

Privatization of the Commons and Access to Land on The Frontier : Evidence from The Colonial Legacy in The Democratic Republic of Congo.

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June 15, 2017

Abstract

What is the importance of colonial policies in shaping today's land tenure institutions and inequalities in access to land ? This paper sheds light on this question by analyzing "paysannat", a colonial intervention in the Belgian Congo attempting to push the evolution of the tenure system from communal toward private property rights. In the context of forced cultivation of cash crops, the Colony imposed the privatization of communal land (forests or fallows) to individual families in some villages. Despite ambitious plans, paysannat was only partially implemented due to administrative capacity and local resistance. Using spatial discontinuities of its implementation and a unique combination of contemporary household survey data, geographic data, as well as historic data from both colonial records and contemporary oral history surveys, this paper shows that paysannat had a persistent impact on local land institutions through its impact on the privatization of collective land. We find that paysannat was successful in pushing toward the individualization of the commons, and that it had important distribution consequences between the clan groups.

Key words: land rights, commons, colonization, agricultural policies, economic history, Democratic Republic of Congo

JEL classification: Q15, O13, P14, P16, O55

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”One of the objectives of African history, once it freed itself from an over dependence on sources in colonial archives, was to look at African history from an African viewpoint with sources rooted in Africa.”

Merrick Psnansky, Inaugural address, University of Ghana 1969

1 Introduction

Since colonization, land reforms have been recurringly viewed as a key development strategy in Sub-Saharan Africa, where a large share of the population relies on agriculture for its livelihood. But the approach has been the subject of much debate, and land policy in Africa has been torn between the desire to preserve customary tenure and to promote modern individual land rights. In 2011, at least 1.6 billion hectares of land were still hold under customary common property rights in SSA according to a conservative estimate, much of it without legal recognition (Wily, 2011). However, there is still no concensus on the impact of their privatization¹ on future development outcomes, welfare, and natural resource use.

The land reform question in Africa has long been very different from other continents, since communal land ownership was dominant at the time of colonization. In this system, the land was held in common and was allocated by a tribal chief who did not own the land but acted as a trustee (Vansina, 1990). This allowed for a relatively diffused access to land, and therefore few redistributive land reforms have been conducted in Africa until recently². Rather, the emphasis has initially been on defining rights to land and determining the importance of communal versus individual rights (King, 1977; Platteau, 2000).

In this paper, we study the long term consequences of a land tenure change introduced by the administration in the Belgian Congo shortly before Independence, attempting to push the evolution of the tenure system from communal toward private property rights. Shortly before the seminal paper about the ”Tragedy of the Commons” (Hardin, 1968), this policy led to the partial appropriation by individual families of parts of the communal land that was not under cultivation (forests or fallows) and to its formalization. Despite ambitious plans, the policy was only partially implemented due to administrative capacity, misinformation, and local resistance. This partial roll-out provides a natural experiment that allows us to shed light on its consequences. Did this institutional change persist, why, and through which channels? How did it affect the development trajectory, access to land, resource use, and welfare?

Our paper relates to the literature on the evolution of customary land rights and the priva-

¹individual (or family) appropriation of land for exclusive use

²Most notably, Kenya was the first country in Africa to conduct a large scale consolidation and redistribution land reform. (King, 1977)

tization of the commons. Since the end of the colonial period, the tendency toward individualization of land rights and the privatization of the commons has occurred spontaneously in response to population pressure and growing market integration (Boserup, 1965; Platteau, 1996). However, large parts of the forests and of the land which is not being cultivated are still held in common (Wily, 2011). The remaining communal land is under pressure due to population, market integration, and the surge of large scale investments by foreign investors following the global food crisis (Deininger and Byerlee, 2011). It raises the question of the best governance structure (common or private property rights) for the remaining communal land, and of the best way to formalize land rights for the land that has already been de facto individualized Goldstein et al. (2015).

While theory predicts that formalization of rights can lead to efficiency gains, the empirical evidence in Africa is limited Goldstein et al. (2015); Besley (1995); Besley and Ghatak (2010); Brasselle et al. (2002); Jacoby and Minten (2007). Similarly, although the privatization of communal land has been the subject of a vast literature, the economics literature is mostly theoretical and empirical evidence about its consequences is scarce. Privatization is often advocated in response to concerns about overuse of resources under conditions of free access (Hardin, 1968; Baland and Platteau, 2003). However, theory predicts that privatization can have adversely impact equity (Weitzman, 1974; Baland et al., 2009), while common property rights regimes can provide efficiency and equity benefits in some conditions: "when entry is limited to a well-defined set of users over a well-delineated set of resources through informal recognition of community rights or through formal community titling³, rational management of common property resources becomes possible if cooperation among community members can be achieved." De Janvry and Sadoulet (2001). The potential equity benefits include better access to the resource for the poor (including protection from "uncontrolled appropriation" (Baland and Platteau, 1998)), flexibility, insurance (Baland and Francois (2005) show that the commons may effectively protect poor people against adverse income shocks), and preservation of community relations (De Janvry and Sadoulet, 2001). In fact, Baland and Francois (2005) show theoretically that common property regimes can be more efficient than private ones when markets are imperfect.

The identification of the impact of privatization raises methodological issues because of the endogeneity of the relationship between the tenure regime (common versus private), the expected gains (in efficiency and equity) and the characteristics of the communities. Although the literature is rich in case studies, to our knowledge most of the empirical evidence relies on cross-section studies based the comparison of user-groups with different characteristics and tenure regimes and do not address the issue of endogeneity (Baland and Francois, 2005). This study makes a central contribution to this literature by exploiting a natural experiment that

³Much of the communal land in Africa is still untitled despite efforts in the previous decades to promote their legal recognition (Wily, 2011)

provided some exogenous variation in the level of privatization.

Our paper also relates to a growing body of work that investigate empirically the impact of colonialism on former colonies' development. The objective of this literature is to unveil historical dependencies and understand the importance of institutions set up during colonization in explaining today's development outcomes. In seminal papers, [Acemoglu et al. \(2002, 2000\)](#); [La Porta et al. \(1997\)](#); [Engerman and Sokoloff \(1994\)](#) provided the first empirical evidence that the colonial rule can have a lasting impact on colonized countries. The main channel they supported was the persistence of initial institutions: changes in institutions that were introduced by the colonizers persisted even after those countries became independent. While [La Porta et al. \(1997\)](#); [Engerman and Sokoloff \(1994\)](#) focused on the importance of the identity of the colonizer, while [Acemoglu et al. \(2000, 2002\)](#) focused on the characteristics of the colonized countries. He was the first to provide a strong identification strategy: he instruments current domestic institutions by settlers mortality, and identifies the impact of institutions on income, relying on the assumption that settlers mortality affects today's income only through its impact on institutions. These first papers paved the way for other studies at the macro and country levels.

Tackling the question of the long term impact of colonization raises several challenges: uncovering the full development trajectory since colonization, identifying causal impacts, and understanding the mechanisms that link colonial interventions to today's outcomes can be challenging. This is particularly the case in cross-country analysis. More recently, a few empirical studies have focused on limited geographic areas and a particular colonial rule to identify the influence of colonization on today's outcomes ([Banerjee and Iyer, 2005](#); [Iyer, 2010](#); [Dell, 2008](#); [Huillery, 2009, 2011](#)). The advantage of this seemingly narrow focus have been underlined by [Cogneau and Dupraz \(2015\)](#): when comparing more homogenous areas it is easier to understand precisely what differed between them and identify the exact channels through which colonial rules shaped long term development. Those studies provide detailed information about the trajectory of the region of interest and strong empirical evidence. For example, [Banerjee and Iyer \(2005\)](#) examine differences in revenue collection across districts in colonial India: in some district, revenues were collected directly from the farmers while in others the collection was performed by local landlords. They find that landlord districts have lower levels of health, education, and agricultural technology than their non-landlord counterpart and use the date of conquest as an instrument for the type of revenue collection that was experienced to argue that the impact is causal. [Dell \(2008\)](#) uses a regression discontinuity strategy to identify the long term impacts of the forced labour mining system "mita" in Peru. She finds that mita districts have lower levels of consumption, and argues that the transmission channel is that wealth was more concentrated in mita districts which led to lower levels of provision of public goods (education and roads). [Huillery \(2009\)](#) shows that colonial public investments are an important determinant of current regional inequalities

in West-Africa, because of the persistence of early colonial investments. To identify the effect of colonial public investments on current outcomes, she instruments European settlement by hostility toward colonization. She finds that conditional on precolonial conditions, Europeans decided to settle in districts that were relatively less hostile to colonizers. Those districts received more public investment, which had a positive impact on later investment and on today's development outcomes.

In this paper, we follow [Banerjee and Iyer \(2005\)](#) in that we focus on a specific colonial rule related to land tenure in a specific region : we study the long term consequences of the "Paysannat" policy in Equateur, the northwestern region of what is now the Democratic Republic of Congo. Similarly to the land revenue collection system described by [Banerjee and Iyer \(2005\)](#), the paysannat policy continues to have an effect on today's institutions although it was abolished after Independence, another example of an "institutional overhang". However, it differs in that paysannat affected land tenure at a very local level while revenue collection in India took place at the level of the districts, with consequences for their future policy decisions. The advantage of this approach is that it allows us to locate precisely the source of the variation and therefore to have a convincing identification and examine the channels in detail.

The first contribution of this paper is therefore the use of a natural experiment to identify the impact of paysannat, while changes in land tenure systems are typically endogenous. Since this policy was only partially implemented, my strategy is to use the spatial distribution of Paysannat to study its influence on subsequent development trajectories. I compare villages that were possible targets of paysannat to villages where paysannat was not implemented. The main empirical challenge is therefore the selection of villages: did colonial administrators chose to implement Paysannat in those villages first because they had systematically different characteristics? In particular, since we are interested in the effects of privatization, were paysannat villages chosen for being already more privatized, closer to commercial areas, and experienced more pressure on the land ? We use historical records to show that in practice, territorial administrators were constrained to set up paysannat in some specific administrative Secteurs, and that they had little information to discriminate between villages within them. Using geographic and survey data, we also show that the location of paysannat villages is not correlated with geographic characteristics such as accessibility or distance to commercial urban centers during colonization, but that it is positively correlated to the distance to the district capital at the time of colonization. Apart from selection, another important question is whether the fact that a village had been involved in Paysannat led to different development policies after Independence and different patterns of investments. We show that there is not evidence in historical records or village data that this was the case, and that the distance to schools and hospitals today is not different in these two groups. Finally, since the variable indicating whether a village took part in Paysannat or not therefore stems

from oral history surveys, we could worry that this could introduce new biases: if villages where paysannat never took hold forgot about its existence, the effects will be overestimated. To avoid this, we devoted a lot of time to the village survey and insisted to record every possible attempt to change the land tenure in the villages. In fact, several villages report failed attempts to redistribute the commons in this period, and despite the abandon, they are coded as paysannat villages. Finally, to investigate whether paysannat affected within village inequalities, I compare the differences in outcomes between households belonging to different social groups in treated versus non treated villages. In particular, I compare households who belong to clans who founded the village ("founders") with those from other clans recognized at the village level ("locals") and those who don't have a recognition in the village institutions ("marginals"). This relies on the additional hypothesis that these social groups are comparable in paysannat and non paysannat villages.

Another contribution of this paper is the use of a first-hand household-level data set and a detailed village survey of oral history and current and past land institutions that we collected between 2013 and 2015. We complemented and confirmed the oral history data by collecting colonial history record data from the Ministry of Foreign Affairs in Brussels.

First, we run a simple OLS comparing village level outcomes in villages that were reached by paysannat (whether or not it took hold) to villages that were not. Those regressions include a fixed effect at the administrative Secteur level to account for differences in geographic and colonial administrator's and indigenous chiefs characteristics, as well as geographic controls such as the distance to the capital of the administrative district. We show that paysannat villages have less common forest near the village center, and that they already face more shortage of forest for young generations. At the same time, it also seems to be more difficult for migrants from the village to come back and get access to land, and older generations of strangers in the village seem less integrated in the local institutions. Second, we examine the distributional consequences of this privatization of the commons by the Belgian Colony within villages. To do so, we run an OLS comparing household level outcomes for households belonging to social groups that identify as descendents of the founders of the village, to other local groups and marginal one by interacting a paysannat dummy with social group dummies. We establish that there are strong inequalities in access to land between the different clanic groups within a village, and we give evidence that part of these differences can be explained by the presence of Paysannat. Finally, to test the robustness of our results and to control for possible endogeneity in the choice of the villages for the agricultural policy, we then follow a nearest neighbor's approach: we construct pairs of villages which are geographical neighbors across administrative borders of a territory, but which happened to have different agricultural policies (with or without a policy to push toward the individualization of land rights).

One interpretation of these results is that paysannat disrupted the local institutions and

adversely affected social capital in the village. As a result, the remaining communal land was poorly managed and led to overuse and appropriation by the clans who were in the village at the time of the distribution, leading to a tighter social structure and land ownership pattern.

The remainder of the paper proceeds as follows. Section 2 presents background on the history of the land tenure system and agricultural policies in Congo since the beginning of colonization, and how they led to the design of the paysannat scheme. Section 3 describes the potential channels through which this institutional change might influence the long term trajectory. Section 4 describes our experimental strategy and data, and discusses our key identification assumptions. Sections 6 presents the results and section 7 concludes.

2 Historical Background

King Leopold was granted control of most of the Congo Basin in 1885 and created the Congo Free State. Its large territory was then still largely unexplored, so his priorities were to take control of the vast territory and to generate financial resources to fund this expensive undertaking (Piet, 2013). The land legislation was designed to serve these two objectives: the first decree published in 1885 declared most of the Congolese land to be "vacant" and hence to belong to the King, and a heavy taxation in kind was imposed to collect ivory, wild rubber, and copal (Boelaert, 1956). The ill-treatment of indigenous people soon triggered international protests, and together with the state's financial difficulties led Belgium to annex the country as a colony in 1908. The Parliament attempted to reform the land legislation but its grounding principles remained unchanged: throughout the period, the primary objective of the land legislation remained to allow the appropriation of the "vacant" land and the exploitation of its resources for the benefit of the colonial administration, missions, and European companies. By granting huge land concessions and helping with the recruitment of local labor, the state supported the development of the mining industries as well as large scale agricultural production by commercial companies. Much of the present land law is still either a legacy from or a reaction to the land law system established by the Belgians (Piet, 2013; WorldBank/UN-Habitat, 2016; Mugangu Mataboro, 2016). The agricultural policy focused on the forced cultivation of cash crops (such as cotton, cocoa, rice or palm oil) by smallholder farmers in their villages. Commercial companies were granted large monopolies over entire regions, and farmers were forced to cultivate cash crops and to sell their production to the monopolist at state-fixed prices under the "compulsory cultivation scheme". This coercive system led to an increase in exportation but failed to improve living standards and the declining soil fertility soon became a pressing issue in rural areas. To tackle this challenges and further encourage the production of cash crops, a new agricultural policy called "paysannat" was tested in the 1940's and expanded in the 1940's. To rationalize traditional cultivation

and encourage the emergence of a class of small entrepreneurs, it pushed the evolution of customary land right toward private property rights, with limited success on production but lasting consequences on institutions.

2.1 Pre-colonial institutions, land tenure and agriculture

Before exploration and colonization began in the region, several ethnic groups speaking Bantu languages had been living in the Congo Basin forests for four millenia. They formed complex societies that shared common traditions and food systems, as well as social and political institutions. They had already experienced the rise and fall of several chiefdoms and forms of power, as well as the arrival of the Atlantic trade near the Congo river, as described by [Vansina \(1990\)](#). Customary land rights were complex, variable, and poorly understood by the colonizer ([Piet, 2013](#)).

Political institutions in the region were very decentralized and best characterized by a tension between the desire for local autonomy and the need for security. Three groups are critical to understand their social and political organization: the clan, the village, and the district. The clan ⁴ was a large household establishment organized around an actual or perceived common ancestor. Several clans lived together in a settlement called a village in which the founding clan had a prominent role. Villages often bore the name of the supposedly ancestral founder of the elder clan in the village. A district was a network of allied neighboring villages, which retained autonomy but occupied of precise position in a hierarchy, from the elder village to the newest. They came together mainly when they were attacked from outside, and conflicts within districts were settled through mediation by the leader of the elder village. Sometimes, fractions of a clan could split up to form a new settlement in new lands in response to impoverishment of soils and games or to social events such as attempts to enforce autocracy. The movement of men between clans and villages was also relatively flexible. Population densities were low and allowed creation of a relatively stable equilibrium, punctuated by wars and the expansion of some ethnic groups.

On the eve of the colonial conquest, districts, villages and clans formed a complex and structured network of communication and exchange in the Congo Basin. Farming had been well established, and surplus was traded along the many rivers. The agricultural process was similar among the different ethnic groups ⁵: farmers practiced shifting cultivation and used slash and burn techniques with a strong gender division of tasks. Typically, men took charge of the clearing of forest or savanna and of the burning of the remains, while women took over for planting, cutting weeds, and harvesting. This gender division of labor allowed men

⁴”Etuka” in local languages, also referred to as ”House” in Vansina’s terminology.

⁵Except for some ethnic groups which specialized rather in fishing or hunting and gathering such as the pygmies

to devote time to fishing and hunting that brought diversity to the diet. When soil fertility started to decline, farmers moved to a new plot of land. When fertility started to decline in the village or fields became too far from the village dwellings, the clan or village could move further. Many villages were semi-nomadic and moved at irregular intervals to occupy new land or reoccupy land they had left fallow for decades. The indigenous land tenure institutions therefore reflected this flexibility. Land rights were not static and incorporated the fact that agriculture was complemented in large parts by fishing, hunting, and gathering (Salacuse, 1985; Piet, 2015). The land belonged to the lineage groups (or clans) through their ancestors. Its allocation was under the authority of a "land chief", while the members of the clan who cultivated it had usufruct rights to the land. Population density was still low and allowed cultivators to leave the land fallow for very long periods of time. Colonization violently disrupted this pattern.

2.2 Predatory System under King Leopold

In 1885 the Berlin Conference created the Congo free state, a property of Leopold II King of the Belgian. The first decree he passed regulated land ownership⁶: all "vacant" land was considered to be the property of the state in either its public or private domain, while land occupied by indigenous populations could continue to be governed by the customary system⁷. State land was withdrawn from customary law and governed by written legislation inspired from European legal concepts. A land registration system was created, and European enterprises, missions, or colonists could obtain grants or concessions in the private domain of the state. The land to be obtained was surveyed, delimited, and registered before a title was issued. This decree effectively meant the expropriation of the majority of the Congolese land (Piet, 2013). Even if the legislation formally recognized customary land rights, in practice the administration denied them and considered vacant all the land that was not currently under cultivation or formally occupied by settlements. It was based on an illusion: many scholars consider that no land was completely vacant at that point and that all of it was claimed by one indigenous group or another (Vinck, 2011; Salacuse, 1985). The land legislation provided both a way to attract investments and a source of revenue to fund colonization, while land occupied by indigenous populations was not subject to registration and titling, putting them in a very weak position.

Between 1891 and 1893, the colonial administration promulgated two further decrees stating that the state had exclusive rights to the produce of the domanial lands that provided the

⁶Decree of July 1, 1885, Article 2: "No one has a right to occupy vacant land without legal title, nor to dispossess indigenous people from the land they occupy. All vacant land must be considered to belong to the state."

⁷Decree of September 7, 1886, Article 2: "lands occupied by the native population, under the authority of their chiefs, shall continue to be governed by local customs and usages"

legal basis for the exploitation of the resources. A heavy taxation in kind was imposed on the Congolese farmers to generate revenue: the population was forced to collect ever increasing quantities of ivory, and later wild rubber and copal. This forced farmers to spend a large share of their time away from their fields and often abandon them. It eventually led to the exhaustion of the wild rubber reserves and to international indignation. In 1905, an international commission led by British diplomat Roger Casement published a report that underlined the abuses and atrocities committed by the administration. The report pointed to the land legislation as one of the main causes of the abuses and as a threat to future development of the indigenous communities (EIC, 1905). Between 1885 and 1908, it is estimated that the area over which Leopold II made grants and concessions covered more than 27 million hectares, out of a total land area of 234 million hectares (Salacuse, 1985).

2.3 Colonization, continuities, and forced cultivation

In 1908, following intense diplomatic pressure and financial difficulties, the Belgian Parliament took control of the Congo Free State and created the Belgian Congo. The new colony put an end to the rubber system, attempted to reform the land legislation without changing its fundamental principles, and introduced forced cultivation.

After the annexation, many of the concessions were renegotiated, but new ones were also granted. New legislation aimed to define more precisely what land could be considered "vacant" and how local communities should be compensated.⁸ In 1935, a new decree defined the procedures to be followed by territorial administrators before ceding domanial land⁹: a survey investigating the vacancy of the land and the customary land claims had to be conducted, compensation were calculated based on that, and local chiefs had to be involved in the determination of the boundaries. It was long, but provided the concession holder with legal certainty. However, this proved very challenging in practice and local administrators lacked the time and resources to implement the decree. The demarcation of the land was not only difficult because of the lack of financial and human resources, but also made difficult by the transitory nature of many of the villages who were reported to disappear after having been demarcated. The presumption also remained that all the land was vacant unless local populations could provide convincing evidence that it was not. In practice, villagers had no bargaining power and all they could do was to hope to receive a small compensation. The administration relied on village chiefs (also called "capitas") to negotiate the terms of the arrangement. Those chiefs were often appointed by the state and replaced when not obedient,

⁸Several decrees passed in 1906 and 1909-1910 aimed to define more precisely the term "vacant" and to require investigations and compensations about the rights of the indigenous communities. A new definition of vacant was introduced "Land which the indigenous people cultivate or exploit in whichever way, in conformity with customs and local practices".

⁹Decree of May 31, 1935

and they received the compensation directly when there was one. This policy had a broad impact in the region: thousands of hectares of land were given in concession, creating much resentment among local populations. While population was sparse and land seemed abundant, good arable land was not, and labor even less. After commercial concessions took possession of large swathes of land, they set up mining activities or plantations of cocoa, rubber, or palm tree. Those required labor resources that they tried to satisfy locally, and indigenous people were hired, often by force, for meager salaries. As of 1944, a total of twelve million hectares are thought to have been controlled by European companies or individual households.

The new colonial administration also expressed worries about the low agricultural production by the indigenous population. In 1917, they introduced the Compulsory Cultivation Scheme¹⁰ to promote indigenous production of cash crops and increase exports. The administration decided which quantities of which cash crops should be produced in each village, and farmers were obliged to grow crops and sell their production to a monopolist. Although the Colonial Charter prohibited the use of forced labor, it was a coercive scheme, closely monitored by state agents. Although exports of agricultural products improved, the system proved very unpopular and the benefits for commercial companies were made at the expense of the local populations. Low production or disobedience were sanctioned by fines and imprisonment. The scheme increased the leverage chiefs had over their villages, and systematically undervalued the role of women in agricultural production. While it was theoretically limited to 60 days per year, in practice crops like cotton required many more days to be cultivated and it limited the time farmers could devote to hunting or fishing. It further tied farmers to their land and worsened the soil fertility issues associated with more sedentary villages and monocultures, and the rural exodus accelerated (Likaka, 1997). The scheme was widely criticized in particular by the International Labor Office, but even if it was renamed to be called "educational scheme", it continued with very little change until the independence of the country in 1960.

District administrators were responsible for the supervision of the scheme, but the operational tasks were led by the territorial agents. Since 1933, the Districts were the intermediate level between the colonial and provincial governments on the one hand and the territorial agents and indigenous chiefs on the other hand (De Clerck, 2006). The role of the District Commissioner was wide-ranging: he had important judiciary responsibilities (both as the judge of the district and because he was overseeing the indigenous tribunals), he played a key role in the attribution of Land Concessions to foreign companies and determining levels of taxation, and he had to oversee the work of territorial agents and in particular the creation of "chefferies" and "secteur" and the appointment of their chiefs. Since 1912, the territoire was the basic unit of the administrative division of the country, and the lowest administrative level led by a Belgian expatriate. He was in charge of maintaining public order, collecting

¹⁰Decree of the 20 February 1917

the taxes, lead infrastructure investments etc. He was also entrusted with conducting surveys about indigenous organization in order to create the aforementioned "chefferies" or "secteur", a lower administrative level led by indigenous chiefs. Relationships between district and territorial administrators were not always easy, and the implementation of paysannat was no exception (De Clerck, 2006).

2.4 The introduction of Paysannat: a new approach to agricultural policies and land issues

Between 1940 and 1960 a new ambitious agricultural policy was developed and implemented, the "paysannat indigène" (hereafter paysannat). The starting point for this scheme was the recognition that the compulsory cultivation scheme had failed to improve the situation in the countryside sufficiently and to stop the rural exodus. Agricultural productivity remained very low and declining soil fertility had become a pressing concern (Likaka, 1997).

The core idea of Paysannat was to reorganize and modernize the indigenous agriculture based on a scientific approach. The objectives were twofold: first, the colony aimed to create a class of small farmers owning their land and selling their produce on the regional and national market. Second, they aimed to push the evolution of collective land tenure towards a system of private property rights. Families were grouped around a homogeneous block and were assigned plots on land that traditionally belonged to their clan. Rotation of crops and duration of fallows were determined by the state agronomists to ensure the preservation of the soil fertility. On their individual plots, they were asked to produce cash crops (cotton most of the time), sometimes perennial crops (hevea or palm trees), and food crops for their own consumption (cassava, maize, and groundnuts)(Piet, 2015). In practice, it meant the distribution of collective land to individuals.

The hope was that customary land would become privatized over time, even if official documents avoided to mention it through fear of fueling the contentious land issue. In the propaganda, they instead insisted that the scheme would provide villagers with a way to protect their village land from being declared vacant and given into concession to a foreign company (Piet, 2015). This argument was meant to help convince them to voluntarily participate in the scheme. However, local populations lacked enthusiasm and perceived it as the continuation or at best an extension of the compulsory cultivation scheme. The territorial agents had to resort once more to coercion to expand it. ¹¹

The scheme started at a very small scale as an experiment conducted by the National Institute for Agronomic Research with one family in 1936. At the beginning of the 1940's, European

¹¹This perception is very visible in the local names that were given to the scheme "kasangisa", meaning "being forced, coerced" in Katanga.

Figure 1: Land allotments for Paysannat, from Piet (2015)



Cotton Companies became very interested in the scheme as a way to improve soil fertility and proposed to help extend it in a combined effort with the colonial administration. Cotton companies saw it as a way to safeguard and increase production of cotton which farmers were forced to sell to them at fixed prices. In 1948, the systematic extension of the scheme became a key objective of the Ten Year Plan for social and economic development. It was decided that 500.000 farmers with their families would be allotted their own plots of land under the program between 1949 and 1959.¹² The paysannat expanded quickly in Kasai, Orientale Province, and in Katanga and Equateur. By 1955, 150.000 families had already been assigned a plot under the scheme.

However, implementation turned out to be an extremely difficult task. District administrators were responsible for the implementation of the scheme, but the operational tasks were conducted by the territorial agents who led a small team of agronomists and assistants. They had to cover large areas in very difficult transport conditions to prospect suitable land, study the local customary rights in each village, and distribute the land within a short period of time.¹³ The prospection was meant to identify land suitable for agriculture (with a preference for forests), and the land survey was meant to establish to which villages and which clans the land belonged to. In practice, there were insufficient numbers of "political specialists" to conduct this delicate work, and their lack of diplomatic skills led to misunderstandings and sometimes conflicts with local chiefs. In many instances they tried to convince villages to give parts of

¹²"Etude paysannats indigenes" , In African Archives Brussels, A21 (749) - Agriculture Indigene, 1934-55, dossier 7.0.c : Paysannats indigenes, 1954-56.

¹³"Compte-rendu de la reunion tenue le 5 mai 1952 á Itipo relative au Paysannat dans les territoires du District de l'Equateur", In AAB, GG 17051 - Equateur AGRI-AIMO, Paysannat Indigène, Programme Plan Décennal.

their land to neighboring villages, to move the villages to areas with more untouched forest, and failed to recognize which clans owned the land. They were often very authoritative with local chiefs, despite instructions from district commissioners. We will provide more detailed information about the selection of the villages in section 4. In 1955, acknowledging there were many implementation issues, the administration decided to slow down the expansion in order to "learn from past experience and to adjust when necessary". In 1959, they had reached 210.000 farmers and their families: less than half of the objective, but a significant share of the population (Piet, 2015).

2.5 Post-independence trajectories

The Paysannat program was swept away immediately after Congo gained independence in 1960, after achieving only limited success despite the large resources devoted to it (Salacuse, 1985). Incentives to invest remained limited for small holder farmers since their access to markets was constrained by state-fixed prices and monopolies. Despite localized success-stories, there was no evidence of increased living standards or significant increases in indigenous productivity. Aggregate production of cotton however had flourished and in 1960, the Democratic Republic of Congo was one of the largest cotton producers in Africa. But production fell dramatically after the Independence of the country, and the crisis of this sector worsened after the "Zairianisation" of the country launched by Mobutu Sese Seko in 1972 and the nationalization of foreign companies.¹⁴

The land tenure system remained the same after Independence. Despite attempts to make a full inventory of the land under grants or concessions and to redetermine their status,¹⁵ in practice few changes were made to the existing concessions and to the law, and the view that the land was plundered by foreign interests spread. Four types of land holdings were still recognized: land belonging to the state, concessions to companies (for limited periods of time), individually registered land rights (for companies or individuals) and land governed by customary law (WorldBank/UN-Habitat, 2016). Under Mobutu, in a movement to end the privileges of foreign interests obtained during the colonial period, an amendment to the Constitution was voted in 1971¹⁶ and a new General Property Law was enacted in 1973

¹⁴"Zairianisation" was a nationalist political process launched in 1973 by president Mobutu, by which, among other changes, agricultural businesses that belonged to foreigners were transferred to citizens of the DRC. In many cases, the new owners did not continue to farm the land they received and many plantations were abandoned.

¹⁵Ganjika Law, 1960: the state "retakes the full and free disposition of all land, forest and mining rights conceded or granted prior to June 30, 1960."

¹⁶Law No. 71-008 of December 31, 1971 amending the Constitution" The Zairian land (sol) and subsoil, as well as their natural products, shall belong to the State. The law shall fix the conditions for their assignment and concession, for their retaking and retrocession. However, the retaking or the retrocession in case of non-development (non mise en valeur) shall not give rise to the payment of any indemnity."

¹⁷ that still prevails today. The general principle is that all the land belongs to the state, and that the land can only be given in concessions to companies or individuals who can not claim "ownership" of it, but only "rights of enjoyment". Concessions can be "perpetual" for nationals, or for limited periods of time for foreigners, and those rights have to be registered as previously. In practice, most of the existing contracts were transferred into the new system. While since the beginning of colonization it had not been clear who the customary land belonged to, the new law declared the land occupied by indigenous population to be part of the domanial land, over which communities hold "rights of enjoyment". Article 387 of the 1973 Law stipulated that such rights of enjoyment were to be regulated by an presidential ordinance, which still has not been enacted as of today ([WorldBank/UN-Habitat, 2016](#)). While the law did not change anything in practice, it cast doubt about the future status of this type of land which constitutes most of the country's land. Will it be turned into concessions ? Into collective or individual property rights? In the mean time, land chiefs remain crucial actors locally even if they are not mentioned anywhere in the law.

After Independence, rural population densities increased and the perception of growing land pressure emerged, to which farmers reacted gradually by seeking additional security on their land holdings. Three types of tenure can now be distinguished in the villages: traditional customary rights, semi-formal land rights, and legal concessions ([WorldBank/UN-Habitat, 2016](#)).

First, as is many other countries in Sub Saharan Africa, traditional customary rights evolved spontaneously and gradually toward more individualization and transferability of rights in response to increased land pressure and market penetration that started in colonial times ([Platteau, 1996, 2000](#)). This means that both the range of rights enjoyed by the tenants and the autonomy enjoyed by the tenant regarding their decisions about how to use the land, expanded over time. Qualitative and quantitative data collected in the region evidenced that families or households now tend to have exclusive rights of use over parts of the land of their clan while part of it remains collectively owned by families, clans, or villages. Qualitative evidence suggests that most farmers in the region are free to make their own agricultural decisions regarding choice of crops, rotations, and inputs. Sales and lending of land have started to emerge although they are limited, and direct inheritance between fathers and sons is now widespread. Forest that has not been cultivated for a very long time (also called primary forest or "ngunda" in local languages) are partly divided between clans or families, but are still frequently common land regulated by the village or groupement chief. Families from the village usually have a right to open fields in this new land if they seek authorization from the land chief, and the clearing of a field often gives them the right to appropriate the land for exclusive use and sometimes pass it to their descendants. The collective belief is

¹⁷Law no. 73-021 of July 20 "Law Providing for a General System of Property, Land and Immovable System, and Securities System" (Loi Portant Regime General des Biens, Regime Foncier et Immobilier, et Regime des Suretes.)

that all the landholdings of a family are fields that have once been opened and cultivated in the forest by their direct ancestors, which justifies their rights on it. The only other way to obtain new land in a village is usually either to negotiate with a local family (to rent or buy land) or to with the village chief.

Second, an increasing number of farmers attempted to obtain some documentation to claim their rights, as has been observed in other parts of SSA ¹⁸(Platteau, 2000) Villagers seek such documents from local land chiefs in or outside their village either for fields they have obtained through customary practice or more commonly for fields they bought : those documents do not have any legal basis, but they provide some security locally since they are usually signed by land chiefs and local administrators. While they may be used in the resolution of local land disputes within traditional institutions, it is not clear whether they would not help in a formal tribunal.

Last, some small farmers managed to obtain legally registered titles for land outside their village where they set up small farms, but they still constitute a minority. Many commercial companies still own concessions over large areas in what used to be village land.

3 Why do we expect paysannat to have a lasting impact ?

In this section, we first want to clarify exactly what differences in treatment were introduced by paysannat. Second, we draw on existing literature to build hypothesis about why paysannat may have durably impacted the development trajectory of the villages and have persisted despite its short-lived implementation.

3.1 Paysannat, what kind of tenure reform?

The main difference in treatment between villages affected by paysannat and others is in all likelihood related to the land tenure. As described in section 2.4, paysannat involved a range of measures aimed at rationally organizing the "indigenous agriculture", such as scientific based rotations of crops, duration of fallows, and provision of inputs for cash crops. However, we believe that the main feature likely to have durably impacted their development is the change in the land tenure system. Indeed, altering the land tenure system was one of the key objectives of the policy, and other villages were also part of the compulsory cultivation system. They were therefore also forced to cultivate cash crops under the tight supervision of agents from Belgian companies. This supervision involved extension services and the provision of

¹⁸"in countries such as Rwanda, Uganda, Benin, and Zambia, land sale transactions are typically attested by written documents established in the presence of witnesses, thereby ensuring the validity of land transactions. This demonstrates that what matters are de facto rather than de jure rights."

inputs, so the difference with paysannat villages was probably not large on these aspects. Moreover, it is likely that the good practices pertaining to the rotation of crops and the duration of fallows determined by the Research Institute and promoted in paysannat villages were also to some extent eventually promoted in other villages.

Second, it is critical to understand exactly which land was distributed, and why I regard it as a privatization of the communal land. In theory, administrators were supposed to identify communal land not currently under cultivation, if possible in the forest. In practice, they struggled to find blocks of land that were large enough to allocate land to the whole village, and often found patches of land including forests but also fallows. The land was attributed to individual families for exclusive use, which means that the land was not supposed to be allocated by the land chief again in the future, and would therefore no longer be part of the communal land neither as a potential plot for cultivation or as a common forest. In villages not reached by paysannat, the cultivation of cash crops was often done on a block of land as well, where households were temporarily allocated plots for cultivation. However, these distributions were not assorted with exclusive use rights of the land, and the land remained under the authority of the land chief.

Another key question is who benefited from this new allocation of land. The universality and brutality of the land distribution for paysannat is a recurring theme in the discourse by village leaders today. They claim that every household head in a paysannat village was forced to participate in the scheme, was allocated a block of land, and was forced to produce cash crops¹⁹. Most of the time, they also claim that they all received the same acreage, with some exceptions for polygamous men who sometimes benefitted from slightly larger areas²⁰. If this was indeed the case, the scheme may have had some redistributive effect on land allocation. Indeed, although customary institutions usually do well in terms of guaranteeing access to land for all, power and lineage groups clearly also matter (Platteau, 2000). Here a word of caution is in order, and other forces are likely to have mitigated the scale of the redistribution. Indeed, we stressed previously that the allocation took place in a context of strong information asymmetry. Even if the intention of the colonizer was to give equal shares to every household, the process is likely to have been influenced by more educated and powerful people in the village, who were more likely to get access to strategic information. They were also in a better position to influence the customary land surveys and the decision-making. How much they could understand about the consequences of the scheme is unclear, but land is so embedded in the social structure and history of these communities that it is hard to believe that they accepted a redistribution passively.

¹⁹Some rare exceptions include young men who were working on nearby plantations and later stayed in the village. They were not originally from the village itself so did not have any claim on the land at the time.

²⁰A surprising assertion given the officially offensive discourse of the colonizer on these matters. It is worth noting that it was assorted with larger objectives in terms of quantities of cash crops delivered

The tenure reform bears some resemblance with more recent formalization (through registration and land titling) reforms in that it aimed to increase tenure security, but also differs in important aspects. While land formalization involves the official recognition of rights that are supposedly already individualized, paysannat led to the recognition of the rights of clans to their ancestral land, but also to its individualization for exclusive use. Paysannat increased the level of formality since it involved the demarcation and clarification of the rights, which could be beneficial. The idea behind paysannat was that customary land rights held in common did not provide the right incentives for investment and did not meet the requirements for the development of an intensive commercial agriculture. It was based on the premise that people would invest and act like entrepreneurs once freed from the authority of the land chief and safe from prospect of expropriation for a commercial concession. Because their farms would be theirs, they would be able to invest without risking to lose the benefits from their investment. However, its immediate impact on tenure security is ambiguous. On the one hand, enforcement was almost certainly quite strong since it was accompanied by the use of violence and coercion, and the appropriation of the land was regarded by Belgian authority as definitive and exclusive. On the other hand, the partial disruption of traditional customary order is likely to have caused confusion and uncertainty about the future status of customary land rights, that may have discouraged investment. Moreover, it is not clear whether they trusted administrators who claimed that no company would be granted a concession on their land if they participated.

To sum up, we regard paysannat as a privatization intervention, assorted with the demarcation of the land and strong enforcement during the duration of the policy.

3.2 What has become of the land distributed for paysannat after Independence ?

Today, villages where Paysannat was implemented in the Equateur Province still remember where the blocks of land were on which they cultivated cash crops. They remember which clan received parcels of land in this period, and the owners are often still the descendants of those who first received them. In many cases, land distributed for paysannat during the last 10 years of colonization seems to have been often passed within the families who received them from one generation to the next. Some families even consider it as a "collective family plots" and are reluctant to split it among themselves. Because those land distributions took place in a context of coercion and violence, they were often interpreted as mandatory as opposed to voluntary. Families therefore perceive that they have very strong rights on them, and they are now part of the collective oral memory. In some cases however, the changes introduced did not took hold and the land tenure order was quickly reverted to what it was before. In other cases, the land used for paysannat was distributed again to accomodate more people

and continue cultivation of cash crops.

In other compulsory cultivation villages with no paysannat, land was not allocated to households through definitive distributions of plots. However, in some cases villages later spontaneously decided that the blocks of land used for cash crop cultivation would be shared among previous cultivators after the end of cultivation. It is also common that those blocks of land are still held in common and under the authority of the land chief.

This anecdotal evidence suggests that paysannat persisted in some way in the villages where it was implemented, despite being whipped out at Independence.

3.3 Hypothesis about the impact of paysannat

Why did this institution persist, and how did it affect future development? In this subsection, we draw on the literature to provide hypothesis about the response to these questions, which we will test empirically in section 6.

3.3.1 Investment

Can we expect paysannat to have led to sustained increases in tenure security, and therefore investment and production? Despite potential gains in tenure security in the short term on some parts of the land, the overall effect in the long run is a priori ambiguous. Paysannat may have had a positive and lasting impact on security (and then investment) if the clarification and demarcation lasted beyond Independence (which seems to be the case), and if the security enhancement surpassed the uncertainty introduced over the status of land rights, and the uncertainty introduced by individuals who challenged the distribution claiming ownership from before.

Paysannat bears some resemblance with contemporary tenure reforms aiming to formalize tenure rights, the key difference being that paysannat lost its "formal" status after Independence. Economic theory predicts that secure land rights are beneficial for investment, production and poverty reduction (Besley, 1995; Besley and Ghatak, 2010), and improving tenure security through tenure reforms is therefore often considered as a priority today. However, the link between tenure reforms and tenure security is not straightforward. Evidence stemming from Latin America and Asia shows that formalization through land registration and titling programs can achieve this objective and lead to large increases in investment (Deininger, 2009; Feder, 1988), even if the evidence is mixed (Gignoux et al., 2014). However, it contrasts with the very scant evidence for SSA (Jacoby and Minten, 2007). In fact, customary land rights can provide sufficient levels of security for investment in some rural settings, and formalization is only cost-effective in specific contexts (where land can be used

as collateral to obtain credit, where customary institutions are weak, and returns to land are high) (Platteau, 2000; Brasselle et al., 2002).

The absence of results by titling programs led to a shift in the design of land reforms in SSA, toward increased recognition of the complexity of land relations and better integration of customary rights through decentralized participatory approaches (Udry, 2012). These alternative approaches also recognize the need to unpack the link between tenure changes and investment by decomposing the steps toward formalization. Following this approach, (Goldstein et al., 2015; Hornbeck, 2010) show that demarcation alone can have a positive impact : using evidence from the first large scale land titling experiment in West Africa, Goldstein et al. (2015) show that the effect of demarcation in a decentralized setting that accounts for customary land rights led people to shift their investment decisions from subsistence crops to long-term and perennial cash crops.

This suggests that paysannat rights, while they were not registered and lost their "formality" after Independence, may still have had a positive impact on tenure security, to the extent that they lived on and were accepted and integrated in customary land rights. Indeed, anecdotal evidence suggests that both individualization and demarcation partly persisted until today. However, the results in Goldstein et al. (2015) are obtained in a context where demarcation was preceded by a resolution of the competing land ownership claims. In this context, clear demarcation means that the demarcated parcels will be less subject to conflicts and expropriation risk, boosting investment and allowing households to reallocate efforts from guarding their rights to more productive activities. Additionally, clear boundaries will facilitate renting or selling of the land. In the case of paysannat, the distribution and demarcation were not accompanied by a democratic process of conflict resolution, especially as they were often mistaken about who the land belonged to. This led to several conflicts at the time of the distribution. However, the strong and violent enforcement by the Belgian authority means that farmers had little margin to redefine these rights. The question is therefore whether they later challenged the legitimacy of these rights after the departure of the colonial administration, which would reduce the gains in security.

Finally, the incompleteness of the reform (the whole village land was not always included in paysannat), also means that the additional security was probably only perceived on land distributed for paysannat (Goldstein et al., 2015).

3.3.2 Distribution of access to land

We hypothesize that the effect of paysannat on the agrarian structure is to increase inequalities, by reducing flexibility and threatening secondary usage rights.

Indeed, while the immediate effect of the reform might have been somewhat redistributive

(every capable household was supposed to receive the same acreage), it is likely that the most powerful in the village benefited the most at the time of the distribution, and after Independence when enforcement was up to the village ([Goldstein and Udry, 2008](#)).

Second, customary land rights involve a large range of secondary access rights that act as a social safety net, and ensure some access to land for all, even if not perfectly egalitarian ([Obeng-Odoom, 2012](#)). Moreover, they are very flexible and can accommodate new households migrating to the village, and women who return to the village after a divorce ([Platteau, 2000](#)). These two characteristics of customary land rights are often threatened by land reforms, who usually only recognize ownership rights, and paysannat is no exception. Paysannat, by individualizing the rights, may have weakened these social security effects.

The privatization of the common forest in particular means a loss of its insurance function ([Baland and Francois, 2005](#)) (if there the forest frontier is closed in the village) and that there is less margin to accommodate new social groups migrating into the village. Those groups would have to acquire land directly from households rather than be granted land by the village chief, which is likely to provide less security. Theory predicts that privatization can have adversely impact equity ([Weitzman, 1974](#); [Baland et al., 2009](#)).

3.3.3 Changes in the power structure

We hypothesize that paysannat had a deleterious impact on social capital by triggering conflicts over land ownership, weakening the authority of land chiefs and their ability to solve future conflicts, and restricting the scope of common forests. One of the key prerogatives of customary land chiefs is to allocate the land between families for cultivation. By distributing the land directly to individual families, paysannat is likely to have eroded their prerogatives and authority. In the long term, this may impede their ability to solve conflicts. Moreover, we hypothesize that these effects are stronger in areas where land pressure is stronger and therefore the need for mediation is more important. Paysannat may have created a pluralist situation in which different people claim ownership rights on the same land with different sources of legitimacy. This is likely to have been a source of conflict after Independence.

Despite weakening the role of land chiefs, paysannat may also have reinforced the importance of some social groups (who benefited from the distribution) at the expense of others (who settled in the village later). It may thus have made it more difficult for new social groups to be adopted in the community and to be granted land, since the reserve of common land was reduced and the awareness about the land question was raised.

3.3.4 Privatization and conservation

While the literature on property rights and investment suggests that formalization and enhanced tenure security can have a positive impact on conservation (Ali et al., 2011; Goldstein et al., 2015), the literature on the privatization of common resources suggests ambiguous results.

Before paysannat, common resources were managed by the communities and were not in open access to other communities. Paysannat is likely to have affected this in two ways : First, on the land that was privatized, paysannat is likely to have a positive impact on conservation (Baland and Francois, 2005). However, it may have adversely affected cooperation within the village by triggering conflicts over land ownership for parts of the land that had already been appropriated, leading to inefficient resource use. Indeed, while resource management under common property rights can be efficient, sustainable, and equitable in some conditions, failure to cooperate can lead to efficiency costs (lower profits and to the depletion of the resources) (De Janvry and Sadoulet, 2001).

4 Data, and summary statistics

This paper uses a first-hand dataset collected between 2012 and 2015 in the Equateur Province as part of a randomized experiment conducted on a World Bank funded agricultural project called "PARRSA" (see appendix for more details). Using this data, we construct treatment and outcome variables at the village and household level for our analysis.

4.1 Data

4.1.1 Household level data

The data used in this paper is first hand data collected in 192 villages in the Equateur Province in DRC. The 192 villages in the sample were selected across the region by the PARRSA team for their accessibility by road in each of the 9 territories involved in the project, and were surveyed three times between 2012 and 2015.

In 2012, we visited the 192 villages and in each of them a group of 4 to 5 people was selected to answer a community level questionnaire as well as an indirect household survey about 20 randomly chosen households. The group of informants was composed of knowledgeable people in the village including the village chief, the director of the school, the director of the dispensary, and other notables, depending on availability. At the village level, we collected information

about external interventions, agricultural practices, institutions and conflict resolution, infrastructures, access to markets, common resources of the village (including communal land), and the land market. We also conducted a full population census, from which we randomly drew 20 households. We then collected basic household characteristics related to agriculture, demographics, and poverty through an indirect survey from the same group of informants (by asking information about easily observable characteristics).

In 2013, a subsample of 92 villages were visited in relation to the experiment and we collected detailed household and plot level data about agricultural inputs and production. We surveyed 22 households per village : 12 with a detailed questionnaire, and 10 with a shorter questionnaire focused on program take-up and information.

In 2014 and 2015, we visited the same 12 households in 92 villages which we had surveyed with a long questionnaire in 2013, as well as 6 other households drawn from the households surveyed with a short questionnaires in 2013. We also added households drawn from a list of the fraternity of the household heads (a maximum of 10 such "brothers" per village) to study inequalities in access to land, inheritance rules, and diffusion of technology within families. We exclude them from the sample for this paper since the selection may be different from the rest of the sample. We also surveyed 12 households per village in an additional 100 villages. The survey covered a wide range of topics ranging from agricultural inputs and production, nutrition and health, intrahousehold decision making, external interventions, conflicts, credit and labor sharing arrangements, networks, and access to land. We also collected detailed information about the composition of households and the clan affiliations of each member, as well as a history of the arrival of the household in the village. For all these households, men and women were interviewed separately, and two women were interviewed in polygamous households (in the case of polygamous households with more than 2 women, the first wife and a randomly selected other wife were selected). Because of the length and complexity of the survey, we visited households twice : a first wave was conducted between June and July 2014, and a second wave was conducted between November 2014 and March 2015.

This quantitative data was complemented by a series of qualitative interviews conducted between 2011 and 2016 in several villages, to deepen our understanding of several key issues such as production choices as well as land institutions and access to the collective forests.

In this paper, we restrict the sample in two ways : first, we exclude villages which were administratively created after Independence (8 were created during Mobutu's rule and 4 were created shortly after Independence), since they experienced a drastic change in organization since paysannat which would make interpretation difficult. Second, we exclude from the sample households who are village chiefs, households who were added to the sample as "brothers", as well as households who received a gift for helping us collecting rainfall data.

4.1.2 Oral history data and colonial history record data

"It is no consolation to be told by others that, because there are no written sources, no past can be recovered, as if living traces of that past were not part and parcel of daily life."

Vansina, *Paths in the rainforest*, p.xi

An original feature of this paper is the use oral history data from a community survey we conducted systematically in the same 192 villages between 2014 and 2015. In each village, a group of 4 to 5 people was selected to answer a community level questionnaire and detail the history of the village. The group was composed of knowledgeable people in the village, including the chief of the village, the director of the school, the director of the health center, and other notables (clan leaders or elderly people). This in depth village survey provides information about the history of village its founding, the migration waves to and from the village, the forced cultivation of cash crops, and historical land distributions. It also details the current situation by providing detailed data about the institutions that govern access to land and other natural resources available in the village, recent governmental and non governmental projects, as well as recent conflicts and how they were settled. This data was complemented and confirmed using historical record data collected from the "Archives Africaines" at the Ministry of Foreign Affairs in Belgium, as well as contemporary research on paysannat by historians (Piet, 2015). Those records contain detailed information about the implementation of the scheme and the difficulties encountered.

There are several justifications for the use of oral history data as a primary source of information, complemented with colonial administrative data. First, Belgian colonial records are often incomplete and biased (Likaka, 1997, 2009). Colonial administrative data was built by colonial agents and in particular territorial administrators. The incentive for them was to provide the best possible picture of the work they were doing in order to be promoted, in particular when they were posted in such hostile and remote regions as Equateur. Their work was very hard to monitor, and they often underestimated the reluctance of villagers to participate in cotton cultivation and in Paysannat, and overestimated the success of their undertakings (Likaka, 1997). The names of the villages were often wrongly recorded, and the colonial maps of the region are very unreliable (Piet, 2015).

Moreover, African societies have long favored oral tradition. Osumaka Likaka's work showed that oral based history can be used to reconstruct the history of cotton production in the region and how the villagers resisted it. In fact, I found out about Paysannat in the first place when conducting qualitative work while villagers were telling me about the different types of land in the village, and they pinpointed Paysannat fields as being very different from the others because they had been distributed by the Belgians. If dates collected this way don't

seem very reliable, villagers remember distinctly the key events in the history of their country (colonization, independence, the rise of Mobutu, Zairianisation, and the more recent civil wars) and they are very confident when trying to locate village events within this framework. The oral history I reconstructed this way allowed the creation of historical variables that I use in the analysis such as cultivation of cotton and distributions of land related to Paysannat.

Of course, oral history data may also have its own biases. First, we could worry that this could introduce new biases: if villages where paysannat never took hold forgot about its existence, the effects will be overestimated. To avoid this, we devoted a lot of time to the village survey and insisted to record every possible attempt to change the land tenure in the villages. In fact, several villages report failed attempts to redistribute the commons in this period, and despite the abandon, they are coded as paysannat villages. However, if villages have been involved in Paysannat for a very short time, it is possible that people don't remember it today. The colonial intervention variables constructed this way should therefore be interpreted as reflecting only interventions that were sufficiently intense.

Finally, colonial records were used to confirm that territorial administrators indeed reported the implementation of paysannat in the same areas, even if it did not allow to check for each of the village what exactly had been done. It gives us confidence that our oral history variables are sufficiently reliable. They also contain a wealth of details about implementation difficulties and concerns that help us build our argument for the empirical strategy.

4.1.3 Geographic data

The geographic data we use in this paper comes from various sources. Geographic data for the village geographic locations and borders comes from the village surveys described above. Port and markets names were collected in our village surveys and localized using geonames. Data on roads and administrative borders comes from the Ministry of Infrastructure. Finally, data on forest cover comes from [Hansen et al. \(2013\)](#). Distances from villages to key locations were computed using ARC-GIS network analysis tools, in order to identify the nearest location (among the list of ports or commercial urban areas, administrative capitals in the region) and calculate the distance to these locations by road.

4.1.4 Information about clanic affiliations

One piece of information that is critical in this paper is the social groups or clanic affiliations of households. In each household, we asked the household head and his wife (or wives where appropriate) to tell us the name of the clan that each member of his household belong to. In most cases, his children were affiliated to his own clan but his wife was still listed as a

member of the clan of her own father. In parallel, we conducted the community survey with village leaders and drew a list of all the clans living in the villages. After doing this, we would go through the history of the village and ask for each period of time whether any immigrants settled in the village, and to which clan they corresponded in the list. Among the clans who arrived after the creation of the village (thereafter "foundation clan"), we often realized that the village leaders had not listed some of them in the list of clans. When this happened, we asked why: if they had simply forgotten them, we would add them to the list. If they had not listed them for a good reason, we added a comment but did not add them to the list of village clans. The most common story was that they simply did not know the name of the clan of this family, because they did not have any voice and representation at the village level. It was common for those clan to have been "adopted" by one of the local clans of the village, although it seemed to indicate a very different condition from being an autochtone.

I then matched the clans declared by households with those listed by the villages using fuzzy matching techniques based on names, and divided them into five categories : the foundation clans (the clan of the household's head matches one the clans listed by the village leaders as one who took part in the creation of the village), the local clans (the clan of the household's head matches one of the clans listed by the village leaders, but not there at the creation of the village), women's foundation clans (the clan of the household's head is not identified in the village, but the clan of one of the wives of the household's head was matched with one of the foundation clans in the village), women's local clans (the clan of the household's head is not identified in the village, but the clan of one of the wives of the household's head was matched with one of the local clans in the village), and marginal clans. We call marginal clans all the clans who were not listed by the village leaders : they represent 23% on average of all the households living in the villages we surveyed, and encompass the clans who were identified in a different village, those who gave us the name of one of the villages in the region, and those whose clan name could not be found either in the village clan list, in the list of villages in the region, or in the list of clans from all the villages we surveyed. It is very reasonable to assume that we would be able to match almost all of them with clans in other villages if we had the full list of all clans in the region. We call them "marginal" because they are not represented at the village level, even if they may have been adopted by a local clan. We could also call them "migrants" or "newcomers" but we are reluctant to do so since some of them have been in the village a long time, and other households recently moved to the village but were originally autochtones so they migrated recently but have full access to their clan.

4.2 Background: the Equateur Province

The provinces of the Democratic Republic of the Congo are divided into 26 districts (see figures 2 and 3), that closely resemble the districts that existed during colonization. These in turn are divided into 192 territories. During colonial rule, districts were led by a district commissioner who supervised territorial agents which was the lowest administrative level held by Belgian agents (De Clerck, 2006)²¹. In this paper we study three districts ²² in the North of the Equateur Province, that are divided into 9 territories. As far as we can tell from approximate and low resolution colonial maps, the delimitations of the districts changed very little after 1940 and only two changes have been made until Independence in 1960: the name of "Bomboma" district had been changed for "Kungu", and "Banzville" district had been split into two districts named "Businga" and "Banzville". By 2015, the borders of the districts were still very close to the colonial borders of the colonial districts in 1960 even if "Banzville" district changed name during Zairianisation to become "Yakoma".

The Equateur Province is a remote region in the Congo Basin Forests, with extensive slash and burn agriculture, high levels of food insecurity and extreme poverty, and arguably severe constraints to economic development in other sectors (Herdeschee et al., 2012). The main cash crop that was produced there as part of the compulsory cultivation scheme during colonization was cotton, but rice, cocoa and palm oil were also important in parts of the region. Cotton production started falling after Independence, and the agricultural sector was further dislocated during the Zairianisation. The region includes many historical plantations of hevea, cocoa or palm trees that are still abandoned or function at the smallest capacities. Some of them resumed functioning in recent years, but there are still many cases of conflicts with local villages and previous belgian and congolese owners of plantations who all claim property of the land (WWF, 2015). Infrastructures were poorly maintained after Independence and their condition degraded until they finally collapsed during the Congo Wars (1996-2003). Inadequate infrastructure for the transport of agricultural products is still a key constraint (Herdeschee et al., 2012). In this context, households rely mostly on subsistence smallholder agriculture through shifting cultivation of staples ²³, as well as gathering of forest products, fishing and hunting. While agricultural potential is believed to be large, road density is very low, commercialization is hampered by long distances from farm to market, and most farmers don't have access to improved varieties or technologies. Traditional slash and burn clearing methods are still used, and generally the only capital inputs used are hand held tools.

²¹In 2015, a reform of the territorial organization turned the districts into 26 provinces, but the borders remained very close to the borders of the districts in 2015 and remained very close to the colonial district borders.

²²Nord-Ubangi, Sud-Ubangi, and Mongala

²³maize, rice, groundnuts, cassava, soybeans, cowpeas, yam, plantain

4.3 Village characteristics

Villages are characterized by a large heterogeneity in terms of demographic and geographic characteristics, but also access to land and natural resources. Tables 1 to 13 as well as figures 4 and 5 present summary statistics of those characteristics.

Consistent with the previously described historical settlement pattern in the region, most of the villages in our sample were formed before or during colonization (table 1). Only a few were created later, usually the result of a preexisting village growing too large to be administered properly and being split into two parts by the administration. The population of the villages varies widely. There are on average 287 households per villages, but it ranges between 13 and 2500. Population density varies widely between 4.46 inhabitants per square kilometer to 378. The ngwaka, ngbandi, budja, and mbanja are the 5 dominant ethnic groups in the region. As evidenced by figure 2, most villages are dominated by one principal ethnic group, while only a few are composed of several ethnic groups who cohabit under the same chief. There are on average 5.8 clans per village, even if a minority is composed by only one clan. Typically, the clans are relatively balanced and only one third of the households belong to the most numerous clan on average.

As evidenced by table 2, villages differ in terms of geographic characteristics. In terms of access to markets, the distance to the nearest port is 55 kilometers on average, from 0 to a maximum of 300. Distance to the nearest local market is very small, 6 kilometers on average, because there are several local markets along the roads. In terms of access to resources, access to forest at the village level varies widely: first, the area of the village varies widely with some village land spanning over very large areas; and vegetation is much denser in the South and East of the region, while the North-West is characterized by forest-savanna mosaic.

Finally, land formalization varies both between and within villages. As described in section 2, farmers in the region barely own any legally recognized titles on their land, nor do the villages. In practice, land is managed by the chief of the groupement and the chief of the village. To protect their rights, some farmers obtain semi-formal documents to secure their land. In our sample, those semi-formal titles have been issued or signed either by the Groupement chief or the Secteur chiefs, or they are documents they issued when they bought the land. We also found evidence of 81 cases where farmers claim to own a "Paysannat document" (see table 8). The share of people owning documents varies widely from one village to another: on average 13% of the households surveyed declare owning at least a document on one of their fields. Additionally, 19% report owning land in paysannat (a very small share of which is associated with a document). While traditionally land chiefs were in charge of allocating and managing the clanic or family land, today 26% of the households claim that there is no such land chief regulating their access to land (table 9). 20% say that they are the land chief for their families,

and almost 50% name either their elder brother, uncle, father or grand-father.

Households cultivated 2.79 hectares on average in 2014, with an average of 4.3 cultivated plots and they owned 6 additional fallow plots. While half of their fields cultivated in 2014 came from land that was already cultivated the year before, a large share came from land that was left fallow and 4% came from a conversion from primary forest to agriculture. The main crops cultivated in the region are maize, groundnut, cassava and rice.

Finally, table 3 presents statistics about the clanic affiliations of households in our sample. We asked the household head and his wife to tell us the name of the clan that each member of the family belongs to, and we then matched this name with the list of clans mentioned by the village leaders in the community questionnaire. We find that 52% of the households in our sample belong to one of the foundation clans, 20% belong to a men's local clan (ie the clan of the household's head has been identified in the village), 2.7% belong to a women's foundation clans (one of the wives of the household's head is from a foundation clan in the village), 1.8% are from a women's local clan (one of the wives of the household's head is from a local clan in the village), 9.7% of the households clans were identified in another village, and 13.6% could not be identified. In total, we therefore have 22% of households from a marginal clan. Compared to the households from one of the foundation clan, those households report much less often that they own land in paysannat, they seem to have more fields with a document, and cultivate a smaller area in 2014. They also report much more often being worried to lose at least one of their fields. Finally, they report less often that they have access to collective lands, whether at the village or family level.

5 Empirical Strategy

5.1 Exogeneity : what we learn from historical records

In this paper, we aim to compare villages of a given Secteur in which the colonial administration tried to distribute parts of the communal land between individuals (whether or not this privatization took hold) to villages in which did not take place although they were cultivating cash crops as well within the compulsory cultivation scheme. First, we will clarify the differential in treatment that they received and how it may have impacted their development. Second, we discuss a key identification hypothesis, namely whether they were chosen based on specific characteristics that can also explain why they differ today. We discuss this hypothesis and argue that they do not seem to differ in systematic ways. A second important question is whether being part of paysannat may have triggered a differentiated treatment by subsequent administrations in the provision of public policies. Again, we find no evidence that this is the case.

As described in section 2, paysannat involved a range of measures aimed at rationalizing the "indigenous agriculture", such as scientific based rotations of crops, durations of fallows, and seeds for cotton. However, we believe that the main feature likely to have durably impacted their development is the change in land tenure system. Indeed, other villages were also part of the compulsory cultivation system and cultivated cash crops under the tight supervision of agents from cotton companies for example. This supervision also involved extension services and the provision of seeds. Moreover, it is likely that the good practices promoted in paysannat villages were also eventually promoted in other villages.

Villages were identified by territorial agents and their team. However, they were constrained to intervene in a list of Territoires and Secteurs that had been chosen for paysannat (they chose areas where agricultural potential was high, and deforestation rates were worrying or where the quality of the soil had become a concern for the colonial administrators). The historical records evidence that paysannats were set up in the territoires of Kungu, Gemena, Budjala, Bumba and Bosobolo. In those administrative areas, the territorial agents had to prospect the land, conduct land tenure surveys to understand the land tenure in the area, and attribute the land to individual households within the customary boundaries of their own clan or family. To the extent possible, they had to ensure that the land attributed to each household was fertile, and that customary chiefs were willing to participate ²⁴.

Prospection and land surveys were costly and labor intensive. In practice, they often identified several blocks of land in the forests or in fallows, and reallocated land between clans or villages. Understanding customary right was an immensely complex task : there were several levels (clan, families) and types of rights ²⁵. Moreover, Territorial Administrators and Agronomists were not popular, so the population was reluctant to participate ²⁶. The difficulty in obtaining reliable information is evidenced by the many cases in which colonial agents were often mistaken even in the identification of the village chief (Likaka, 1997). A report about the implementation issues faced in the implementation of Paysannat in the Equateur region ²⁷ mentions their frustration and their difficulty to even identify village names because they had to rely on local interlocutors who sometimes disagreed or tried to mislead them (Likaka, 1997). Based on this, it is easy to imagine how difficult it was for them to conduct the so-called survey of existing customary rights, and to identify a block of land that would be suitable for Paysannat. They did their best to find suitable blocks of land with the limited

²⁴"Le paysannat indigène, Annexe lettre 99 21/77 99/2357/11.D/18 bis du 3 avril 1953. Rapport destiné à la Conférence CCTA sur le bien être rural. Laurencq Marques", In African Archives Brussels, AGRI 80 Dossier 1

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²⁶"L'agriculture dans les perspectives d'avenir, Lebughe Pierre, Ingénieur agronome congolais", In African Archives Brussels, AGRI 748, Dossier 5

²⁷"Compte-rendu de la réunion tenue le 5 mai 1952 à Itipo relative au Paysannat dans les territoires du District de l'Equateur", In African Archives Brussels, GG 17051 - Equateur AGRI-AIMO, Paysannat Indigène, Programme Plan Décennal.

information they had, near the roads. When they thought that pressure on land was too high in one area and found land that looked "vacant" further away, they did not hesitate to relocate the villages. The construction of roads was also extended in this period to reach the villages growing cotton. After independence, the road network did not improve but rather slowly fell apart, and all the villages we are studying are along these colonial roads so they were comparable at the time of independence in terms of accessibility by road.

When the expansion of the scheme was abruptly slowed in 1954 to focus on improving monitoring of existing Paysannats, administrators were in the middle of their prospection and had to slow down the expansion. One of the concerns of the upper levels of administration was that villages were chosen before a full prospection of the region was conducted, and without a full investigation of customary rights. They were therefore chosen without full information about which villages were more suitable in a given Secteur, and they could not complete work in all the villages they had first identified. Even if they had had full information on the villages, the instructions were to identify villages with fertile collective land available, in order to increase production of cash crops. Whenever possible, they tried to find collective forests to divide it between households. This should have meant that if anything these villages should have had less land pressure, lower levels of privatization, and less population pressure than those they did not choose in the first place (Platteau, 1996; Boserup, 1965, 1983).

One question is therefore why how they chose the villages where they started? One plausible hypothesis is that administrators were inclined to start in villages where they had a better relationship with chiefs. The relationships between colonial administrators and the local population were based on the use of threat and violence, and in this context the "voluntary" participation of the villages became in practice a forced participation (Likaka, 1997; Piet, 2015). Administrators relied on local chiefs for the collection of taxes and the supervision of cotton production, and they did not hesitate to punish or replace them if they were not cooperative. However, the villages were not given complete information about what the policy involved: the administration avoided on purpose mentioning that they would try to modify the land tenure system when they presented the scheme, and instead insisted on the improvement of agricultural techniques and standard of living. In that sense, it is hard to imagine how the local elite would have been able to distinguish the scheme from the existing compulsory cultivation scheme. The propaganda also insisted that they would be less subject to arbitrary expropriation by commercial companies, so villages relatively closer to a concession may have been more to this argument.

Finally, I found no evidence so far that chiefs complacent with paysannat were given other kinds of advantages such as better access to school or other investments that could have had a long term impact, or that Post-Independence policies took the location of Paysannat into account when making investment decisions after the Independence of the country in 1960.

The paysannat scheme was associated with social interventions (health centers and schools) at the level of the Secteur, but this part of the program was very late to start and there is no evidence that villages without paysannat in the same secteur were excluded from it.

5.2 Paysannat in our sample, village level

In our sample, 104 villages report attempts by the Belgian colony to force the definitive distribution of communal land for the cultivation of cash crops. By definitive we mean that they were understood by villagers as being a permanent attribution of a block of land, and not simply a temporary allocation for the duration of the cultivation period. Among those 104 villages, the distribution was done in a single year in 41 villages while in 63 villages the administrative the division was done more progressively.

The data from community level interviews also shows that many villages where land distributions were not imposed for paysannat experienced several other types of land allocation for cash crops. In cotton producing villages for example, it was common that the village chief (helped by agents from cotton companies) would reserve one block of land for cotton cultivation for the whole village. He would then allocate parcels of land to individual households for forced cultivation for a few years. In most cases, the land was used for a few years of cash crop cultivation followed by subsistence crops before being returned to the community. In some of these villages, the families decided to divide these blocks of land between those who used it for cotton - a privatization decided by the villagers. In other villages, these blocks of land are still considered as common village land, and managed in various ways. Finally, in some villages cotton was cultivated on the plots that households chose freely.

When constructing village level treatment variables, we only considered as "paysannat" villages where land was distributed with the intention of being definitive. It means that we will compare them to villages where the privatization of the land used for cotton or cash crop cultivation sometimes also occurred spontaneously. In paysannat villages, the fact that the distribution was intended to be definitive does not necessarily mean that it was. We found several examples of villages who decided to reallocate the land between households, where previous owners of the land took back control over (another indication that the land was not always given to the right clans), or where it was reestablished as collective village land managed by the village chief.

Interviews with village elders also revealed the violent way in which cash crops were cultivated in all villages, and the violent way in which common land was divided, or village were moved. When we asked who in the village benefited from the distributions, they virtually always replied that every household head received the same area of land and that it was mandatory for every person in the village to participate (since they then had to sell their production to the

monopoly at state-fixed prices). The interviews also reveal small differences within villages in the area attributed to single or married men, and don't mention the fate of divorced women or widows. Finally, it reveals heterogeneity between villages in the total area that was distributed ²⁸

5.3 Baseline characteristics and balance tests

To further investigate how villages differed in terms of observable characteristics before Independence, we use all the Pre-Independence characteristics we have about the villages in our sample and conduct simple balance tests. Table 14 confirms that paysannat villages didn't differ systematically in terms of these observable characteristics. We also put the villages on a map of the region to examine their geographic distribution.

First, they had the same number of clans at foundation, which could indicate there is not difference in population pressure at the time of colonization. Second, there is no statistically significant difference in the distance to the nearest commercial town nearest river, the distance to the nearest port along the roads (the location of ports has not changed since Independence). All of these variables give an idea of access to markets, whose proximity could mean more pressure on the land. Finally, we compare distances to the administrative capitals to which the village belongs. Sometimes, a village can be very close to a commercial town but because of the administrative borders he depends on an administrative capital that is far away. We find that distance to Secteur and Territoire capitals are not statistically different (again, the local of administrative capitals does not seem to have changed since Independence). All the villages in our sample are located on a dirt road that connects these administrative towns. However, they seem to differ in terms of distance to the district capital. This could indicate that territorial agents tried to chose villages that were closer to the District Capital so they could show their progress to their superiors more easily when they would visit. This does not show a difference in terms of access to markets since the distance to any urban town is not statistically different on average. In the rest of the paper, we will control for this variable to account for this difference.

Maps 11 12 and 13 show the geographic distribution of paysannat villages. From the maps, it is clear that paysannat villages are present in all vegetation types in the region, and most secteurs have both paysannat as well as non paysannat in close distance. The (dirt) road

²⁸Example of comments from village leaders about the forced cultivation of cotton and the distribution of land : "Selon l'enquêté tous les ménages pour chaque clan ont participé à la culture du coton car ils étaient forcés et personne ne pouvait résister" ; "Pour la culture du coton à cette époque, tout le monde devrait le faire c'était obligatoire et la répartition des terres était obligatoire." ;"Pendant l'époque des belges, ils étaient forcés par les autorités belges de quitter et de s'installer ici pour cultiver le coton et d'être à la proximité de la route. A cette époque tous les clans ont participé à la culture du coton, la distribution des terres était définitive, tous les clans ont bénéficié de cette distribution et après l'arrêt de la culture de coton ces terres sont restées propriété des familles qui les avaient recues."

network in the region is very limited and in a bad state but all villages in our sample are along a road and paysannat villages don't look obviously advantaged nor disadvantaged.

5.4 Empirical Strategy

First, I run a simple OLS comparing village level outcomes in paysannat villages to others where no attempt was made to influence the tenure system. I will compare contemporary outcomes (tenure security and agricultural intensity, stock of natural resources, and inequalities in access to land) between villages with and without paysannat, and between households belonging to different types of lineage groups within paysannat and non-paysannat villages running a regression of the form:

$$Y_i = \alpha + \beta P_i + X_i \lambda + \sigma_s + \mu$$

where Y_i is the outcome of interest for village i , P_i is the historical measure of an attempt to implement paysannat in village i , X_i is a set of pre-independence geographic controls (mainly distance to the capital of the district) and σ_s is a secteur fixed effect. My coefficient of interest is β , which captures the average difference between a paysannat and a non-paysannat village.

Second, I investigate the heterogeneity of the impact between households from different clanic affiliations in the villages. In this part, a new exogeneity issue will need to be considered: since we are going to compare households from different clanic groups within a secteur, a key assumption is that the different types of clanic groups are comparable in paysannat and non-paysannat villages for a given period of arrival of the family in the village. We argue this assumption is not problematic. I run the following regression:

$$Y_{h,i} = \alpha + \beta P_i + \epsilon G_{h,i} + \gamma P_i G_{h,i} + X_i \lambda + \sigma_s + \mu$$

where $Y_{h,i}$ is the outcome of interest for household h in village i , $G_{h,i}$ is a set of dummies indicating lineage groups to which household h in village i belongs to (founding clans will be the omitted category, and we control for marginal clan, local clan, and add a separate control if the clan identified in the village is that of the wife of the household head), X_i is a set of pre-independence geographic controls (mainly distance to the capital of the district) and σ_s is a secteur fixed effect. My coefficient of interest is γ , which captures the average difference between the mean difference in outcome between lineage groups in paysannat versus non-paysannat villages. For example, if G is a dummy indicating affiliation with a local clan, the sign of the coefficient γ shows whether there is more or less difference on average between average outcomes of local clans and foundation clans in paysannat versus non-paysannat villages.

Finally, to test the robustness of our results and to control for possible endogeneity in the choice of the villages for the agricultural policy, we follow a nearest neighbor’s approach: we construct pairs of villages which are geographical neighbors across administrative borders of a territory, but which happened to have different agricultural policies (with or without a policy to push toward the individualization of land rights). On all our observed geographical variables, these villages look very similar, and we assume that such neighboring villages would be similar in other unobservable variables as well.

6 Empirical Results

First, we show that paysannat villages have less ”commons”, or collective forest, so in that sense paysannat succeeded in pushing toward more privatization. At the same time, it also seems to be more difficult for migrants from the village to come back and get access to land . Older generations of strangers in the village also seem less integrated in the local institutions. Second, we examine the distributional consequences of this privatization of the commons by the Belgian Colony. We establish that there are strong inequalities in access to land between the different clanic groups within a village, and we give evidence that part of these differences can be explained by the presence of Paysannat.

6.1 Results: Impact at the village level

Table 15 to 31 report the results of the OLS regressions at the village level. In all regressions, Secteur fixed effects and geographic control variables are included.

6.1.1 Impact on natural resources

Tables 15 to 19 show the impact of paysannat on village level outcomes related to natural resources.

First, table 16 show the results on dummies indicating whether different types of collective land resources exist in the village (collective primary forest, collective secondary forest, or savanna). There is no statistically significant difference for any of those resources, confirming that most villages still govern part of their resources collectively.

Table 16 shows the more detailed results concerning collective primary forest. The coefficient on a dummy for whether there exist any amount of collective primary forest (column 1) is negative but not significant. However, the nearest collective primary forest is almost 2 km further away in paysannat villages compared to non paysannat villages (column 2), and

villages leaders are 15% more likely to consider that the shortage of forest is already an issue in the present, a strong and significant difference (column 3). They are also more likely to be concerned that there will be shortages of forest in the near future, but the difference is not significant (column 4). These results seem to indicate (as will be further confirmed in the next section) that paysannat succeeded in pushing toward more privatization of the forests near the village centers. Even if a large share of villages still report there is some forest in their villages, there is also a high level of awareness that the frontier is close, and the forests are relatively far from the village dwellings (4.9 kilometers on average). Tables 17 to 19 show the results on the area of forest in 2000 calculated using satellite data. The coefficients are not significant but point in the same direction.

There is more pressure on forest in paysannat villages today.

6.1.2 Impact on the share of different types of lineage groups and demographic characteristics

Tables 20 to 22 show the results of regressions on the clan composition of the villages and demographic characteristics to investigate whether paysannat led to differentiated patterns of migration and settlement.

We do not find any differences in the share of marginal clans ²⁹, local clans, or foundation clans between paysannat villages and others. One category of lineage group that is less represented in paysannat villages are households heads whose wife is from a founding clan in the village. This could suggest that it is harder for those women to come back to their village with their husband (the village of their father) and get access to land for their family. In table 21, we differentiate the households by the period of arrival in the village of their own family. We call "newcomers" households whose family arrived in a village this generation or the previous one (for example their brother, their father, or their uncle moved to the village). We call households whose families have been in the village for more than two generations "oldcomers". We find that overall the share of newcomers in paysannat villages is 5% lower than in non-paysannat villages on average (column 1), and the share of oldcomers is therefore 5% higher (column 4). Columns 2 and 6 shows that this is driven by local clans in the case of newcomers, and by marginal clans in the case of oldcomers. The newcomers for local clans are households who have family in the village but had migrated elsewhere or come to join a member of their family. One interpretation of this result could be that it is more difficult for family members of local clans to get access to land in the village because there is less collective land. Moreover, the fact that there are more marginal oldcomers (households whose family has been in the village for 2 or more generations but are not recognized by village leaders)

²⁹Marginal clans : remember that is how we decided to call clans who are not recognized by village leaders but are present in the village

could mean either that there was more migration in the past, or that the migrants following independence were less likely to have been formerly recognized by their host village. Since there are not more local oldcomers, the second interpretation seems more likely.

Table 22 shows the results on demographic characteristics of the villages today. The coefficients of the effect of paysannat on population and the number of households (columns 1 to 5) are negative but not significant. However, the table shows that there is a significant difference in the number of clanic groups : on average, there are 1.3 less clanic groups in paysannat villages, consistent with our results on lineage composition, there are less clanic groups that are formally recognized by local institutions in paysannat villages.

Overall, these results suggest a tighter social structure in paysannat village, that does not translate in strong differences in population.

6.1.3 Impact on agricultural practices

Tables 23 to 27 show the impact of paysannat on village level outcomes related to agricultural practices and land use. Overall, we find very little impact of paysannat on agricultural practices.

First, table 23 shows that there is no difference on indicators of intensity of cultivation such as the average number of households in the village who practice line sowing, or use improved seeds. The last column shows that the total amount of labor used in a given season is lower in paysannat villages, which could be a direct consequence of the fact that there are less forests (which are costly to clear).

Second, table 23 shows that the total number of different crops is not different on average, but that households in paysannat villages are 4% more likely to cultivate maize on average. Table 25 further shows that the average number of plots farmed and the number of fallows are not statistically different.

Third, in table 26 we find that households in paysannat villages are 12% more likely to report that their family owns land in something that they refer to as paysannat compared to non-paysannat village. The fact that 10% of households in non-paysannat villages reports owning land in paysannat seems counter-intuitive but it is consistent with the fact that some villages spontaneously privatized parts of their communal land, and in particular this is often the case for land previously used for cash crop cultivation. However, there is no difference in the share of household who own semi-formal documents for their fields, whether they are farmed on in fallow, and no significant difference in the perception of insecurity on fallows.

Finally, table 27 points toward more land sales and rentals in paysannat villages, but the results are not significant.

6.1.4 Impact on access to infrastructures, health, education and food security

Tables 28 to 31 show the impact of paysannat on village level outcomes related to welfare. First, table 28 shows that we do not find any significant differences between paysannat and non-paysannat villages in terms of distance to markets, to health centers, and schools today, suggesting that those two types of villages did not receive any differentiated treatment in terms of welfare investments from the state since Independence. Second, table 29 shows that there is not significant difference in the average level of education of the household head, in the average household size or on the share of the average share of the households that has migrated permanently. Consistent with the fact that there is no better access to health centers and no strong differences in agricultural practices, table 30 shows that there is also no average difference in food security. Finally, table 31 shows that Gini and Theil coefficients calculated on total area farmed, number of fallows, and years of education of the household head.

6.2 Results at the household level

Table 32 to 40 report the results of OLS regressions at the household level. In all regressions, Secteur fixed effects and geographic control variables are included, and the reference category are the households from founding clans.

6.2.1 Characteristics of the fields at the household level

Tables 32 and 33 shows the difference in ownership of Paysannat land and documented land by the households depending on the clan they belong to, as well as insecurity about land rights. We find strong differences in ownership of these types of land between marginal clans and founding clans, as well as between households where the wife is from a founding clan. The difference with other local clans is negative but not significant. Unsurprisingly, village founders have benefited more from paysannat, and this advantage has been passed on to the next generations. As evidenced by the first column, households from marginal clans are much less likely to belong to a family who owns land in Paysannat. They are also more likely to own land in fallow that has a document, have a higher share of plots with a document cultivated in 2014, and are more likely to cultivate at least one plot with a document in 2014. Finally, both local clans, whether founders or simply locals, have lower levels of insecurity over their fallows and fields in cultivation, as evidenced by columns 5 and 6. By differentiating by period of arrival in the village, table 33 reveals that these results are driven primarily by newcomers for marginal clans, even if insecurity on the fallows seems to be slightly higher among oldcomer marginals. It also reveals that local clans who came

back recently experience a similar situation : they are more likely to have documents on their fields or to own paysannat, but they express much more confidence over their land rights than marginal clans. The fact that newcomers own more documents is likely to reflect the fact that they have to negotiate with individual farmers or with village chiefs to gain access to arable land. It probably becomes more and more common to require a written document as pressure on the land increases, and its more common to seek a document when you don't have customary rights on the land you obtain. It can also reflect the fact that newcomers seek more protection from village chiefs or other administrative officials to prevent disputes as they can not rely on their clan to protect their rights.

Tables 34 and 35 show that there is a strong persistence of ownership of Paysannat rights over time and that paysannat explains a large part of the differences in documentation. Local clans are the clanic groups who still benefit from Paysannat land the most: in villages where oral history reports occurrence of Paysannat related land distributions, 23% more households from local clans report owning land in Paysannat compared to non-founding local clans in other villages. Marginal clans are only 10% more likely to have land in Paysannat in treatment villages compared to non treatment villages. Founders are almost 20% more likely to report owning paysannat in treated villages, but they are also 8% more likely than marginal clans to do so even when their villages was not treated. This result reflects the fact that land distributions for plantations of spontaneous land distributions after cotton cultivation also took place in non paysannat villages as described in Section 2. When a block of land was reserved for cotton, even when it was not attributed to specific households during colonization, there are many cases where the farmers decided to share the land between themselves after the end of cotton cultivation. This table also suggests a very different pattern of land documentation in villages with and without Paysannat : in non-treated villages, local clans (whether founding or not) are less likely than marginal clans to have documents on their fallows or on the fields they cultivate. Founding clans, on the other hand, are more likely to do so. This suggests that it is more difficult for marginal clans to access and secure land in treated villages. This is further evidenced by column 5: marginal clans are 7.6% more likely of feeling insecure about some of their fallows in treated villages compared to marginal clans in non-treated villages, while local clans are not. Table 35 shows that this pattern is true for both marginal clans who settled in the village a long time ago and those who arrived recently. These result further point to more privatization and tigher land claims in paysannat villages.

6.2.2 Characteristics of the land portfolio, household level

Tables 37 to 40 show the results of a simple regression on the land portfolio of the households in our sample (land cultivated or owned by households). Table 37 shows that marginal clans have on average 2.4 less fallow plots than founding and local clans, and that own on average

2.4 less fallow plots than founding clans and 2 plots less than local clans. The total area they cultivated in 2014 is also 0.3 hectares smaller for marginal clans compared to founders. Table 37 also reveals that households who live with the clan of the wife of the households head own less fallow plots. Table 40 shows that this pattern is the same for marginal clans irrespective of the period of arrival of their family in the village. There is also no statistically significant difference between newcomers from local clans and oldcomers from local clans. It confirms that access to land seems to be much more difficult for clans that are not recognized by village institutions, and for women, while local founders who have stayed in the village are those who have the largest land portfolio. Interestingly, households who settle in the village of the wife seem to have a large share of their plots in the primary forest, suggesting that they have access not their family land but rather to collective forest.

Tables 39 and 40 show that paysannat led to smaller number of plots cultivated per household, a smaller area cultivated, and a smaller number of fallows for most groups. The two exceptions are the oldcomers from marginal or local clans, whose situation is comparable in paysannat and non paysannat villages. All other groups have less fallows, cultivate less plots and smaller areas in paysannat than non paysannat villages.

7 Conclusion

In this paper, we use a natural experiment to investigate the impact of privatization of the communal land by the Belgian Colony of today's development outcomes in DRC. First, we show that paysannat villages have less common forest and are more worried about not having enough common resources for current and future generations. At the same time, it also seems to be more difficult for migrants from the village to come back and get access to land, and generations of strangers in the village also seem less integrated in the local institutions. However, agricultural practices do not differ from other villages. Second, we examine the distributional consequences of this privatization of the commons by the Belgian Colony. We establish that there are strong inequalities in access to land between the different clanic groups within a village, and we give evidence that part of these differences can be explained by the presence of Paysannat. One interpretation of these results is that paysannat disrupted the local institutions and adversely affected social capital in the village. As a result, the remaining communal land was poorly managed and led to overuse and appropriation by the clans who were in the village at the time of the distribution, leading to a tighter social structure and land ownership pattern. This hypothesis is supported by evidence I present in a companion paper, which shows that paysannat lead to an increase in the occurrence of land related conflicts.

References

- Acemoglu, Daron, Simon Johnson, and James A. Robinson**, “The Colonial Origins of Comparative Development: An Empirical Investigation,” June 2000.
- , – , and – , “Reversal of Fortune: Geography and Institutions in the Making of the Modern World Income Distribution,” *The Quarterly Journal of Economics*, November 2002, 117 (4), 1231–1294.
- Ali, Daniel Ayalew, Klaus Deininger, and Markus Goldstein**, “Environmental and gender impacts of land tenure regularization in Africa: pilot evidence from Rwanda,” *World Bank Policy Research Working Paper Series, Vol.* 2011. 00023.
- Baland, J.-M. and J.-P. Platteau**, “Division of the Commons: A Partial Assessment of the New Institutional Economics of Land Rights,” *American Journal of Agricultural Economics*, August 1998, 80 (3), 644–650.
- Baland, Jean-Marie and Jean-Philippe Platteau**, “Chapter 4 - Economics of Common Property Management Regimes,” in Karl-Göran Mäler and Jeffrey R. Vincent, ed., *Handbook of Environmental Economics*, Vol. 1 of *Environmental Degradation and Institutional Responses*, Elsevier, 2003, pp. 127–190.
- and **Patrick Francois**, “Commons as insurance and the welfare impact of privatization,” *Journal of Public Economics*, February 2005, 89 (2–3), 211–231.
- , **Kjetil Bjorvatn, and others**, “On the distributive impact of privatizing the commons: the case of renewable resources,” Technical Report, Citeseer 2009.
- Banerjee, Abhijit and Lakshmi Iyer**, “History, Institutions, and Economic Performance: The Legacy of Colonial Land Tenure Systems in India,” *American Economic Review*, September 2005, 95 (4), 1190–1213.
- Besley, Timothy**, “Property Rights and Investment Incentives: Theory and Evidence from Ghana,” *Journal of Political Economy*, 1995, 103 (5), 903–37. 01296.
- and **Maitreesh Ghatak**, “Property Rights and Economic Development*,” in “Handbook of Development Economics,” Vol. 5, Elsevier, 2010, pp. 4525–4595.
- Boelaert, E**, “L’Etat indépendant et les terres indigènes,” 1956.
- Boserup, Ester**, *The conditions of agricultural growth: The economics of agrarian change under population pressure*, Transaction Publishers, 1965.

- , “The impact of scarcity and plenty on development,” *The Journal of Interdisciplinary History*, 1983, 14 (2), 383–407. 00044.
- Brasselle, Anne-Sophie, Frédéric Gaspart, and Jean-Philippe Platteau**, “Land tenure security and investment incentives: puzzling evidence from Burkina Faso,” *Journal of Development Economics*, 2002, 67 (2), 373–418. 00350.
- Clerck, Louis De**, “L’administration coloniale belge sur le terrain au Congo (1908-1960) et au Ruanda-Urundi (1925-1962),” in “Annuaire d’Histoire administrative européenne,” Vol. 18 2006.
- Cogneau, Denis and Yannick Dupraz**, “Institutions historiques et développement économique en Afrique,” *Histoire & mesure*, June 2015, XXX (1), 103–134.
- Deininger, Klaus and Derek Byerlee**, *Rising Global Interest in Farmland: Can It Yield Sustainable and Equitable Benefits?*, The World Bank, January 2011.
- Dell, Melissa**, “The mining mita, explaining institutional persistence,” *Mimeogr. MIT*, 2008.
- EIC**, “Bulletin Officiel,” Technical Report 152, Etat Indépendant du Congo 1905.
- Engerman, Stanley L. and Kenneth L. Sokoloff**, “Factor Endowments: Institutions, and Differential Paths of Growth Among New World Economies: A View from Economic Historians of the United States,” Working Paper 66, National Bureau of Economic Research December 1994.
- Feder, Gershon*Onchan**, “Land policies and farm productivity in Thailand,” Technical Report 13379, The World Bank July 1988.
- Gershon, Klaus Feder Deininger**, “Land Registration, Governance, and Development,” *World Bank Research Observer*, August 2009, 24 (2), 233–266.
- Gignoux, Jérémie, Karen Macours, and Liam Wren-Lewis**, “Impact of land administration programs on agricultural productivity and rural development: existing evidence, challenges and new approaches,” 2014.
- Goldstein, Markus and Christopher Udry**, “The Profits of Power: Land Rights and Agricultural Investment in Ghana,” *Journal of Political Economy*, December 2008, 116 (6), 981–1022.
- , **Kenneth Hounbedji, Florence Kondylis, Michael O’Sullivan, and Harris Selod**, “Formalizing Rural Land Rights in West Africa,” *Development Research*, 2015.

- Hansen, M. C., P. V. Potapov, R. Moore, M. Hancher, S. A. Turubanova, A. Tyukavina, D. Thau, S. V. Stehman, S. J. Goetz, T. R. Loveland, A. Komareddy, A. Egorov, L. Chini, C. O. Justice, and J. R. G. Townshend**, “High-Resolution Global Maps of 21st-Century Forest Cover Change,” *Science*, November 2013, *342* (6160), 850–853.
- Hardin, Garrett**, “The Tragedy of the Commons,” *Science*, December 1968, *162* (3859), 1243–1248.
- Herdeshchee, Johannes, Kai-Alexander Kaiser, and Daniel Mukoko Samba**, *Resilience d’un Geant Africain: Accelerer la Croissance et Promouvoir l’emploi en Republique Democratique du Congo, Volume I Synthese, contexte historique et macroeconomique*, Kinshasa: MEDIASPAUL, 2012.
- Hornbeck, Richard**, “Barbed Wire: Property Rights and Agricultural Development,” *The Quarterly Journal of Economics*, May 2010, *125* (2), 767–810.
- Huillery, Elise**, “History Matters: The Long-Term Impact of Colonial Public Investments in French West Africa,” *American Economic Journal: Applied Economics*, March 2009, *1* (2), 176–215.
- , “The Impact of European Settlement within French West Africa: Did Pre-colonial Prosperous Areas Fall Behind?,” *Journal of African Economies*, March 2011, *20* (2), 263–311.
- Iyer, Lakshmi**, “Direct versus Indirect Colonial Rule in India: Long-Term Consequences,” *Review of Economics and Statistics*, June 2010, *92* (4), 693–713.
- Jacoby, Hanan G. and Bart Minten**, “Is Land Titling in Sub-Saharan Africa Cost-Effective? Evidence from Madagascar,” *The World Bank Economic Review*, 2007, *21* (3), 461–485.
- Janvry, Alain De and Elisabeth Sadoulet**, “Access to land and land policy Reforms, policy brief,” 2001.
- King, Russell**, *Land reform: a world survey* Bell’s advanced economic geographies, London: Bell, 1977.
- Likaka, Osumaka**, *Rural society and cotton in colonial Zaire*, Madison, Wis: University of Wisconsin Press, 1997.
- , *Naming colonialism: history and collective memory in the Congo, 1870-1960* Africa and the diaspora: history, politics, culture, Madison, Wis: University of Wisconsin Press, 2009.
- Mataboro, Severin Mugangu**, “Revue historique du secteur foncier en République Démocratique du Congo,” Technical Report 2016.

- Obeng-Odoom, Franklin**, “Land reforms in Africa: Theory, practice, and outcome,” *Habitat International*, January 2012, *36* (1), 161–170.
- Piet, Clément**, “The land tenure system in the Congo, 1885-1960. Actors, motivations and consequences,” in “Colonial Exploitation and Economic Development, The Belgian Congo and the Netherlands Indies Compared,” frankema, ewout and frans buelens ed., London: Routledge, 2013, pp. 88–108.
- , “Agricultural development in the Belgian Congo: the origins, implementation and impact of the indigenous peasantry scheme, 1920-1960,” August 2015.
- Platteau, Jean-Philippe**, “The Evolutionary Theory of Land Rights as Applied to Sub-Saharan Africa: A Critical Assessment,” *Development and Change*, January 1996, *27* (1), 29–86.
- , “Does Africa need a land reform ?,” in “Evolving land rights, policy, and tenure in Africa” Issues / Department for International Development, London: IIED : Natural Resources Institute, 2000.
- Porta, Rafael La, Florencio Lopez-De-Silanes, Andrei Shleifer, and Robert W. Vishny**, “Legal Determinants of External Finance,” *The Journal of Finance*, 1997, *52* (3), 1131–1150.
- Salacuse, Jeswald W.**, *The National Land Law System of Zaire*, Land Tenure Center, University of Wisconsin-Madison, 1985.
- Udry, Christopher**, “Land tenure,” in “The Oxford Companion to the Economics of Africa,” oxford university press ed. 2012, pp. 410–415.
- Vansina, Jan**, *Paths in the rainforests: toward a history of political tradition in equatorial Africa*, Madison, Wis: University of Wisconsin Press, 1990.
- Vinck, Honoré**, *Conflits fonciers au Congo belge opinions congolaises: texte intégral d’une enquête de 1954*, Bruxelles: Académie royale des sciences d’outre-mer, 2011. OCLC: 949794234.
- Weitzman, Martin L**, “Free access vs private ownership as alternative systems for managing common property,” *Journal of Economic Theory*, June 1974, *8* (2), 225–234.
- Wily, Liz Alden**, “‘The Law is to Blame’: The Vulnerable Status of Common Property Rights in Sub-Saharan Africa,” *Development and change*, 2011, *42* (3), 733–757.
- WorldBank/UN-Habitat**, “Revue du Secteur Foncier en République Démocratique du Congo,” Technical Report 2016.

WWF, “Etude sur l’identification et la localisation des anciennes plantations industrielles de palmier à huile inactives ou abandonnées dans les Provinces de Bas-Congo, Bandundu, Equateur et Orientale,” Technical Report, République Démocratique du Congo June 2015.

Maps

Figure 2: Map : DRC Provinces in 2015



Figure 3: Map : Administrative Borders of the Secteurs and Territoires in the sample

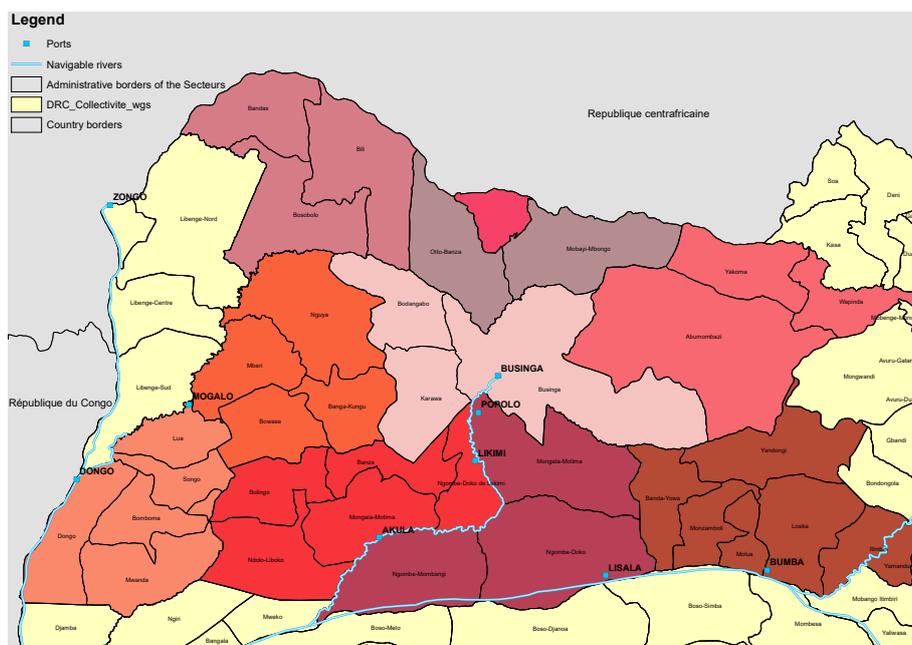


Figure 4: Map : Ethnic groups in the sample

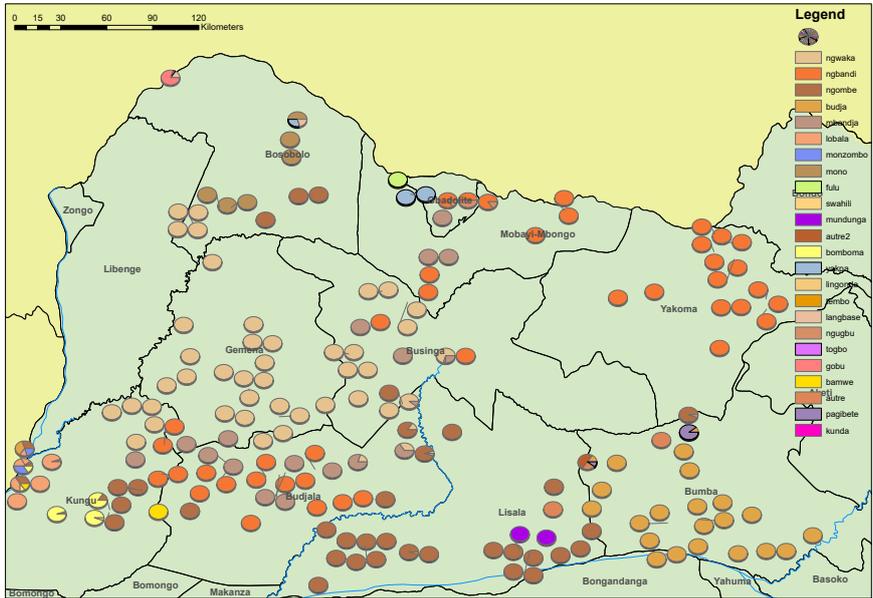


Figure 5: Map : Forest Cover in the Equateur Province

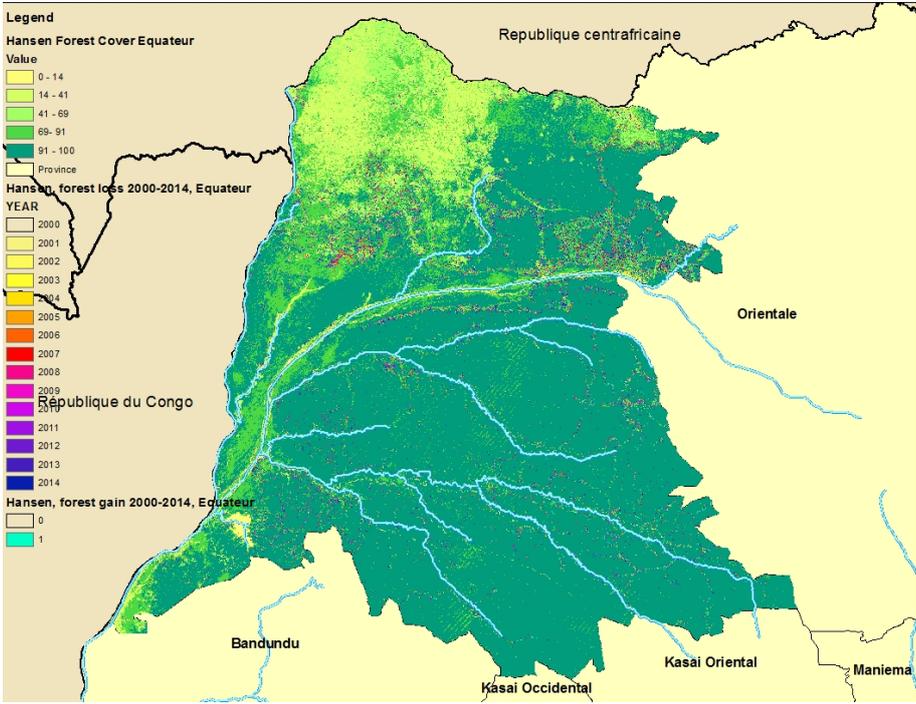


Figure 6: Map : Shortest Path from the villages to the Nearest District Administrative Capital

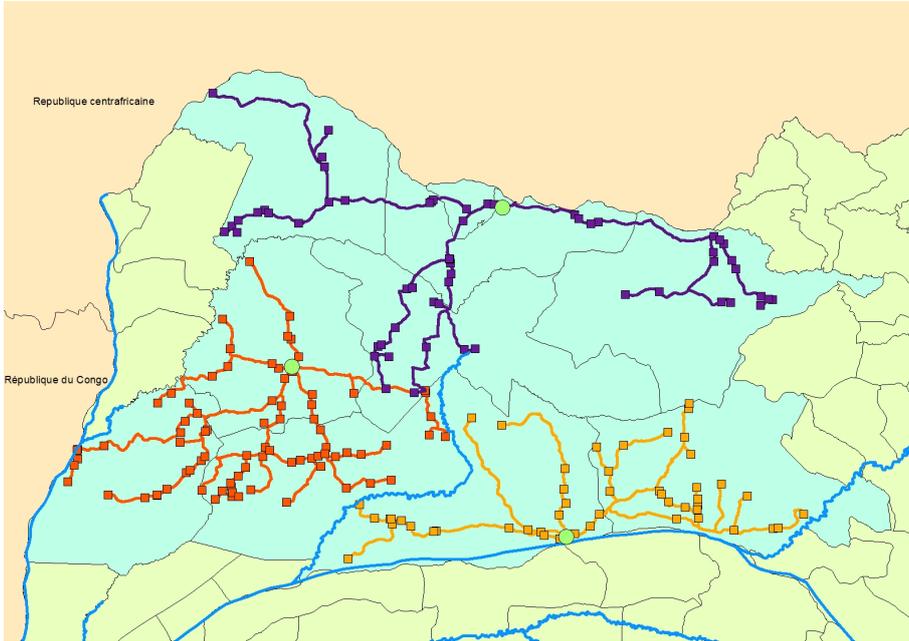


Figure 7: Map : Shortest Path from the villages to the Nearest Territoire Administrative Capital

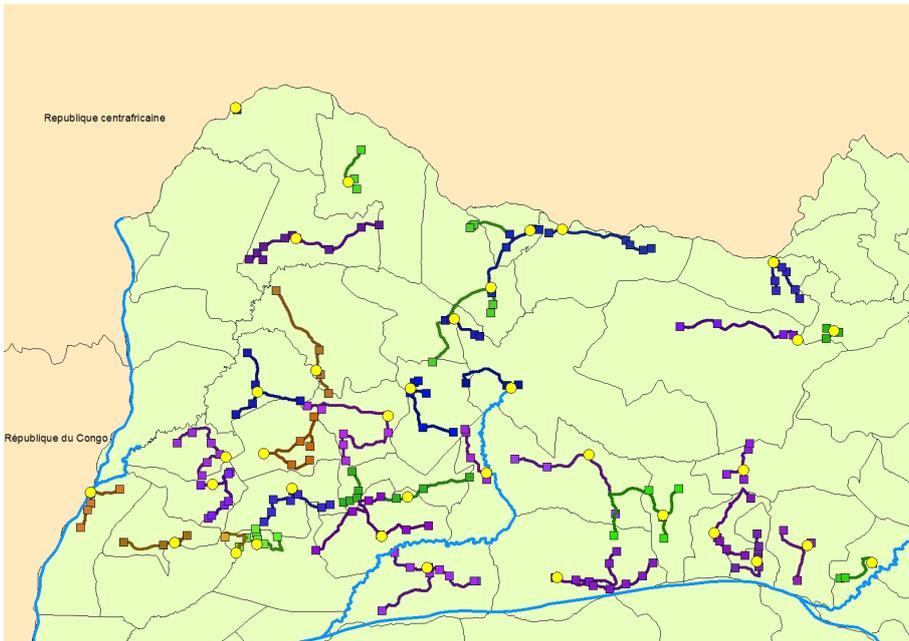


Figure 8: Map : Shortest Path from the villages to the Nearest Secteur Administrative Capital

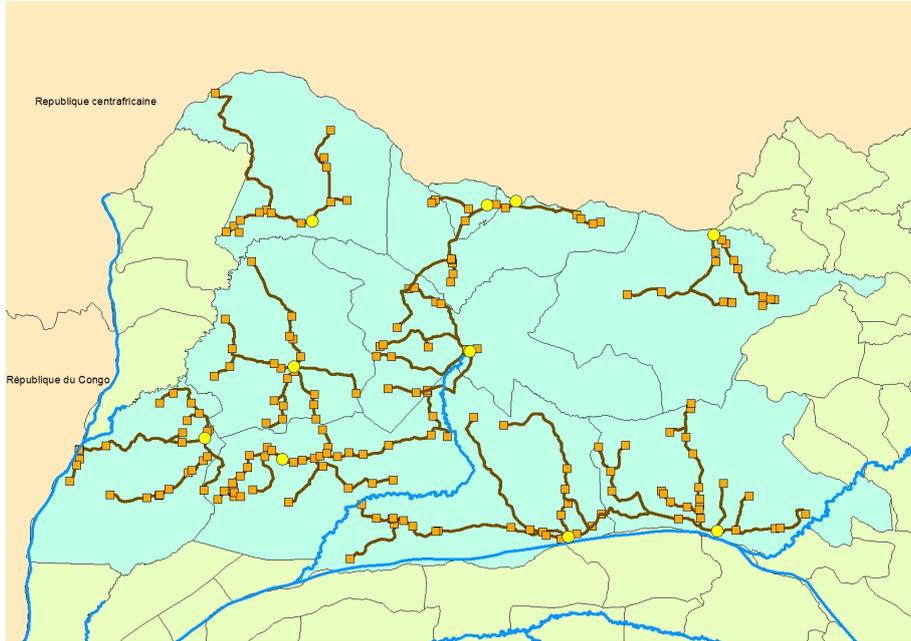


Figure 9: Map : Cotton Cultivation during Belgian Colonization

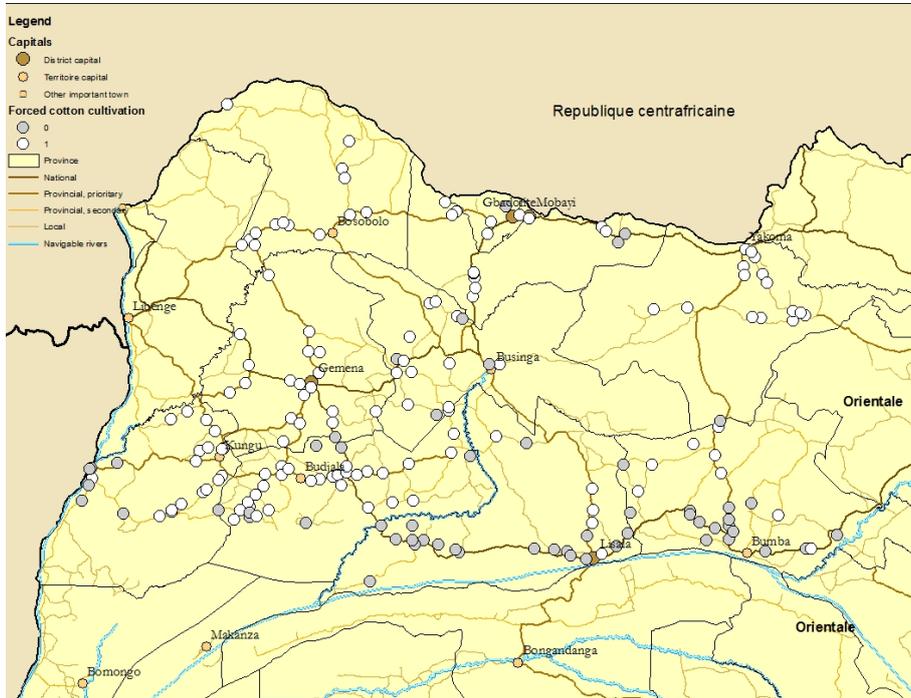


Figure 10: Map : Cotton Cultivation during Belgian Colonization and Forest Cover

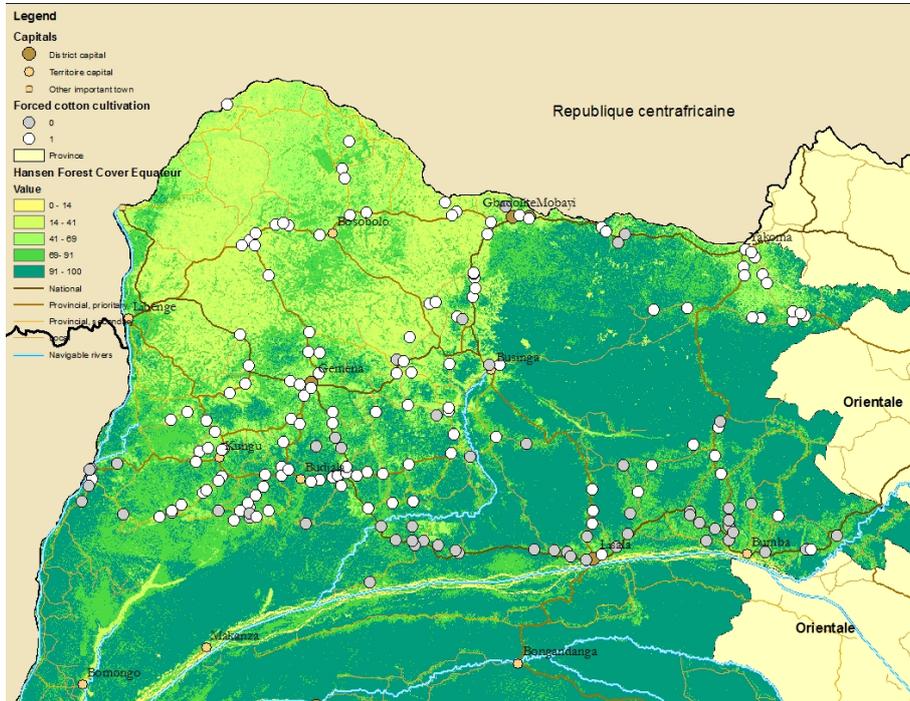


Figure 11: Map : Definitive Land Distributions during Belgain Colonization and Administrative Borders

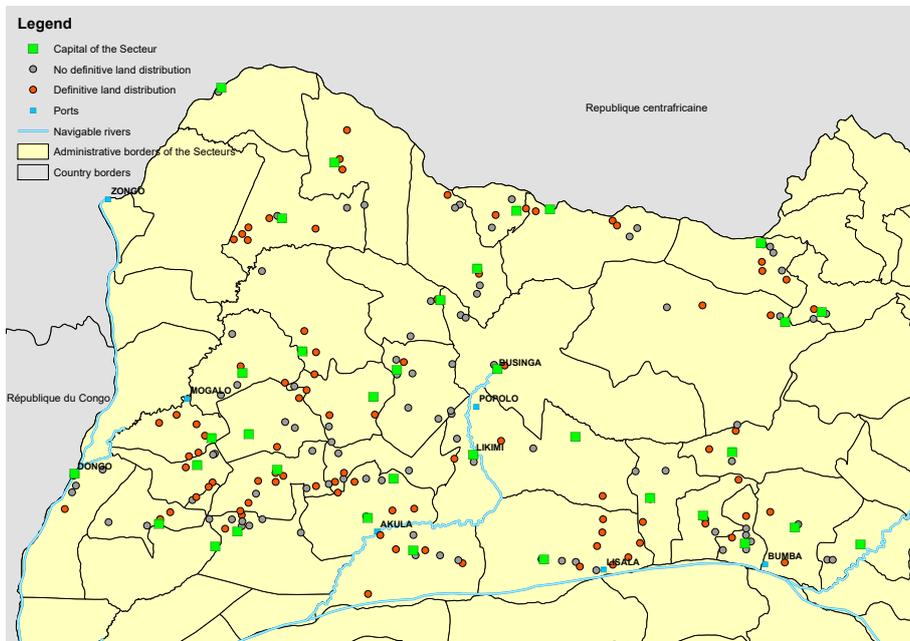


Figure 12: Map : Definitive Land Distributions during Belgain Colonization and Roads

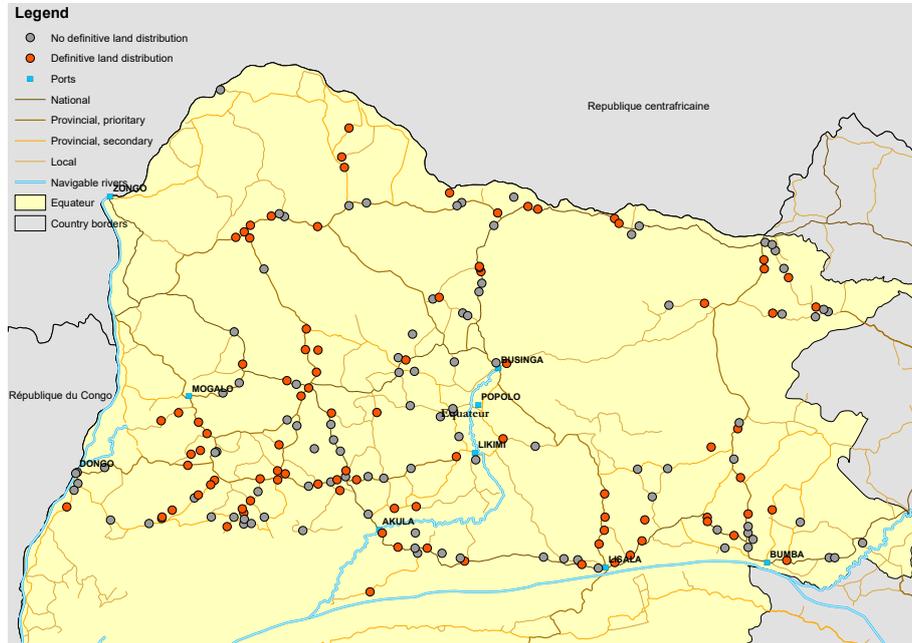
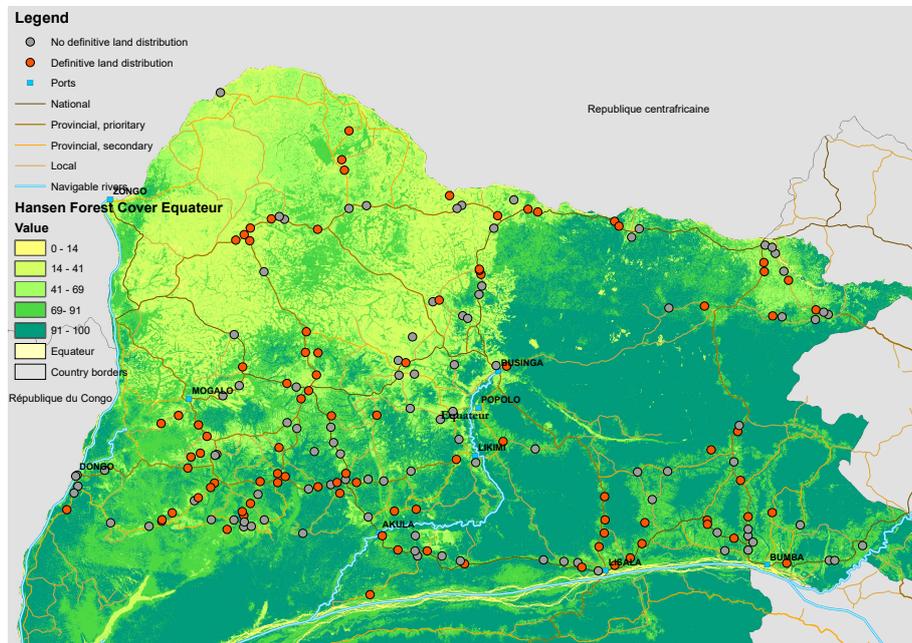


Figure 13: Map : Definitive Land Distributions during Belgain Colonization and Forest Cover



Summary Statistics

Table 1: Foundation of the village

	Freq	Pct
Before colonization	138	71.88
During colonization	42	21.88
Mobutu	8	4.17
Between independence and Mobutu	4	2.08
Total	192	100.00

Table 2: Demographic and Geographic Characteristics of the Villages in 2014

	Mean	SD	25th	Median	75th	Min	Max	N
<i>Population</i>								
Number of households	307	357	120	120	350	13	2500	174
Number of individuals	2785	3067	919	919	3432	160	18000	179
Number of men	755	991	200	200	855	41	6800	175
Number of women	999	1219	270	270	1250	40	7000	175
Number of children	1048	1233	318	318	1304	45	7700	175
<i>Ethnic composition</i>								
Number of clans	5.62	3.07	4.00	4.00	7.00	1.00	15.00	177
Share of the largest clan	0.35	0.18	0.25	0.25	0.40	0.10	1.00	175
Number of ethnic groups	1.25	0.69	1.00	1.00	1.00	1.00	5.00	174
Share main ethnic group	0.96	0.14	1.00	1.00	1.00	0.00	1.00	174
<i>Geographic characteristics</i>								
Forest cover (km sq)	54	57	15	15	65	0.31	306	173
Nearest river (km)	65	47	27	27	94	0.04	194	178
Nearest port (km)	96	63	47	47	128	2.96	256	178
Capital of the district (km)	117	63	69	69	164	0.26	287	178
Capital of the Territoire (km)	58	40	27	27	77	1.54	191	178
Capital of the Secteur (km)	25	21	7	7	38	0.00	92	178

Note: Distances are based on computations made by the author using the geographic location of the villages and capitals in ArcGIS to compute the shortest path along the road network. Forest cover is calculated based on Landsat images from Hansen Global Forest Watch dataset and village borders drawn by the author based on information from village surveys.

Table 3: Clanic Groups

	Freq	Pct
Own clan/brother identified in the village	1892	71.86
Clan could not be identified/unknown	385	14.62
Clan identified in a different village	244	9.27
Clan of the wife in the village	112	4.25
Total	2633	100.00

Table 4: Characteristics of the land

	All		By Clanic Group			
	Mean		Founding	Men's	Women's	Marginal
<i>Land Formalization</i>						
Family owns Paysannat	2627	0.20	0.24	0.22	0.08	0.13
Owens at least one documented field	1603	0.12	0.11	0.12	0.09	0.14
Documented field in 2014	2660	0.13	0.11	0.15	0.13	0.16
% fields in 2014 with a document	2660	0.07	0.06	0.08	0.06	0.10
Fear about one field	1609	0.12	0.10	0.12	0.21	0.15
Worried about losing a field	1601	0.07	0.06	0.07	0.10	0.10
<i>Fields cultivated in 2014</i>						
Number of plots cultivated in 2014	2677	4.34	4.50	4.41	4.04	4.01
Number of fallow plots	1610	10.80	11.62	11.57	9.33	8.87
Total area cultivated in 2014	2677	2.77	2.82	2.96	2.75	2.55

Table 5: Summary Statistics : knowledge about and access to collective land

	All		By Clan Group			
	Mean		Founding	Men's	Women's	Marginal
<i>Collective primary forest or savanna</i>						
Declares this type of land exists	2645	0.62	0.62	0.62	0.55	0.61
Authorization to open a field (free)	2645	0.55	0.58	0.54	0.44	0.50
Has already opened a field there	2566	0.26	0.27	0.27	0.22	0.23
<i>Collective secondary forest or old plantation</i>						
Declares this type of land exists	2645	0.12	0.12	0.12	0.11	0.13
Authorization to open a field without paying	2641	0.07	0.08	0.08	0.07	0.07
Has already opened a field there	2581	0.03	0.03	0.03	0.04	0.04
<i>primary forest or savanna, other village</i>						
Declares this type of land exists	2638	0.07	0.07	0.06	0.09	0.07
Authorization to open a field (free)	2637	0.03	0.03	0.03	0.06	0.03
Has already opened a field there	2619	0.02	0.01	0.02	0.02	0.02
<i>Collective primary forest or savanna, clan</i>						
Declares this type of land exists	2645	0.20	0.22	0.20	0.16	0.16
Authorization to open a field (free)	2645	0.19	0.20	0.19	0.15	0.15
Has already opened a field there	2618	0.10	0.11	0.11	0.06	0.09
<i>Collective family land, uncultivated</i>						
Declares this type of land exists	2645	0.23	0.25	0.23	0.19	0.19
Authorization to open a field	2643	0.21	0.23	0.22	0.19	0.18
Has already opened a field there	2610	0.14	0.15	0.17	0.11	0.12
<i>Land that belongs to the family</i>						
Declares this type of land exists	2642	0.55	0.62	0.53	0.40	0.44
This land can not be individualized	1446	0.96	0.96	0.96	0.98	0.96

Table 6: Summary Statistics : Transfer of land to children

	All		By Clan Group			
	Mean		Founding	Men's	Women's	Marginal
<i>Transmission of land to children</i>						
Already given some for cultivation	2643	0.20	0.21	0.20	0.12	0.19
Already lent some for cultivation	2643	0.16	0.15	0.18	0.13	0.16
Already given some for futur cultivation	2643	0.09	0.10	0.10	0.05	0.06
Decided after-death sharing of land	2621	0.14	0.15	0.15	0.07	0.13
<i>Children who already got some land</i>						
All boys and girls	2643	0.02	0.02	0.02	0.01	0.02
Only the eldest boy	2643	0.10	0.11	0.09	0.06	0.10
All boys	2643	0.06	0.06	0.07	0.04	0.07
Part of the boys	2643	0.12	0.11	0.14	0.08	0.11
Some of the boys and girls	2643	0.03	0.03	0.03	0.04	0.02
All the girls	2643	0.00	0.00	0.00	0.00	0.00
Part of the girls	2643	0.01	0.01	0.01	0.01	0.01

Table 7: Summary Statistics : Access to collective primary forest or savanna

	All		By Clan Group			
	Mean		Founding	Men's	Women's	Marginal
<i>Reason for not opening a field</i>						
Physically too demanding	2646	0.00	0.00	0.00	0.00	0.01
Too far	2646	0.01	0.00	0.01	0.02	0.01
Enough Family land	2646	0.01	0.01	0.01	0.03	0.02
Protect family land	2646	0.00	0.00	0.00	0.00	0.00
No money to pay for labour	2646	0.00	0.00	0.00	0.00	0.00
No money to pay authorization	2646	0.01	0.00	0.00	0.00	0.02
Other	2646	0.00	0.00	0.00	0.00	0.01
<i>Reason for opening a field</i>						
Land is more fertile	2645	0.13	0.14	0.13	0.12	0.13
Increase arable family land	2645	0.07	0.08	0.06	0.05	0.06
Increase duration of fallows	2645	0.02	0.02	0.02	0.03	0.02
Ensure enough land for children	2645	0.05	0.06	0.07	0.03	0.02
Mimic ancestors	2645	0.01	0.01	0.01	0.00	0.01
Reduce risks of divagation	2645	0.00	0.00	0.00	0.02	0.01
Be closer to campement for fishing/hunting	2645	0.01	0.00	0.01	0.00	0.00
Some crops need this type of land	2645	0.08	0.08	0.09	0.08	0.06
Other	2645	0.01	0.01	0.01	0.02	0.01
<i>Transmission of fields opened there</i>						
Transfer to children	664	0.86	0.86	0.90	0.83	0.86
Lend	664	0.79	0.79	0.86	0.74	0.76
Rent	664	0.72	0.74	0.78	0.70	0.64
Sell	662	0.35	0.35	0.34	0.52	0.34
Only autochtones can do it	2645	0.01	0.00	0.00	0.01	0.02
Only some clans can do it	2645	0.00	0.00	0.00	0.01	0.00
Only possible when chief decides	2645	0.03	0.03	0.03	0.02	0.03
Other	2645	0.01	0.01	0.01	0.00	0.01

Table 8: Summary Statistics : type of document

	Freq	Pct
Groupement Chief	538	43.46
Secteur Chief	147	11.87
Paysannat title	91	7.35
Certificate of sale	462	37.32
Total	1238	100.00

Table 9: Summary Statistics : Family land chief

	Freq	Pct
No land chief	730	27.74
Household head	500	19.00
The father of the Household Head	367	13.94
The uncle of the Household Head	358	13.60
The elder brother of the Household Head	322	12.23
The grandfather of the Household Head	176	6.69
Other	103	3.91
A relative of the wife	35	1.33
Nephew of the Household Head	34	1.29
A Cousin or brother of the Household Head	7	0.27
Total	2632	100.00

Table 10: Summary Statistics : Mean of obtention of collective land

	Freq	Pct
Appropriation by an ancestor	20	57.14
Families	7	20.00
Notables	3	8.57
Other	3	8.57
Kapita	2	5.71
Total	35	100.00

Table 11: Summary Statistics : Land distributions during colonization

	Freq	Pct
Definitive Distribution, progressive	63	35.00
Definitive distribution, one	41	22.78
Temporary allocation, progressive	37	20.56
Temporary allocation, one	23	12.78
No Distribution	14	7.78
No cash crops	2	1.11
Total	180	100.00

Table 12: Summary Statistics : mean of obtention of the fields in paysannat

	Freq	Pct
Inherited	483	35.75
Clearing of a family field	294	21.76
Confiage, family	173	12.81
Clearing	115	8.51
Confiage, other	96	7.11
Bought	55	4.07
Other	54	4.00
Rented	46	3.40
Confiage, wife's family	19	1.41
Given by the wife's family	16	1.18
Total	1351	100.00

Table 13: Summary Statistics : Access to collective primary forest or savanna

	Mean	SD	25th	Median	75th	Min	Max	N
<i>Area in 2000 (km)</i>								
Primary Forest	6.75	9.71	0.50	0.50	8.93	0.00	57.08	173.00
Secondary Forest	2.88	2.85	0.84	0.84	3.98	0.00	20.74	173.00
<i>Area Deforested 2001 11 (km²)</i>								
Primary Forest	-5.99	8.28	-7.48	-7.48	-0.98	-60.93	0.00	171.00
Secondary Forest	-13.42	7.97	-19.02	-19.02	-7.62	-36.61	0.00	172.00
Forest	-19.38	13.32	-26.12	-26.12	-9.88	-71.82	0.00	171.00

Balance Test of Pre Independance Characteristics

Table 14: Balance Test : Characteristics of the villages before independance

	N	Paysannat	No P	Diff No P - P	S.E.
<i>Preindependence characteristics</i>					
Number of clans at foundation	179	3.7	3.8	0.11	0.38
Distance to urban area (km)	178	75.9	84.8	8.89	8.63
Nearest river (km)	178	68.0	61.8	-6.25	7.14
Nearest port (km)	178	94.0	98.7	4.73	9.50
Capital of the Secteur (km)	178	24.6	25.6	1.01	3.22
Capital of the Territoire (km)	178	55.0	62.6	7.64	6.03
Capital of the district (km)	178	109.1	126.9	17.71*	9.45

Regressions at the Village Level

Tables : Results on natural resources

Table 15: Existence of different types of collective land, OLS with secteur fixed effect

	(1) Primary Forest	(2) Secondary Forest	(3) Savanna	(4) Access to forest in another village
Paysannat	-0.018 (0.079)	-0.074 (0.054)	0.045 (0.058)	0.052 (0.063)
Geo Control Vars	Yes	Yes	Yes	Yes
Observations	178	178	178	177
Mean	0.70	0.12	0.24	0.15

* $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$.

Table 16: Collective Primary forest, OLS with secteur fixed effect

	(1) Collective Primary Forest	(2) Distance	(3) Shortage Forest now	(4) Fear of future Shortage of Forest
Paysannat	-0.018 (0.079)	1.974** (0.964)	0.153** (0.075)	0.108 (0.081)
Geo Control Vars	Yes	Yes	Yes	Yes
Observations	177	121	154	152
Mean	0.70	4.90	0.14	0.23

* $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$.

Tables : Forest Cover in the Village

Table 17: Forest Cover in the village in 2000, OLS with secteur fixed effect

	(1)	(2)	(3)	(4)	(5)
	PF	SF	Deforestation PF 2001-11	Deforestation SF 2001-11	Deforestation Forest 2001-11
Paysannat	-1.337 (1.489)	0.438 (0.450)	-1.001 (1.241)	-0.177 (0.851)	-1.199 (1.642)
Geo Control Vars	Yes	Yes	Yes	Yes	Yes
Observations	173	173	171	172	171
Mean	6.79	2.56	-5.38	-13.52	-18.83

* $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$.

Table 18: Forest Cover in the village in 2000 (rank), OLS with secteur fixed effect

	(1)	(2)	(3)	(4)	(5)
	PF	SF	Deforestation PF 2001-11	Deforestation SF 2001-11	Deforestation Forest 2001-11
Paysannat	-5.703 (7.727)	6.379 (7.743)	-10.518 (6.852)	-1.314 (5.331)	-4.891 (5.624)
Geo Control Vars	Yes	Yes	Yes	Yes	Yes
Observations	173	173	171	172	171
Mean	85.26	81.28	90.58	85.95	88.35

* $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$.

Table 19: Forest Cover in the village in 2000 (log), OLS with secteur fixed effect

	(1)	(2)	(3)	(4)	(5)
	PF	SF	Deforestation PF 2001-11	Deforestation SF 2001-11	Deforestation Forest 2001-11
Paysannat	-0.151 (0.170)	0.075 (0.098)	0.486 (0.361)	0.104 (0.412)	0.762 (0.186)
Geo Control Vars	Yes	Yes	Yes	Yes	Yes
Observations	173	173	43	11	6
Mean	1.41	1.08	-0.95	-0.44	-0.47

* $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$.

Tables : Results on lineage groups characteristics

Table 20: Share of different types of lineage groups in the village, OLS with secteur fixed effect

	(1) Marginal	(2) Local Men	(3) Founding Men	(4) Local Women	(5) Founding Women
Paysannat	0.041 (0.038)	-0.048 (0.043)	0.015 (0.051)	0.010 (0.007)	-0.018* (0.010)
Geo Control Vars	Yes	Yes	Yes	Yes	Yes
Observations	178	178	178	178	178
Mean	0.24	0.17	0.55	0.01	0.03

* $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$.

Table 21: Share of different types of lineage groups in the village, OLS with secteur fixed effect

	(1) Newcomer	(2) Newcomer Local	(3) Newcomer Marginal	(4) Oldcomer	(5) Oldcomer Local	(6) Oldcomer Marginal
Paysannat	-0.056* (0.033)	-0.041** (0.021)	-0.014 (0.023)	0.056* (0.033)	0.002 (0.041)	0.053** (0.026)
Geo Control Vars	Yes	Yes	Yes	Yes	Yes	Yes
Observations	178	178	178	178	178	178
Mean	0.18	0.08	0.10	0.82	0.68	0.14

* $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$.

Tables : Results on demographic characteristics

Table 22: Population in the village, OLS with secteur fixed effect

	(1) Nb households	(2) Population	(3) Population Men	(4) Population Women	(5) Population Children	(6) Nb tribes	(7) Nb clans	(8) Proportion Main tribe
Paysannat	-21.862 (59.846)	-22.017 (289.056)	-24.380 (106.588)	-61.284 (117.039)	-128.106 (164.780)	-0.265** (0.116)	-1.339** (0.519)	4.973** (2.250)
Geo Control Vars	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations	171	173	173	173	173	171	174	174
Mean	318.58	1783.70	494.72	608.20	901.03	1.38	5.97	88.87

* $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$.

Tables : Agricultural Practices

Table 23: Agricultural practices

	(1) Improved seeds	(2) Improved seeds main crops	(3) Line Sowing	(4) Labor man-days
Paysannat	-0.034 (0.039)	-0.037 (0.032)	-0.027 (0.020)	-60.424** (25.776)
Geo Control Vars	Yes	Yes	Yes	Yes
Observations	178	178	178	178
Mean	0.39	0.25	0.12	173.59

* $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$.

Table 24: Agricultural practices

	(1) Number of crops	(2) Maize	(3) Rice	(4) Groundnuts
Paysannat	-0.004 (0.047)	0.046* (0.024)	0.044 (0.031)	0.020 (0.033)
Geo Control Vars	Yes	Yes	Yes	Yes
Observations	178	178	178	178
Mean	0.69	0.83	0.23	0.58

* $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$.

Table 25: Agricultural practices

	(1) # farmed fields	(2) # Fallows	(3) Farmed area
Paysannat	-0.093 (0.165)	-0.234 (1.168)	-0.207 (0.197)
Geo Control Vars	Yes	Yes	Yes
Observations	178	85	178
Mean	4.31	10.77	2.78

* $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$.

Table 26: Agricultural practices

	(1) Family owns paysannat land	(2) Documented fields	(3) Sh documented fields	(4) Fallows documents	(5) Insecure fallow
Paysannat	0.126*** (0.038)	-0.038 (0.025)	-0.024 (0.016)	0.001 (0.030)	0.017 (0.019)
Geo Control Vars	Yes	Yes	Yes	Yes	Yes
Observations	178	178	178	85	85
Mean	0.10	0.13	0.08	0.12	0.06

* $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$.

Table 27: Land sales and rentals in the village, OLS with secteur fixed effect

	(1) b.1.7	(2) b.1.7_dum3	(3) b.1.8	(4) b.1.8_dum3
Paysannat	-0.007 (0.110)	-0.053 (0.079)	-0.183 (0.119)	-0.063 (0.065)
Geo Control Vars	Yes	Yes	Yes	Yes
Observations	177	177	177	177
Mean	2.39	0.55	2.03	0.34

* $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$.

Note: b.1.7 : Are land sales more frequent than they were 10 years ago ? 1:Yes 2:No 3:There are no land sales b.1.8 : Are land rentals more frequent than they were 10 years ago ? 1:Yes 2:No 3:There are no land rentals

Tables : access to infrastructures, health, education and food security

Table 28: Infrastructures

	(1) Distance to nearest market	(2) Distance to nearest school	(3) Distance to nearest health Center
Paysannat	-0.500 (1.220)	-9.467 (6.785)	-0.331 (2.448)
Geo Control Vars	Yes	Yes	Yes
Observations	178	178	177
Mean	5.56	7.51	4.22

* $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$.

Table 29: Education and household size

	(1) Years of education household head	(2) Household size	(3) Share of permanent migrants
Paysannat	0.321 (0.306)	0.129 (0.571)	-0.209 (0.183)
Geo Control Vars	Yes	Yes	Yes
Observations	85	93	93
Mean	5.77	9.93	1.50

* $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$.

Table 30: Food Security

	(1)	(2)	(3)	(4)	(5)	(6)	(7)
Paysannat	0.009 (0.016)	0.015 (0.026)	0.032 (0.026)	-0.004 (0.017)	0.005 (0.032)	-0.034 (0.030)	0.011 (0.011)
Geo Control Vars	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations	178	178	178	178	178	178	178
Mean	0.91	0.80	0.78	0.12	0.39	0.73	0.94

* $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$.

Note: Within the last 7 days : (1) "Have you been worried about not having enough food to prepare ?" (2) "Have you been through a time when you lacked some types of food because of a lack of resources?" (3) "Did you go to bed hungry because you did not have enough food?" (4) "Did you spend a day and a night without eating ?" (5) "Did you borrow food from friends or family because you did not have enough food?" (6) "Did you have to reduce the number of meals per day?" (7) "Within the last 12 months, did you go through a time when you did not have enough food?"

Table 31: Inequality indexes :GINI and Theil

	(1)	(2)	(3)	(4)	(5)	(6)
	Total area Gini	Total area Theil	Nb fallows Gini	Nb fallows Theil	Years educ Gini	Years educ Theil
Paysannat	-0.015 (0.015)	-0.025 (0.026)	0.008 (0.014)	-0.005 (0.023)	-0.011 (0.013)	-0.009 (0.011)
Geo Control Vars	Yes	Yes	Yes	Yes	Yes	Yes
Observations	172	172	82	82	85	85
Mean	0.36	0.25	0.37	0.26	0.26	0.12

* $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$.

Regressions at the Household Level

Tables : Land documents and insecurity over land rights, Household Level

Table 32: Land formalization and documents, OLS with secteur fixed effect

	(1) Paysannat	(2) Document Fallow	(3) Document Field	(4) %Document Field	(5) Insecurity Fields	(6) Insecurity Fallows
Marginal clan	-0.070*** (0.017)	0.031* (0.017)	0.039*** (0.014)	0.037*** (0.009)	0.048*** (0.018)	0.033** (0.014)
Men local clan	-0.009 (0.018)	-0.033* (0.018)	-0.004 (0.016)	0.001 (0.010)	0.011 (0.019)	-0.014 (0.015)
Women from local clan	-0.068 (0.050)	0.007 (0.046)	0.025 (0.044)	0.021 (0.029)	0.123** (0.050)	0.010 (0.039)
Women F clan	-0.091** (0.040)	-0.027 (0.038)	0.009 (0.035)	0.003 (0.023)	0.037 (0.042)	0.014 (0.033)
Geo Control Vars	Yes	Yes	Yes	Yes	Yes	Yes
Observations	3127	2119	3169	3169	2137	2116
Mean	0.09	0.11	0.13	0.07	0.13	0.06

* $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$.

Note: The variable about which titles households own on their fallows is only available in a subsample of villages

Table 33: Land formalization and documents, OLS with secteur fixed effect

	(1) Paysannat	(2) Document Fallow	(3) Document Field	(4) %Document Field	(5) Insecurity Fields	(6) Insecurity Fallows
Marginal clan	-0.028 (0.020)	0.014 (0.020)	0.005 (0.017)	0.017 (0.011)	0.011 (0.022)	0.014 (0.017)
Marginal newcomer	-0.132*** (0.027)	0.055** (0.028)	0.092*** (0.024)	0.058*** (0.016)	0.098*** (0.030)	0.040* (0.024)
Men local clan	0.004 (0.019)	-0.046** (0.019)	-0.023 (0.017)	-0.009 (0.011)	0.014 (0.021)	-0.014 (0.016)
Local newcomer not F	-0.167*** (0.044)	0.122*** (0.043)	0.134*** (0.039)	0.077*** (0.025)	-0.004 (0.046)	-0.010 (0.036)
Women from local clan	-0.080 (0.060)	-0.005 (0.053)	-0.001 (0.053)	0.008 (0.035)	0.069 (0.058)	0.028 (0.045)
Local newcomer F	-0.127*** (0.034)	0.054 (0.036)	0.003 (0.030)	0.026 (0.020)	-0.031 (0.039)	-0.044 (0.030)
Women F clan	-0.067 (0.049)	-0.030 (0.047)	0.003 (0.044)	-0.004 (0.029)	0.010 (0.051)	-0.047 (0.040)
Local newcomer not F W	0.014 (0.102)	0.052 (0.101)	0.077 (0.091)	0.043 (0.059)	0.187* (0.110)	-0.084 (0.085)
Local newcomer F W	-0.095 (0.079)	0.029 (0.080)	0.033 (0.070)	0.034 (0.045)	0.084 (0.087)	0.175*** (0.068)
Geo Control Vars	Yes	Yes	Yes	Yes	Yes	Yes
Observations	3126	2077	3124	3124	2097	2074
Mean	0.09	0.11	0.13	0.07	0.13	0.06

* $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$.

Note: The variable about which titles households own on their fallows is only available in a subsample of villages

Table 34: Land formalization and documents, OLS with secteur fixed effect

	(1)	(2)	(3)	(4)	(5)	(6)
	Paysannat	Document Fallow	Document Field	%Document Field	Insecurity Fields	Insecurity Fallows
Paysannat	0.132*** (0.019)	0.044** (0.020)	-0.010 (0.017)	-0.006 (0.011)	-0.025 (0.022)	0.003 (0.017)
Marginal clan	-0.081*** (0.026)	0.096*** (0.027)	0.083*** (0.023)	0.068*** (0.015)	-0.003 (0.029)	0.001 (0.023)
Marginal clan x P	0.008 (0.033)	-0.104*** (0.033)	-0.072** (0.029)	-0.051*** (0.019)	0.081** (0.036)	0.049* (0.028)
Men local clan	-0.070*** (0.026)	0.008 (0.025)	-0.017 (0.023)	-0.008 (0.015)	0.008 (0.027)	-0.009 (0.021)
Men local clan x P	0.142*** (0.036)	-0.076** (0.036)	0.025 (0.032)	0.018 (0.021)	-0.001 (0.039)	-0.012 (0.030)
Women from local clan	-0.125 (0.084)	0.087 (0.084)	0.065 (0.076)	0.063 (0.050)	0.140 (0.092)	0.018 (0.071)
Women from local clan x P	0.074 (0.103)	-0.123 (0.101)	-0.060 (0.093)	-0.063 (0.061)	-0.019 (0.110)	-0.010 (0.085)
Women F clan	-0.044 (0.053)	0.006 (0.053)	0.039 (0.047)	0.006 (0.031)	0.089 (0.057)	0.059 (0.045)
Women F clan x P	-0.085 (0.078)	-0.057 (0.077)	-0.066 (0.069)	-0.006 (0.045)	-0.121 (0.084)	-0.097 (0.065)
Geo Control Vars	Yes	Yes	Yes	Yes	Yes	Yes
Observations	3127	2119	3169	3169	2137	2116
Mean	0.09	0.11	0.13	0.07	0.13	0.06

* $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$.

Note: The variable about which titles households own on their fallows is only available in a subsample of villages

Table 35: Land formalization and documents, OLS with secteur fixed effect

	(1)	(2)	(3)	(4)	(5)	(6)
	Paysannat	Document Fallow	Document Field	%Document Field	Insecurity Fields	Insecurity Fallows
Paysannat	0.137*** (0.020)	0.057*** (0.021)	-0.006 (0.018)	-0.001 (0.012)	-0.023 (0.023)	0.011 (0.018)
Marginal newcomer	-0.130*** (0.034)	0.162*** (0.035)	0.164*** (0.031)	0.122*** (0.020)	0.067* (0.039)	0.017 (0.030)
Marginal newcomer x P	-0.053 (0.046)	-0.163*** (0.047)	-0.124*** (0.041)	-0.087*** (0.027)	0.072 (0.051)	0.068* (0.040)
Marginal oldcomer	-0.050 (0.032)	0.066* (0.035)	0.031 (0.029)	0.039** (0.019)	-0.066* (0.038)	-0.009 (0.030)
Marginal oldcomer x P	0.020 (0.040)	-0.083* (0.043)	-0.038 (0.036)	-0.033 (0.023)	0.113** (0.046)	0.032 (0.036)
Local newcomer not F	-0.133*** (0.050)	0.136*** (0.051)	0.148*** (0.045)	0.080*** (0.029)	-0.013 (0.054)	-0.007 (0.043)
Local newcomer Not F x P	-0.017 (0.090)	-0.134 (0.087)	-0.110 (0.080)	-0.027 (0.052)	0.051 (0.095)	-0.052 (0.074)
Local newcomer F	-0.055 (0.051)	0.138** (0.053)	0.030 (0.046)	0.050 (0.030)	-0.063 (0.058)	-0.005 (0.045)
Local newcomer F x P	-0.109 (0.067)	-0.145** (0.071)	-0.045 (0.061)	-0.040 (0.040)	0.053 (0.078)	-0.068 (0.061)
Local oldcomer Not F	-0.061** (0.028)	-0.003 (0.027)	-0.050* (0.026)	-0.021 (0.017)	0.017 (0.030)	-0.005 (0.023)
Local oldcomer Not F x P	0.140*** (0.038)	-0.076** (0.038)	0.050 (0.034)	0.024 (0.022)	-0.014 (0.042)	-0.017 (0.033)
Local newcomer not F W	-0.166 (0.157)	0.375* (0.211)	0.107 (0.142)	0.153* (0.092)	0.418* (0.230)	-0.042 (0.179)
Local newcomer Not F W x P	0.115 (0.185)	-0.414* (0.231)	-0.042 (0.167)	-0.140 (0.109)	-0.188 (0.253)	-0.020 (0.197)
Local newcomer F W	-0.098 (0.080)	0.065 (0.091)	0.067 (0.072)	0.037 (0.047)	0.067 (0.095)	0.221*** (0.077)
Local newcomer F W x P	-0.102 (0.126)	-0.122 (0.131)	-0.079 (0.114)	-0.017 (0.074)	0.051 (0.145)	-0.191* (0.112)
Local oldcomer Not F W	-0.119 (0.098)	0.052 (0.091)	0.061 (0.088)	0.041 (0.058)	0.090 (0.100)	0.033 (0.078)
Local oldcomer Not F W x P	0.060 (0.122)	-0.093 (0.112)	-0.096 (0.110)	-0.051 (0.072)	-0.028 (0.123)	-0.007 (0.096)
Local oldcomer F W	-0.017 (0.069)	0.002 (0.065)	0.040 (0.062)	-0.001 (0.041)	0.109 (0.071)	-0.016 (0.055)
Local oldcomer F W x P	-0.093 (0.097)	-0.055 (0.094)	-0.071 (0.087)	-0.006 (0.057)	-0.214** (0.103)	-0.065 (0.080)
Geo Control Vars	Yes	Yes	Yes	Yes	Yes	Yes
Observations	3126	2077	3124	3124	2097	2074
Mean	0.09	0.11	0.13	0.07	0.13	0.06

* $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$.

Note: The variable about which titles households own on their fallows is only available in a subsample of villages

Table 36: Land formalization and documents, OLS with secteur fixed effect

	(1)	(2)	(3)	(4)	(5)	(6)
	Paysannat	Document Fallow	Document Field	%Document Field	Insecurity Fields	Insecurity Fallows
Paysannat	0.201*** (0.033)	-0.021 (0.029)	0.001 (0.031)	-0.011 (0.021)	-0.023 (0.032)	-0.001 (0.025)
clan_regnant_c	0.019 (0.034)	-0.005 (0.029)	0.006 (0.032)	0.006 (0.022)	0.044 (0.033)	0.004 (0.025)
clan_regnant_c_t1	-0.026 (0.041)	0.041 (0.036)	0.059 (0.038)	0.030 (0.027)	-0.038 (0.040)	-0.016 (0.031)
Marginal clan	-0.061** (0.031)	0.084*** (0.027)	0.099*** (0.029)	0.084*** (0.020)	0.007 (0.030)	-0.002 (0.023)
Marginal clan x P	-0.042 (0.038)	-0.060* (0.033)	-0.068* (0.035)	-0.050** (0.025)	0.086** (0.037)	0.056* (0.029)
Men local clan	0.017 (0.021)	-0.024 (0.018)	-0.021 (0.020)	-0.006 (0.014)	0.014 (0.020)	-0.017 (0.016)
Women from local clan	-0.064 (0.052)	0.002 (0.046)	-0.008 (0.049)	0.015 (0.034)	0.130** (0.051)	0.008 (0.040)
Women F clan	-0.079* (0.043)	-0.024 (0.038)	0.005 (0.040)	0.006 (0.028)	0.035 (0.042)	0.014 (0.033)
years_educ_cm_14	-0.004 (0.003)	0.009*** (0.003)	0.010*** (0.003)	0.005*** (0.002)	0.003 (0.003)	0.002 (0.002)
years_educ_cm_14_t1	0.001 (0.004)	0.003 (0.004)	-0.001 (0.004)	0.001 (0.003)	-0.000 (0.004)	0.000 (0.003)
Geo Control Vars	Yes	Yes	Yes	Yes	Yes	Yes
Observations	2080	2095	2116	2116	2108	2092
Mean	0.09	0.11	0.13	0.07	0.13	0.06

* $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$.

Note: The variable about which titles households own on their fallows is only available in a subsample of villages

Tables : Characteristics of the land portfolio, household level

Table 37: Characteristics of the land portfolio, OLS with secteur fixed effect

	(1) Nb plots 2014	(2) Nb Fallows	(3) Area 2014
Marginal clan	-0.379*** (0.107)	-2.426*** (0.697)	-0.318** (0.137)
Men local clan	0.002 (0.120)	-0.470 (0.770)	0.057 (0.154)
Women from local clan	0.038 (0.342)	-4.002* (2.048)	-0.177 (0.438)
Women F clan	-0.392 (0.264)	-1.295 (1.660)	-0.105 (0.338)
Geo Control Vars	Yes	Yes	Yes
Observations	2608	1561	2608
Mean	4.30	11.49	2.81

* $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$.

Note: The variable about which titles households own on their fallows is only available in a subsample of villages

Table 38: Characteristics of the land portfolio, OLS with secteur fixed effect

	(1) Nb plots 2014	(2) Nb Fallows	(3) Area 2014
Marginal clan	-0.298** (0.131)	-2.188** (0.887)	-0.296* (0.168)
Marginal newcomer	-0.168 (0.175)	-0.948 (1.147)	0.010 (0.225)
Men local clan	-0.011 (0.129)	-0.323 (0.836)	0.092 (0.165)
Local newcomer not F	0.072 (0.294)	-2.455 (1.849)	-0.342 (0.377)
Women from local clan	-0.405 (0.444)	-2.428 (2.537)	-0.197 (0.570)
Local newcomer F	-0.168 (0.218)	-2.337 (1.473)	-0.198 (0.279)
Women F clan	-0.385 (0.354)	0.962 (2.179)	-0.184 (0.454)
Local newcomer not F W	1.038 (0.678)	-5.092 (4.157)	0.014 (0.870)
Local newcomer F W	-0.154 (0.523)	-5.594* (3.313)	0.232 (0.671)
Geo Control Vars	Yes	Yes	Yes
Observations	2572	1529	2572
Mean	4.30	11.49	2.81

* $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$.

Note: The variable about which titles households own on their fallows is only available in a subsample of villages

Table 39: Characteristics of the land portfolio, OLS with secteur fixed effect

	(1) Nb plots 2014	(2) Nb Fallows	(3) Area 2014
Paysannat	-0.280** (0.129)	-1.826** (0.884)	-0.549*** (0.165)
Marginal clan	-0.450*** (0.168)	-3.515*** (1.120)	-0.693*** (0.215)
Marginal clan x P	0.122 (0.215)	1.804 (1.410)	0.625** (0.275)
Men local clan	-0.226 (0.178)	-2.299** (1.096)	-0.452** (0.228)
Men local clan x P	0.389 (0.239)	3.455** (1.551)	0.876*** (0.306)
Women from local clan	0.361 (0.626)	-5.399 (4.232)	-0.174 (0.801)
Women from local clan x P	-0.415 (0.749)	2.268 (4.849)	0.083 (0.958)
Women F clan	-0.374 (0.349)	-1.789 (2.171)	0.010 (0.446)
Women F clan x P	-0.139 (0.536)	0.504 (3.374)	-0.481 (0.685)
Geo Control Vars	Yes	Yes	Yes
Observations	2608	1561	2608
Mean	4.30	11.49	2.81

* $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$.

Note: The variable about which titles households own on their fallows is only available in a subsample of villages

Table 40: Characteristics of the land portfolio, OLS with secteur fixed effect

	(1) Nb plots 2014	(2) Nb Fallows	(3) Area 2014
Paysannat	-0.326** (0.134)	-2.137** (0.937)	-0.561*** (0.172)
Marginal newcomer	-0.402* (0.220)	-3.945*** (1.418)	-0.622** (0.282)
Marginal newcomer x P	-0.174 (0.298)	1.257 (1.891)	0.548 (0.381)
Marginal oldcomer	-0.550** (0.215)	-3.652** (1.546)	-0.739*** (0.275)
Marginal oldcomer x P	0.417 (0.268)	2.391 (1.871)	0.724** (0.343)
Local newcomer not F	-0.090 (0.340)	-1.748 (2.170)	-0.225 (0.435)
Local newcomer Not F x P	0.247 (0.612)	-4.617 (3.798)	-0.594 (0.784)
Local newcomer F	-0.354 (0.327)	-3.230 (2.206)	-0.244 (0.418)
Local newcomer F x P	0.300 (0.437)	1.479 (2.958)	0.012 (0.560)
Local oldcomer Not F	-0.317 (0.197)	-2.848** (1.207)	-0.531** (0.252)
Local oldcomer Not F x P	0.509** (0.258)	4.798*** (1.683)	1.048*** (0.331)
Women from local clan	-0.321 (0.315)	-2.621 (2.013)	-0.061 (0.403)
Women from local clan x P	0.056 (0.433)	0.189 (2.700)	-0.183 (0.554)
Geo Control Vars	Yes	Yes	Yes
Observations	2572	1529	2572
Mean	4.30	11.49	2.81

* $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$.

Note: The variable about which titles households own on their fallows is only available in a subsample of villages

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