The Role of Communities in Land Cadastre Maintenance

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SUMMARY

This paper emphasizes that for a land cadastre system to be effective and sustainable, the issues of updating and maintaining it with trustable and up-to-date spatial and legal/legitimate land information is critical and it can be achieved through a more participative role of communities.

The authors suggest that communities must be empowered to not only participate actively in the first registration of their land, both community delimitations and individual parcels, but also to keep their cadastre up-to-date with the means of appropriate tools and procedures that must be made available preferably at the community level, to ignite the required updates when they occur. The procedures and tools to support the updates of the cadastre should be designed to accommodate the needs of land rights holders, not a government bureaucracy, as opposed to current practices that have led to outdated records of past land cadastres exercises.

The focus of this study is to further detail the procedures and tools to promote a trustable and up-to-date rural land cadastre based on a more participatory community effort. The results are a series of recommendations to adjust: (i) the existing land information cadastre system (SiGIT[1]); (ii) the tools for community land recordation (SiGIT mobile and SiGIT Cloud); and (iii) the specific processes embedded into the Fit For Purpose DelCOM/RDUAT[2] Methodology designed for the massive land tenure registration, having in mind the reality of Mozambique especially in rural areas.

The study was performed in a cluster of eight communities in a specific locality where the recordation was performed utilizing a participative approach, comparing two different moments of land registrations at the same location, a year apart.

[1] SiGIT is the Portuguese acronym for Land Information Management System
[2] A methodology that harmonizes both community delimitations and individual parcels registrations

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1. INTRODUCTION

Mozambique has launched a massive systematic land cadastre first registration. It is being implemented through the *Terra Segura Program* with the goal of achieving, in 5 years, the registration of 4 thousand communities and 5 million rural parcels, out of an estimated universe of around 12 million rural parcels. In the recent months, the initiative has been under discussion to include urban areas as well.

Since this initiative intends to create the land cadastre, an important to the State, not only to know how land is being utilized, but also to have a clear understanding of the territory and plots that are not being properly exploited or mobilized, new approaches have been designed and tested to create an effective sustainable cadastre, one that: (i) is complete and accurate; (ii) provides data for management decision making; (iii) maintains data up-to-date; and (iv) is flexible enough to adjust to new business requirements (Balas et al, 2017a).

A methodology based on a Fit For Purpose (FFP) approach to land administration was developed, harmonizing community delimitations and individual parcels registrations. The Land Information Management System -LIMS/SiGIT, an ISO 19152 Land Administration Domain Model (LADM) based system, was adjusted to accommodate the requirements to massively register these parcels and communities. Tools to support field work and data quality were also developed and made available, namely SiGIT mobile and SiGIT Cloud, reducing working time and rejection rates through a series of quality controls and interoperability mechanisms.

These efforts, however, did not focus on the processes required to maintain and update the land cadastre once parcels and communities have been registered into the National land cadastre, although the system allows these changes, and by not preparing this important component of the cadastre lifecycle, the entire effort to implement a land cadastre will be at risk.

This paper is part of a research effort to fine-tune the methodology and the SiGIT system and tools, focusing on determining how the cadastre must be kept updated given the importance of having a trusted cadastre both at local and national level. The recommendations from this exercise are to be implemented within the Terra Segura Program, ensuring that the Land Cadastre is kept a live instrument to promote sustainable development.

2. OBJECTIVES

The following objectives are to be accomplished through this study:

(i) analyze the different changes that commonly require cadastral information updates, by comparing two different registration processes and the changes that have occurred;
(ii) evaluate the different community scenarios and propose appropriate tools to effective and efficiently capture changes to the cadastre;
(iii) evaluate the ability of communities to register and update their cadastral information, given appropriate training and tools;
(iv) propose a comprehensive training program focused on community members or locality chiefs (and certifying them) to perform both the registration and the updates;
(v) propose specific interaction mechanisms between all the stakeholders in the approval process until the change is authorized by Government entities;
(vi) adjust the land information cadastral system (SiGIT) and all land registration tools accordingly.

3. APPROACH AND METHODOLOGY

First of all, to understand the complexity involved in the maintenance of a land cadastre in rural areas, a decision was made to focus on a location with the following characteristics:

(i) a locality comprised of one or more communities - there are cases of a community being larger than a locality as no legal instrument prevents that. However, it may be an advantage when a community (or a cluster of communities) corresponds to a locality: as cadastre maintenance is an administrative task and the locality is the lower level of state administration, this will provide security of recognition not only at community level, but anywhere in the country;
(ii) a locality where the limits may need to be adjusted to update changes to the administrative division of the country or fine tune these limits;
(iii) existence of cadastre data of at least some parcels - parcels that had been registered previously through other efforts, for comparison purposes;
(iv) the communities involved would have to be willing to perform the work by themselves, selecting their members to be trained not only to validate the information as well as to collect data - previous exercises proved that it is possible to utilize community members to perform these tasks (Balas, 2018a).

Second, the Mozambican Fit For Purpose methodology was used, and changes were proposed to accommodate the processes of updating the land cadastre. A similar approach was applied to the SiGIT[3] system, the National Land Information System.

Third, the work was supported by the provincial and district government officials, as well as by the ICT[4] team, providing all the means available to conduct the study.

4. THE IMPORTANCE OF A NATIONAL LAND CADASTRE

FIG (1995) statement of cadastre defines that "a cadastre is normally a parcel based, and up-to-date land information system containing a record of interests in land (e.g. rights, restrictions and responsibilities). It usually includes a geometric description of land parcels linked to other records describing the nature of the interests, the ownership or control of those interests, and often the value of the parcel and its improvements". In Mozambique, the land cadastre is comprised of both rural and urban parcels, being these described in terms of their tenants, rights, uses, restrictions, duration of the lease right as well as implanted infrastructure on the parcel. Taxes apply dependant on a number of factors such as location, dimension, and land use.

According to an exclusive interview with the Geospatial World, Dorine Burmanjee, CEO of Dutch Kadaster, says that 70 percent of the world do not have land registration. Larsson, (1991) justifies that the high cost of implementing a land registration system is the main cause for hesitation on the part of developing countries. An efficient land registration system is expensive and the high cost of initial compilation and subsequent maintenance is a deterrent to development in developing countries. Dale & McLaughlin, (1998) state that although establishment and maintenance of a land registration system is expensive, refusal to establish such a system may be more expensive.

Governments must therefore weigh the benefits against the costs to be able to justify the investments made in creating a land cadastre, one that is in fact effective and that will promote substantial benefits. Williamson (1995) concludes his views on justification of cadastral systems in developing countries indicating several benefits that result from the formal recognition of individual and communal land rights, and the establishment of cadastral systems, namely:

- promote security of tenure,
- improve access to land,
- promote economic and sustainable development,
- reduce poverty,
- support environmental management, and
- support national development in the broadest sense.

[3] Portuguese acronym for LIMS - Land Information Management System
[4] Information and Communication Technology, comprised by the entire SiGIT team.

Independent of how much effort is given into implementing a land cadastre, Governments should also understand that there will always be a certain resistance to land registrations, mainly due to fear of land tax or compulsory acquisition, due to investors pressure to acquire land. This resistance is supported by West, (1969) in his studies, and it has become a hard reality in some areas of Mozambique where systematic registration was put on hold.

4.1. The Journey Towards a Land Cadastre

The law provides that the National Land Cadastre relies on the Ministry of Land, Environment and Rural Development- MITADER[5], and it should comprise both urban and rural cadastres as well as all other cadastres that relate to land. The rural cadastre is a responsibility of the National Directorate of Lands - DINAT, through its provincial offices of land administration. The urban cadastres can be either a responsibility of these provincial offices (municipalities that do not have capability in-house to manage their own cadastre) or a responsibility of the municipality itself. There are at the moment 53 municipalities but many of them still lack capacity to manage their land cadastre and therefore this is done with the support f the provincial services.

In 2012 Mozambique has embarked on the development of its Land Information Management System - SiGIT, with the intent to administer both rural and urban land, and to create a national land cadastre. From 2013 the system was rolled out to all ten provincial offices and eight municipalities with cadastral capacity plus two other supported by provincial offices. Through the "Terra Segura" program, various projects for rural land registration started to log their land parcel surveys into the national land cadastre. Currently, the national land cadastre is comprised of more than 500,000 parcels, 72% from rural areas and 48% of those 10 municipalities that performed land tenure registrations. Additionally, there are around 60,000 parcels from historical data that still need to be validated and updated since there are data quality issues to be resolved.

The past few years have illustrated that the efforts to maintain the parcel lifecycle up-to-date or to correct historical data have failed and that many parcels existing within the land cadastre are in fact outdated, creating several data conflicts when new parcels are being registered under this massive land tenure registration program. Apart from that, transmission of rights within community land under customary practices is quite common and these changes do not require formal registration. However, now that the massive registration is taking place with data being submitted to the National Land Cadastre, it is of critical importance to register these changes as well.

Out of the 53 municipalities, ten are utilizing the SiGIT system for their cadastre administration and these integrate into the national land cadastre, one has a different system and has performed systematic registration in peri-urban areas. Most of them however still work on a paper basis

[5] Or any other Ministry with the responsibility of the land sector.

registry or with some digitalized files, but not with a management information system. Efforts from certain projects related to climate changes are starting to create land administration capacity in these municipalities. The efforts to register these parcels into the national land cadastre is still to be undertaken.

Currently, the law does not make it compulsory that the land and property cadastre, under the responsibility of the Ministry of Justice, are updated every time there is a change (an improvement, a land transaction, or property sale for instance), and very rapidly the cadastre loses track of the reality on the ground and becomes outdated. Simultaneously, other cadastres such as the mining cadastre are also not integrated with the land cadastre although the law requires that one validates with the other the existence of registered land and communities.

At the moment most rural land administration is centralized in the provincial capitals and very little is decentralized to districts, localities or community level. The Ministry of Lands, through its National Directorate, is creating conditions to decentralize the cadastre to the district level, utilizing the Government Network Infrastructure. Since internet access can be a constraint, alternative means should be considered such as paper-based system to make formal registration of land and property transactions, preferably at community level where these occur, and have protocols for upgrading these property transactions registration at provincial level. The huge investment in land administration systems only make sense if there is a functional way to make it alive and updated at all times.

4.2. The Land Cadastre and the Land Information Management System

SiGIT is an ISO 19152 Land Administration Domain Model (LADM) based system, that utilizes the parcel as its core object. SiGIT is currently utilizing maps that range from scales of 1:10,000 to 1:250,000. Information in the textual or attribute files of the Cadastre, such as land ownership and land use, can be accessed by the unique parcel code provided by the system. Taxes that are applied to each parcel are also validated according to a number of factors. The parcel is also shown on the cadastral map, and quality rules exist to validate the administrative jurisdiction of each parcel. This set of data enables the creation of a complete Cadastre.

The SiGIT system has embedded several rural and urban land administration processes, from initial registration to parcel lifecycle management, as illustrated in Figure 1. The system provides the means for the country to have its land cadastre, comprised of multi-purpose information, although this endeavor is still in its beginning.

In the past couple of years, the SiGIT system was adjusted to contemplate the massive land tenure registration and a mobile application was developed to support the field work to collect and validate data. These efforts are described in more detail in previous publications (Balas et al (2016b) and Balas et al (2017a)).

5. THE CASE STUDY: CHICUANGUE LOCALITY

Based on the requirement to choose a specific location, the locality of Chiguangue was chosen, within Mandlakazi district, administrative post of Chidenguele (previously part of Nguzene administrative post), as illustrate in Figure 2.

This location corresponded to the requirements previously defined: (i) it is comprised of eight communities, the local authorities were interested in participating in this exercise; (iii) the limits of the locality had to be re-allocated to another administrative division; (iv) district authorities were committed to support and supervise the work. Almost a year before, in beginning of 2017, selected beneficiaries of these communities participating in production of cassava were already registered through an agriculture development project promoting value chain approach for Red Meat, Horticulture and Cassava (a total of 350 parcels were registered in the selected area of this study, during the first registration process).

The second registration took place between February and April 2018, with a more participatory approach to the land registration, as opposed to the first registration where a private surveyor was contracted. This second exercise resulted in eight community delimitations and 820 additional parcel registrations Discussions over the changes and reasons for the changes in previous registrations as well as adjustments to accommodate the law were held after the field work had finished. A total of 150 parcels required updates, which are described later in this section.

The methodology was followed, from public consultations, community training, to community delimitations and afterwards individual parcel registrations. Results of this participatory registration are described in Balas, 2018a. Figure 3 illustrates the training process that occurred, and Figure 4 illustrates the public meetings that were held during the process of social preparation.

From the first and second registrations, several observations were made that helped systematizing the types of changes that occurred as well as the work that was done to accommodate these changes.

5.1. Observation #1: The need to update the Administrative Division

In Mozambique, spatial information with regards to localities does not exist. When a change is made to an administrative division based on a locality change, there are difficulties in implementing these on the system.

In this specific case, it was determined that, since the locality encompasses all the eight communities, then with their delimitation it would be possible to define the limits of the locality and therefore adjust the administrative limits both of the Administrative Post and the District. First, sketches of these limits were made, and discussion were held within the neighboring

communities to validate the limits. Only after this exercise it was possible to adjust the administrative division of this district. **Fejl! Henvisningskilde ikke fundet.**Figure 5 illustrates the stages to accommodate these adjustments.

This reality occurs even in other locations where the administrative division does not change but the limits need to be adjusted according to the reality in the field. These are changes to fine tune an existing boundary, as illustrated in Figure 6. The risk of not accommodating these changes is that too many parcels are left out of the registration into the land cadastre due to quality controls of their location. To solve this issue the SiGIT application had to be adjusted to contemplate another level of quality control of these limits.

5.2. Observation #2: Transmission of rights through disaggregation

Parcels that have changed their shape and size due to transmission of rights under customary practices (mostly heritage practices)

It is customary practice to transfer land rights to relatives. This has a different approach throughout the country depending whether we are in a matrilineal or patrilineal region. In this locality the customary practice is mostly patrilineal but we found cases that no distinction was made between female or male children of a family, having all of them equal rights. Figure 7 illustrates two cases of transmission of rights through disaggregation of a part of the parcel.

With this change, there is the risk that land grabbing and fake and fraudulent transmission of rights occur. However, if appropriate controls are embedded within the methodology (including publication of the changes) and if the locality authorities together with the community authorities will be involved in the change validation, this risk is mitigated.

5.3. Observation #3: Changes in right ownership

Parcels that have changed their tenant information to include additional family members as co-title holders

It this part of the country, men emigrate to South Africa to work in the coal mines. They normally return for Christmas. Our work for the second registration was done in a period where these families were complete and therefore two situations occurred: (i) families that initially had registered the land with only the name of the wife: now requesting to include the name of the husband as a joint holder (as illustrated in the two cases of the Figure 8); (ii) families that did not register previously the land because the wife did not feel comfortable to register only under her name: now requesting that the land would have to be registered with the two names - new registrations; (iii) families that initially only the wife was registered, but the husband is now

refusing to share the jointly the right (these cases were put under a conflict resolution procedure as the rights of women and vulnerable groups are to be protected).

With this change, there is the risk that land grabbing and fake and fraudulent transmission of the entire parcel occurs, even if no development was made on it. There is also the risk of vulnerable members of the community being left with no rights. Communities must be educated to protect the rights of all and to defend the vulnerable groups. Specific controls must be put in place to prevent land sale as this is not permitted by law.

5.4. Observation #4: Re-dimensioning of parcels due to legal impositions

Parcels that were re-dimensioned due to legal impositions (Special protection areas)

The locality of Chicuangue negotiated with Government that the high voltage power line could cross the area of the community. Evidence shows that most of the protected area was kept free, but there are some cases that the plots are being utilized beyond the limits permitted by law. The community was advised that all parcels should be registered, even those located in protected areas but those should be marked as being within a protected area, and therefore not entitled for rights adjudication.

Based on the observations to the field data, there are cases of small farming activities are being performed not on a permanent basis but also cases where infrastructure (houses) exists either at the border or within the limits (Figure 9). Discussions are required with the provincial and district authorities to solve these situations. There was no evidence of negotiations to re-settlement due to the power line construction. Nevertheless, through the training of the community it is possible to avoid these situations in the future, having the community respect the protected areas as defined by law.

5.5. Observation #5: Community dedicated parcels

Parcels that were allocated to community usage (schools, churches, rural hospitals)

This community has several of these situations, where specific plots were attributed to community projects such as schools, health centers, churches. These locations are decided by the local community council comprised of members of the eight communities, taking into account distances and demography of the locality. Since these developments are done with investments either from donors or from Government, these plots are not usually registered under the massive land tenure registration. The authors suggest that this procedure should change not only to create a more accurate cadastre but also to better support the planning process of Government initiatives. Figure 10 illustrates the land parcels that were attributed both to the health center and to the house of the resident nurse, as well as for a church.

5.6. Observation #6: New Parcels

Parcels that were allocated to new community members or parcels that were not formalized previously

In this particular community, there are cases where the community allocated specific plots for young couples to start their house and farm. Most of the new parcels are however parcels that have existed previously under good-faith or customary practice occupations but had not been formally registered before. The recommendation is that any attempt to register parcels within a community is done after community delimitation and is done systematically for the entire community, to prevent conflicts, to gain economies of scale, and to have a complete cadastre of the community. Figure XX

5.7. Observation #7: Changes in Community areas (inter and intra-community)

Community areas conflicts between Cuco and Manganhela, and between Nbahanine, Chizavane and Chicuangue

These observation reports to inter-community conflict and intra-community conflicts. The first relates to a conflict between one community of our study and another from a different locality as both claim a certain pasture area. The second type of conflict is intra-community and in this case, the main issue encountered was the fact that three communities were claiming the areas where tourism investments had been made, with the argument that they wanted to have more compensations from these investments (Figure 11).

The resolution mechanism for the inter-community conflict involved the district authorities and a decision was made to allocate the pasture area to Cuco community.

With regards to the intra-community conflict, the resolution mechanism encountered was: (i) utilize the information given by the parcel tenants with regards to the name of the community to which they belong, and from this information draw a more defined limit between communities; (ii) agreement between 1st degree and 2nd degree local chiefs (local community council) that benefits should be divided between the eight communities since they all belong to a main community of 1st degree, as the example of the health center that was built in the center of the locality. The final boundaries are still under discussion within the local community council.

6. CREATING AN EFFECTIVE AND SUSTAINABLE LAND CADASTRE

In order to manage ongoing practices and guarantee a regular update of the cadastral system and its information, government must include in the methodology specific procedures for cadastre

maintenance and provide the appropriate mandates and tools for that matter. This chapter proposes several initiatives that as a whole ensure an effective and sustainable land cadastre.

6.1. Involve Communities in the maintenance of their cadastral information

From previous work and tests performed (Balas et al, 2016a, 2017a,b; Norfolk, 2017; Groenendijk et al, 2017), there seems to be a common understanding that communities can be made responsible for this task. This however only brings benefits if these changes are recorded into the National Cadastre and not only part of the community cadastre.

Maintaining and updating a cadastre will need the involvement of those involved directly with the assets being transacted, and it makes sense to create a local level mechanism to make the registration, fulfilling the formalities required by law. For that to happen, appropriate means must be delivered so that communities not only capture these changes but that these are sent to the Land National Cadastre for update. the following recommendations are proposed:

1. A Cadastre Committee should be nominated (may be a part of the Local Community Council or Council of Natural Resources Management or even through a *paralegal*) and this committee should be accountable to the Locality or Administrative Post Authority and recognized by the cadastre services (District, Province, Central);
2. All documents in writing, maps and imagery should have a copy which is entrusted to the leadership of the community: (i) a dossier, containing all parcels that were registered for that community, must be delivered to this council or to the locality authority, with specific areas for updates (amendments). This dossier should be available for public consultation; (ii) a map with all the registered parcels within the community must be created and delivered to the community;
3. The members of the council must be trained with regards to all working processes and legislation to ensure that update of the cadastre is made within the law and following the pre-defined procedures;
4. In communities where there is internet access, and where registration was performed through the community members, consider delivering a mobile device with the means to request updates into the cadastre system (through a specific mobile application for that purpose).

6.2. Include changes to methodology and tools

None of the above would be feasible unless Government sets up a series of initiatives to:

1. Deliver the communication channels between the community and the district land offices;

2. Establish a fee to accommodate required changes - first registrations are being performed subsidized by the Government and its partners but we recommend that all transactions thereon must be mandatory to be registered at a cost. The engagement of different stakeholders in order to keep a record system (land cadastre, property cadastre and others) up-to-date must be made on a payment for services base. If communities are to be involved in these activities, it makes sense that they are compensated for the services they will provide;
3. Avoid duplication of authority - the limits of the community should correspond to the limits of the locality, avoiding thus the creation of double level of authority and facilitating the communication and authorization process;
4. Adjust the DelCOM/RDUAT methodology to contemplate the processes for the lifecycle management of the cadastre, as illustrated in Figure 12;
5. Adjust the SiGIT application to: (i) create the community dossiers; (ii) provide maps of the community cadastre; (iii) adjust the mobile application (SiGIT Mobile) to contemplate these new workflow and processes, and guarantees that this application can be fully operational to support the cadastre.

6.3. Provide Reliable Spatial Data Quality

Most of current cadastral maps had been made about ten years ago, using scales 1:50,000 and 1:250,000 and these are not adequate anymore. In order to assure geospatial information coherence, it is necessary that they have all the same cartographic base, therefore it is important that DINAPOT[6] (or the territorial planning and mapping entity) an official orthophotomap of Mozambique, with the official administrative divisions and all public delimited lands, including reserves, and official servitudes. A network of territorial reference points[7] must be completely updated and populate the territory with necessary density. The access to the primary territorial information must be provided free of charge.

6.4. Interoperate with other land related cadastres

A complete and accurate land cadastre requires data from a multiple entities. There is a need to interoperate with other cadastres, both upstream and downstream. Examples of this would be the interoperability with property cadastre - to interoperate and share information with regards to land and property information, with ID system - to update tenant information whenever changes occur, and with mining cadastre - to ensure that all validations are performed based on accurate and up-to-date information, and other municipalities cadastre. This would require that all land

[6] National Director of Territory Planning
[7] In portuguese "marcos geodéticos nacionais"

related information would have to be standardized, based on the Spatial Data Infrastructure that has been created (SDI) with the support of the World Bank, based on the ISO 19152 Land Administration Domain Model (LADM), as well as taking into consideration the interoperability framework that the Government of Mozambique defined for its e-Government systems.

6.5. Making the information of the Land Cadastre a public tool

This initiative is a huge step towards transparency and credibility of the land cadastre. The national directorate of lands has taken this as a flagship activity and efforts are being done to launch a new version of the SiGIT portal still in 2019. Figure 13 illustrates the current version of the portal, currently only available for internal use. The portal can be utilized also to provide some returns on the investment made the Government, in the sense that organizations could pay a fee for specific detailed reports and information.

7. CONCLUDING REMARKS

An effective and sustainable land cadastre should be considered an essential component to properly plan, manage and administer the land. This makes it mandatory that such a cadastre is complete, up-to-date and accurate or it cannot support appropriate decision making. Another essential aspect of such a cadastre is that it needs to accommodate new requirements either from the user perspective or from the policy makers perfective.

As stated before, implementing land information systems is an expensive endeavor and the initial first compilation of the land cadastre is a time consuming and of high cost. Moreover, maintaining this cadastre requires huge efforts not only to collect the changes when and where they occur but also to maintain the systems that deliver this ability.

The recommendations presented in this paper tend to alleviate part of these efforts and transform the land cadastre into an effective and sustainable tool to promote development and security of tenure.

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BIBLIGRAPHY

Balas, M.; Carrilho, J.; Murta, J.; Pascoal, T.; Queface, D.; Carimo; R. Pinheiro; Tualufo, J., *Secured Land Tenure Program In Mozambique - A Fit For Purpose Approach,* 2016, World Bank Conference on Land and Poverty, The World Bank - Washington DC, March 14-18, 2016

Balas, M., 2016, *National Land Cadastre in Mozambique - SiGIT as a lever to success,* FIG Commission 7 Conference on Cadastre 4.0, 24-28 October, Coimbra Portugal

Balas, M.; Carrilho, J.; Murta, J.; Joaquim, S; Marques, M; Lemmen, C. Matlava, L, 2017, *A Fit For Purpose Land Cadastre in Mozambique,* World Bank Conference on Land and Poverty, The World Bank - Washington DC, March 20-24, 2017

Balas, M.; Carrilho, J.; Murta, J.; Joaquim, S; Marques, M; Lemmen, C. Matlava, L, 2017, *Mozambique Participatory Fit For Purpose Massive Land Registration,* World Bank Conference on Land and Poverty, The World Bank - Washington DC, March 20-24, 2017

Balas, M.; Carrilho, J.; Murta, J.; Joaquim, S; Lemmen, Carvalho, J, 2018, *Assisted Community-Led Systematic Land Tenure Regularization,* World Bank Conference on Land and Poverty, The World Bank - Washington DC, March 19-23, 2018

Balas, M.; Carrilho, J.; Murta, J.; Joaquim, S; Lemmen, Carvalho, J, 2018, *SiGIT Land Information System and the Challenges Imposed by the Fit for Purpose Approach to Land Administration,* XXVI FIG Congress 2018 Embracing our smart world where the continents connect: enhancing the geospatial maturity of societies Istanbul, Turkey, May 6–11, 2018

Dale, P.F; McLaughlin, J.D; 1998, Providing a Detailed Discussion of a Third Type of Cadastre, the "multi-purpose cadastre", Land Information Management 63-84.

Enemark, S.; Bell, K.; Lemmen, C.; McLaren, R., 2014, *Fit-For-Purpose Land Administration,* joint FIG/World Bank publication. FIG Guide 2014. ISBN 978-87-92853-10-3. International Federation of Surveyors, Copenhagen, Denmark

Enemark, S.; Clifford, K.; Lemmen, C.; McLaren, R., 2016,. *Fit-For-Purpose Land Administration - Guiding Principles for Country Implementation.* FIG/World Bank.

Enemark, S., McLaren, R. and Lemmen, C.H.J. (2016): *Scaling Up Responsible Land Governance: Guiding Principles For Building Fit-For-Purpose Land Administration Systems In Developing Countries.* 2016 World Bank Conference on Land and Poverty, The World Bank - Washington DC, March 14-18, 2016

FIG, "The FIG Statement on the cadastre", Publication No.11, 1995

Groenendijk, E.M.C., Lemmen, C.H.J. and Bennett, R.M. (2016), *Educational tools for fit-for-purpose land administration: experiences and lessons from Mozambique*. In: GIM International, 30(2016)8 pp. 29-31

Larsson, G., 1971, Land Registration in Developing Countries, World Cartography

Larsson, G., 1991, Land Registration and Cadastral Systems: Tools for Land Information Management,: John Wiley and Sons, Inc.

Lewis, L., *10 vital considerations for software implementation: how to ensure success of your new land administration system*, Thompson Reuters

McLaren, R., Enemark, S. and Lemmen, C.H.J. (2016): *Guiding Principles For Building Fit-For-Purpose Land Administration Systems in Developing Countries: Capacity Development, Change Management and Project Delivery.* 2016 World Bank Conference on Land and Poverty, The World Bank – Washington DC, March 14-18, 2016

McLaren, R., 2016, *Crowdsourcing Land Rights*, FIG Commission 7 Conference on Cadastre 4.0, 24-28 October, Coimbra Portugal.

Norfolk, Simon: *Aplicação da Cadeia de Valor da Terra Comunitária (CaVaTeCo) nos processos de formalização da posse da terra e a emissão de certificados de DUATs pelas comunidades locais*. White Paper. Terrafirma, August. 2017. Maputo

UN 2030 Millennium Sustainable Development Goals, UN Agenda for Sustainable Development, https://sustainabledevelopment.un.org. UN.

West, H.W., 1969, The Role of Land Registration in Developing Countries, Chartered Surveyor, Nov. 1969.

Williamson, I.; Enemark, S.; Wallace, J.; Rajabifard, A. , 2010, *Land Administration for Sustainable Development*, ESRI Press Academic

Williamson, I.P., 1985. *Cadastres and land information systems in common law jurisdictions*. The Survey Review, Part 1, Vol 28, No 217, 114-129. Part 2, Vol 28, No 218, 186-195.

Williamson, I.P., "*Cadastral and land information systems in developing countries*", The Australian Surveyor, vol.33(1986), No.1, pp27-43

Williamson, I.P., 1991. *Land Information Management at the World Bank*. The Australian Surveyor, Vol 35. No 5, March, 41-51.

Williamson, I.P, 1995, *The Justification of Cadastral Systems In Developing Countries, Geomatica,* Vol. 51, No. 1. 20p.

FIGURES

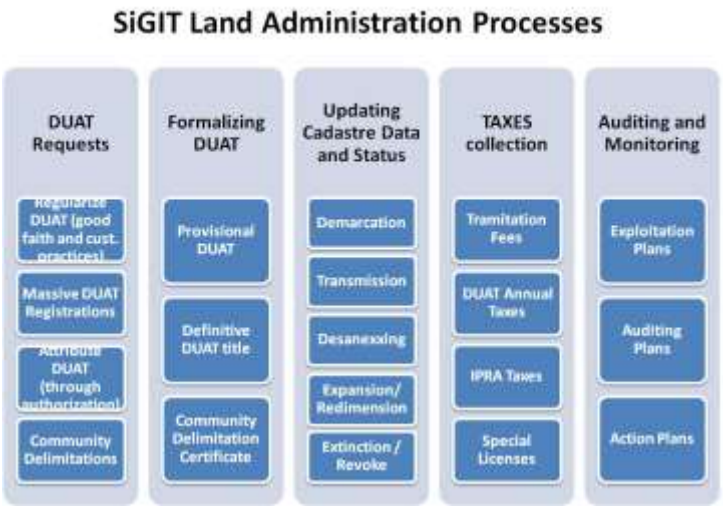


Figure 1: SiGIT current functionality (Balas, 2016b)

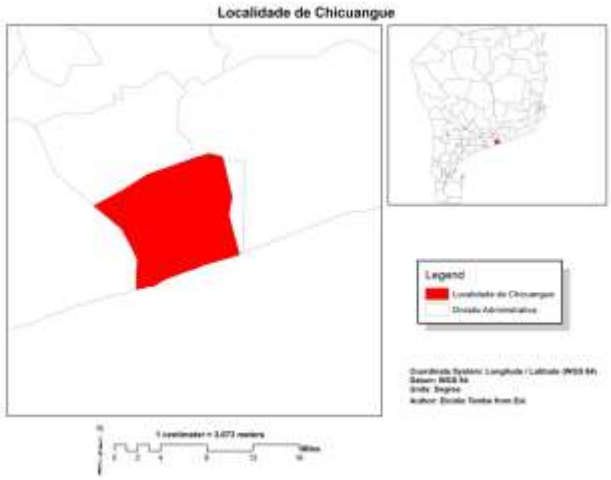


Figure 2: Locality of Chicuangue, Administrative Post of Chidenguele, in Madlakazi District

Figure 3: Training the members of the local community council

Figure 4: Public Presentation meeting

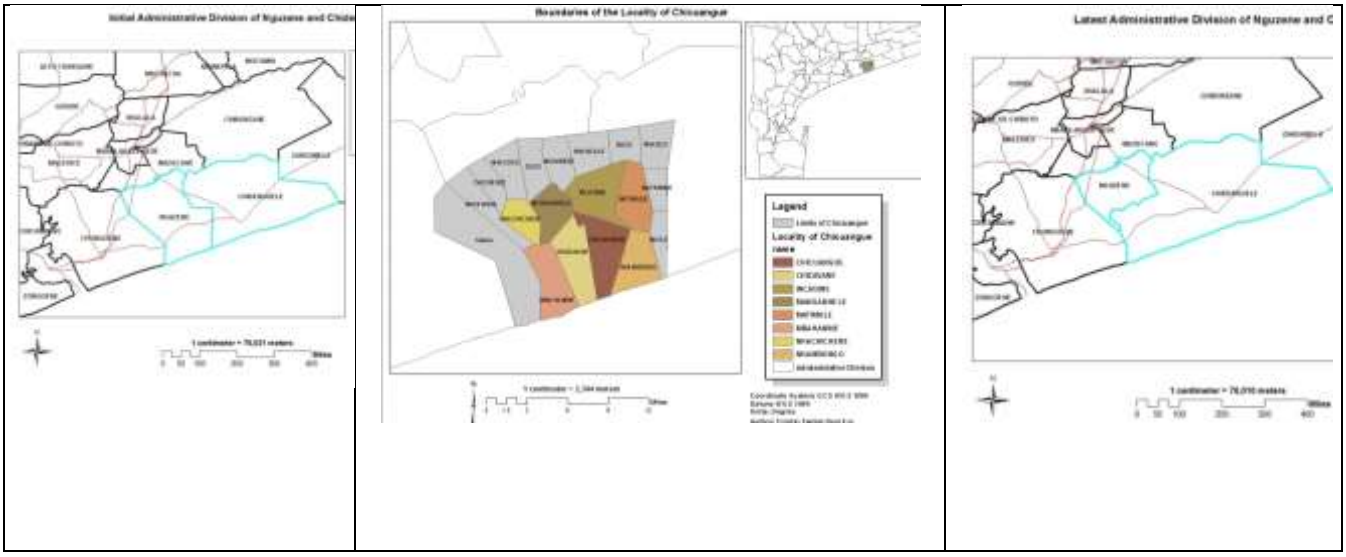


Figure 5: Changes to the locality boundaries either through Government decree or due to required adjustments on the field

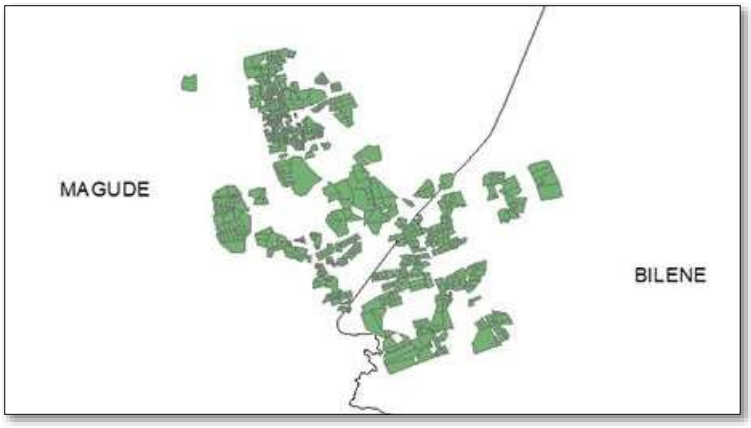


Figure 6: Parcels belonging to Magude but when displayed at the map they fall into Bilene boundary. Requires adjustment to these boundaries.

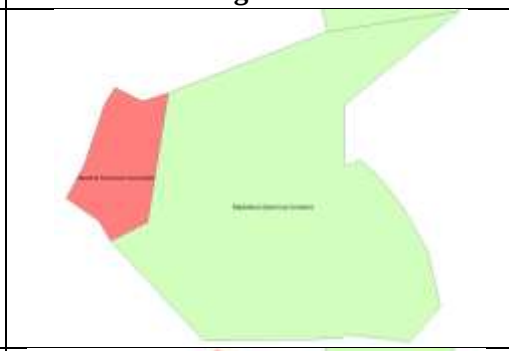
Change	1st registration	2nd registration
A mother has transferred rights to two of her children		
An uncle has transferred rights to a niece		

Figure 7: Changes of the land cadastre through transmission of rights (Need to disaggregate parcels)

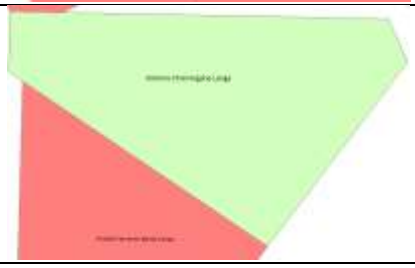
Change	1st registration	2nd registration
Inclusion of the husband name as a co-title holder		
Inclusion of the husband name as a co-title holder		

Figure 8: Change in the tenants information (either full transmission of inclusion of another tenant)

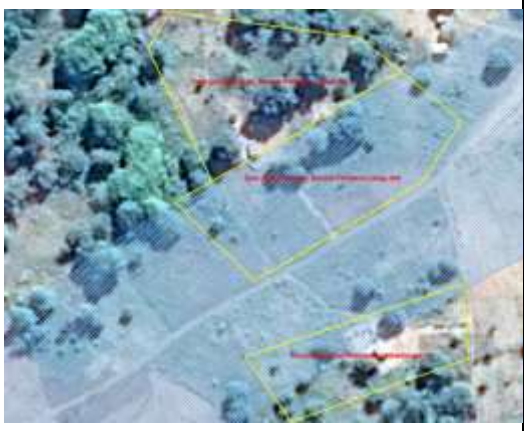


Figure 9: two cases where the limits go beyond the protected area.

Figure 10: The Community (all eight of them) decided to give a plot of land to build a health center, one to serve as the house of the resident nurse, and one plot for a church (area in blue)

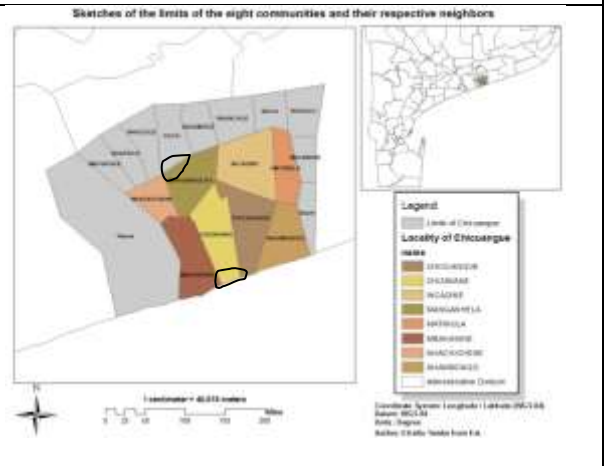
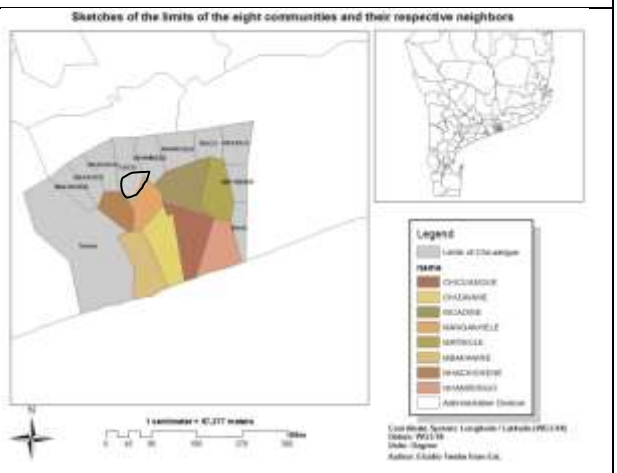
Conflict areas	Proposed boundaries
	

Figure 11: Inter and intra community conflicts

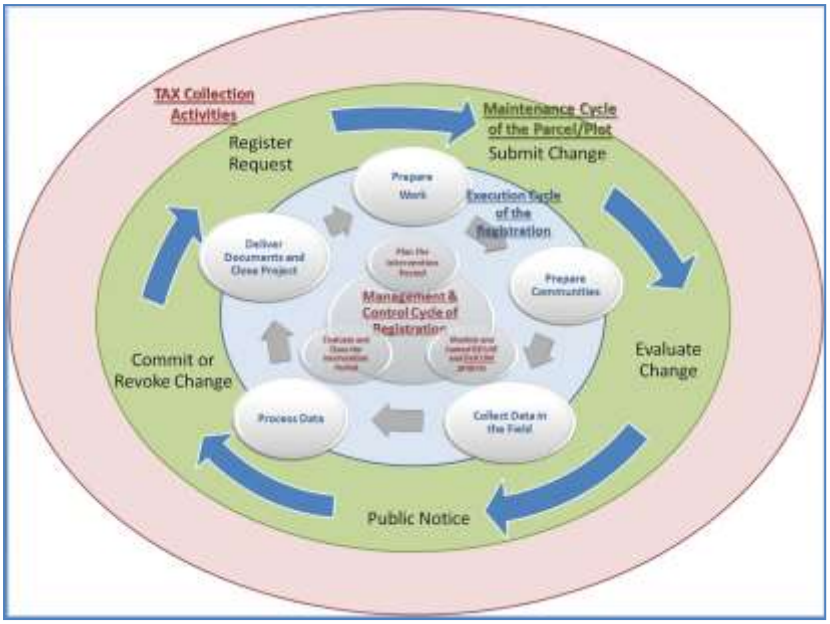


Figure 12: Proposed Changes to the Current Methodology Processes

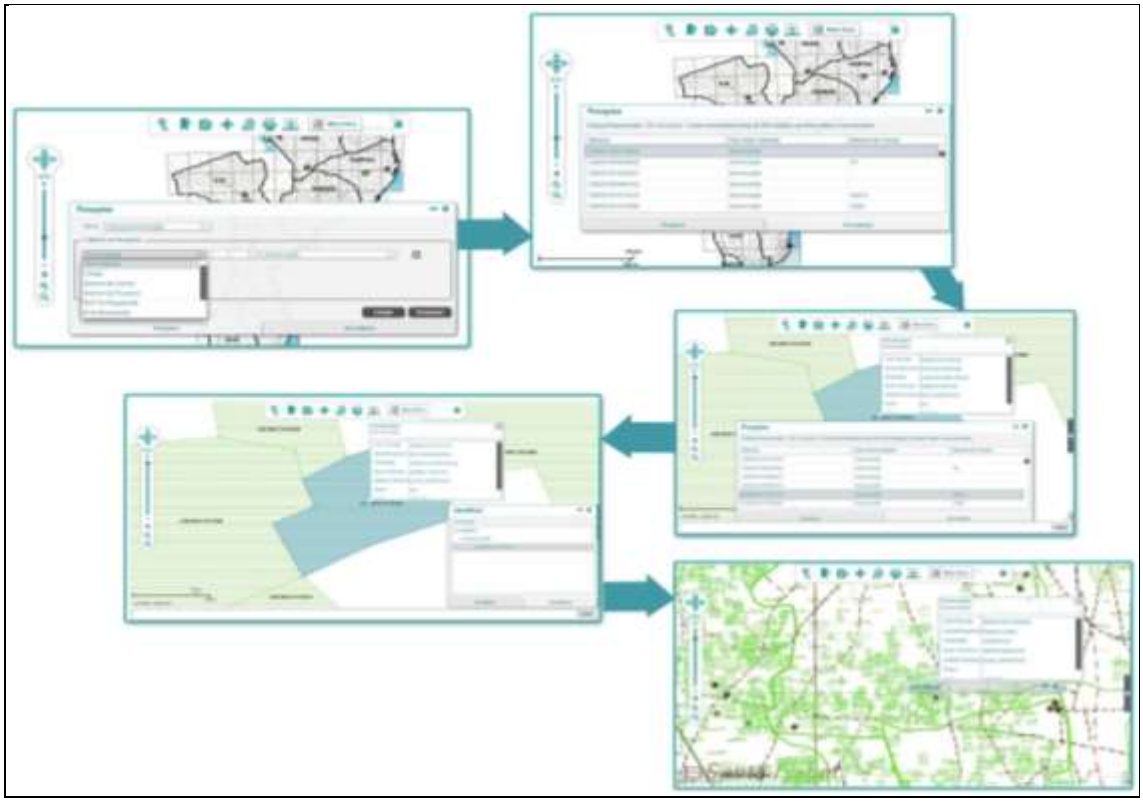


Figure 13: The National Cadastre GeoPortal

BIOGRAPHY NOTES

Marisa Balas is the Operations Director at EXI, a Mozambican company responsible for developing and implementing the Land Information Administration System (LIMS/SiGIT) in Mozambique. She has a Masters degree in Management of ICT and a degree in Business Administration. In the past 5 years she coordinates the team that supports the SiGIT land system at DINAT. She also a Project Management Professional and teaches Project Management and Strategic ICT planning at the University Eduardo Mondlane. Her current interests are related to program and project management and the improvement of the Fit For Purpose Community Delimitations and Individual Parcels Registration methodology, involving communities in the process of data collection and data maintenance.

João Carrilho is an Environmental Engineer, and MSc. in Remote Sensing. Currently an independent Consultant, advising the National Director of Lands in Mozambique. He coordinated Land projects from 2011 to 2016, implementing systematic individual and community land tenure regularization. He managed rural finance projects from 2006 to 2011 Carrilho served as Vice-Minister of Agriculture and Rural

Development from 2000 to 2005. He was the Chairman of the Institute for Rural Development from 1996 to 1999. Carrilho is undergraduate in Civil Engineering and Agricultural Development.

Kemal Vaz is an Agriculture Engineer. Is a Senior Partner and Managing Director of Verde Azul Consult Lda. VA has implemented in partnership with HTSPE-UK the MCA-MCC funded project to support the creation of the existing national land administration system. Mr. Vaz has provided leadership to various projects implemented by VA in land management and administration. Managing land registration projects like PROMAPUTO for the Municipality of Maputo (World Bank Funded), GESTERRA, technical assistance to the National Directorate of Lands (funded by the Netherlands and Sweden), PROSUL, promoting land registrations for beneficiaries of Red Meat, Horticulture and Cassava value chains (funded by IFAD), LANDSCAPE an integrated project to register 320,000 land registrations and 400 community land delimitations to secure investment opportunities in agriculture (Sustenta) and Forestry (FIP) private sector initiatives for small scale enterprises (funded by the WB, managed by FNDS).

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