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Mapping for Peace and Prosperity: Applying participatory mapping in conflict-affected settings.

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Abstract:

This paper engages with innovative ways to apply participatory mapping techniques and the latest technological tools in fragile, conflict-affected settings to contribute to sustainable land use. In this paper, the authors describe in detail the process and purpose of a participatory mapping project in northeastern Democratic Republic of Congo (DRC), and elaborate on the lessons learned so far. The paper concludes with a set of recommendations to take the process forward for greater sustainability and long-term land rights protection.

About ZOA

If the aim of humanitarian and development actors is to contribute to a world with long-lasting peace, a world without poverty and hunger, then they cannot ignore the issue of land rights (ZOA, 2019). Even for more short-term objectives such as settling refugees, restoring livelihoods and rebuilding housing and other property aspects relating to land rights such as access to land and water play a central role.

For ZOA, Land Rights is a sub-sector under Peacebuilding. Our work on land rights links to the pillars of our peacebuilding work:

• Strengthening social cohesion and trust;

• Community based security, conflict prevention, and conflict resolution mechanisms;

• Reducing land and water conflicts; and

• Reducing gender based violence.

About Cadasta Foundation

The World Bank estimates that the ownership rights of 70 percent of the land in the developing world is undocumented. Cadasta Foundation uses innovative technology and advocacy to advance global land and resource rights for the world's most vulnerable people. By creating an accessible digital record of land, housing, and resource rights, Cadasta helps empower individuals, organizations, communities, and governments with the information they need to make data-driven decisions and put vulnerable communities and their needs on the map.

Cadasta was founded in 2015 with the mission to deliver a simple, accessible technology solution for documenting the land and resource rights of the estimated 1 billion people in the world with insecure land tenure. These vulnerable populations are left out of government land registry systems, which are top-down and lack the systems, staffing, and resources to reach marginalized communities. Cadasta's mobile tools and cloud-based platform were created to allow communities to map, document, and store their own property, land, and resource rights data and to use the data to advocate for recognition of land rights and to access public and private services that improve their lives.

In all of its projects and partnerships, Cadasta is committed to strengthening women's and vulnerable people's land and resource rights in all of its projects and partnerships.

Introduction

Through the project "Maji Ya Amani"—Water for Peace in Swahili—ZOA International and Cadasta Foundation are working to revive an existing irrigation scheme created in the 1950s in Luberizi, South Kivu, Democratic Republic of Congo (DRC). The project is part of a larger consortium implemented by the Search for Common Ground (SfCG) and the International Rescue Committee (IRC). From the beginning, it was understood that improving the land through irrigation would result in an increase in land value and potential speculation, jeopardizing those who currently occupy and use the land. Due to the ongoing conflicts and tension between the statutory and customary laws, land rights in the area are of particular concern. In the project area, most of these rights are rooted in customary systems that are strained due to ethnic tensions, migratory pressure, and violent conflict.

A Highly Fragile Environment

The Water for Peace project operates within a complex social context, where, despite their efforts, people remain poor and continue to live at a subsistence level. The Ruzizi plain has been an arena of intense conflict in the past. Struggles for political power led to alliances between political leaders and armed groups. Violent outbreaks and insecurity have frustrated attempts to improve agricultural production and other development efforts.

It was here, where the Luberizi river joins the Ruzizi and separates the DRC from its neighbours of Burundi and Rwanda, that an earth dam was built in 1952. Maintenance work was carried out in the 1970s, but over time the dam eroded and finally collapsed at the beginning of this century. Since then, the irrigation system has been comprised of channels bringing water straight from the mountains, but in periods of drought, water is in short supply. In addition, rainfall has become less regular and access to water can be difficult in some areas, even in the rainy season. These problems are exacerbated by the influx of new residents, the shrinking of available fertile land (due to demographic and climatic reasons), land sales organized by chiefs without the knowledge of the smallholders, and co-operatives that are well organized but whose boundaries are not clear. Routes to cattle watering holes have been altered as water becomes more scarce, while other routes have been appropriated by small farmers in need of land. As a result, conflicts regularly erupt between farmers, herders, and landowners. The conflict in the Ruzizi plain is often seen as being rooted in questions of ethnicity. The Ruzizi plain is officially the chiefdom of the Barundi community who present a large minority group in the area. The majority population are Bafuliiro and some of their leaders contest the authority of the Barundi. The struggle for political power has led to a situation that is framed to be an inter-community conflict. However, some observers have criticized that this

is a dangerous over-simplification that does more harm than that it helps to analyse the situation (Verwijen 2015). In 2012, the customary chief of the Barundi was assassinated and more violent incidents have occurred since then. In 2014, a violent dispute between crop and the stock farmers left 34 people dead, including women and children. In this fragile situation any engagement by outside parties with agricultural activities and infrastructure construction needs to be highly sensitive of land rights issues in order to ensure that no harm is done.

The fundamental legislation regulating land rights in RDC includes law no. 73-021 of 20th July 1973 on the general property, land, and real estate and the regime of security interests (so-called Bakajika Law). This text and its decrees of application act as the Land Tenure Code. But the agricultural, forestry, and mining codes also govern the sale, purchase, and renting of land. These laws, which do not agree with each other, now provide a formal legislation that is not rational or consistent. They often overlap with different legal bodies contradicting each other. Lastly, this formal legislation is superimposed onto the traditional land rights system recognized in the the Bakajika Law, which itself has no legal provision for its exact roles and status.

"Maji Ya Amani" – Water for Peace

In this fragile setting, the little that people possess is in under constant threat. Water could easily be "Maji Ya Mijoso"–Water of Conflicts. It is within this context that the project implementers decided to use water as an opportunity for peace and participative mapping to establish informal agreement among different stakeholders, as well as for formally protecting traditional rights. Through the process, water was distributed to meet the needs for agriculture, stock rearing, and clean drinking water. The project is composed of a number of interdependent activities that mutually reinforce each other. Search for common ground engages with the stakeholders around issues of community coherence and communal processes of cooperation. IRC supports the setting up of land management councils and the development of community by-laws (among other things) while ZOA leads efforts to document and secure the land rights of people in the irrigation area and the building of the irrigation system itself. The basis of the land rights protection is a comprehensive participatory mapping exercise.

Purpose of the Participatory Mapping

The International Tropical Timber Organization (ITTO) defines 'Participative Mapping'[1] as identifying, in situ and with the involvement of the communities concerned, the areas and resources which are important to them as well as their position on a geo-referenced map. These areas can include; agricultural resources, the influence of the traditions of different ethnic groups as well as the cultural and historical importance of the sites. Participative Mapping is presented as an indispensable tool for anticipating, minimizing, and resolving conflict that may arise from the creation of an *irrigation perimeter*. It is a tool to assist with decision making, which must benefit the public at large, especially those who are most affected by this *perimeter* and other partners in the *hydraulic* sector. It is a community based concept that emerged in the wake of the Participatory Rural Assessment Methodology in the 1980's (FIDA, 2010)[2].

Strategy Leading to the "Mapping for Thought" Project

To mitigate the risk of conflict, ZOA and Cadasta Foundation facilitated a broad participatory mapping exercise with the government, the customary authorities, and local communities to map and document land rights and the irrigation infrastructure across an initially estimated 5,000 parcels. Including the land administration authorities was key to enable the preparation for recognition of land rights and to ensure that the state was a full partner. Despite the long-standing rivalries and history of violence in the area, key traditional leaders have agreed to support the project following their involvement in the participatory mapping exercise. Provincial authorities have also given guarantees that the current access and land use arrangements will be protected and the participatory demarcation was conducted with the active involvement of the communities, local land bureaus, and technical experts trained by Cadasta. ZOA's partners IRC and SfCG are simultaneously working on the establishment of land management councils and other supportive measures. They have actively engaged the broader community in awareness raising campaigns and the drawing up of by-laws for land management to prepare for the re-established irrigation infrastructure.

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[1] Guide Pratique De Cartographie Participative, 2010, International Tropical Timber Organization (ITTO): https://docplayer.fr/12909184-Guide-pratique-de-cartographie-participative.html
[2] Cartographie participative: l'approche évolutive du FIDA, Conception et exécution des projets de cartographie participative, FIDA 2010.
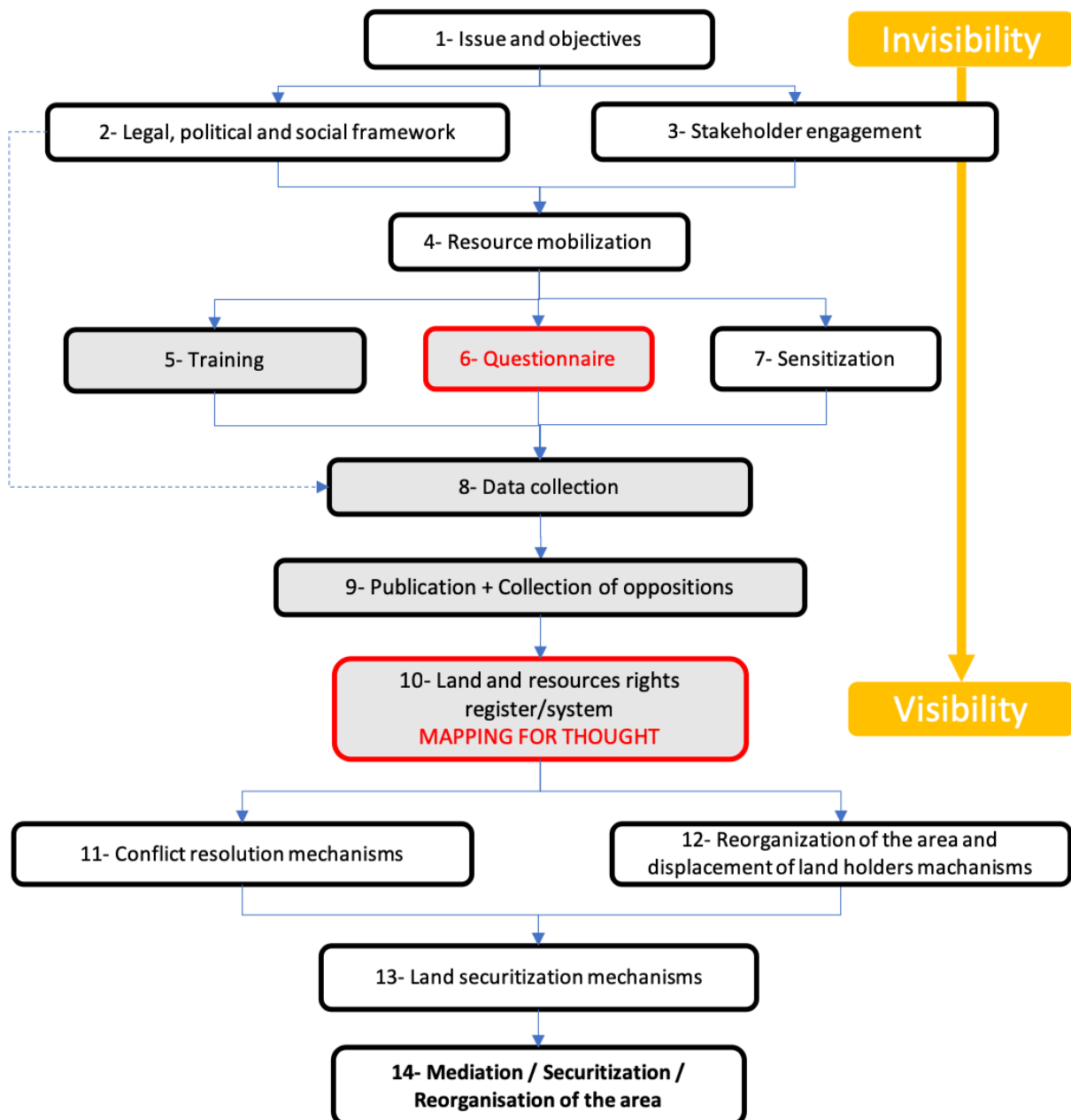
Fig 1: Adopted process for the land securitization in Luberizi, Cadasta's assistance for steps 5, 6, 8, 9 and 10

The Cadasta Foundation assisted ZOA and the stakeholders in a generic process aiming at bringing visibility to existing customary and undocumented land and resource rights. These four steps (highlighted in grey in the illustration above) of training, design of the survey questionnaire, data collection, and publication aimed at making sure that no landholders were left behind, and all rights, restrictions, and responsibilities were mapped and integrated into the system, and therefore made visible.

The process was set up to implement participatory demarcation in this specific and highly conflictual setting step-by-step. By doing this, the necessary conditions for success are highlighted while particularly difficult aspects are traced and underlined. These relate among other things to the diversity of interests that need to be accommodated through the project and the history of violent conflict in the area. Some of the diverging interests are extremely difficult if not impossible to reconcile. This illustrates once more how crucial land governance is for post-conflict stability (see: Van Leeuwen, Van Dijk and Kobusingye 2017). A project like the case described here presents a direct contribution to such efforts and holds lessons for the larger political-economic context. It is demonstrated that such interventions need to be linked to the larger political-economic context in a dialogical way that allows for input from and towards higher levels of governance and policy-making.

The outcome of the process was a land and resource register aimed at drafting different mechanisms established to solve conflicts over land and resources, which also enables people to relocate to more appropriate locations if necessary, without being deprived of access to land, and to register the properties into the formal system where possible.

Recognizing that the project is set in a highly fragile context which requires constant close coordination among all stakeholders, the consortium partners needed to ensure the complementarity of different activities while maintaining a high level of sensitivity towards potentially conflictual issues. Similar to other ZOA land rights projects in Burundi and Uganda, the *Maji Ya Amani* project works from the ground up but requires an integration of activities on different governance levels and active support from actors on various levels. Sustainability can only be achieved through political support and a formal recognition of the identified landholdings and use structures. This means in essence that discrepancies between legal provisions and customary practices would need to be addressed. In such a conflict prone setting with limited state authority, only multi-level approaches, involving a variety of actors to connect different levels of governance seem to promise long-term positive outcomes. At the same time, local cooperation and locally anchored conflict resolution are necessary for the project's long-term success and sustainability. An urgent current challenge is to attach a legal status to the documentation of use and ownership rights. Without this, long-term protection appears to be illusory.

Preparation of the Data Collection

The exercise was based on the principles of the Social Tenure Domain Model (STDM), which provides a framework for achieving consensus among the various actors and stakeholders

involved, including traditional authorities, civil society organizations, local and provincial authorities, and individual landholders.

The setting up of the Cadasta technology is based on a field study questionnaire to decide what data should be included in 'Mapping for Thought', the database of existing land tenure relationships. The questionnaire was drawn up during an initial working group of all the stakeholders in participatory mapping. It was then formatted to be used within the technical constraints of the XLS file, the ODK Collect mobile application connected to the project created on the Cadasta Platform 1.0. Formatting the files can be the source of many problems, so the Cadasta Foundation drew up generic files. In Lubérizi we used a file created specifically for the needs of smallholders and using the STDM model, we classified all the information into three groups; people, property, and the relationship between those people and their property. The ZOA technicians grasped the concept and rapidly created an XLS file that was adapted to surveying the existing properties and infrastructures (roads, irrigation channels, etc.) in the area to be irrigated. These infrastructures play an essential role in land use, and their relationship with the farmers needs to be defined.
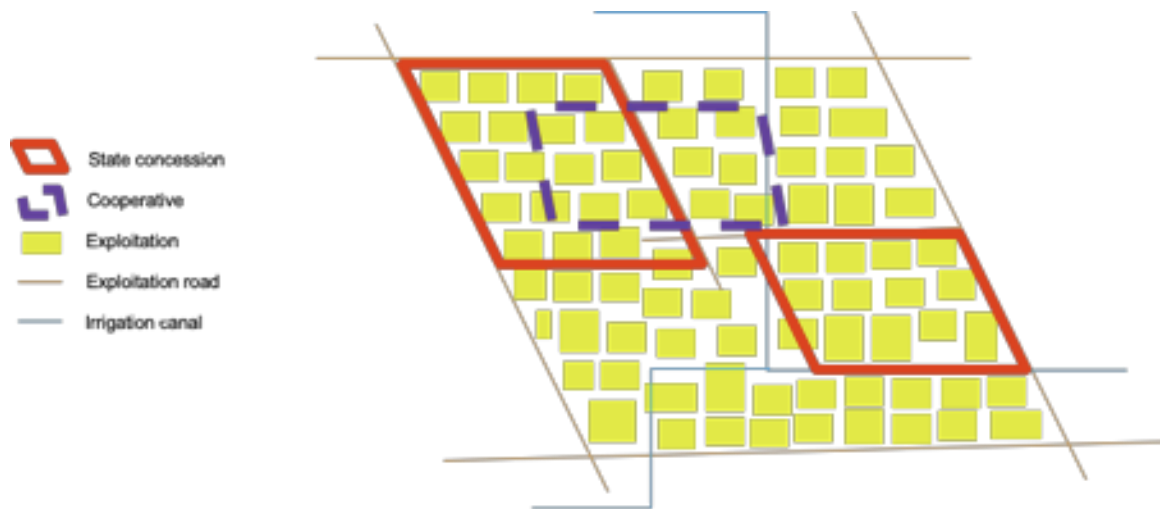

Fig 2: Subset of existing land and resource rights needed to be captured in Luberizi

Technical Solution

The project data was collected using Cadasta's user-friendly electronic cloud-based system facilitating the storage and management of land information. The Cadasta Platform records data on land tenure collected in the field by using many different methods, including smartphones, and tablets, that are downloaded to an online platform. This information can

then be distributed to anyone with a pre-determined user ID and used in any Geographical Information System (GIS) software.

Field Work

The Open Data Kit (ODK) Collect, mobile application used by Cadasta uses Android smartphones to replace paper questionnaires. It makes it possible to collect a range of data; geo-referenced sites, semantic data, images, audio and video clips, bar codes, etc. *ODK Collect*, following the logic configured in the XLS file, can control how the data is to be collected and displayed with dictate filters according to the replies. Whether they are questioning a co-operative or an individual, the data collectors are thus directed to options that will enable them to ask the questions specific to each case.

The accuracy of the geographical data

For the participative mapping in Lubérizi, the choice of the surveying equipment was determined by the accuracy required. The provincial survey department in Uvira uses a nominal scale of 1/2000. Even though this department's survey data is not geo-referenced at present, it was important to adhere to this nominal scale in order to match any prospective land titles to boundary maps in the area to be irrigated. It is also important to mention that in this part of the world demarcation of rice fields is determined by the embankments between them, an accuracy of 20cm by the surveyor is difficult to apply. The accuracy of Smartphones is between 5 and 15m so it was necessary to use GNSS receivers with external antenna/aerials, which are more accurate. The Trimble Catalyst receivers were chosen for their low initial purchase price, but more importantly because they offer a flexibility for the required accuracy, with subscription payments as operations advance. Thanks to position sharing, the Trimble Catalyst gives a WGS84 position at 1Hz (1 per second) in the ITRF2014 *Current Epoch* database, in the form of latitude, longitude, and height, as well as an estimation of positional error. Trimble, at a height of 2m, can achieve a position with a margin of error of up to a centimetre to within centimetres. In Africa, Trimble guarantees error to between 30 and 70cm. However as the techniques are in constant progression we were asked to carry out tests. For two weeks in Lubérizi, using a Trimble France subscription at 10cm, a maximum geographic positional error of 24cms was indicated, which is close to the surveyors nominal scale. When these tests were completed, the 30-70 cm subscriptions that had been ordered were installed and the GNSS receivers displayed an almost constant geographic positional error of 30cm. We should, of course, have compared the positional error produced.

Fig 3: Two female para-surveyors being trained on using the Cadasta tools to collect field data

The choice of smartphone

Using Trimble Catalysts GNSS receivers requires certain types of Android smartphone or tablet. The choice was the Samsung A5 2017. After a short training period with the six field teams for the project, the installation and configuration of the different mobile applications necessary for collecting data went ahead smoothly. The biggest problem encountered was due to the way the smartphones were configured via the developers option (an option specific to each phone) to allow the replacement of the phone's positioning system with that of the Catalyst. However, after some internet research, solutions were found to make it work

Internet Access

Internet access is not required for collecting data in the field, although a regular access is recommended. To meet the needs of this exercise 3G access was installed on each of the six collection units, but as Congolese network was often interrupted or inaccessible in the remote areas of the perimeter, a Burundi 4G was also installed by means of a modem. The very first modem set up on a promontory was stolen, forcing one of our technicians to make a day's journey by canoe, along with its cargo of chickens and mangoes, across the river to Burundi to get a new one.

Electricity

Access to electricity is the Achilles heel for new technology in remote areas, and the Catalysts consume a lot. However, luckily this region of the DRC has good coverage compared to other parts of the country. To provide a backup system for any electricity shortage, large external

batteries were purchased, which replaced the small ones that were provided by Trimble. These larger batteries can take a whole day to charge,

Office Work

After completion of the field operations by ZOA and stakeholders in the Participative Mapping in Lubérizi, the data was loaded on the Cadasta Platform for storage. In 2018, ZOA used the open source Cadasta Platform 1.0. and the data was edited in the Quantum GIS (QGIS). Spatial data was geo-referenced into the WGS84 system, enabling it to match Google satellite images made available worldwide, though satellite images at 50cm resolution were purchased by ZOA in order to increase the quality of the image support.
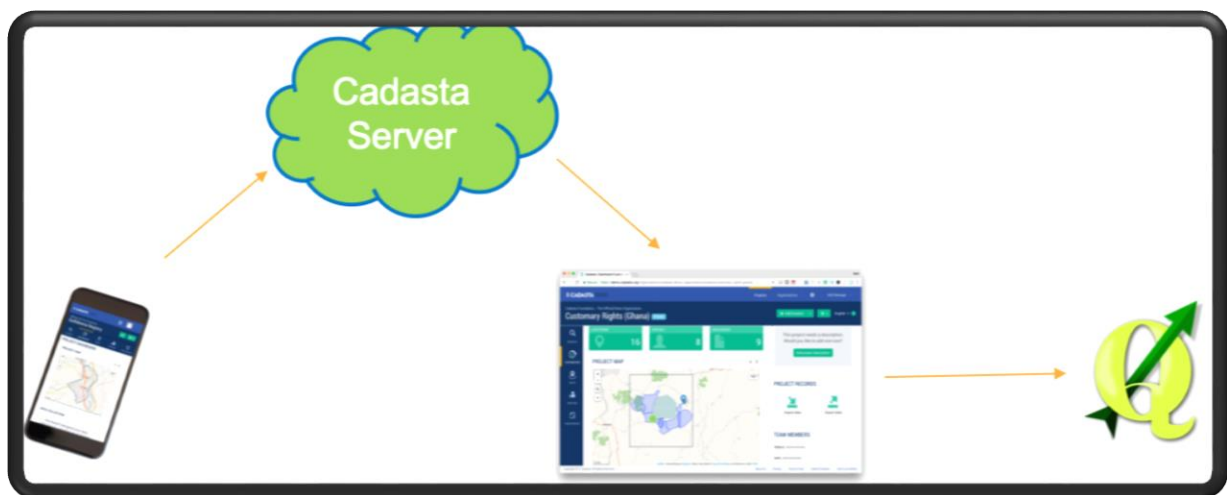

Fig 4: Cadasta data management flow from field collection using an android smartphone via a stand-alone Geographic Information System via the Cadasta platform hosted on a cloud server

Maps and custom reports were edited using QGIS and published in the villages to provide the stakeholders a clear visibility and understanding over the existing land and resource rights collected in the field. The period of publication was also a time to collect opposition to the different claims that were collected in the field.

The claims collected in the field and the opposition collected during the publication created what the stakeholders called the Cadasta 'Mapping for Thought' database. This database was supposed to be the base of discussion for the different mechanisms to put in place: conflict resolution, planning/displacement, land registration/tenure security, and the decision-making for the formalization of traditional land rights in general. The outcome of this exercise was supposed to help the different stakeholders analyse the current land occupation pattern, resolve land conflicts, document tenure rights, and ensure equitable and sustainable access

to the irrigation scheme. But the database raised new issues that needed to be solved before starting the actual revival of the irrigation scheme in Luberizi.

Social Issues Highlighted by the Clarification of Land and Resource Rights

After the finalization of the data collection, various challenges arose that impeded the progress of the project. Among the different communities in the plain some complaints were made that accused the project of favouring one community over the other. This was mainly due to the fact that before the reconstruction of the irrigation system. only few and relatively specialized positions became available for local job seekers and the expected creation of jobs was less immediate than many had hoped for. Furthermore, it was difficult to completely align all activities implemented by the consortium partners and create all of the expected synergies that would reinforce the achievements of different activities such as land management councils, by-law creation, and community cohesion to support the demarcation activities. This meant, that the links between different project components and the potential long-term benefit might have been less visible to the local population than anticipated. Furthermore, legal protection for the identified rights was seen as a prerequisite for proceeding with the irrigation work but it was unclear how exactly the legal protection would need to look in practice. Individual titles for all of the more than 3000 identified parcels would have required financial investments beyond the capacities of the project. Furthermore, the cooperation of the traditional authorities with any kind of legal recognition was in jeopardy after tensions between the communities increased. Many of the land users and other rights holders voiced concerns about the implications that registration might have for them. Some were suspecting that use rights might be impeded if ownership rights were registered.

Achievements and the Way Forward

ZOA and its partners held various stakeholder meetings with local communities, traditional authorities, cadastre staff, and others in order to define options for long-term rights protection. Among the possibilities identified were group titles that would provide a title document to a group of owners, specifying each individual's rights to the land. While the local stakeholders signalled that this might be an option. Given the authority of the central government in land matters, a delegation from Kinshasa was asked to do an assessment on the ground of options that would be legally possible.

In total, 3095 parcels were documented and it was agreed that individual registration would not be feasible. There was also broad agreement that different existing rights would need to be considered and protected, thus registration alone would not be the solution. The consortium

partners agreed that an increased effort was necessary to align the different activities and to integrate a conflict sensitive approach to land questions in all community engagement activities. While the final verdict on the solution preferred by Kinshasa is still to be delivered, there is hope that a group registration of 12 farmers will be possible. Based on that, the construction of the irrigation system will begin at the start of the next dry season.

Lessons Learned

As Malembe Simplex (an advisor on questions of land rights and democratic engagement, ZOA RDC, South Kivu, Bukavu office) said at the beginning of the project: *"Depending on how you look at it, Maji Ya Amani, 'Water for Peace', can easily become Maji Ya Mijoso, 'Water of Conflicts'.* Only through a well-coordinated effort by the consortium and the local and other stakeholders can the project be successful and bring benefits to the local population.

Technical challenges

The team faced many different challenges along the way, including limited electricity and internet, hot climates and rough geography, and equipment that required special care. Pressure was also added by knowing that any small error on the data published in the villages could lead to more conflicts instead of solving them. The electronic collection and storage of data had never been done before in the area and most of the local stakeholders were keen on understanding the details of the system, including how to set up the GNSS to deliver the accuracy need to receive official land rights recognition.

Adoption of new technology by administrative agents.

Although the methods of collecting information and the principles of 'Mapping for Thought' have been taken on board by administrative agents, the same can not be said for the technology. What posed a particular challenge was how, what is commonly known as GPS, works, and the logic behind the questionnaire. Two working sessions were necessary before effective field operations could begin. ZOA engineers were responsible for the training on the logic behind the questionnaire, whilst the Cadasta Foundation took charge of the training on the principles of GPS. Explanations were given by drawing comparisons with manual tasks.

Doubts concerning the overlapping of rights and conflicts

Throughout the working sessions, doubts and intense debate arose about how to manage the overlap of existing land rights. At the start, the administration opposed the recognition of the rights of farmers who inhabited land along roadsides, areas normally designated for the hard

shoulder and rain collection, or smallholders who refused to have their land documented as belonging to a State concession, or herding zones that had deteriorated. It was finally admitted that is was important to understand clearly what the existing land tenure situation was in order to be able to redevelop land, taking into consideration the administrative, technical, and environmental constraints as well as the expulsion of some smallholders.

Social issues impacting on the land securitization

The process so far has underlined the need for participatory processes as well as flexibility in implementation and planning. A land rights project such as the one described here cannot be planned at the drawing board and then implemented according to an inflexible output oriented plan. The fears, needs, and interests of local stakeholders need to be taken into account while at the same time, implementers cannot let spoilers influence every single decision and be manipulated by particular interests. A transparent process that allows for a structured exchange of opinions and positions is important in such a setting. Mapping is a great tool to visualize certain aspects of communal governance and conflicts that otherwise might remain abstract and unaddressed. This is an opportunity to engage with some of the root causes of conflict and diversion in a sustainable way. The implementing parties had to find their way among key stakeholders with limited trust in each other and limited faith in the capacities and goodwill of external parties. They had to learn to communicate in a way that enabled broad inclusion. Surveys and focus group discussions relating to needs and fears in the context of land rights documentation and registration allowed for the development of targeted solutions that could be offered to the communities and increase the potential for broad buy-in. The restructuring of local implementing teams allowed for renewed cooperation efforts among the different parties. Critical self-examination by all partners enabled more coherent cooperation strategies that will improve the synergies among the different activities in the long term. One of the key learning points for many of those involved was the centrality of land rights issues for the sustainability of the project and the ability to implement the technical aspects of the work. In the beginning, the land rights related aspects were seen as a technical exercise by some, without immediately realizing that this would be a critical issue for the project as a whole.

Conclusion

In total, 3095 parcels were mapped, 41 double allocations of land were identified, as well as 19 expropriations, 12 conflicts about parcel limits, six illicit occupations, and four conflicts related to damage by cattle. Moreover, a broad debate around land governance and its related challenges and possible solutions ensued. While the project is not yet at its end, it is already very clear that some key issues in the Luberizi plain are being addressed. All stakeholders

have become highly sensitive to the intricacies of land administration and land governance and the need to find durable solutions.

The project activities highlighted the added value of participatory mapping as well as the need to do this in a cooperative, multi-stakeholder context. In the specific context discussed here, long-term solutions will require better institutional frameworks and potentially more suitable legal and policy frameworks that allow for low-cost solutions to document and legally protect various kinds of land rights, not least customary rights. The implementation of conflict-sensitive land rights work in a context such as Luberizi, presents a strong challenge to all parties because periodic review of changes in context and monitoring of the effects of the various activities are necessary. Strong partnerships that enable critical feedback on each other's activities are an important asset to achieve this. The cooperation between ZOA and Cadasta proved extremely fruitful in this regard.

Tables and Figures:

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Fig 4: Cadasta data management flow from field collection using an android smartphone via a stand-alone Geographic Information System via the Cadasta platform hosted on a cloud server.

Literature:

FIDA: Cartographie participative: l'approche évolutive du FIDA, Conception et exécution des projets de cartographie participative, FIDA 2010: https://www.yumpu.com/fr/document/view/22522284/cartographie-participative-lapproche-acvolutive-du-fida-ifad

Guide Pratique De Cartographie Participative, 2010, International Tropical Timber Organization (ITTO): https://docplayer.fr/12909184-Guide-pratique-de-cartographie-participative.html

Kobusingye, D., Van Leeuwen, M., & Van Dijk, H. (2017). The multifaceted relationship between land and violent conflict: The case of Apaa evictions in Amuru district, northern Uganda. The Journal of Modern African Studies, 55(3), 455-477. doi:10.1017/S0022278X17000106

*Verwijen, J.; The Making of Conflict in the Eastern Congo: Trouble in the Ruzizi Plain, Rift Valley Institute, December **2015**, available online: http://riftvalley.net/news/making-conflict-eastern-congo-trouble-ruzizi-plain#.XFAcqFxKiM8 (accessed: 29-01-2019)*

ZOA; Making Land Rights Work - ZOA land rights guidelines, David Betge, 2019, available online: http://www.landgovernance.org/making-land-rights-work-zoa-land-rights-guidelines/