Improvements in the Colombian Land Administration System: possible contribution from the Brazilian experience

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Absence of clear land rights played an important role in the social insurrections in the early 19 century up to the modern conflict with territory disputes with the Narcos, and until the present, it is one of the main challenges that Colombian democracy faces. The peace agreement of 2014 had as one of its main issues, the improvement of the Land Administration System (LAS), but with a strong emphasis on the construction of an integrated multi-purpose cadastre and lesser on institutional arrangements to make it operational.

Efforts are being made by different governmental levels and international donors (PRESIDENCIA, 2021), but it seems that those happen mostly in changes of laws, the creation of new institutions, and in the implementation of pilots, rather than in building the instruments to promote substantial changes in the Colombian reality. The land ownership situation hasn't changed much, as 28 % of Colombia's surface is still not mapped, 63,9% of the territory has outdated cadastres (CONPES, 2019), the maps are still in different scales and the different types of protected areas are not mapped. On the other hand, official documents estimate that 7 million peasants with access to land, need to register their legitimate rights (MINAGRI, 2022).

Brazil, despite not being an example of good land administration (FAO/SEAD 2017), has achieved very interesting results with some quite simple changes in a similar process of updating the legislation, but also, with specific programs, and some inter-institutional agreements. Some of these were:

a) Law 10.267 of 2001 – integration between cadastre and register ;
b) Forestry Code – that guarantees a minimum share for environmental protection in private areas;
c) Terra legal program – gave land rights to protected areas, indigenous peoples' land, and private owners, on clear state-owned land in the Amazon Region;
d) Law 13.465 – simplified the regularization process for all landowners, from small to large, from rural to urban plots ;

This article's aim is to show how those solutions that occurred in the Brazilian LAS can inspire the Colombian authorities to solve their institutional and legal bottlenecks.

After the introduction, a brief overview of the current institutions and the legislation that rules land ownership in Colombia will be presented. Demonstrating that, as it was created

to solve specific problems, it still cannot provide an efficient LAS. The next item will describe the Brazilian system and the recent solutions that could contribute to the Colombian case. The concluding item will try to synthesize the findings and propose concrete policies for Colombia based on the Brazilian experience.

Considering that Brazil was able to improve its LAS in some areas, Colombia can also find solutions to simplify its regularization process, by speeding up and giving out titles for legitimate owners using Fit for Purpose methodologies, considering its legal, procedures, and institutional settings.

The main lesson, mostly to avoid institutional resistance, is to develop synergies and instruments that make possible the creation of an integrated cadastre that can be updated permanently and automatically with the information from the existing institutions.

1. COLOMBIA

1.1. A brief historical background to the Land Administration System

Colombian history is marked by many civil wars and internal conflicts, that affected deeply the development of institutions linked to access and use of land[1]. The struggle for land, between landowners, peasants, settlers, State, rural and urban society, was a causal factor of many of these conflicts (LODOÑO, 2008). This context hampers the construction of competent institutions responsible for the land governance in Colombia, leading to the fragility of property rights and the inability of the State to guarantee them, since there is no updated cadastre, which is the foundation for a good Land Administration System (LAS).

The property rights started to be registered after the enactment of a law on June 1 of 1844, before a more general Land Law was established. This created the public instrument of registration offices; whose function was to publicize and authenticate the acts of public instruments. With this, the origin of the *Sistema Nacional de Registro* (SNR) is established even though a cadastre was not in place. At this period, other regulations were approved to recognize the ownership over vacant lands, such as the Decree of August 20 in 1856, referring to the alienation and lease of vacant land.

As an attempt to organize the process of land acquisitions the Law nº 61 of 1874 (The Land Law) was enacted and stated: "Any individual who occupies uncultivated land belonging to the Nation, to which no special application has been given by law, (…), acquires property rights over the land he cultivates, whatever its extension" (COLOMBIA, 1874).

In the 19th century, the central State, or sovereign states (during the federative phase), granted large portions of land to those who helped solve the civil conflicts at the time, such as military, politicians and government creditors, or influential figures in political life, which in turn deepened inequality in access to land (KALMANOVITZ, 2017), what also contributed to

[1] The period of violence in the first half of the 20th century was marked by different periods of conflict - 1840, 1853, 1862, 1885, 1892, 1899-1902, and later the Thousand Days War – that was accompanied by growing public debt. These insurgencies prevented the socio-political stability necessary for sustained long-term development, with good institutions and responsible land governance.

the fragility of its LAS , since those were not accompanied by a cadastre. This reality gained greater highlight in the early 20th century, with the crisis of the 1930s, when a new distribution of property took place favouring the middle and upper layers of society (MACHADO, 2009).

During this period, with the increase of landowners and properties holdings, promoted the creation of the national cadastre in 1935, coordinated by the *Instituto Geográfico Militar* which later became the *Instituto Geográfico Agustín Codazzi* in 1950. Following the efforts to control the territory occupation, the Law nº 200 of 1936 was enacted to rule the occupation of vacant land, which required that the owners of land obtained up to 1935 should present their titles, and if not, the land would be considered vacant and would be destined to settle peasants.

After a period of great violence during the fifties, the modernization of the agricultural sector began along with further attempts to regulate the use and occupation of land. With this, it was enacted Law nº 2 in 1959 to create several protected areas and established that forest exploitation on vacant land is forbidden, a regulation that later aggravated the land administration in Colombia due to overlaps with private occupants and a poor scale/accuracy for determining the shapes of those protected areas. Since much of the Colombian territory is affected by this law, still today it favours undefinition of land rights due to these overlaps.

During the periods of conflict, it is important to highlight that the invasion of land and the eviction of the civilian population was a war strategy adopted by armed groups to control territories, expand their areas of influence, and usurp agricultural properties. According to a study by the Episcopal Conference (1999), after a period of Violence Escalation (1980-1990), 1,322 families were displaced from approximately 32,000 hectares . In that sense, large landowners, smallholders, and settlers clashed for decades, and over the past fifty years, with illegal armed groups and drug traffickers in this dispute (LODOÑO, 2008). The displacement, caused by the terrorist strategies of the illegal groups, was followed by a cloud of businessmen who cheaply bought the property of those who fled, supported by groups of judges, notaries, and precocious public officials (KALMANOVITZ, 2017, p. 264)[2].

From the 1990s onwards, the Colombian economy went through periods of expansion (1991-1996) and (2003-2008), with growth rates that reached 4.4%, especially in the first period, pushed by the discovery of oil in the country. This context contributed to progressive changes with many of them linked directly or indirectly to access to property rights. In 1991, a new Federal Constitution was promulgated, by which private property, and other rights acquired by civil laws, were guaranteed, but also, stated that property had a social function that implies obligations (Art. 58). Besides that, the State was obliged to protect and promote associative and solidary forms of property. After these legal changes, Legislative and Judiciary gained power, and several initiatives returned to the territorial organizations, especially the municipalities.

At this period, Colombia also created the National Agrarian Reform System through Law nº 160 of 1994. This law is also responsible for determining the functions of INCORA

[2] During the 1980s, a process began to organize armed drug trafficking groups, supported by politicians, landowners, and merchants to neutralize the influence of the guerrillas, catalysed the development of civil insurgency, particularly the FARC, which became a serious threat to national security.

(article 12), which later was transformed into INCODER. At this time there was intention to destinate more land to the landless, but less attention was given to the development of a LAS and a good cadastre. Those institutions had their attribution cancelled during the 2000s with several accusations of fraud (FRANCO, A. & DE LOS RÍOS, I., 2011).

From 1985 to 2014 violence returned to a critical point, with the advances of narcotrafficking and land as an important asset for cocaine production. Therefore, solving the land issue became a major aspect of the Peace Agreement that started in 2012 and was signed in 2016. In this context, the National Land Agency (ANT) was created through decree nº 2,363 in 2015, as the main authority responsible for re-establishing control over land use in Colombia. Today, the ANT is the main responsible for the regularization process and land destination.

1.2. An estimation of the Colombian land tenure situation

The LAS of Colombia has a big challenge in the new decade. Even though the government has made great strides in the reconstruction of institutions and this new regulatory framework, it's possible to observe that the problems related to access and use of land remain, since there is still no consistent diagnosis of the real situation or effective cadastre in place.

According to official estimates, 28% of all national territory did not have a cadastral background and 66% that had cadastral information was not updated, being only 5,68% updated (CONPES 3959, 2019). The document also states that from 2012 to 2019, the level of updated information in the cadastre system went from 33.44% of the area in 2012 to 5.68 % in 2019, even though it had 43.44 % in 2014, demonstrating the downgrading of the LAS at the time.

From the registry perspective, the CONPES 4007 (2020) estimated that in 2014, 54,3% of properties were not registered, which generates an informal market that reduces property rights, increases transaction costs, and feeds informality in the property market (CONPES 4007, 2020, p.31). By January of 2020, the registration of properties corresponded to approximately 40% of the total households, most of it stored in an analogic format (CONPES 4007, 2020, p. 30). This compilation of official data clearly shows the weakness of land governance in Colombia because there is no single repository of cadastral information associated with clearly defined and recognized rights. In addition, this information must be updated periodically, something that the national cadastre agency has confirmed it is not.

For this reason, the results cast doubt on the capacity to implement the goals described by CONPES 3958 (2019), which "proposes the gradual and progressive updating of the country's cadastral information, going from the current 5.68% of the area of the national territory with updated cadastral information, to 60% in 2022 and 100% in 2025". Because of the current status of the Colombian LAS, it is very difficult to implement policies and land regularization since there is no clear diagnosis of the situation. Considering that, an estimation of the tenure situation was proposed in table 1, based on the most trustworthy information of Census and the responsible institutions.

The construction of the estimation for Colombia's land use was based on official data as an attempt to consolidate the tenure situation of the whole territory. For that, it used the Agricultural Census of Colombia, made by the National Department of Statistics (DANE) to define the size of indigenous and Afro-Colombian territories. It considered the information from SINAP and the Law nº 2 of 1959 to estimate the protected areas, even though overlaps between those and traditional communities' territories were considered. At last, it was used the ANTs estimate based on *the Observatorio de Tierras Rurales* for the undesignated areas (*Baldios*) and the estimates from DNP to define the size of the urban areas. Once these were defined, the private holdings were defined by exclusion, which also encompasses large infrastructure developments, roads and highway networks, as well as water bodies.

The first more general impact that comes out of the table is the small amount of free land in the country: only 1,3 million ha (1,1 % of total) is of *Tierras Baldías*. Because of the methodology proposed, the largest participation is classified as 'privately owned' with 56,2 % of the surface. Most probably these areas are not registered, which provides important input for the way forward: to map and register the land for the legitimate occupant. On the other hand, it is important to highlight the large proportions of indigenous territories, protected areas, and Afro-descendant's areas, but since most of them were defined in the past, before the modern technology, there are problems with the definition of shape, size and scale, presenting overlaps with other categories and formal occupations, especially around its borders.

Table 1: Land Tenure estimates for the territory of Colombia

Type	Area ha	%
Private areas, infrastructure, and water bodies	64.483.955	56,42
Indigenous Territories	33.615.916	29,41
Protected Areas	8.493.070	7,43
Afro-descendants Communities	6.236.859	5,46
Tierras Baldías	1.300.000	1,14
Urban areas	170.200	0,15
Total	114.300.000	100

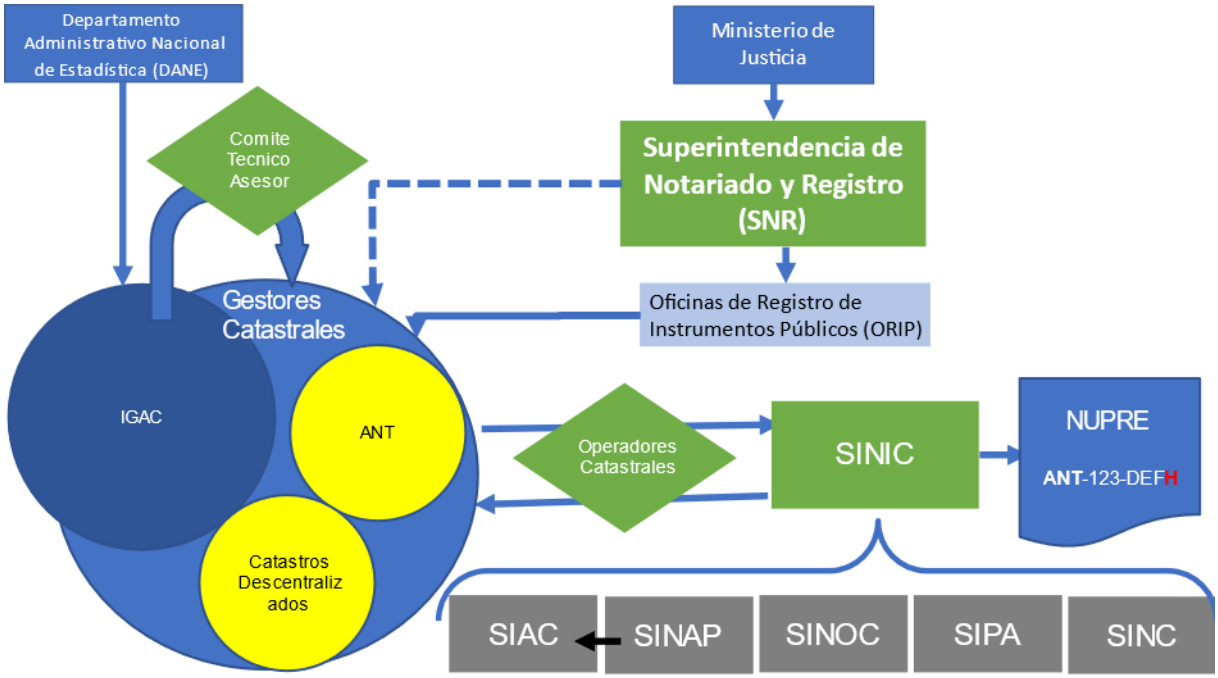
Source: Own elaboration with data from the Census, 2015; SINAP, 2021; OTR, 2021; DNP, 2017.

However, we must recognize the political will and capacity for modernization of the Colombian LAS, which has seen many recent changes in its general structure and the regulations that they follow, obtained through international support and cooperation, with a theoretical background based on the LADM (Land Administration Domain Model) and the most modern concepts from FIG (Federation Internationale des Geometres). Today, although incipient, the Colombian LAS is duly regulated by laws and other instruments by these parameters.

1.3. The current Colombian Land Administration system

A simplified scheme of the current Land Administration System in Colombia can be seen in figure 1 below. Important to note that, differently from other countries, the Colombian framework is centred on the cadastral aspects of it, instead of the registry/legal aspects.

Figure 1 - The Colombian Land Administration System



Source: Elaborated by the authors based on the Decree nº 148 of 2020 and the CONPES 4007 of 2020

1.3.1. The Cadastre

Currently, the LAS of Colombia is centred in the Cadastre rather than Registry, mostly related to the 'Cadastral Managers'[3] which can insert, correct, update and/or rectify property holdings and their configurations under the one single national system, that will compile all land data, the SINIC[4], according to the Decree nº 148 of 2020 that regulates and provide specific dispositions to the IGAC[5], which is responsible for the national service of cadastre, according to the Law nº 1,955 of 2019, that sets the National Development Plan for 2018-2022.

In the current configuration, the IGAC[6] is the highest authority in the Colombian LAS since it holds the competence as a regulatory authority, responsible for providing an organized and efficient cadastral service, guaranteeing its constant update within the SINIC, notifying the responsible agencies of any changes in property holdings or profile, facilitat ing

[3] *Gestores Catastrales* – according to the Decree nº 148 of 2020

[4] Sistema Nacional de Información Catastral.

[5] The Colombian national cadastre was created with the Instituto Geográfico Militar, in 1935. In 1940, it became part of the Ministry of Finance and Public Credit under the name Instituto Geográfico Militar e Cadastral, and only in 1950 did it receive the current name Instituto Geográfico Agustín Codazzi. Currently, the IGAC is part of the National Administrative Department of Statistics (DANE). In the spatial scope, IGAC manages 972 municipalities and twenty departmental bodies. These represent approximately 1,075,979 km², or 94.24% of the national territory (BERMÚDEZ; GAROLERA, 2007).

[6] About the IGAC framework, it is necessary to highlight that the structure of the Colombian cadastre is a land information system based on the lot as a unit for the administration of land, for urban and rural planning, spatial planning, environmental management, and sustainable development.

regularization processes by providing the responsible parties with relevant information , among other responsibilities. But IGAC can count on other cadastral managers, as decentralized agencies, such is the case for Bogotá, Cali, Medellín, and other independent agencies that can be enabled by IGAC to provide this type of service. The ANT is one of those[7], and holds another responsibility for the current update of the LAS, as it is responsible for the regularization of property holdings that are over public areas and other jurisdictions, which will be detailed .

IGAC is also responsible for acting in the regions where there is no decentralized agency, it is also responsible for regulating and supervising the other Cadastral Managers, with support from a Multistakeholder Technical Committee that must approve (or not) the legal propositions made by IGAC. It also must be aligned with the National Department for Statistics (DANE), which oversees the cadastral activities and participate in the elaboration and the diffusion of pertinent information, such as the real estate market data.

The execution of policies and regulations determined by the Cadastral Managers is promoted by the "Cadastral Operators", which can be "legal people, of public or private nature that, through a contract signed with one or several cadastral managers, carry out operational tasks that serve as input to advance the processes of formation, updating, and cadastral conservation, as well as the procedures of the multipurpose cadastral approach that are adopted" (Decree nº 148, 2020). The specific regulation for the LAS in Colombia also determines that it is essential the update the SINIC by the criteria defined by the regulatory authority for this purpose. These regulatory aspects also contribute to the decentralization of the cadastral services provided, once they can cover demands anywhere in the territory .

At last, the central piece for interconnection of information in the Colombian LAS is the SINIC, a very recent land management tool based on the LADM international standards . Today, Colombia holds different thematic systems with territorial information[8], related to the natural environment, roadways system, marine and coastal information, mineral resources, and public/cultural patrimony, among others related to strategic information and diffusion of data. Eventually, the SINIC could aggregate those databases into one single repository of updated and interconnected information regarding the territory, facilitating the decision-making and the diffusion of this data to the general public, but it is still too incipient to understand its full potential[9].

1.3.2. Registry

[7] Agencia Nacional de Tierras.

[8] Sistema de Información Ambiental de Colombia (SIAC); Sistema Nacional de Áreas Protegidas (SINAP); Sistema Nacional de Información Oceánica y Costera (SINOC); Sistema de Información de Patrimonio (SIPA); Sistema Integral Nacional de Información de Carreteras (SINC); Sistema de Información Geográfica para el Ordenamiento Territorial (SIGOT); Sistema Nacional de Gestión de Tierras; Sistema de Información Geográfica para el Ordenamiento Territorial (SIGOT); Sistema Estadístico Nacional (SEN)

[9] Until September 2021, checked at March 2022, there was very little information regarding its advances https://www.icde.gov.co/node/263

Another vital component of any LAS is the registry, or legal recognition of rights by a responsible institution, which, in the case of Colombia, it is centred in the SNR (*Sistema Nacional de Registro*) and the Registry Offices (*Oficina de Registro de Instrumentos Publicos* - ORIP). The SNR promotes the information of the Property Registry and grants its publicity, but also, adopts and socializes the unified standards and the technical specifications for carrying out the survey and maintenance of the public property registry. The purpose of the SNR is to carry out the inspection, surveillance, and control of notaries and the ORIP. Important to say that under the Decree nº 148 of 2020, the SNR is also responsible for the inspection, oversight, and control of the exercise of the Cadastral Managers, including IGAC and ANT. It should be possible for the agency to oversee the changes and updates from the households rectified by the Cadastral Managers and its Operators through the SINIC , considering its legal responsibility towards the information and rights associated with the plots within the system.

The ORIP works along with and is subordinated to the SNR but it does not have access or direct relation to the SNIC. Instead, the ORIPs must communicate the Cadastral Managers to update and verify the interrelation between the cadastral information and the legal rights registered in its files (or folios). "It must publicize the acts and contracts that transfer, change the domain of real estate, impose legal restrictions or limitations, or provide greater guarantees of authenticity and security of the titles, acts or documents that due to their characteristics must be registered" (CONPES 3641 - 2010). Under the new LAS scope, the ORIPs and financial institutions, real estate markets, etc.; must provide the Cadastral Managers with the updated information on transactions, changes, or any other relevant facts regarding the household , and cooperate with the integration and regularization of land-related data within the territory. Currently , the existing problems in the correlation between cadastre and registry generate difficulties and an inadequate identification of the physical and economic characteristics of the properties, but also, limitations for the full exercise of the social function of property, management fiscal of the municipalities, and the efficient planning of the territory (CONPES 4007, 2020).

Eventually, these limitations can be overcome with the new configuration of the Colombian LAS, once the Decree nº 148 (2020) has stated that the ORIPs must include "the description of the area and/or boundaries in the real estate registration folios that lack this information. In cases where the real estate registration folios have not had information on the area and/or boundaries since the beginning of the transfer cycle of the real estate they identify, the Public Registry Office will proceed to include the area and/or boundaries data in the respective real estate registrations, which will be taken from the cadastral base administered by the competent cadastral manager" (Cap. 2. Art. 2.2.2.2.21). Once the ORIPs must be in direct communication with the Cadastral Managers and must also update, rectify, and verify the folios with the correct geographical description of the households, eventually, the SINIC will be complete and permanently updated, either from the Cadastral side or by the ORIPs .

1.4 Operability and other institutions in detail

Considering the recognized deficit on the land-related information, from the cadastre and the registry alike, the Colombian government has put much effort in redesigning its LAS but also, in the regularization of properties, occupations, possessions, and other forms of land

rights . Under the scope of land regularization, it is important to understand the recent regulations and the institutions responsibilities , but also, how they interact and cooperate to update and formalize the land-related information (cadastre) with rights (registry).

As determined , all properties within the system will have inputs for its different attributes, physical (geospatial definition of its limits and format), legal (with the information regarding the holder of the right, its characteristics, and restrictions, even when dealing with informal occupants) and economic (with the market value and the official valuation of the property). These will be associated with a single and unique NUPRE (the *Número Unico Predial*) that will identify and connect the correct information of a property in the cadastral or the registry system, working as a link to pinpoint any household in any given system. The NUPRE will be an alphanumerical sequence, serving as a validation device.

The Cadastral Managers will have a set of processes they can use to regularize different plots under different contexts and conditions, as advocates de LADM theoretical background, identifying different 'degrees' of property rights (from the informal occupant to the rightfully recognized holder) and different cadastral status, which can be created from scratch or updated from a previous occurrence . Among the processes to create or update information , the Cadastral Managers can use a strategy called *Barrido Predial Massivo*, which consists of the regularization of plots within a specific region, or promote integration with the registry system, setting out from a previous deed or official document, and/or the inclusion of informality status/conditions to an existing plot. Other procedures for the update, interconnectedness, provision of digital services, and continuum evolution of the system are also within the Decree.

Data can be later verified and validated by the SNR, which will have access to the system and knowledge about the legal status of the region where the plot is located. More effective will be the procedures of cadastral update (or creation) with registry effects, the update or validation of the plot from the cadastral and registry perspective, regularizing the situation of the area and its occupants in an integrated strategy .

Although, if the verified plot overlaps a public property or undesignated areas (*Baldío*), the process immediately moves to the ANTs jurisdiction, due to its responsibilities, which will demand a specific validation process . In any case, the Cadastral Manager will be able to upload the information of the plot within the SINIC system, but only ANT will have the capacity to proceed with the regularization. The same situation applies for areas of public good/usage, where the correction of the plot's limits must be conducted by the responsible agency.

Most of the focus for the ANTs action will be guided by the Ministry of Agriculture and Rural Development (MADR) that must comply with the Plans for Social Management of the Rural Property[10] (POSPR), providing inputs or correcting information's of the plot within the SINIC. Although, the ANT will not be able to proceed with the regularization of private properties whose titles originates from a decisions made by previous land regularization agencies, such as the Colombian Institutes for Agrarian Reform or the *Unidad Nacional de Tierras Rurales*, most possibly due to the 'shady' reputation those institutions had in the past.

2. THE BRAZILIAN LAND ADMINISTRATION INSTITUTIONAL FRAMEWORK

[10] Ordenamiento Social de la Propiedad Rural.

2.1. General characteristics of the system[11]

Similar to the Colombian case, the main reason for the origins of the Brazilian agrarian problem and its continuance is the lack of an adequate Land Administration System, that should integrate effectively the rules of land ownership. The rules for effective regulation of the land market were frequently ignored or not enforced or verified for years, leading to numerous situations that permitted speculation. Some pieces of evidence of the historical lack of land administration[12], and its main consequences, such as, a) high level of land concentration; b) Generalized speculation with land; c) Significant level of land conflicts; d) High level of deforestation; and e) Inefficient land use.

The current institutional framework for Brazilian land administration is formed by several organizations working independently, with little integration of data among them. Similar to the situation of Colombia, with many institutions with little integration and many overlapping responsibilities. The listed institutions can also be seen in figure 2 :

a. the Federal government, after approval of the House of Representatives (Senate and Congress), is responsible for the creation of different kinds of Conservation Units (Extractivists Units, National Forests), Quilombola and Indigenous territories;
b. the State government, after approval by the Senate and Congress, also can propose the creation of Conservation Units (Extrativist Units and State Forests).
c. INCRA, part of the Ministry of Supply, Agriculture and Cattle Ranching, can: create and notify the individual national property registration number ; determine unclaimed lands; register real estate (based on a cadastre filled by landowners, which serves as basis for the calculation of the rural land tax[13]); grant land for agrarian reform settlements; use unclaimed land for settlement projects; and most importantly, it's the main institution co-responsible for the national cadastre system (SIGEF).
d. the State Land Institutes which are responsible for managing its respective public lands;
e. the Notaries, which although autonomous, is subordinated to the Ministry of Justice , and controls contracts of acquisition and sale of property and provides legal signatures;
f. the Registry Offices, which shares the same institutional characteristics as Notaries, but it is responsible for controlling the registration books, where all rural and urban property transactions are kept.
g. the Municipal government and the City Council that define the Municipal Development Plan containing specifications of the rural land to be transformed into an urban property and may establish urban areas independently of a Development Master Plan; it maintains a cadastre of urban lands for several purposes ; defines criteria for urban land use and inspection based on the Municipal Statute; and charges ITR jointly with the Federal Revenue Service, and the urban land tax.
h. the Secretariat for Federal Real-estate (SPU), under the Ministry of Economics, is responsible for all national properties , including unclaimed land, and the transfer of those to a responsible institution for registration .

[11] For some history of its genesis verify at Reydon (2017).

[12] The detailed description can be found in Reydon et al (2015).

[13] The ITR (Imposto Territorial Rural) it's the national land tax designed for rural properties that can be paid by anyone, either a tenant or a rightful owner with a formal registered deed.

i. the Federal Revenue , part of the Ministry of Economics, collects several direct taxes, specially the land related taxes. It is also co-responsible for the national rural cadastre and responsible for the national integration system for all cadastres, including the urban ones, the SINTER.

2.2 The current Brazilian land tenure situation

Today, the Brazilian LAS can present a well-structured picture of the country and who owns what, where, due to these innovations and the already mentioned outcomes, so now the country can start having a better vision of its land tenure situation and where the land problems are. Even though there are still many problems to be overcome and regularization processes to be fulfilled, much effort was needed to reach this situation, which is not perfect, but it changed a lot when compared to the historical context of the country. From Law 10.267/2001 and the creation of the SIGEF, it is possible to have this idea by the numbers shown in table 2 below.

Table 2 - Current land tenure status according to SIGEF 2022[14]

DIRECT ADMINISTRATION OF INCRA			
Type	**Polygons**	**Area(ha)**	**% of total**
Settlements	7.674	75.925.788,39	8,92
Quilombola territory	420	2.866.543,77	0,34
Certification of properties/public installments	27.312	95.755.667,21	11,25
Certification of properties/private installments	431.296	205.532.088,76	24,14
Incra land regularization agreements	107.853	4.335.993,96	0,51
Subtotal	574.555	384.416.082,09	45,15
FROM PARTNER ENTITIES DATABASES			
Type	**Polygons**	**Area(ha)**	**% of total**
Indigenous area	607	119.553.662,85	14,04
Conservation units	1.641	162.776.197,70	19,12
Georeferenced area by secretary of land reform of incra	80.041	3.254.260,69	0,38
Georeferenced area by terra legal	183.438	22.218.245,85	2,61
Subtotal	265.727	307.802.367,10	36,15
Georeferenced Grand Total	840.282	692.218.449,19	81,30
Brazilian Total Area		851.487.600,00	100,00

Source: LAND COLLECTION, 2022.

Sparoveck (et al , 2019), used all available geo-referenced databases to make a mosaic of types of land ownership categories, presented at table 3. This survey goes beyond the SIGEF's capacity once it covers all public data available and other private claims , therefore including possessions that are not certified yet. Because of this, it was possible to identify that, 36.1% is classified as public lands and 44.2% as private lands. Also, it was possible to estimate that there is at least 54.6 million ha (6% of the total area) of public land that remains undesignated, the majority of which is in the Amazon biome. Second,

[14] Colected at Acervo fundiario on March 2022; https://acervofundiario.incra.gov.br/acervo/dados_acervo.php

one-sixth (16.5%) of Brazil is not classified as having any legal or official land tenure registration. Much of this area has been illegally occupied by farmers and is most probably in current disputes.

Table 3 - Total and relative area and number of units of Brazilian land tenure categories.

Categories	Hectares	%
Private properties from CAR	173.844.446	20,4%
Private properties from SIGEF	188.782.796	22,2%
Private properties from Terra Legal Program	9.830.630	1,2%
Quilombola's Territories	3.117.971	0,4%
Rural Settlements	41.736.096	4,9%
Communitarian Territories	1.779.373	0,2%
Indigenous Reserves	112.412.239	13,2%
Conservation Units	93.403.026	11,0%
Military Areas	3.006.965	0,4%
Undesignated Lands	54.599.607	6,4%
Unregistered	141.454.569	16,6%
Transportation network, Urban area and Waterbodies	26.310.500	3,1%
Total Brazil	850.278.218	100,0%

Source: SPAROVECK et. al., 2019.

2.3 Innovations in the Brazilian land administration that can inspire Colombia

Despite its limitations, the Brazilian LAS has improved a lot in recent years, being its initial milestone the Law nº 10,267 from 2001 that determined the need for a spatial component on the national cadastre and the need for its information to be aligned with the registry office . This aspect may seem basic for any modern LAS but was only institutionalized in recent history. Even though formal legislation was enacted , the advances were very limited until a proper system for data exchange was and made available. It was only in 2013 that the SIGEF was operational online . Since then, lots of incremental improvements were made to populate the system and allow its integration with other platforms . Even though these institutional changes were determinant for the Brazilian LAS, its enforcement and legal accommodation took many years, what might be an important lesson for Colombia, along with the bottlenecks perceived .

From all institutional renovations in Brazil, the most important one was the legal need for both institutions (Registry Offices and INCRA) to communicate in a common system in case of any change of attributes . Another important mechanism developed that helped populate the system was a time frame for the certification process depending on the size of the property, with the larger owners with a stricter deadline and for smallholders (under 4 Fiscal Modules) a loose limitation . Even though many public properties are still not properly certified, for various reasons, the vast majority of the territory (>80%) is already certified within the system in less than 20 years, which makes it the closest instrument of a national cadastre that Brazil has.

The certification process means that there is (some) certainty on what's underneath and who owns it, because of its integration with the Registry system. Even though the certification process was extensive, there are still many blind spots on this LAS , for example, many public areas are still unregistered or have poor geospatial definition, which might result in overlaps with formal households that are left unchecked or territories that are pending legal recognition. Besides that, many of those smallholders that the Brazilian State should support on their certification process, are left behind, since very little was done in that sense, meaning that there is still a lot of conflicting information on the SIGEF that might be questioned in the future.

Even more critical is that the integration and verification at the registry system are slow, since the smaller offices lack technological and/or administrative support, resulting in many overlapping or poorly defined legal rights over land that need to be rectified. More recently, some advances were enacted for that matter, with the National Operator for Public Registries (ONR) and its accompanying System, the SREI, but these still lack proper regulation .

What is being understood as 'lessons learned from Brazil's experience can now help to inspire countries in similar situations, such as Colombia, to leapfrog some of the bottlenecks encountered and bypass other of the limitations that institutional changes provoked.

2.3.1. Law 10.267 of 2001 – integration between cadastre and register

Since 1967 (Law nº 4,947of 1966) it is demanded by the owner of a household to register every (formal) dismemberment, lease, mortgage, sell or promise of sell, with the possibility of nullity if not verified, but since Law nº 10,267 the geospatial component was also demanded along with the characteristics for the certificated household . This obligation is passed on to the Notaries, that have to mention those information's on the deeds being transacted and eventually all information ends up in the same electronic system.

The administration of the national cadastre created by the Law nº 10,267 (named CNIR) was determined to be of co-responsibility between the Federal Revenue and INCRA, not only to better align the tax collection and the household's information's with the Certificate under a single code, but also to guarantee more stability to the framework. Since INCRA was created for a different purpose the addition of the Federal Revenue as an administrator helped to create a more solid arrangement, less prompt to changes by different political cycles.

Another important feature was the outsourcing of the georeferenced survey, something that used to be a responsibility from the State. Originally, only the technicians from INCRA could do the survey and upload it to the main system for verification, but after the Law nº 10,267, a qualified professional can produce the technical piece by respecting the standards determined by law. This proposal came after the experiences with the Law nº 11,952 of 2009, when INCRA was entrusted with the verification process to certify claims in the Amazon

region before uploading the information in the main system. Along with this possibility came in the technical obligations of scale and accuracy by IBGE[15].

The implementation of the institutional changes can be challenging, as it was perceived from the SIGEF experience, since it took more than 10 years to be made available for public consultation and another decade to be populated with the parcels we see today. The challenges that are posed to poor smallholders are related to high costs for a registry that might push compliance away (taxes and fees must also be considered); lack of public awareness towards its importance; and the 'easier ways' of the informal market, to mention a few. For each challenge presented, solutions must be put in place, such as discounts based on lack of revenue, integration among institutions to prevent informal agreements, and monitoring those when happen. Many of these challenges were perceived long after the law was enacted, a learning curve that other countries can now take advantage of.

2.3.2. Forestry Code (2012)

The enactment of the forestry code demanded all rural private properties a minimum percentage of environmental protected areas, near rivers or watersheds (APPs) or available for economic purposes (Legal Reserve – RL). Those percentages vary from different biomes but in the Amazon region they account for 80% of the total area of the plot. This resource enabled forest preservation in the region even though the regularization process of private holdings. Without this determination, the regularization of public areas can represent an increase in deforestation, as they are being incorporated by the private market to be explored. This could also be the case for many areas pacified during the cease-fire promoted in Colombia, since many of those were previously occupied by paramilitary forces and kept (mostly) preserved, once there was the concern of escalation of violence in the region, preventing the economic or agriculture use of these areas. If the limitation on land use and deforestation are set for those regions, it will be possible to balance the private holding for productivity with the preservation of natural habitats for sustainable use.

With the Forestry Code another innovation was introduced, the need to all landholders[16] to georreference the forested/preserved areas. This information has been integrated and consists of a cadastre of land use and landholdings called CAR[17].

The forestry code also tried to promote a solution for the plots within Conservation Units, that were there before the enactment of it, by predicting a fair compensation for the landholder before its disposition. Even though the solution was limited, it was an agreement for the resolution of pending conflicts. This might also be the case for property holdings that are affected by the Law nº 2 (1959) in Colombia, especially those that are encountered on the fringes of protected areas and are overlapped due to poorly defined scales at the time.

2.3.3. Terra legal program (created by Law nº 11,952 of 2009)

[15] Instituto Brasileiro de Geografia e Estatística

[16] It is not necessarily the titled land ownership, it can be a simple possession.

[17] Cadastro Ambiental Rural

Another relevant policy that promoted land rights in Brazil was the Terra Legal Program, enacted by Law nº 11,952 and dedicated exclusively to the Amazon. One of the main reasons for its positive results was its specific focus in a region with many specificities . After almost ten years, the program was responsible for mapping and registering public areas in the "Legal Amazon", such as protected areas, indigenous territories, but also private owners in the Amazon Region, according to a pre-determined rules and regulations . Its original goal was to regularize 57 million hectares of public federal lands in the Amazon by focusing on property holding up to 1,500 hectares and destination of areas for different purposes, giving higher priority to traditional communities, environmental conservation, rural settlements, and at last, private holdings depending on its size and profile of tenant.

Its whole purpose and strategy of action was designed specifically for the Amazon region, considering its difficulties and context, such as the presence of many communities, sometimes isolated and unknown to mankind, but also the environmental protection by demarcating limits of public property that should not be occupied without formal permit .

Yet, another recurrent destination issue used to happen when none of the public agencies had a claim over the mapped and registered area, mostly due to lack of budgeting or administrative capacity to overlook them, and there were no current private occupants in the recently recognized region, what lead the operators of the program to register the area under the Federal government jurisdiction to be later allocated. Nowadays, many of those public undersigned areas are being targeted for illegal logging, mining, and land grabbing, but mostly due to a political trend that started once the PTL was dismantled.

The overall process for verifying land rights, mapping , and registering public (or private) areas in the Amazon region was designed to be made by 'bulk' (mutirões) to optimize the efforts in regions with difficult access, something similar to what we have seen in ANT's efforts in Colombia and the recognition of rights by "*Barrido Predial Massivo*". This was one of the main reasons for the PTL effectiveness and results since a previous analysis of different areas under the same scope was made to identify the biggest impact by effort, since the fieldwork in the region can be very harsh depending on local conditions. A nother breakthrough designed for this herculean task, was the creation of a system built to facilitate the ongoing process of mapping and registering land for future monitoring, a management tool that was later served as an inspiration for the current design of the SIGEF.

For a private holder to be able to claim an area through the PTL, the applicant must comply with a series of demands determined by Law (Art. 5º), including the payment and respect toward the environmental legislation, being prone to eviction if any requirement is disobeyed for 10 years or the acquittance of the debt. Even though the rules and restrictions for occupants to be regularized were formalized in legislation, it was later perceived that the reversion of process during this policy were very few (closer to none), meaning that the monitoring and enforcement of the program were falling behind .

Another important takeaway from it was the SIGEF, that not only permitted the integration of cadastres and land-related information (such as registries) but organized and facilitated the processes of regularization and verification of occupants and their profile for

compliance. A similar experience developed in Colombia, with the ANT and the SINIC .

2.3.4. Law nº 13.465 of 2017

To stimulate the land regularization process in the national territory, a specific law was designed for that end much based on the 11,952 and its experiences, as an attempt to simplify the processes in the rural and urban contexts alike. Besides defining clearer standard procedures nationwide, its main attribute was the change in the Public Registries Law (nº 6.015 of 1973) by determining (in the Artº 7º, § 2º) that the eventual previous owner of the area being regularized will be notified by the registry officer and set a specific deadline for response with a limit of 30 days. After this regulation, when no response is given, it means that the involved party agrees with the process. That was a 'simple' change that allowed many processes to be concluded, because, in the past, many of those previous owners could not be reached and without their manifest , the regularization process could not be finished. This premise is based on the principle of 'adverse possession' which guarantees land rights for those who are peacefully occupying a plot for a long period and should be entitled with the property holding.

By considering the Colombian context, the facilitation of regularization through the premise of adverse possession (or *prescripción adquisitiva*) can be an important legal instrument to rectify the situation of millions of smallholders that are legitimate occupants without deeds. But if you would consider the Brazilian experience, the solution of setting a reasonable deadline for the manifestation of interested parties before making it official, could escalate this solution in regions where the overlaps of rights or titles are common. Besides , the possibility to conduct this process within an administrative jurisdiction, can ease the process of recognition of rights when there is no conflict , an institutional change that Colombia could appropriate considering the need to rectify most of registries in the country.

The law also standardized and simplified the urban regularization process (REURB) that in the past was a responsibility from the State and now it has become responsible only for a smaller share of plots, only those that are evidenced as poor and smallholders, among other restrictions/limitations. This specific process was named REURB of "Social Interest" (REURB-S), so those framed as "S" must be from low-income families and can go through the regularization process free of charge, from the georeferenced survey and registry fees , being the mandatory infrastructure for the neighbourhood a responsibility of the municipality.

Those occupants that do not fit the legal description of "S" can claim a regularization process of "Specific Interest" or REURB-E. For the informal settlements that are occupied by 'wealthier' families and/or have larger plots (among other standards), the law established the possibility of individual/private payment for the regularization process, as long it oversees the minimum and mandatory infrastructure requirements. If so, it is later issued a Certificate of Land Regularization that can be registered once all the obligations are in place. so the law eventually stimulated market solutions to solve long-lasting informality, especially in slums.

Besides that, creating the possibility of a regularization process through a private market could also escalate the resolution of many informal situations for people that are willing

to pay for it . Specially designed for urban contexts, that require much more attention to infrastructure , the market-based solution can be proposed once the institutional settings allow it. By this, it can be possible to promote decent housing and minimum standards for quality living in informal areas with residents that can afford these costs or deal with them in the long-term .

3. Final remarks and propositions

The focus of this article was to pinpoint the Brazilian experiences that Colombia could take advantage by considering its similarities and parallels regarding the modernization of the LAS. Even though being promoted in different contexts, the attempts to solve long-lasting land-related issues, Brazil suffered operational setbacks after its regulation, and since Colombia is promoting a similar modernization process, it could take advantage of the different timing, by learning from Brazilian bottlenecks and limitations that are now recognized.

One of the most outstanding similarities among both countries is the creation of a system/instrument that can connect the legal (registry) and cadastral (georeferenced) components of each property holding, such as the SIGEF and the SINIC. Needed to say that the SINIC is somewhat (theoretically) more advanced since it allows the co-existence of formal/registered plots with other forms of possession and/or overlaps . In Brazil, this discussion is emerging at an eventual update to a SIGEF 2.0 format. Part of this difference is related to the fact that SIGEF was born after empirical experiences , as the SINIC was part of a much more structured and coordinated 'land governance revolution' that is taking place in Colombia.

Either way, it is important to remember that after SIGEF was proposed and enacted, it took over ten years to be operational , with all the information it was designed to . Today, Colombia counts with the political will to make this change, but this might not last for decades , so it is important to involve all intuitions and consider legal means to sustain this LAS revolution in years to come. Another important feature that is yet to be seen in the SINIC is the level of transparency and accessibility of the information , a discussion that was very polarized in Brazil between civil organizations demanding easy/full access and other groups claiming that it cannot overrule the individual privacy of personal data. Today, in the SIGEF, a person can only access information one plot at a time, as long some information of it is known for enabling the search of it, preventing a massive disclosure of all property owners in Brazil at once.

Another valid recommendation to stimulate the ongoing LAS revolution in Colombia is to promote the regularization process through the Adverse Possession, but facilitate by making it an administrative process (at the Notaries and/or Registry Offices). That is the case because judicial processes can take too long, and the Notaries already may have much of the personal information of the holder and his neighbouring parties, which can help provide the legal security . This would avoid extensive searches for those who used to own the previous area and the verification of the validity of such right, especially considering the civil conflicts Colombia has faced in the past. By providing a reasonable timeframe for any alleged previous owner to manifest itself, an agreement was found and negotiated between multiple stakeholders, something that could be adopted by the Colombian perspective.

Similar strategies implemented by the PTL, could stimulate the opportunities for executing policies such as the *Barrido Predial Massivo* by focusing in strategic areas, like the Amazon region and/or areas related to violent conflict, since those are harder to mobilize a technical team for field data collection. By determining a focus on strategic regions with difficult access, this initiative could speed up much the regularization process in forested areas and/or with difficult terrain, by mobilizing the counterparts necessary to formalize the situations and by setting goals and performance indicators for permanent evaluation.

In these areas, especially in the Amazon region, it could also be important to consider compliance clauses and/or environmental commitments for those being regularized. Inspired by the Brazilian Forestry Code, it might protect a fair portion of forests within the private plots , something that could be monitored at a distance and enforced when necessary. Another initiative that also could be enhanced is the solution for the plots located within protected areas, by envisioning a fair compensation for the area occupied before disposition.

By investigating the current LAS and the regulations enacted, it is hard to believe that Colombia will reach its intended goal to have all properties regularized by 2026 , but good and promising actions are undergoing, especially with the creation of the SINIC and the NUPRE to 'connect' all different systems . But to reach this , even more institutional concessions could be made to scale up the regularization processes, possibly reducing the amount of personal information needed to do it, especially where there are no conflicts or overlaps of land rights.

Another attempt to stimulate this process could be the digitalization of former registries to be accessible in electronic format (considering that most of the information and folios are still existing in analog format). Eventually, the whole registration act could be made electronically, to facilitate the integration with different systems but, before that, the existing (and valid) folios can be scanned to be made available in a faster and more accessible way.

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