interviewee (s) Gender	Interviewee Description
I4	July 1 2019	Puerto Asís	1	M	Farmer, JAC vice-president, ex-coca producer
I5	Sept 11 2019	Puerto Asís	1	M	Carpenter, coca picker, ex-coca producer
I6	Sept 11 2019	Puerto Asís	1	M	Farmer, ex-coca producer
I7	Sept 11 2019	Puerto Asís	1	M	Farmer, JAC secretary, coca producer
I8	Sept 12 2019	Puerto Asís	3	F/F/M	All coca-pickers and inhabitants of the same rural subdistrict
I9	Sept 12, 2019	Puerto Asís	2	M/M	Both farmers, JAC members and ex-coca producers – inhabitants of the same rural subdistrict
I10	June 28 2019	Puerto Asís	1	F	Farmer, JAC president, ex-coca producer
I11	July 2 2019	Puerto Asís	2	F/M	Farmers (neighbors), one is a long-time social org leader, the other an ex-coca producer
I12	June 30 2019	Puerto Asís	1	M	Farmer, Afro community leader, ex-coca producer
I13	Mar 31 2019	Puerto Asís	4	F/M/M/M	All JAC presidents of different rural subdistricts,
I14	Sept 14 2019	Valle del Guamuez	1	M	Farmer, ex-coca producer
I15	Mar 29 2020	Puerto Asís	8+	F & M	Group discussion with various inhabitants of the same rural subdistrict.
I16	Sept 15 2019	Valle del Guamuez	4	F/M/M/M	Farmers, inhabitants of the same rural district, all involved in social orgs, one is a regional social leader, ex-coca producers
I17	Aug 5 2018	Puerto Asís	1	M	Farmer, JAC president
I18	Sept 9 2019; Feb 5 2020; Mar 12 2020	Puerto Asís	1	M	Farmer, JAC president, regional social leader
I19	Sept 26 2019	Puerto Asís	1	M	Farmer, social org leader
I20	Feb 6 2020; Mar 10 2020	Puerto Asís	1	F	Farmer, social org leader, JAC president, ex-coca producer
<i>All interviews with the prefix "F" were with government or quasi-government functionaries.</i>					
F1	June 2 2020	Puerto Asís	1	M	Employee of the State-owned Agrarian Bank
F2	Oct 9 2018	Bogotá	1	M	Former PNIS coordinator in Putumayo
F3	Oct 18 2018	Bogotá	1	M	Former director of land access at the National Land Agency
F4	May 24 2019	Bogotá	1	M	Former PNIS director
F5	May 9 2018	Puerto Asís	2	M/M	PNIS officials in Putumayo
F6	Sept 24 2019	Puerto Asís	1	M	PNIS official in Putumayo
F7	Sept 25 2019	Puerto Asís	1	M	PNIS official in Putumayo
F8	Oct 16 2018	Bogotá	1	M	Director of community action at the Ministry of Interior
F9	July 2018	Puerto Asís	1	F	Criminal law judge in Putumayo
F10	Sept 9 2019	Puerto Asís	1	F	Notary Office functionary in Putumayo

Appendix 2. - Table based on interviewees' responses to open-ended questions: "why did you request a title? or "why did/do you think it was/is important to have a formal title?"

± indicates that the person acquired their land via a formal transaction with a public deed – the rest solicited an adjudication resolution or title for public lands.

* indicates that the person is not speaking about themselves, but rather in general or about their neighbors or other people from the rural subdistrict.

GENERAL

To prove I am the owner/so I know the farm is mine/to have property rights/to legalize ownership/to have a document/ to ensure my land is not treated as 'baldíos' or public LQ1, LQ2, LQ3, LQ4, LQ6, LQ7, LQ9±, LQ12, LQ13, LQ15±, I10

TENURE SECURITY

To clarify boundaries/have a proper map and measurement of the farm LQ4, LQ6

To protect my land from.../avoid it being taken by.../defend against...

Unspecified / people in general LQ6, LQ12, I10, LQ15±

Oil companies LQ1, LQ9, LQ2, I16*, I11*

State/Government LQ1, LQ2

Elites/large landowners/companies LQ1, I16

Armed actors LQ1

Neighbors LQ6

Neighboring indigenous communities I7

CREDIT/INVESTMENT RELATED

To access to credit LQ2, LQ4, LQ9±, LQ14, I5, I6, I16*

(continued on next page)

	Note: interestingly, none of those interviewees who reported this as a reason for formalizing their land ownership had actually used their title to solicit credit.
To be able to participate in State programs/ because its required for government investment	LQ2, LQ13, I11*
To facilitate phytosanitary certification	I10
OTHER	
The government recommended I request a title/told me to do it. . .	LQ3
Others (unspecified) recommended I request a title/said it was important	LQ12, LQ13, LQ14
Because the opportunity arose	LQ3, LQ7, LQ13
Because titling was/is cost-free	LQ3, LQ7
To ensure compensation from the oil companies. . .	LQ3, I11*
Because they were going to construct a road (unexplained)	I5

Appendix 3. - Table based on interviewees' responses to open-ended questions: "why didn't you or your neighbors request a title? or why don't you or your neighbors have a title?"

* indicates that the person is not speaking about themselves, but rather in general or about their neighbors or other people from the rural subdistrict.

REASONS FOR NOT HAVING A FORMAL TITLE	
They had more land than can be legally titled (over 90 ha)	LQ2*
They were scared to request a title because their farm had coca . . .	LQ1*, LQ2*
I/they didn't think it was necessary or important; or feel the land is theirs anyway and so don't see the need	LQ7*, F10*, LQ14 Note: LQ14 has had more than 1 farm, the current one is not titled.
They didn't want to pay taxes	LQ7*, F10*
They found it difficult to travel to request a title	I18*
They never went to collect the title from the relevant office	I16*, I18*
My application was denied (reasons unclear)	LQ5, I18
Their application was denied or was never resolved because of oil company presence	I7*, I1*
The government isn't interested in ensuring people have legal titles	I16*
The government "lost" the titles or couldn't find the documents	I16*, I18*

Appendix 4. - Table with information on interviewees' experiences with formal bank loans

Used a land title as collateral to obtain a loan	LQ1, LQ11 - in the past, when they had a farm with a title deed
Took out a loan using a certificate of possession or purchase/ sales agreement	LQ3, LQ4, LQ6, LQ11, LQ13, LQ14, LQ15 LQ5 - says no document was required at all because the loan was via an intermediary
Took out a loan using a certificate of possession or purchase/ sales agreement DESPITE having a formal property title	LQ4, LQ6, LQ13, LQ14, LQ15
Tried and failed to obtain a bank loan	I20- allegedly because the land title is in her husband's name (note: her husband has successfully taken out loans) LQ2- he didn't complete the application process because the bank was asking for too many papers - reference letters from 4 different people
Use of loan	LQ1- to purchase cattle LQ3- to plant cacao LQ5- to purchase some tools (he can't recall how he spent the rest) LQ6- to build a house in town LQ11- to fund cattle ranching (specifics undefined) LQ12- to buy some animals LQ13- to plant black pepper LQ14- to plant cacao (and off the books, for cattle, coca and home improvement)

	LQ15- officially for cacao, but in practice to buy land and pay for a lawyer to get a family member out of prison
Payment of loan	LQ1- yes, with some delays (funding source unspecified) LQ3- they couldn't pay because the cacao didn't produce, they got a reduction in the debt and paid with other funds (source unspecified) LQ5- paid a reduced amount with PNIS money LQ12- no, their farm was fumigated, and they lost their animals LQ13- no, his pepper plants died, and he still has the debt years later LQ14- yes, with coca income LQ15- yes, with coca income
Mentioned access to credit as a rationale for -or potential benefit of- land formalization.	LQ2, LQ3, LQ4, LQ5, LQ9, LQ14 Note that none of these interviewees had actually used a formal land title for a loan application, while LQ3, LQ4, LQ5 and LQ14 had taken out credit without presenting a formal land title. Also, LQ2 mentioned on a number of occasions that other farmers from his community had used purchase/sales agreements or certificates of possession to secure a loan.

Appendix 5. - Table based on interviewees' responses to open-ended questions about why their particular legal agricultural venture failed, why people don't participate in legal agricultural economies, and why it's difficult for people to shift out of coca production.

Lack of buyers/market/demand for legal produce (e.g. pigs, chickens, rice, plantain, black pepper, <i>sacha inchi</i> or Amazonian peanut, Amazonian fruits – <i>arazá</i> , <i>copoazú</i> and <i>cocona</i>)	LQ2, LQ4, LQ5, LQ12, I11, I1, I2, I3, I9, I16, I17, I12, I13, I14
Lack of collection centers/processing plants (e.g. for transforming fruits, rice mill, slaughterhouse for pigs, organic fertilizer factory)	LQ2, LQ4, I11, I10, LQ5, I17, I13
Low prices for legal produce/price fluctuations (e.g. plantain, maize, cacao, and black pepper)	LQ1, LQ2, LQ3, LQ7, LQ12, I1, I2, I3, I12, I14, I13
Intermediaries take big cuts or don't pay on time (e.g. plantain, chicken)	LQ9, I10, I12, LQ4, I2, I13
Poor quality of soil/land isn't very productive/land isn't apt for much except coca	LQ2, LQ4, LQ9, I10
Land fertility and other production problems due to aerial fumigation	I4, I9, LQ1, LQ2, LQ6, LQ12, LQ13, I10
Other problems with production, such as pests or fungi, or poor harvests for unknown reasons/other crops don't produce well (e.g. maize, plantain, rice, and especially cacao)	LQ1, LQ2, LQ3, LQ4, LQ9, LQ12, LQ13, LQ14, I1
Lack of transport infrastructure, like roads or bridges/high cost and difficult of transporting legal produce – especially bulky or delicate produce and perishables (e.g. pineapples, limes, plantains, yucca, milk, cheese)	LQ1, LQ3, LQ7, LQ9, I1, I2, I6, I10, I9, I12, I13, I16, I17
Lack of other public goods, such as electricity	LQ7, I1
Lack of phytosanitary certificates or permissions for production and processing/confiscation of legal produce by authorities (e.g. pigs, rice, <i>panela</i> or processed sugar cane, black pepper)	LQ4, I10, I11, I16, I15
Difficulty of hiring day laborers for work other than coca harvesting/high cost of labor due to coca economy	LQ7, LQ11
Coca cultivation has become the cultural norm/is what everyone knows how to do	LQ1, I11

Appendix A. Supplementary data

Supplementary data to this article can be found online at <https://doi.org/10.1016/j.worlddev.2021.105680>.

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