Addressing Fuzzy Boundaries in Community Delimitations for Systematic Cadastre in Mozambique

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Abstract

This article is part of a series of studies that have been conducted regarding the process of systematic registration of land rights in Mozambique, both for communities and individual occupants. The methodology adopted to support the systematic registration, combines the delimitation of community lands and the registration of individual parcels. According to the proposed methodology, the outline of community boundaries must be established before individual rights are captured, and that must be the result of a consultative and participatory process.

It is known that various conflicts between neighboring communities and individual users result from boundary disputes. Furthermore, when considering the concepts of “continuum of rights” and “bundle of rights” (UN-HABITAT, 2008), provision should be made for overlapping and sharing of rights in the same parcel (Agustinus & Lemmen, 2011). If not taken care of, systematic land rights recordation can lead to an increase of conflict situations. Therefore, one of the main challenges requiring solutions through the methodology is that of boundaries: administrative, inter-communities and inter-parcels.

These potentially conflicting situations occur more frequently in border areas, where there is no correspondence between the administrative division and community circumscription. While some discrepancies arise from the technical cartographic process or in relation to both reliability and precision of representation, with different sources, there are real uncertainties and overlaps, generally not covered by field staff and their data collection instruments. Field staff, also generally, does not allow for the possibility of the same area being adjudicated to two communities or individuals simultaneously.

The solution proposed by the authors is to explicitly incorporate the knowledge of these discrepancies, particularly those rooted in history since the commencing of the colonial regime and, with that, the consultative process, into the programs of systematic registration of community and individual lands, by introducing a category of areas of potential overlap and or uncertainty as to rights and users.

**KEY WORDS:** Community Delimitations, Administrative Limits, Land Cadastre
I. Introduction

This article draws from the experiences of different studies (Balas et al, 2018, 2017, 2016; Monteiro, 2015; and Cabral & Norfolk, 2016) that have been conducted regarding the process of systematic registration of land rights in Mozambique, known as the Terra Segura program, both for communities and individual occupants. The laws in Mozambique determine that land rights can be acquired by occupation, both for communities and individuals, either by customary norms or in good faith, regardless of formal registration. The Constitution, in article 111, obliges the State to recognize such rights (Moz. Const., 2004, p. 111), except in legal reserve or if the land has been adjudicated to another person or entity. While there is no legal requirement of formal registration attached to such recognition, the government promoted it in order to improve and increase knowledge on the situation on the ground and also with the aim of increasing security of tenure and inclusion of communities and individuals in investments. In this way sustainability of the environment and land use and improvement of the overall land governance in rural areas is promoted. The emergence of land related large scale projects also prompted this initiative. As more than 99% of the country’s agricultural holdings are not registered (INE, GoM, 2011), a large scale, massive systematic registration was deemed necessary. Five million individual holdings are to be recorded and 4 thousand communities to be delimited. The World Bank and other government partners are supporting the government in this endeavor.

A. The context

While some pilots started to be implemented around the year 2000, the activities were decelerated allowing for its review and, in this way, to regulate some challenges. After 2007, two main initiatives took place. First, a group of donors agreed to support a project to assist communities in the delimitation of their lands. Conceived as a tool to respond to demand coming from the communities themselves, it later changed to a supply-led approach. The second, a Land Services Project under the Millennium Challenge Corporation funded project, implemented both community and individual land rights regularizations. It was later agreed that individual regularization should preferably take place sequentially where community delimitation was completed. The moto was “delimitation first” (Monteiro, 2015).
B. The problem

Two problems related to this stance are attracting the attention of the land administration institutions. The first one relates to the number of field records that fail to be validated to enter the national land cadastre in its Land Information Management System (LIMS) which in Portuguese translates into SIGIT - Sistema de Gestão de Informação sobre Terras. The methodology and the software requires a correct location within an administrative unit to be validated. There is the perception that unvalidated records lie mainly close to the limits of such units. Recognizing that this could well be due to reliability and measurement errors in the reference maps as indicated by Mendito et al (2007) in Figure 1, some rules of conditionality for data collection were relaxed in due time. For instance, validation of the location of the parcel within an administrative unit lower than district-level is no longer required. The question is: should the program stick to the “delimitation first” rule or should it also be relaxed, and under which conditions?

Secondly, with the acceleration of the registration, in a matter of a few years there will be some 4 million registered parcels, with their land use titles issued. Annually, judging by the recent experience, one can easily expect some 500,000 new individual/household land use titles and some 200 community delimitations. There is doubt on which level should administrative tasks be delegated, so as to allow it to be as close as possible to the land rights holders, to keep the cadastre true and updated. There are four possibilities – the district, the administrative post, the locality, or the community, the latter being the closest, but not currently a level of state administration. Should the program suggest that communities be elevated to locality status to allow for a smooth delegation of administrative powers of cadastre management?

These issues are compounded by the fact that there are strong opinions from two main points of views among officials and practitioners: the first says that if it is well done, linking community delimitation to individual rights recognition does not only have the potential to reduce the occurrence of conflicts, but rather creates a favorable environment to improve the overall land governance, starting from the mapping and the land use planning and its implementation. And, indeed, it has the value-adding of contributing to the overall governance of the rural transformation, which implies changes in land occupancy resulting from transactions related to consolidations, resettlements and land use changes within the community. In support to this point of view is the fact that this approach helped in strengthening the position of communities and individuals in negotiations with large scale land related investments in plantations, mining and other resettlement inducing infrastructure investments.
The other point of view defends that there is no need to link individual use rights recognition to community delimitation, that in fact it can even delay the process of community delimitation and increase substantially the chances on conflict. And, since the lack of registration or documentation does not preclude the acquired rights, it may only be needed if a conflict or threat occurs. Furthermore, when considering the concepts of “continuum of rights” and “bundle of rights” (UN-HABITAT, 2008), provision should be made for overlapping and sharing of rights in the same parcel (Agustinus & Lemmen, 2011). As it is known that various types of conflicts between neighboring communities and individual users may emerge from boundary disputes, there is the risk that the systematic land registration with hard-set limits of communities may increase local inter- and intra-community conflicts, and those between the communities or individual/household good-faith occupants and external agents, including investors. It might, indeed, reduce security of tenure. Therefore there is a need to work carefully – and slowly – to avoid conflicts with potentially disastrous consequences for social and economic stability (Reyes-Ramos M. E., 2005; Takeuchi & Marara, 2009).

While both of them admit that it is not necessary to have rigid boundaries for the communities, none of the views explicitly refers to ways to address boundary uncertainty in relation to territories of administrative powers and administrative units, and integration in a wider governance system, in a way that the mandate of cadastral maintenance can be delegated to communities. Cabral and Norfolk already raised these issues, concerning the conditions for actual decentralization in land governance (Cabral & Norfolk, 2016, pp. 36-37), but stopped short of offering a course of action. We follow on their steps, trying to find a proposal for a solution in this paper, which is about dealing with uncertain and fuzzy community boundaries, taking it as an advantage and not as a mistake or drawback.

C. Hypotheses

According to the methodology in practice by the Terra Segura program in Mozambique (Matlhava & Balas, 2017) a draft map of community boundaries should be established before individual rights are recorded and the areas where individual titled use rights cannot be granted should also be identified beforehand, including those of common use. However, for the final community limits to be drawn, (Balas, et al., 2018) recommend that individual parcels must be collected and indication to which community they belong to should also be captured This can be achieved in a participatory process, involving consultations to and participation by the communities, with inclusiveness of all and with the community-leadership (Balas M., et al., 2017). The opinion and judgment of the traditional leaders has, a heavy weight in the consultation process.
Many of today's community leaders are descendants of the traditional authorities, called régulos or regedores, which translates in English to rulers, recognized by the colonial power (República Portuguesa, 1961), and assigned to designated administrative areas (reedorias) (Falcão, 1970), which were administrative units to implement the so called indirect ruling (Florencio, 2008), whereby the state uses local authorities to enforce its rule. The administrative posts, localities and villages (povoações), the lower levels of the administrative division defined in the first Constitution of the Republic of Mozambique, relates to one or more "reedorias" (Ministry of Agriculture and Fisheries, 1995). Why communities do not correspond to reedorias? Because within a reedoria more than one community may be identified according to the criteria of the law. Customary power used to have two to three layers in hierarchy, and a community usually corresponds to the second or third layer – although, in some cases, it also may correspond to the entire reedoria.

Since 1975, there have been adjustments, subdivisions, and consolidations in the Reedorias, and there is always the possibility that new state administrative units are created in the future, requiring an update and maintenance of the mapping and of the cadastre. Figure 2 illustrates one of the latest updates that were made to the administrative division where several new districts were created.

We hypothesize that the inconsistencies do not only derive from technical cartographic or field data collection errors. Also the traditional social organization at village level relates to the inconsistencies being reported, which should be reflected in the draft map of community boundaries.

After this introduction, the second section presents some of the definitions used as well as the assumptions and their justifications. The third section informs about the materials used and the methods applied. The results and their discussion are presented in the fourth section. A fifth and final section concludes, with recommendation of further action and research.

II. Boundaries and Community Land

A. Definitions

A boundary can be defined as a line separating two administrative, socioeconomic, natural and cultural realities. It can also be interpreted as a buffer, around a line, where there is interaction between contiguous units, with some sort of different realities. Looking away from the boundary, there is the identification of a territory, both physical and cultural, of a community, institutions. It can then be seen as a line or buffer where continuity is dissolved in dimensions enough to establish a distinguishable pattern of spatial distribution of different units, which we call communities (Haesbaert, 2005; Souza & Gemelli, 2011).
If languages and dialects are a proxy for cultural, administrative and political institutions, as well as practices of land administration (including customary rules and dispute resolutions, where it is easier to witness exchanges and miscegenation) one should not expect rigid boundaries between communities – except for central administration purposes.

The implication of this is that it is risky to draw a rigid line for any other objective, and maps with well defined limits of administrative units are more the convenience of the states than of the civil society. Indeed, in the past there have not been many boundary disputes between communities – they start emerging more often as a result of population densification and the understanding of the increasing scarcity of resources. But even in that case, there is the need to consider the intrinsic mobile and fluid nature of the boundaries and boundary regions.

The Mozambican legislation provides for a definition of community (Assembleia da República, 1997) and criteria of boundary setting that is mostly participatory self-identification by the community and its members (Ministério da Agricultura e Pescas, 2000). As stated above, the opinion and judgement of the traditional leaders has a heavy weight in the consultation process.

B. Assumptions

The authors assume that the current approach to traditional communities boundary delimitation resembles that of the colonial regime.

The delimitation of indigenous - conquered - people has been a key policy instrument of most land occupying colonial regimes. That it is not only applicable to the colonies far from the occupying nation, such as the cases of Mozambique, Angola, Brazil, Central American countries and Indonesia, to name just a few, but also for occupied territories close to the occupying power.

This very issue was discussed in relation to the regimes, such as submission, integration, autonomy, and indirect rule, to impose in the colonies, particularly after the Berlin Conference, i.e., post-1885. Both Garret (1910) and Direito (2013) provide an extended account of that.

Bárbara Direito, (Direito, 2013, pp. 55-56), discusses the underlying motives for “protection” of indigenous property, the counter-argument against it because it would subtracted the communities from the good influence of the colonization; she also refers to the criteria set for the delimitation, one more socially oriented, the other more technically oriented, both defending enough land to ensure food security and availability of able-bodied laborers. Note that the definition of community, in art. 1, n.”1 of the current Mozambican Land Law (Assembleia da República, 1997) also refers to “protection”. In what refers to the criteria, self-identification of the territory very much aligns with
Rui Ulrich (1910), as cited by Direito (2013) that “governments should be ‘generous’ in the area to be reserved in order to ensure the future survival of the population and avoid conflicts” and was part of the agenda in conference on land delimitation in 2010 (Cabral & Norfolk, 2016, p. 27).

Fernando Florencio (Florencio, 2008, p. 373) discussing indirect rule and neo-indirect rule, through régulos or regedores states that the colonial demarcation effort and the creation of circumscriptions and regedorias intended to substitute the local social organization for the logic of the colonies and colonizing nation. He also shows that the régulos had administrative functions and that “from 1994 onwards […] what happened was] the progressive restoration of the most significant functions played by traditional authorities during the period of colonial administration.” [op. cit. p.385].

III. Materials and Methods

For this study we resorted to documents providing historical and legal information on the definition of limits of administrative units and “indigenous” lands, as well as maps representing such documents.

From the beginning, it must be recognized that several maps are missing such as the map of localities for the entire country and the map of Regedorias in some parts of the provinces of Zambézia and Tete due to poor visibility for digitization; others cannot simply be compared due to differences in scale, except in very general terms. We decided, even so, to proceed, and to accept, as the only possible option, a generous dose of visual interpretation.

We used the map of the limits of Administrative Posts, which we know was drawn on a cartographic base at the scale of 1:250,000, much lower than that of the imagery used in the field, of some meters.

Shapefiles for the communities already delimited were used, as well as the boundaries of individual parcels recorded under the implementation of field work. It should be noted that these shapefiles are based on GPS-collected data, with different precision and by differently trained staff. When community delimitations is performed, a file is created according to the relevant legislative instruments. Not all files and reports of each delimitation were at hand, but we had access to those available at the central office of the National Directorate of Lands (DINAT). Processed validation maps produced by SiGIT– were also available and community shapefiles provided by the provincial agencies of DINAT.

How could we judge the reliability of the delimitations? What could be the term of comparison with the current community delimitations and the official administrative division? As we faced the need to have a cartographic expression of how community organization evolved in the country, we decided to digitize and to bring to the pool of materials the map of the administrative division of Mozambique.
into regedorias, based on the rationale presented above, although on those limits we saw signs of more concern for the comparisons because of the inclusion of some settlements rather than their delineated territories.

A simple geographical analysis was undertaken. This is the result of lack of reliable data and also because the explanation of the phenomena should be easily and visually supported.

The analysis focused on half a dozen of communities for which there are abundant data. The limits of the involved Administrative Posts (AP) and Regedorias (R) were compared, as well as the inconsistencies due to differences in scales and other technical related reasons. The old 1:250,000 maps, over which the regedorias were drawn and recent satellite imagery, assisted in checking for correspondences and mismatches. Those limits were compared to the limits of the involved communities including the parcels recorded, and highlighting those which have not been validated, and inspected for the limits that have the most “attraction”. Some polygons were subjected to a smoothing to conform with natural features, if any, and the before and after comparison assisted in compiling technical reasons for inconsistency.

We evaluated whether:

a) The limits of AP are close to those of R;
b) Limits of R were closer than limits of AP to community limits;
c) Most invalidated parcels were located close to limits;
d) The overlaps between contiguous communities were significant in cases where there have been reports of inter-community disputes.

In cases with a) and b) confirmed, there is a good reason to include the map of R as part of the basis for preparation of the draft community delimitation. This can be a desk task at district level, with the participation of traditional and other community leaders belonging to the Consultative Councils.

In cases with c) and d) confirmed, we have reasons to suggest rules to avoid hard-set line boundaries, eventually recommending a buffer, instead of a line, to define and represent community boundaries.

We evaluated the occurrence and need to have a different class of land use where clustered communities jointly use the same area, without reports of disputes.
IV. Results and Discussion

A. Spatial occurrence of inconsistencies

Along APs limits

More than 80% of the invalid records due to conflict of limits occurring within the limits of localities that are bordering the AP, being these localities that have expanded in terms of population. The population claim they belong to that locality and consequently to a certain AP. Adjustments would then be required to the AP limits but this is a time consuming effort and one that Terra Segura cannot afford to wait for.

Along R limits

There was no explicit correlation between the rejections of parcels within the limit of a AP and of a R, as the validation rule is now in terms of districts and not AP and therefore it was difficult to validate this assumption. However, we did found that the map of a R is somehow similar to the one of a community, especially in its inception draft (Figure 11 and Figure 12).

B. Types of inconsistencies

Explained by cartographic errors

The polygons defining the AP, when compared to a background image, reveal inconsistencies typically as a consequence of working at different scales, while better than the map of R – the limits do not follow natural features such as rivers and hill crests. At the very least, those polygons need to be smoothed to conform to such features, as imagery is a key support in the implementation, of the Fit For Purpose - FFP methodology (Enemark et al, 2016).

There are overlaps between contiguous communities attributable to errors in field data collection, within a band width of 300m. However, the legal allowance is of 30m (Ministério da Agricultura e Pescas, 2000), which does not seem realistic for a FFP. Figures 3-11 illustrate the cases above.

Not explained by cartographic errors (reliability)

Some of the limits of Regedorias show shapes typical to include a representation of settlement limits rather than the territory limits. They also show lines which do not seem natural and there is no reason to believe that they have been drawn for election purposes, which could be one reason to redefine administrative limits. But it seems there has been care not to “break” communities as a consequence of this process. In those cases, the limits of AP fit better to the community limits. However, overall,
the limits of \( R \) are closer to the limits of communities recorded in the field as illustrated in Figure 11 and Figure 12.

Some overlaps between communities are large enough to question the reliability of the points collected.

Furthermore, as regedorias were further subdivided into settlements and groups of settlements, it should be noted that some communities, if corresponding to settlements, are part of a larger territory, and it is understandable that some resources are shared among neighboring communities – and, in several cases, a cluster approach has been adopted for community delimitation. Figure 13 illustrates this cluster of communities sharing a large area defined for common pasture.

C. Discussion

• relevance of scales and precision

The available maps and imagery vary widely in terms of scale and precision. A reasonable comparability seems impossible. The spurious precision of 30 meters stated by the legislation corresponds to the width of a pencil on the map and has no relevance in the delimitation at the available scales or the scales for general physical planning.

• relevance of training and quality of staff

While there has been some effort to only enroll trained staff, this does hold at community level. There, we rely on primary and high school graduates that are appointed by the leadership, and who receive a basic training to assist trained staff. They are trained to identify features, to perform simple measurements and readings and annotate alphanumeric data on the mobile app forms. The competence of the trained staff is more important, as they are the ones who first control the quality of data entry. Even considering their lower level of schooling, it was observed, as expected, that local staff has a good record in identifying features in imagery and are very careful in entering alphanumeric data, resulting in low levels of rejection. The main cause of non-validation relates to the quality of geo-data collection, which in turn relates to several factors, including technical skills of staff.

• Addressing causes of cartographic inconsistencies

The base maps available of the APs can be improved at least in what refers to conforming to natural features, such as rivers, lakes and coastal shores, and in some cases, hill crests or roads. These maps are at a 1:250,000 scale and should be adjusted to the scale of imagery provided for field work. These
maps should then be annotated with the assistance of traditional and other community leaders over a map of the AP, with indications of features to be verified in the field and which are not mapped at the original scale.

- **Addressing non-cartographic inconsistencies**

A tentative **draft 0** can be done with the help of the map of R, to (1) identify communities and (b) clusters of communities under the same R or locality. “Grey” areas (those of potential conflict or potentially being shared) should be annotated, as well as areas that are known to be of shared use by more than one community. This map takes into account the history and an initial consultative process undertaken together with traditional authorities.

Even after declaration by individual users about their perceived social belonging, the resulting map should remain indicative as a **draft 1**, which can be further refined, if new information is gathered in the process of updating based on local transactions. The “precision” stated in the legislation should be relaxed. This should be redefined in support to accommodation of the current constraints of location validation due to outdated limit information.

Common use areas should be treated the same way. Whenever a parcel is registered within this buffer, the “value” provided by the occupant in what refers to the community he/she belongs to, will be accepted and validated. This **draft 1** is the base map given to the field teams. The community boundary will be determined by the limits of the parcels, except where there is a clear natural boundary, such as a river or shore or road or any other natural limit.

Even in these cases, i.e., after these adjustments, the boundaries are declared as general boundaries, which can be further adjusted.

V. **Conclusions and Proposals**

The uncertainty of community boundaries and the possibility of overlapping claims in rights in certain areas by two or more communities in Mozambique are often not provided with evidence by field staff and data acquisition. A tempting solution would simply be to avoid the delimitation process. This is a solution that would consider population dynamics and the process of rural transformation of a society in which community rights may evolve to individual rights, or the other way around.

But this solution would require the relaxation of several legal requirements in place, and needs consideration to include:

- The current state of the administrative division;
• The tendencies of territorialization in attribution of rights – for instance for benefit-sharing in timber exploitation, or eventual indemnification as a result of the declaration of public interest, need or utility, including the establishment of state reserves;

• A gradualist approach to the search for reliability and accuracy of the bundle of rights and settlement formation.

The solution proposed by the authors is to deepen the explicit incorporation of the knowledge of these discrepancies, overlaps and uncertainties in the applications and software of systematic registration of community and individual land rights, for the case of Mozambique Terra Segura Program, where the map of traditional territories shall be used. While some uncertainties are already incorporated in some steps of the methodology\(^1\), they should be considered in the cartographic mapping, territorial planning, all along through the cadastre, allowing for areas with overlap and or uncertainty of rights and users.

So, in the light of experience, it is proposed that field work approaches and applied tools must consider the following:

• The adoption of the notion of a boundary “region” (a buffer, instead of a line) in the context of community delimitation. The parcels in such buffer would be used to define the recognized limit of the community more accurately. Only after the individual rights and transaction (in a reasonable time period) are recorded the final community boundary should be approved (Figure 14).

• To consider a specific land use category of areas with overlapping community land use rights, thus allowing more than one community to have their rights registered over the same area of common use. This would eventually imply the inclusion of an “easements” (limitation, sharing of rights or other obligations of the rights holder) section in the “Certidão Oficiosa”, which is the official document of recognition handed over to the community.

• The above solutions would be explicitly introduced in the forms and software, as well as in training processes for the collection, validation and registration of data, considering the specificities of the recordation of rights and the need for its updating, both at community and at district and central level;

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\(^1\) Initially the validation was down to the administrative post. Currently it was reduced to the district level. However, there is a need to consider these proposed buffers around the limits both of the administrative divisions where the validation takes place as well as around community limits.
• Communities and their institutions and members are entitled to their data and information, which they provide and share with the government authorities. They are entitled to keep their data in various forms. They are, then, the adequate locus for the participatory process of maintaining and updating the cadastre. The resulting cadastral map should be displayed at designated places as proposed by Cabral, L., & Norfolk, S. (2016) and Balas (2018).

• Furthermore, it is suggested that in some cases the boundaries of the administrative units should be corrected based on the boundaries of the communities. As an example, a locality should be made of one or a cluster of communities as illustrated in Figure 14, where the cluster of the eight communities will then provide the limits of the entire locality.

• To recommend the strengthening and capacity of the judiciary at the district and higher levels, while mapping conflicts between communities, when they occur, and the way they have been solved. This suggestion stems from the acceptance by the Constitution of multiple legal systems and provides a framework to gradually move from uncodified, unregistered norms and customary rules, to common law, i.e. uncodified but with records of judgements of complains and grievances to establish precedent.
VI. List of Figures

Figure 1: Relationship between type of error, qualitative performance characteristics and their quantitative expression (Menditto, Patriarca, & Magnusson, 2007) .................................................... 15
Figure 2: Evolution of the administrative division in Mozambique - example of an update of 2010 .. 16
Figure 3: Several Regedorias in one administrative post .................................................................................................................. 16
Figure 4: Communities being wrongly designed and respective areas of conflict: initial and final delimitation ........................................................................................................................................................................... 17
Figure 5: Conflicts between two or more communities .......................................................................................................................... 17
Figure 6: Limits of communities that go beyond those of the Administrative post .......................................................... 18
Figure 7: Communities poorly delimitated (blue line) and the attempt to adjust the limits to the real field situation (red line right side of the polygon) after individual regularizations took place .......... 18
Figure 8: Parcels rejected due to conflicts of location (different administrative post or district) from the alphanumeric information .................................................................................................................................................................. 19
Figure 9: Delimitation of a community and the corrections that took place to adjust the limits. ...... 19
Figure 10: Several errors when collecting the limits of a community and the errors caused by a poor office work ............................................................................................................................................................................ 20
Figure 11: One Regedoria and the corresponding new community delimitation ............................. 20
Figure 12: Another example of how close a Regedoria is of the limits of the community .................... 20
Figure 13: Four communities sharing common pastures ................................................................................................................ 21
Figure 14: Attempt to redesign some of the limits based on the individual registrations of parcels indicating to what community they belong to ......................................................................................................................... 21
Figure 2: Evolution of the administrative division in Mozambique - example of an update of 2010

Figure 3: Several Regedorias in one administrative post
Figure 4: Communities being wrongly designed and respective areas of conflict: initial and final delimitation

Figure 5: Conflicts between two or more communities
Figure 6: Limits of communities that go beyond those of the Administrative post.

Figure 7: Communities poorly delimited (blue line) and the attempt to adjust the limits to the real field situation (red line right side of the polygon) after individual regularizations took place.
Figure 8: Parcels rejected due to conflicts of location (different administrative post or district) from the alphanumeric information.

Figure 9: Delimitation of a community and the corrections that took place to adjust the limits.
Figure 10: Several errors when collecting the limits of a community and the errors caused by a poor office work.

Figure 11: One Regedoria and the corresponding new community delimitation

Figure 12: Another example of how close a Regedoria is of the limits of the community
Figure 13: Four communities sharing common pastures

Figure 14: Attempt to redesign some of the limits based on the individual registrations of parcels indicating to what community they belong to
References


