



Land Governance in an Interconnected World

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Land and Peace in Colombia: FFP Methodology for Field Data Collection and Data Handling

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Abstract

Effective land administration is an essential step on the road to peace in Colombia. The Colombian government plans to have a complete nation-wide land tenure coverage within seven years. The traditional approach to land administration in Colombia is not up to this policy challenge: the pace is too slow, the costs too high, the procedures too complex. Fast and effective land administration is essential for the implementation of the Reforma Rural Integral of the Peace Agreements, and to maintain public confidence in the peace process.

The Netherlands contributes to the implementation of the peace agreements by focussing on fast and effective land administration, together with the Colombian institutions. This paper presents a methodology for a project where fit-for-purpose Land Administration is tested at scale – after a successful field test. The test will be done in two pilot areas. These are participatory and integrated pilots, leading to cadastral maps and, more important, to land titles whenever the legal framework and institutional cooperation allows for land regularization and adjudication.



Photo 1. Rural family without legal security (Nubia Samirno). Termales, Vista Hermosa, February 2018. Colombia. Photographs made by Liliana Merizalde Gonzalez.

Key Words: Colombia, Peace, fit-for-purpose, participatory, land tenure, pilots



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Introduction

Effective land administration is an essential step on the road to peace in Colombia. The Colombian government plans to have a complete nation-wide land tenure coverage within seven years. The track record in Colombia regarding rural land titling up till now is not up to this challenge. It is estimated that up to 60% of the rural land parcels do not have a legal land title nor cadastral map. Furthermore, given the current procedures, it costs about US \$400 to measure and register an average two-hectare parcel. There is an estimated number of about 4 million parcels still to be formalised, which means it will cost at least US \$ 1.6 billion and a substantial amount of time to formalise all rural parcels. The current approach to land administration in Colombia is not up to the policy challenge of full coverage within seven years: the pace is too slow, the costs too high, the procedures too complex. Fast and effective land administration is essential for the implementation of the Reforma Rural Integral of the Peace Agreements, and to maintain public confidence in the peace process.

To reach the objectives on land as laid down in the Peace Agreements, a radical new approach is needed. As established in CONPES 3859, the country must have a complete, up-to-date, reliable, multi-purpose cadastral system consistent with the real estate registration system and integrated with other information systems. To achieve this, a 7-year implementation plan has been defined, including a pilot test in chosen municipalities to define the methodologies to be used in the rest of the country. As it became more and more obvious that conventional methods do not meet current societal needs, professionals and academia have teamed up to develop a new and innovative fit-for-purpose (FFP) approach for Land Administration.

The Fit-For-Purpose approach (FIG/World Bank, 2015; UN-Habitat, 2016) argues for cost-effective, time-efficient, transparent, scalable and participatory land administration, including Participatory Surveying, Volunteered Land Administration and Crowdsourcing. Often it is sufficient to identify visual boundaries in the field using imagery. Land administration systems are as plain as possible at the start and can improve over time whenever necessary or relevant. It is a dynamic process: purposes evolve as e.g. the economy and technology develop over time, and so



does the administration as well. Such an approach must be gender sensitive, transparent and highly participatory.

Institutional setting and commitment

The institutional landscape for land administration in Colombia is complex. The roles and responsibilities lie within different institutional actors which also belong to different ministries such as the Ministry of Agriculture, the Ministry of Justice, and the *Presidencia*.

Since 2017, land title deeds are issued by the *Agencia Nacional de Tierras* (ANT), related to the Ministry of Agriculture. The registry of the land titles deeds is taken care of by the *Superintendencia de Notariado y Registro* (SNR), of the Ministry of Justice. SNR provides on demand documents on real estate with its historical chain of title. Land parcel mapping and land valuating is accomplished by the *Instituto Geografico Agustin Codazzi* (IGAC), formerly with the Finance Ministry, now under the national statistics bureau Dane (*Departamento Administrativo Nacional de Estadística*). Apart from IGAC, there are independent urban cadastres in the cities of Bogotá, Cali and Medellín, and the Department of Antioquia has its own, independent cadastre. Cadastral maps in all other areas fall under the responsibility of IGAC.

Over the last years, a fourth institutional actor emerged. The *Departamento Nacional de Planeación* (DNP) is leading cadastral pilot projects in 23 municipalities in Colombia. The project, carried out with funding from the World Bank, USAID (Ovejas municipality) and the Colombian government, is testing different methodologies and will be followed up by a country wide implementation. A newly proposed Law on Cadastre describes the different roles (e.g. of the “cadastral regulatory authority” and the “gestor catastral”) has up to this moment not been officially presented to parliament and is under much debate.

The government is looking for the most efficient processes in land administration, using innovative techniques. Therefore it is important to explore, test and evaluate fit-for-purpose methods and techniques as soon as possible. In all stages of the FFP pilot (including the actual field work), the collaboration with all institutions (ANT, IGAC, SNR, DNP), municipalities, local authorities is



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crucial to improve the methodology and to ensure acceptance of the results. Most crucial is the participation of the farmers themselves in all the stages to ensure trust in the obtained results.

The institutions committed themselves to join the pilots in the field and to discuss the approach with the citizens on site. The people in the pilot areas confirmed that it was the first time that the government came to see and learn about their tenure situation. They were more than pleased that there was attention to them after decades of fierce conflict. The institutions confirmed that the methodology of participatory surveying is a valuable innovation in their experience.

Pilots

This paper presents the methodology for the field data collection and data handling. The field data collection aims to create an overview of all people to land relationships. Those relationships can be formal land rights or recognised customary or indigenous land rights. It is also possible that informal relationships are observed. There may be disputes. Mapping of overlapping claims is included in the methodology. This means agreed disagreement is mapped, the disputed holders are the “claimants” (Parties).

The methodology further aims at the creation of complete coverage of land administration¹ based on the outcomes of field data collection. The people to land relationships should be formally registered where possible.

A Proof of Concept conducted in the municipality of Tenjo in 2015 demonstrated that the field data collection and data handling can be carried out fast, affordable, and reliable. This Proof was carried out by IGAC, MADR, SNR, Dutch Kadaster & universities (amongst others ITC, University of Twente), in close collaboration with software and hardware providers. The results can be seen on: gip.itc.nl/projects/rvo_colombia, as well as in several publications (Molendijk et al 2015; Brent Jones et al 2017).

¹ In this documents Land Administration concerns the integrated land registry and cadastral parcel data - with all related source documents such as deeds, titles, field observations, decisions on restrictions, court decisions on land rights and claims.



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Publications on the urgent need for the broad implementation of Fit for purpose land administration can be found at the World Bank, GLTN (Global Land Tools Network), FIG, UN Habitat, UN GGIM etc.

Two (pre) pilots have been started up now after a successful Proof of Concept: one pilot in the Department of Antioquia (the *vereda* – or village – of *Los Mandarinos*, within the municipality of Apartadó) and one in the Department of Meta (the *vereda* Termales in the municipality of Vistahermosa). See figure 1.



Figure 1 Location of the pre-pilots areas. Termales in the municipality of Vista Hermosa, and los Mandarinos in the municipality of Apartadó. February 2018

Field data collection succeeds procedural steps such as project block selection, preparations, awareness raising, announcement, as well as training. All this was done for both pilots – in close cooperation with the national institutions with responsibilities in land administration, that is the ANT, SNR, IGAC, DNP, the Cadastre of Antioquia, as well as the Universidad Distrital (*ingeniería catastral*), the University of Twente (ITC) and ESRI/TRIMBLE Colombia. The collected data from the field require data handling afterwards and should be available for public inspection and for a confrontation with legally data from the land registry under SNR and IGAC.



This means that the collected data from reality will be compared with the legal data as a basis for decision making on land titling.

The Ministry of Defence provided teams of 5 specialists of the “*Brigada de Desminado Humanitaria (Cantón Caldas)*”, the special humanitarian demining brigades, to each of the project field teams. Their guidance was necessary in the pilot in Vistahermosa because of risk of land mines. This is an issue in post conflict areas and complicates the data acquisition for boundaries. Land mines are often placed close to those boundaries because there are landscape elements providing shadow. In these cases, laser distance measurers were used to establish the parcel boundary information.

Fast, reliable, affordable and participatory

The process of field data collection should be fast, reliable, affordable and participatory. This is the only alternative in support to the establishment of a nationwide land administration in Colombia within the defined timeframe of the peace treaty. The presented methodology is fast and designed to meet this requirement – a nationwide land administration within 7 years. That is 2 years of preparation and piloting and 5 years for data collection. It is reliable because the focus is on a quality link in the data between land and people. It is affordable because high precision and time consuming conventional field surveys are avoided as well highly complex bureaucratic procedures. Participatory, because people themselves will be actively involved in the data collection, especially in post conflict *veredas* to enhance trust in the collected data (including accepting considerable differences in the expected area of the parcel and the measured area) and regain overall trust in the government.

The government is looking for the most efficient processes in land administration, using innovative techniques. Therefore, Fit-For-Purpose methods and techniques should be explored, tested, evaluated and implemented as soon as possible – this is the main aim of the pilots.

Overview of the existing situation

An overview of all existing people-land relationships based on Fit-For-Purpose Land Administration is needed. This is essential for processes of formalisation, restitution, regular



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maintenance and quality improvement. All people-land relationships are included: formal ownership and real rights, possession, occupancy and informal land use. Creating overview of the existing situation includes also overlapping claims, disputes and conflicts. It is crucial to get an overview of parcels or boundaries under dispute and at the same time an overview of all the areas not under dispute. During the pilots the focus was on creation of this overview.

Participatory surveying



Photo 2. 17-year old Ingrid, waitress at the local restaurant, became a grass root surveyor within a day. Termales, Vista Hermosa, 2018.

The ‘Fit-for-purpose App’ enables farmers, together with locally trained “grass root” surveyors, to walk the perimeter of their parcels and to collect the coordinates of the perimeters of their parcels themselves. Those grass root surveyors are preferably young adults from the villages, trusted by the communities and trained and guided by professionals. The first results from the pilots in the field demonstrate that this approach works: young people (with strong legs able to walk the perimeters of parcels and spatial units in mountainous and other areas in the Colombia) could be educated in several hours, be tested, and consequently then use the App and collect the spatial and administrative data together with the farmers. Efforts have been made to design an easy user interface. Young people were eager to join and performed the land surveys well. The interface with a cloud service gives a continuous overview to all who have a browser (“remote participatory mapping”).



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Photo 3: Integrated data collection. Pre-pilot Termales, Vista Hermosa, Colombia, February 2018.



Photo 4: Participatory data collection increasing trust in the measurements and government. Termales, Vista hermosa, Colombia, February 2018.

Owners or claimants are invited to walk the perimeters of their land parcels and to point to the vertex points of the boundaries themselves using a GPS antenna. The (grassroots) surveyor records the observations with an App installed on a mobile or tablet. Satellite imagery of the area is



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displayed on the screen of the mobile device. Data collection is done in an integrated way: the perimeter is stored as a closed polygon together with the claimed type of right combined with a photo of the face of the owner or claimant and a photo of the owner's or claimant's ID². A preliminary identifier is used as linking key. The GPS antenna may also be a handheld-low-accuracy device. In this way the walked perimeters identify a boundary from two sides, from two spatial units. If those two measurements are within a certain tolerance, it demonstrates agreement between neighbours. The approach implies that neighbours do not have to be in the field at the same time: this is a serious logistic problem, since the availability in the field of both neighbours at the right time per boundary is complex to organise and time-consuming. The approach can be done in analogue way too.

After the boundaries have been 'digitally drawn' in this way, a preliminary identifier of the spatial unit (parcel) is typed on the mobile and placed on the image and linked with recorded administrative attributes. This means that the data collection is done in an integrated way: the perimeter is stored as a closed polygon together with the type of right or people-land relationship (ownership, possession, occupation, informal, dispute, etc.) combined with a photo and ID of the owner or claimant. In this way the names and other relevant attributes and polygons (representing measured parcels) can be linked already in the field. Digital photos can be attached; existing documents like passports and IDs, selfies, photos of groups of owners; photos of existing legal documents like deeds or titles; photos of e.g. electricity bills linking somehow the person(s) to the parcel; and photos of the boundaries can all be linked to the walked and observed polygon. A very elementary LADM-based data model has been designed for this purpose (see Figure 3 below).

The administrative data for each parcel is collected only once, and integrated with the spatial data. All data can be collected offline and is later transparently uploaded to the cloud. Ownership or use rights to more than one parcel will be recognised by the ID.

² In most cases there is more than one claimant for a specific parcel – for example in case of a couple. For this reason a share in a right can be recorded to each individual claimant, which is LADM COL compliant.



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Community involvement is required. Since people – land relations are a social phenomenon, the very nature of cadastral survey requires the participation of neighbours, family and community members. Therefore, local authorities such as the municipal authorities and the community authorities - the *Junta de Acción Comunal* e.g.- , are informed in advance to ensure their commitment, awareness and involvement of all parties. If good telecom connections are locally available, everyone can follow the process on-site in the field. The collected data can be send with Esri's Collector App directly to a cloud-based GIS environment, enabling everyone to follow the process remotely. This 'remote participation' is important for the involvement of stakeholders who cannot be on site – and it is possible to set up transparent access to this cloud environment.

Including Disputes and State Land

It is crucial to get an overview of parcels or boundaries under dispute and at the same time an overview of all the areas which are not under dispute. A dispute map forms the basis for conflict resolution and decision making. This means that the area of the dispute is allocated in the field by the 'dispute holders'. The dispute holders are identified in the same way as normal right holders or occupants.

During the collection process in the field, a dispute means the walking of and the creation of overlaps between polygons. Those overlaps are mapped and the corresponding authorities know exactly where to solve which type of land related conflict. Apart from overlaps there may be 'gaps' – areas without spatial units. This may concern government owned lands (*baldios*), roads, rivers etc. In principle those government lands have to be identified and included in the system in order to bring complete coverage.

Data handling

After field data collection the data need to be checked on completeness. Polygons can be linked to boundaries if coordinates are within certain tolerances. For each boundary an "*acta de colindancia*" will be prepared with the location of the boundary – visualised on top of the image – the names, photographs and ID photographs of the neighbours and space for a signature.



Public inspection

Usual procedures, such as public inspections, are conducted at village meetings accompanied by trusted third parties. The community members gather to view all the collected data on a map and discuss and reconcile the results. This public inspection will be the next step in the (pre) pilots. It is important that all owners and claimants are included – for example in case of a married couple that both partners, woman and man, are recorded into the system.

During the Public Inspection owners and claimants will be requested to show their ID. This ID must be equal to the one photographed in the field. If two neighbours agree on the location of their common boundary the “*acta de colindancia*” can be signed. It should be noted here that this agreement is also based on the field observations as made by the two neighbours. If one boundary (as part of the polygon observed by one neighbour) is, within a tolerance, equal to the other boundary (as part of the polygon observed by the other neighbour) there is agreement on the location of the boundary. Signing of the “*acta de colindancia*” can even be done at two different moments in time by the two neighbours in cases where neighbours cannot be available at the public inspection at the same time. As soon as the acta is signed by both neighbours, the boundary will get a green colour in the system. If there are overlaps between the two polygons observed by the two neighbours there is a dispute.

Complaints from public inspection may lead to agreed changes in the collected data. Areas where collected data are without disputes can be certified with land titles by ANT, whenever the legal framework and institutional cooperation allows for land regularization and adjudication.

Comparison with legally known data

As soon as the all boundaries are green, the final comparison of the block or part of the block with legally known data can start. This means a comparison of the agreed and collected data with the cadastral and land registry data. If this comparison concludes that the data can be legally accepted the certificate of title can be handed over and registration and cadastral map updating can be performed.



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Collected and agreed data may:

- match within tolerances with legally known data (“green”)
- be “in the neighbourhood” of legally known data (“yellow” or “orange” if there are differences in right holders),
- completely mismatch (“red”),
- be not comparable because of lacking legal data (“white”).

Workflows will be designed (as far as possible) based on cases to support decision making.



Photo 5: The mobile office of the SNR present in the vereda Termales, Vista Hermosa, February 2018. The official databases could be accessed in the field itself. Citizens could check available legal data on site and consult land matters with the legal experts.



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Results



The objective is to include the results, after quality control, in the cadastre of IGAC and of Antioquia and in the land registry of SNR. From that moment on, regular maintenance can start. Maintenance means that the dynamics in the land market as a consequence of buying and selling land, of inheritance, of the implementation of spatial plans, of the establishment of restrictions and of mortgages, are represented in the formal system of land administration in Colombia.

Recommendations for improvement of these workflows may result from these pilots.

Figure 2. The "Fit-For-Purpose" App with raw field data collected in Los Mandarinos, Apartadó, February 2018.



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Configuration

The design environment in this case is based on Esri's Collector App, which allows for very efficient data collection. The app uses the Bluetooth connect of the mobile to connect with the Trimble R2 GPS device. The R2 is the preferred device. It has a 'quality antenna' for the reception of weak GPS signals and the reception of the required correction signals. This type antenna is needed in most places in Colombia. In areas where the correction signal is strong enough the cheaper Trimble R1 can be used. Similar devices from other suppliers may also be used. This configuration provides, in principle, sub-metre accuracy for the observed points. There may be distortions in this in case of trees or mountainous environments. The interface between the R2 and the Collector App can be managed from Android smartphones. This configuration is fit for purpose, given the often relatively low value of rural land, the intrinsic accuracy of boundaries and even the existing norms for area calculation.



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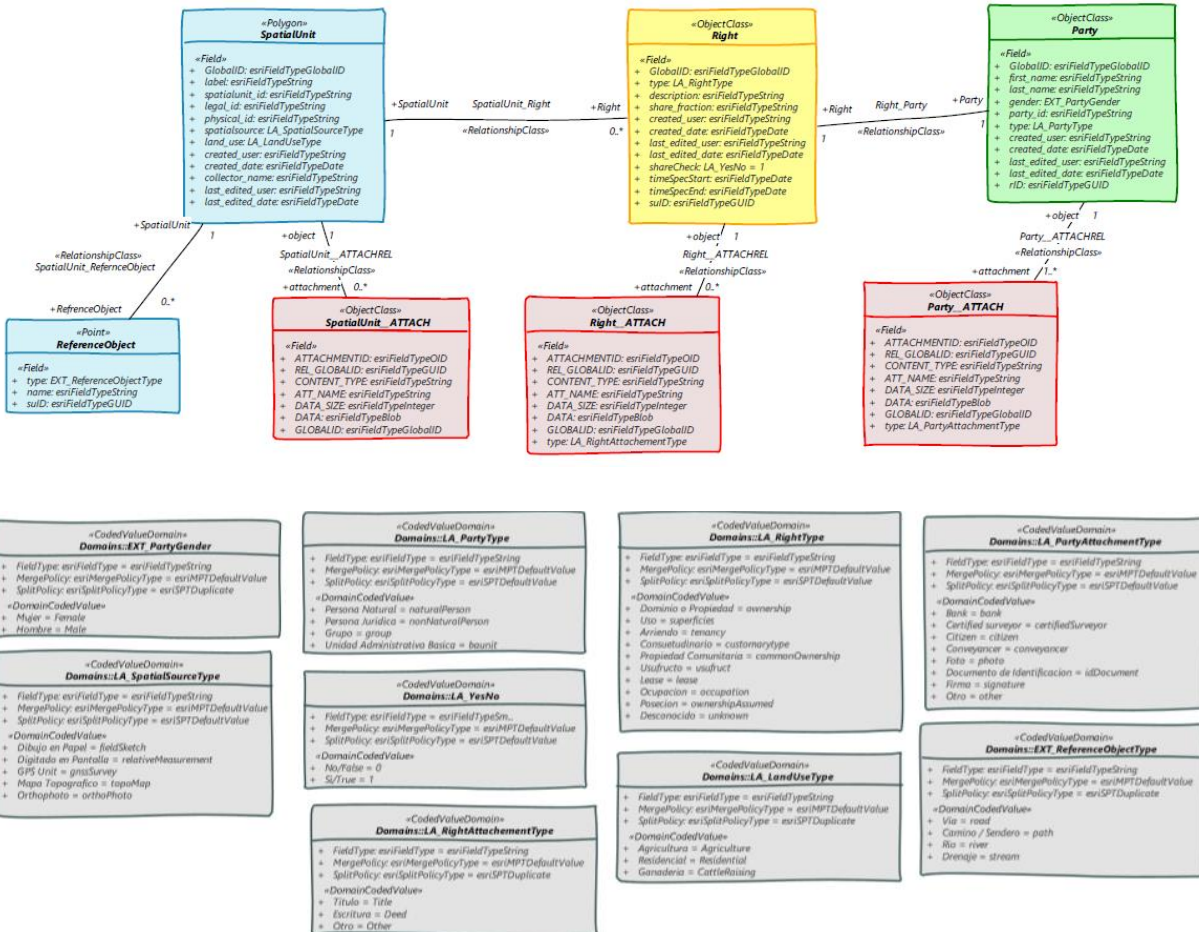


Figure 3 Elementary LADM-based data model used in the pre-pilots. Colombia, February 2018.

Lightweight devices in the field are very efficient to use in mountainous Colombia, and the tools and technologies to develop the application are available. The R1 requires a correction signal for correction of atmospheric distortions of the GPS signals. There are different options (and related costs) in the provision of this correction signal. In some remote areas there may be a need to use the R2. The Trimble Catalyst could not be used – it requires continuous internet access which is not available in a stable way in remote areas.

A paper based approach in field data collection is in all cases an alternative to the computerised version field data collection. This option will be further discussed and analysed.



Efficiency

The proposed method is efficient because:

- Fast integrated (spatial and administrative) data collection with GPS device (RI & R2 & paper)
- Data only collected once and by grassroots surveyors – professionals can organise the logistics, can organise the awareness raising etc. But the real and expensive collection of boundary data with field evidence can be done with boys and girls from the village and the land right holders
- A model with a minimal set of attributes will be used (to add a single attributes makes the process more costly, especially when upscaling. As well, the more attributes, the bigger the liability of the government for the quality of its data).
- The “*actas de colindancia*” will not be signed in the field, but after the data collection, in the municipality or *vereda*.

It should be noted that often farmers do not know the legal status of their specific land rights, whether it is ownership, possession, occupation or informal tenure. Collected evidence in the field brings clarity (*actas* confirming buying/selling and available titles or tax invoices). It is better to ask farmers for this type of evidence, then to ask them for the type of relation between people and land.

Conclusions: work in progress

The presented methodology was tested in a participatory way in two pre-pilot areas in February 2018. The surveys will be completed to achieve the 100% coverage for each *vereda*. The objective is that the collected data backed by the government, leads to cadastral maps and, more important, to land titles, whenever the legal framework and institutional cooperation allows for land regularization and adjudication. These land titles give farmers not only legal certainty but also a source of collateral, giving them access to credits and improving their access to public or private agricultural extension and advisory services which in turn will lead to increasing production in a sustainable manner. Guaranteeing formality in land tenure is expected to have a positive impact



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on reducing land grabbing risks and on other endeavours such as effective land restitution. Consequently, the methodology design will strengthen alternative and transparent conflict resolution mechanism to minimize cumbersome judicial procedures. Based on these pilots, a fit-for-purpose contribution to the roll-out plan for Colombia will be formulated, including evidence based identification of the legal bottlenecks as inputs for promoting administrative simplification and legal reform strategies. The great achievements of the pre-pilots are not only the sincere utmost appreciation of the farmers of the *veredas* for the presence of the government in the field, but also the effective cooperation in the field with all Colombian land institutions involved, such as the Land Agency, Land Registry, the Planning Agency and the Cadastre Agency (ANT, SNR, DNP, IGAC and the Cadastre of Antioquia), local authorities and universities.

After concluding the current pre-pilots in the project, the full scale pilots will start. Local capacity at the municipal level will be developed to maintain an up-to-date land registry after the project finishes allowing the state to identify its parcels. Communication is an essential element in the project to enhance the cooperation between the institutions, to achieve true participation in the demonstration pilots and to reach the general public.

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