MAPPING AS EMPOWERMENT - LESSONS FROM A YEAR OF PARTICIPATORY COMMUNITY MAPPING

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Abstract

Participatory mapping is often presented as an approach that empowers people to create their own maps. Unfortunately, complex tools and inappropriate recommendations have too often led to ineffective or unsustainable mapping programs that do not achieve the targeted empowerment outcomes or even disempower the communities they intended to support. This is particularly concerning for efforts aimed at strengthening land rights and governance process for indigenous and customary communities. The nexus between participatory mapping and empowerment – especially legal empowerment as it relates to formal recognition of land rights – warrants further attention and is central to the work of Namati, Cadasta, and our partner organizations. This paper synthesizes lessons from seven participatory mapping exercises undertaken by Namati's Community Land Protection Program and the Cadasta Foundation with national and grassroots organizations in Kenya, Uganda, Zambia, Nepal, and Myanmar over the past two years. These exercises informed the development of a suite of tools, methods, and training supports that can be tailored to the particular goals and context of an organization and community. This paper analyzes lessons that emerged from the pilots and shares practical suggestions for how organizations can leverage mapping as a tool for empowerment – for communities, civil society, and governments. Participatory community mapping is not only a means to an end. It is an empowering process of documenting local knowledge, building technical skills, and using tools that were previously only available to the State or powerful elites.

Introduction

Unlocking the full potential for new mapping technologies to revolutionize the documentation and recognition of communities' customary and indigenous land rights requires more than merely training organizations and communities to use data collection tools. Organizations and communities must also be empowered with the skills and tools to design and implement fair, rigorous, and complete mapping processes without depending on external support. And their mapping efforts should be designed to achieve formal legal recognition and be integrated into existing land administrations systems. To achieve this, organizations that provide training and mapping technical support should think intentionally and creatively about how we train and support organizations and communities undertaking participatory mapping efforts. We need to build tools and practices that empower communities in the design of their own mapping processes and in the ownership of their spatial data. And we need to actively engage with government at local and national levels to build acceptance for community-led mapping as an approach to land documentation and registration that furthers government's goals for improving land tenure security.

The emergence of low-cost mapping tools has made map-making more accessible than ever before, and a wide range of applications of participatory and community-based mapping methods are gaining legitimacy among communities, civil society, and land professionals (Enemark et. al, 2014). However, for organizations that have never made maps before the diversity of data collection tools, systems for managing information, and technical approaches can be overwhelming. This is often compounded by a lack of impartial guidance and localized support for small organizations and communities who have an interest in mapping. This is particularly the case for groups mapping land and resource rights, which can be significantly more complex than mapping fixed assets like wells or schools. Even mapping projects with a similar theme, such as mapping communities' customary territories, will vary significantly based on local circumstances. Collecting sensitive land tenure information is never as simple as picking points from a GPS or satellite imagery. Rather, it requires an understanding of governance processes and systems and of how land and resource rights are perceived within the community.

Intimidated by the "technical" work of mapping and the lack of clear guidance, many organizations find their mapping efforts shaped by the tools they select, as opposed to selecting tools based upon the objectives of the mapping exercise. The risks associated with weak project design and inappropriate technologies can quickly lead to costly mistakes and limited sustainability, replicability, or scalability of mapping efforts. This is to say nothing of the risk of conflict when mapping exercises lack understanding of the various individuals and communities impacted by the process and their particular perceptions of rights and boundaries, or the potential for data collected to be used by outside groups for unintended purposes. An excessive focus on the technical steps of community mapping can even make mapping a disempowering

experience for communities. To avoid these pitfalls, participatory mapping needs careful goal-driven design; skillful and extensive training; early, sustained, and deep engagement with local and neighboring communities; proactive and intentional handling of data ownership and management questions; and a recognition that approaches and tools will vary based on program needs.

Legal Empowerment and Community Mapping

Legal empowerment strives to build the capacity of citizens to exercise their rights and participate in processes of governing – to know the law, use the law, and shape the law (Golub, 2005; Domingo and O'Neil, 2014). Legal empowerment approaches span activities from public interest litigation, to provision of paralegal support, to legal literary training, depending on the nature of the justice challenge (Cotula and Mathieu, 2008; Hatcher et al., 2010; Cotula, 2010). The legal recognition and protection of indigenous and customary land rights is one justice challenge that is receiving growing international attention (Oxfam, International Land Coalition, and Rights and Resource Initiative, 2016). Legal empowerment organizations in Africa, Asia, Latin America, and the Pacific are supporting individuals and communities in efforts to exercise, claim, and defend their tenure rights; mediate land conflicts; negotiate fair land and resource contracts with governments or the private sector; and enforce environmental regulations (Maru, 2014). Other organizations focused on poverty reduction and environmental conservation are also turning to legal tools and procedures — such as formal land registration and titling — to advance the goals of sustainable development by increasing tenure security for communities and families. However, these efforts often struggle to produce the intended benefits for a number of reasons. One major obstacle is that many existing land administration systems favor elites by requiring land registration procedures that are "complex, costly, time consuming and with high demands for accuracy of boundary surveys and often unnecessary legal interventions by notaries, lawyers and the court" (Enemark et. al, 2014, 23). As well, in many countries the process for community land registration goes unimplemented because of a lack of political will, resources, or practicality.

Grassroots mapping efforts by communities and civil society seek to bypass some of these bureaucratic barriers by empowering communities themselves to create maps of their territories. While not strictly in the realm of 'legal empowerment', community mapping directly supports goals of legal empowerment in several ways. Community mapping creates powerful evidence that can be used in applications for registration, in negotiations with government or private interests, or in court if needed. By providing communities with spatial information, community mapping also supports efforts to strengthen local land governance and localize land management, which are also often part of land-focused legal empowerment efforts. And finally, for many rural and indigenous populations, community-led mapping is directly about reclaiming power – it represents a way to counter-balance or challenge State defined boundaries, or, in

cases where communities are not officially recognized on maps, for communities to assert their tenure rights and identify themselves proactively (Bryan and Wood, 2015, xvi). Participatory community mapping is not only a means to an end. It is an empowering process of documenting local knowledge, building technical skills, and using tools that were previously only available to the State or powerful elites.

Namati and Cadasta Community Mapping Pilots

Namati is an international organization dedicated to strengthening people's capacity to exercise and defend their rights in practical ways. In a world where billions of people live outside the protection of the law, Namati is building a global movement of grassroots legal advocates who work with communities to advance justice. Their community-based approach is practical, flexible, responsive to socio-legal context, and inclusive of both state law and customary systems[1] (Maru 2010, 83). These advocates help people learn how to protect their rights and demand accountable and responsive governance from public institutions.

Namati's Community Land Protection Program works with local NGOs and CSOs in Africa and Asia[2] to support communities' efforts to protect their customary land claims in accordance with national land laws. Namati's integrated community land protection approach combines the legal and technical work of mapping and documentation with the governance work of establishing mechanisms for accountable, equitable and participatory local management of land and natural resources. Namati's community land protection process supports communities to:

- Improve local governance by holding leaders accountable and increasing community involvement in land and natural resource management;
- Strengthen protections for women and minority groups' land rights;
- Resolve long-standing land disputes and reduce future land conflict;
- Improve conservation and sustainable use and management of natural resources;
- Align community norms and practices with national and international law; and
- Plan for community-defined local development.

In most contexts, Namati focuses on protecting the 'tenurial shell' or 'meta-unit' of a community's lands, according to customary boundaries, to strengthen the tenure of a large numbers of families' lands at once as well as protect forests, water bodies, and grazing areas that rural communities depend on and which are often the first to be allocated to investors, claimed by elites, or appropriated by government.

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[1]This is an important consideration in many of the regions where Namati works because of the prevalence of legal pluralism, the co-existence or overlapping of different legal systems in the same territory.

[2] In 2016 Namati's community land protection program was active in Sierra Leone, Liberia, Zambia, Mozambique, Uganda, Kenya, Nepal, and Myanmar/Burma (Karen State).

In the initial years of the Community Land Protection program, Namati and its local partners supported communities to make hand-drawn sketch maps, leaving the stages of GPS data collection or survey to be completed by the government during registration. However, a lack of government resources – or political will – usually meant very long wait times or high fees for this mapping. Frequently once the GPS data collection did begin, boundary disputes thought to have been resolved would re-emerge. Namati became interested in the potential of the growing range of low-cost and accessible mapping technologies to strengthen the community-led mapping activities so that communities could create more detailed maps of their own until such a time as the government formally added their lands to the national registry.

In 2016, Namati partnered with the Cadasta Foundation, a non-profit focused on supporting communities and citizens to directly capture and record evidence of their land and resource rights, through the Cadasta Platform – an open source, cost effective land information platform supported by associated tools. Namati, Cadasta, and four local partners agreed to pilot various new mapping technologies in Kenya, Zambia, and Myanmar. Namati also investigated mapping techniques with other partners in Uganda, Kenya, and Nepal.

Empowering Civil Society Organizations in Mapping

For Namati, one of the central objectives of the mapping pilots was to develop a training strategy that would effectively equip partner organizations to lead their own community mapping efforts. At first we expected that this would involve first testing various tools and associated methodologies to identify a recommended standard and then training partners on how to use the tools. While Namati and Cadasta did identify a suite of recommended tools, we quickly realized that empowering partner organizations to implement complete community mapping processes required far more than just technical skills training.

Learning From a Challenging Pilot

The first pilot was with Kenya Land Alliance in Turkana and Tana River counties. Namati engaged the Nairobi-based mapping firm Spatial Collective to lead a three-day training workshop followed by several days of supported field work to apply the training. Spatial Collective provided a very engaging, practical training and Kenya Land Alliance staff were able to apply the skills learned to collect the necessary GPS data with communities. However, the design of the mapping process – including tool selection, the types and format of data to be collected, the timing of field work, the procedures for engaging community members – was almost entirely decided by Spatial Collective and Namati. It was apparent that Kenya Land Alliance staff did not feel ownership over the mapping efforts: staff described the mapping efforts as 'Namati's', did not voice concerns over the appropriateness of some design decisions, expected Namati and Spatial Collective staff to arrange logistics during field days, and when asked questions about the mapping process would defer to Namati or Spatial Collective staff. Following the training and supported field work,

Kenya Land Alliance staff expressed that they did not feel confident to replicate the mapping process independently (insisting that it was necessary for Namati to join them in further field work) and that they did not fully understand the reasons behind various procedures in GPS data collection or how the GPS data was going to be used. When challenges and uncertainties arose during data collection, map making, and map validation, Kenya Land Alliance staff expected Namati to decide the way forward. These challenges meant that Namati staff were far more involved in implementation than expected, that it was not a sustainable or scalable approach, and that the training failed to achieve its goal of empowering Kenya Land Alliance to independently conduct community mapping efforts.

A Reorientation of Approach

In response to these lessons and feedback from Kenya Land Alliance, Namati and Cadasta radically redesigned our approach to the next mapping pilot with the Ogiek People's Development Program in the Mau Forest complex in Kenya, Kivulini Trust in Isiolo county in Kenya, and Petauke District Land Alliance in Zambia. We realized that we could not think of mapping as a discrete technical step that could be completed almost separately from the rest of the community land protection process. Instead, we realized that there are many critical and interrelated considerations when designing a mapping process, and the design of mapping activities has important implications for many other steps in the community land protection process and should be considered during the initial design of the overall program. While attempting to devise a single recommended approach to mapping for partner organizations, we realized that mapping efforts can take many forms and should reflect the objectives and appropriate approaches unique to each community.

Part of the reason for our oversight was that many of the existing manuals and guidance resources about participatory mapping — upon which we based our original training approach — do not explain the importance of design considerations nor do they highlight the learning process that led to the selection or creation of the methodologies and tools that they describe. This leaves organizations to, at best, repeat a trial-and-error process of learning about their preferred mapping approach. It can also lead organizations to invest precious time and resources in ill-fitting pre-made mapping tools and methods.

In our redesign, we drew inspiration from principles of legal empowerment, which emphasize understanding, agency, and confidence to use tools independently and creatively, not just the technical knowledge of how to implement use of the tools with a dependency on guidance from experts. We realized that the primary goal of our mapping trainings with partner organizations was not technical proficiency, but fostering confidence and ownership over the mapping process. Only then would partners be prepared to

combine their expertise about communities with their new understanding of mapping tools in order to design the most appropriate mapping process for their particular context and the particular target outcomes.

We approached the subsequent mapping trainings as a co-design process. Drawing from a range of existing guides, and Namati's own experience in navigating the numerous options of mapping tools and methods available, we developed a set of tools to support partners to design their own mapping processes, including a series of Design Questions (See Box 1) and an eight-part mapping process framework that illustrates the full arc of a mapping process, the rationale for each component, and suggested tools and roles (See Table 1), both of which we continue to improve with input from partners.

Namati tested the new approach, hosting workshops with partners for three to five days that were based on collaboratively working through each component of the mapping process framework (Table 1) and the Guiding Questions (Box 1). The workshops started with a conversation about mapping goals and the needs of partners and communities (representatives of the communities were included when possible) and various constraints, such as timing, budgets, and government requirements for mapping processes.[3] Namati and Cadasta provided information about principles of participatory mapping that have emerged from other organizations' experiences, a selection of different tools and methods available to choose from, and the advantages and disadvantages of various options. The discussions were interspersed with hands-on testing and practicing with different tools and methods. After a partner decided on the design of their mapping process, Namati and Cadasta worked with them to identify additional training needs and scheduled further sessions or remote support calls.

The co-design approach resulted in variations between partner's mapping exercises. The Ogiek People's Development Program (OPDP) decided that their primary goal of the community mapping was to create detailed evidence of the Ogiek's traditional use, occupancy, and management of their traditional territories to aid with their ongoing negotiations with the Kenyan government about returning forest land to the Ogiek or establishing co-management arrangements. With this goal, it was important that OPDP's mapping process captured community features and land use in addition to boundaries, with detailed records about place names, use and management of resources, and photographs. Instead of hand-held GPS units like what Kenya Land Alliance had used, they chose to use mobile phones equipped with GeoODK because this allowed them to bundle together coordinates, notes, photographs, and audio/video recordings about a location in one easy-to-use survey form. OPDP designed two data collection survey forms on GeoODK, one relatively simple form for recording boundary information and another form tailored to collecting

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[3] In both Kenya and Zambia, the government requirements for the types of maps that partners were creating were largely unclear, despite requests for guidance from government. Therefore partners' design decisions were informed primarily by accepted good practice and the particular contexts and goals of the communities they are supporting.

community feature and land use sites, and trained community mobilizers on how to use the form. In contrast, the primary mapping goal of the Petauke District Land Alliance in Zambia was clear, detailed boundary information to aid communities' applications for recognition of their customary lands. PDLA used a single survey form, to be collected on tablets, and hired experienced data collectors to travel with teams of community members around the community boundaries with fewer stops to record community features.

The new training approach proved an effective way to engender a sense of ownership of the mapping process by partners, even when partners were worked with technical experts for additional ongoing support. Being involved with the design of the mapping efforts moved partners from feeling like simply an implementer of one part of a mapping process designed and funded by another organization to feeling like they could understand, adapt, implement, and replicate an entire community mapping process themselves. Partners exhibited a sense of ownership over the mapping and did not expect Namati and Cadasta staff to answer questions for them beyond providing suggestions and guidance to consider.

Lessons from Subsequent Pilots

The pilots validated that the co-design approach is more effective for empowering partner organizations to undertake community mapping. There were also several valuable findings that emerged, including:

- **Careful and creative design of the mapping components of a community land protection program relatively early in program design** is beneficial not only for the mapping but also other activities such as informing boundary negotiations and adding valuable information to discussions about community rules for land and natural resource management.
- **Mobile tablets are generally preferred by partners** as the more user-friendly and versatile option. Tablets and mobile phones were preferred over hand-held GPS devices because the data entry process is more streamlined, because associated files (like photographs) are more easily linked to the spatial data, and because they can be used during other parts of the community land protection process for communication and other data collection. Tablets and mobile phones are also easier to repair and accessorize locally compared to specialty GPS devices. Tablets are also preferred to mobile phones because the larger screen is helpful for filling out forms and viewing imagery. Paired with Bluetooth GPS receivers (such as the Garmin GLO) accuracy was comparable, and at times better, than the Garmin eTrex 20x during field testing.
- **The stages after collecting GPS data (map design, validation, and long-term data management) are critical parts** of a mapping process and are too often underestimated or overlooked. The later stages need to be adequately planned for to ensure there are not time or cost overruns or a rushed finish to mapping efforts. Appropriate validation and map approval are

necessary steps for maps to be seen as complete and legitimate, both to communities and to government officials tasked with reviewing community applications for land registration.

- **Without a secure, organized, data management system, mapping data is vulnerable** to loss, abuse, or theft. It is natural for an organization to not want to invest significant time or resources into establishing a data management system when mapping efforts are just beginning. However, mapping programs can quickly generate many thousands of sets of data. If data management needs are neglected while mapping efforts expand, there may be complications when it comes time to establish a data management system (e.g. disorganized data, data missing certain key fields, gaps or overlaps in data, challenging data file types etc.) that cost more time and resources than if an appropriate data management system was established earlier. The skills for designing, creating, and maintaining a data management system for mapping data are not intuitive – organizations benefit from training and support on data management.

- **Even with low-cost technologies and free software and satellite imagery, moving beyond sketch mapping requires a significant investment** of time and resources. Based on the pilots, costs for a participatory community mapping process that includes taking GPS coordinates are estimated at an average of $1,800 USD per community. These resources must be budgeted for from the beginning of a community land protection process. That said, organizations should design their mapping processes to be as cost-effective as possible, including using existing maps and data as much as possible, collecting detailed information to inform logistics planning, working with a cluster of neighboring communities, and potentially combining data collection and boundary negotiation visits to reduce transportation costs.

Empowering Communities in Mapping

The commitment to empowerment as a principle of community mapping should extend to work at the community level as well. As Namati observed during our 2016 pilots, mapping can be an empowering or disempowering experience for communities based on how organizations approach it.

Because mapping can involve new, expensive, and unfamiliar technologies and activities, communities may find it intimidating or consider it something that is to be done by technical professionals. If organizations arrive with plans already made and merely consult with communities for approval, it is more likely that community members will feel less ownership over the process and expect the organization to conduct the mapping activities, potentially even expecting payment for participating, which runs counter to the legal empowerment approach. Therefore, Namati and Cadasta's approach to training organizations includes coaching on how to collaboratively plan out the mapping process with a community from the start and techniques for having the community lead implementation of the mapping process as much as possible.

Co-design of Community Mapping Processes

Communities' sense of ownership over mapping activities is not only important for effective implementation and empowerment outcomes; it is also a critical factor in the perceived legitimacy of the map by the community.

In the pilot with the Kivulini Trust, working with Borana and Somali communities in Isiolo county in Kenya, staff and community representatives emphasized that they did not want to create maps that felt foreign. For generations, governments and colonial authorities made maps of Northern Kenya were rejected by the communities living there. As one participant explained:

> When the government drew maps and plans they were not very participatory, they just did their own mapping and excluded the communities – there is no sense of ownership of those maps or boundary lines. County boundaries, sub-county boundaries, these were not done in a participatory way. If it was done in a participatory way there will be no conflicts with the boundaries." (Ali Gufu, Kivulini Trust)

Part of the issue with existing official maps and borders was the top-down, technocratic process used to create them. Another issue is that the maps are missing features and labels that inform communities' understanding of the landscape.

A community-led process helps to ensure that all important community features are added, correctly labelled, and that community members can see their reality and their relationships with their land and other land users appropriately reflected in the resulting map. Especially when mapping boundaries, outsiders are ill-equipped to navigate the complex inter-community relationships that should inform the approach of the mapping process and the design of the map itself. A similar point is made by Thom (2009, 179) writing about the 'paradox of boundaries' in indigenous community mapping:

> Typical ethnographic mapping of indigenous lands leads to the production of territorial boundaries to advance claims to land and resource rights. These boundaries, and the indigenous social groups they attempt to represent, often conform to protocols familiar to the state institutions with which indigenous people are engaging. They tend not to represent a phenomenologically informed view of indigenous relationships to land and formulations of community. There is an inherent tension in 'counter-mapping' of this sort. The very maps that indigenous people hope will reconcile their claims with the jurisdiction and property claims of the state may in fact subvert indigenous notions of territory and boundaries. (Thom, 2009, 179)

Community mapping is a powerful grassroots counter balance to State-controlled cartography and cadasters, but using the tools of the State can be double-edged. If organizations apply the same co-design approach to how they work with communities, this can help to ensure that the mapping actually furthers the goals of the community and in a way that does not distort a community's map into something locally unrecognizable.

The pilots supported by Namati and Cadasta identified several strategies that empower communities to engage with civil society partners to collaboratively designing and complete a mapping process. Three strategies that caused a particularly notable change in community attitude when included or omitted were:

- Use visual examples to illustrate how each step in the mapping process connects to the next to help explain the progression from a community sketch-map to the final product, so community members can understand the reasons why each activity is important and make the final map product feel recognizable.
- Allow time and budget flexibility, whenever possible, to allow for plans and logistics to be responsive to community schedules and preferences, but also discuss resource and time constraints transparently with community mapping teams.
- Having the community closely involved with the visual design of their map, from their initial sketch map through to the symbology and design of the final map. If there are particular official requirements for map design, explain these to the community and work with them to design the map within those constraints. Ideally this can be discussed with communities before map design (for example, during sketch mapping) as well as during validation (to ensure community members are happy with how the map is designed). It may be necessary to have one version of the map designed for community use and one version that meets government standards.

Data Ownership

A key consideration for Namati, Cadasta, and our partners is the question of data ownership. Too often, local communities work with governments and NGOs to collect land information but are not consulted as to how the data can be used – and accessed – following data collection. In the case of digital information, the communities might lack the tools to access the data in the future, and in some cases paper versions of completed maps were not shared and communities did not have a way to hold organizations accountable to sharing the maps.

Cadasta, with significant input from Namati, as well as other partners, has adopted a policy of data ownership that ensures that individuals and communities retain all rights to data (detail in the Cadasta Privacy Policy and Terms of Use). Neither the Cadasta Foundation nor Namati can use, share, or access the data without permission from the partner communities.[4] Namati is also testing methods for working with

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[4] The Petuake District Land Alliance in Zambia took a different approach to data ownership and data privacy questions. They were upfront with the communities that the information collected during the mapping activities would be kept and maintained by PDLA in a secure database, that the communities would receive a physical map, that the data would be shared with the Paramount Chief and the government, and that PDLA has the power to decide whether to share the information with other organizations (but that if they did they would tell the community and report back on how the information was used and ideally bring additional information that would be of interest to the community). Communities were asked to agree to this before proceeding with the mapping. This is

communities to have open and frank discussions about data ownership and privacy considerations, with the goal of signing Data Sharing Agreements that clearly state that the data belong wholly to the communities and must be used according to the agreed terms. Namati has also built in activities during the governance components of the community land protection process to specifically address how communities will manage and protect their maps and associated data, including rules about how the map can be used, by whom, through what process, and how it will be stored and protected.

Community ownership of data does not necessarily preclude organizations from using the data in other forms, but it does require a more cautious approach to publishing data. Communities may be open to sharing some data publicly to stake their claim or as an advocacy tool, but organizations should approach this carefully and be prepared to modify maps or data that are shared publicly or to share only certain data. Before posting a community's map or data to any public platform (such as Open Street Map, Google Maps, Cadasta's public platform, LandMark, etc.) organizations should review their agreement with communities and ensure that it aligns with the terms, and ideally ask for specific permission (if not already granted).

Another common data ownership challenge is the long-term maintenance of mapping data, especially for NGO-led efforts that do not link into government land information systems. Governments have staff and land information management systems dedicated to maintaining and updating cadastral information, but organizations usually only support communities for a limited period. If an organization plans to store communities' mapping data and digital map files, it should consider whether and how it will be able to support communities to access, use, update, or share their data with another organization. If an organization cannot adequately support the long-term data access needs of communities, organizations should consider other options when designing their mapping process, such as partnering with local government or another organization for long-term data management, training appropriate community members how to use data management tools, or providing communities with a copy of their data and digital files for potential future uses. The main lesson is that organizations should consider these questions intentionally and proactively and ensure the community clearly understands and agrees to what they can expect in terms of accessing their data in the future.

Governance and Roles of Leaders and Traditional Institutions

Maps are powerful tools, which can also make them dangerous if not created and protected responsibly. This was apparent in the reaction of local leaders to the mapping activities during the pilots. Almost immediately after conversations about mapping began, Namati observed increased interest and participation

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a proactive, transparent way to approach this. However, it does place the organization in a position of power and communities may feel like they have no choice but to agree if they strongly desire to have a map.

from community leaders – both traditional and official – in both the mapping meetings and the overall community land protection process. Community leaders explained that from their perspective, the mapping activities transformed the community land protection process from a series of community discussions with questionable long-term impact to a process with real and important outputs. In some cases, leaders were excited about the mapping and eager to support and contribute to it. In other cases, some leaders were concerned that the mapping might cause conflict, or potentially decrease their own power. Organizations that are undertaking community mapping should recognize the need to understand community governance systems, design inclusive and democratic mapping processes, and be equipped with skills and techniques for engaging leaders and community members in conversations about land governance, including the responsible use of maps.

Community leaders and traditional institutions are critical for community mapping efforts, both for the information that they can share and their authority when engaging with neighboring communities and helping to manage conflicts. Boundaries and territorial maps are a spatial manifestation of complex social relationships and identities of individuals and groups and organizations external to a community often lack understanding of these dynamics or bring with them ideological biases that may inadvertently undermine the legitimacy of the mapping process or even harm community interests (Thom, 2009). As well, maps that show boundaries can quickly inflame conflicts so community mapping often requires extensive and proactive conflict resolution by skilled and respected community members, either leaders themselves or with support from their leaders.

Given the potential risks of recording contested locations, Namati recommends that recording physical locations and making formal maps should only be undertaken after communities have meet with their neighbors to discuss and agree upon the location of boundaries. Namati's approach is to support communities to create boundary negotiation teams who then meet with leaders and councils of neighboring communities to discuss boundaries and the mapping process. This may require several rounds of meetings and negotiation, especially in cases of active land conflicts or where boundaries have been contested for generations. The goal of negotiations is formal agreement between neighbors about how to record and represent exclusive, overlapping, and/or shared areas of the landscape that they share.

Throughout Namati and Cadasta's pilots, community leaders and elders were critical actors in the management of boundary disputes and flare-ups of concern about the mapping process. Field staff worked closely with community leaders to create plans to prevent and manage conflict and ensure the safety of everyone involved with the mapping effort. Community leaders also improved the design of mapping methodologies to ensure that they met the needs of their community and were appropriate for their community's context and schedule. In Zambia, for example, it was initially suggested that communities

might be able to complete their mapping using only satellite imagery, but community leaders insisted that it was essential to physically visit a location to record its coordinates in order for the maps to be accepted and understood in a tangible way. Community leaders and traditional institutions have also been central to map validation, both when determining the appropriate process for consultation and approval and when organizing meetings of community and neighbor representatives.

However, mapping activities are also vulnerable to capture by leaders, elites, or local 'experts' instead of being a truly participatory community process. Because of logistical challenges associated with certain mapping activities and the more technical, official-seeming nature of the information involved, mapping activities can easily become controlled by a small group of powerful people in a community. Namati and partners needed to proactively support communities to ensure inclusivity and diverse participation in each step of the mapping process and continually monitor for individuals who attempt to dominate the mapping process — especially during the critical steps of data collection and map validation. For example, on several occasions during data collection in Kenya, senior chiefs dominated decisions about the specific locations of boundaries. At times elders or local residents would explain the location of the boundary differently than the senior leader in the group, but would defer to the leader if he insisted that he was correct. Comments and body language of community members indicated that they were not happy with this decision, but they did not challenge their leader. The leaders may have been correct, but it raises concerns about the potential for abuse of power during data collection and map validation, especially when these are done by small groups. This in turn could undermine community perception of the accuracy and legitimacy of the map. Strategies to counter-act this could include ensuring there are several powerful individuals on each mapping team, such as a respected elder and a senior administrative Chief. As well, staff should note if there appears to be any disagreement about a particular point or stretch of boundary and ensure that it is thoroughly reviewed and discussed during validation with a larger group of community members present. Staff may also want to have private conversations with community members who disagreed in order to get a better understanding of the situation.

Diverse Participation

Diverse participation and democratic decision-making is an essential component of a legitimate and empowered community mapping process. However, many mapping activities are challenging to complete with large groups, including the making of detailed data collection plans, data collection, and map validation meetings. As well, Namati and partners observed that introduction of new technologies increased participation by men and youth who have had some exposure to technology and decreased participation by women, the elderly, and those with lower education levels. Finally, the physical demands of map data

collection created a barrier to participation by those with limited mobility or physical fitness and by women, in some communities.

From the initial conversations about mapping through to final map review and adoption, facilitators need to work with each community to figure out an appropriate way to ensure that the mapping is done in an inclusive and participatory manner. Sketch-mapping can be done in large meetings by breaking the group into many sub-groups that make their own draft maps and then work to combine the maps into an overall community map. This is a key opportunity for women and sub-groups to demonstrate their specialized knowledge and expertise about the land and natural resources by creating detailed maps that they can share with the wider community (Namati, 2016). Sketch-mapping can also be done at sub-unit levels such as villages and then brought together in a large community meeting – this allows people to make detailed maps of the areas where they live and work most often and so can be less intimidating than asking people to map the entire extent of their community. During planning, data collection, and validation, it may be necessary for communities to select a smaller team of trusted representatives to carry out these intensive activities. Organizations should ensure these smaller groups are representative, support the community to find creative solutions to participation barriers, and ensure opportunities for wider community review and comment before maps are finalized. As well, to prevent misuse of maps, community mapping efforts should include community discussions and decisions about how maps should be interpreted and used, and should ensure that maps are left with accountable leaders or community governance structures (Knight, 2014).

Governments and Participatory Community Mapping

Mapping of rights to land and resources is much more than a technical process of geospatial data collection. The definition of territories is inherently political and raises challenging questions about how to appropriately engage government in community mapping efforts. On the one hand, many community mapping efforts are a form of 'counter-mapping' whereby communities assert their claims over territory or challenge official boundaries, in which case communities may not want government involvement or may face opposition from government. On the other hand, if communities plan to use their community maps to support applications for recognition of their land rights or management authority, they need to interface with the government's processes and land information systems. A failure to engage with government may result in maps that do not meet official specifications for registration, maps that do not meet process requirements for how boundaries are adjudicated, or maps that are opposed by local governments because they were not involved in their creation, all of which would cost additional time and resources to redo the maps.

Across Namati and Cadasta's community mapping pilots partners took different approaches to engagement with government. Kenya Land Alliance proactively discussed the goals and process of community mapping with the county governments of Turkana and Tana River, building support among the local government for the initiative and benefiting from guidance by county surveyors. When certain local officials of the national government threatened to obstruct the mapping efforts, the support of the county government was critical in allowing Kenya Land Alliance and the communities to proceed. In Zambia, the Petuake District Land Alliance also directly engaged with forestry officials in order to gain their support for the mapping and benefit from their familiarity with the landscape and existing official data. This engagement was successful in large part because PDLA was able to demonstrate to the officials how community mapping would support the government's goals for forest management, reducing land conflicts, and enhancing geospatial information. The efforts of the Ogiek People's Development Program and Kivulini Trust to engage with local officials and county government about mapping have been less successful to date and there is greater community concern about whether and how government should be involved in the mapping.

Drawing upon the experiences of Namati, Cadasta, and partners, three areas where governments could provide greater support to community mapping efforts are: creating supportive legal and technical frameworks; issuing clear guidelines and requirements; and providing technical support, information, and/or resources.

- **Technical and legal frameworks that support community mapping:** For large, rural, nomadic, or forest-dwelling communities in many countries official surveys are often impractical or inaccessible. Recent endorsement of 'fit-for-purpose' land administration by the International Federation of Surveyors (FIG), World Bank, and others point to a growing recognition that achieving land tenure security gains at scale will require many governments to take a more flexible and pragmatic approach to land documentation than cadastral surveying (Enemark et. al, 2014). However, this gradual shift in mindset has yet to result in changes to the technical and legal requirements for land registration in many countries. The establishment of official mechanisms to incorporate and validate land data collected by communities and civil society efforts will greatly support these efforts.
- **Clear guidelines and requirements:** In many countries the official technical or procedural requirements relating to spatial data in community land registration applications are unclear, such as: the minimum required accuracy of coordinates, the process by which coordinates are collected and validated, the tools used, the design and symbols used in map making, data formats, and whether 'general boundaries' are acceptable. The lack of clear technical requirements and process guidelines creates uncertainty about whether and how government will recognize or use

communities' maps or GPS data. If national standards are unclear, local governments may still be able to provide support by offering recommendations from their land departments or surveyors.

- **Technical support, information sharing, and resources:** Participatory GPS mapping often requires a very significant investment of resources by civil society organizations and communities, both in time required to develop the necessary technical skills and funds for equipment and logistics, which creates dependency on donor funding and specialized professionals. The 'fit-for-purpose' approach to spatial data and land administration includes recommendations that governments provide technical guidance and capacity-building support to community-based and voluntary organizations that are well positioned to generate crowd-sourced and community-created land data (Enemark et. al, 2014). At a minimum, governments could increase the accessibility of base maps and existing data for use by civil society and communities.

Designing for Empowerment

While many of the lessons from Namati and Cadasta's pilots relate to capacity building and process design, there is also the need for appropriate tools not only for data collection but also for storing, maintaining and updating community maps. Too often community mapping exercises are conducted as a one-off exercise, presenting a snapshot in time of community spatial information, as opposed to a living repository of information maintained by the community on an ongoing basis. Existing software applications have often proven too expensive and/or complex to be accessible only to a few highly-trained community members, if at all. It is precisely this challenge that led to the development of the Cadasta platform, which has been designed to be a repository of land tenure information that can be accessed online, shared as needed, and utilized not just by mapping and GIS specialists, but anyone with basic computer skills, ensuring that data collected can be accessed and maintained well into the future.

Recognizing that the type of information collected, and of course the data collection processes themselves, can vary by community, the platform had to be flexible enough to allow users to define what information is documented – however much, or little, is deemed necessary. In the spirit of empowerment, the information needed to stay under the control of the user. Furthermore, partners expressed the desire to be able to add information in various formats in order to compile evidence of community tenure - including traditional paper-based surveys and maps, GPS coordinates, footage from drones, digital maps, video or interviews and recordings, photographs, or paper attestations.

While initiating plans for the community mapping process with the various partners, a key first step was a detailed needs assessment and requirements specification phase. During this process, Namati and Cadasta interviewed and observed partners in order to identify staff capacity, mapping experience, data needs,

expected outcomes of the mapping process and proposed long term goals of the data use. This process helped to define approaches and tools for the co-design process, technical skills training, and eventual field activities. The initial needs assessment proved to be very valuable and helped us to think through assumptions, and in many cases, to revise initial thinking in regards to potential methodologies. As well, the Cadasta platform benefited greatly from the needs assessment, resulting in numerous specific platform feature requests that have been integrated into the Cadasta platform – and others which will be in future releases. Experiences co-designing and co-learning with partners has deeply shaped the training materials and platform documentation of Cadasta, including a detailed user guide and video guides for various common tasks completed via the platform.

Ongoing Challenges

Despite encouraging outcomes of Namati and Cadasta's 2016 mapping pilots with partner organizations, there remain several significant challenges, uncertainties, and limitations concerning participatory mapping for the documentation and recognition of communities' customary and indigenous land rights. Moving from simple participatory mapping techniques, such as sketch-mapping, to using GPS data collection and more advanced cartographic tools presents a number of logistical, financial, technical, and political challenges to navigate — for communities, the civil society organizations that work with them, and organizations that train and support civil society. Four challenges with particular relevance to Namati and Cadasta's work are:

- **Mapping increases the potential for land conflicts to escalate and therefore requires proactive and extensive land conflict mediation support:** Mapping boundaries must be intertwined with extensive and proactive conflict resolution. Due to the sensitive nature of recording physical locations and making formal maps, Namati advises that mapping activities should only be undertaken after communities have met with their neighbors to discuss and agree upon the location of boundaries. This may require several rounds of meetings and conflict resolution, especially in cases of active land conflicts or where boundaries have been contested for generations. Even after extensive boundary negotiation and recording of agreements, conflicts may flare during mapping, requiring organizations and communities to have clear plans to manage conflict and ensure safety. In many situations, ignoring the question of boundary harmonization and agreements with neighbors in order to map a community quickly is irresponsible, as it leaves critical adjudication decisions undecided only to flare into conflict during later registration stages, it may result in intentional or inadvertent land grabbing by the communities privileged with being the first to map and register their boundaries, and it may escalate boundary conflicts if neighbors learn of the mapping efforts only after they begin or are completed.

- **Significant investment is required for organizations to complete map production independently, without it they continue to rely on specialized professionals**: Significant time and effort is required to convert raw data from participatory GPS mapping into formatted maps. Organizations must think carefully about how they will do the data processing and map creation and who and what will be required to complete it. While the steps required to create boundaries and community features from GPS points and digitize simple landscape features from satellite imagery are not overly complex, many of the tools and skills do require more extensive training and experience. During the pilots, staff had to invest many hours of learning and practice, even after having prior exposure to GIS software. If an organization plans to use GIS software to independently create or edit maps this will require a significant investment in training, time, and potentially equipment. If this is not feasible for organizations, they will continue to require support from mapping professionals, at least until more accessible cartography tools are available.[5]

- **Practical challenges continue to restrict communities' direct control over the management of their spatial data:** While new mapping tools and participatory methodologies have the potential to make data management accessible to communities, achieving this in practice remains challenging. Equipping communities to responsibly and securely manage their own spatial data requires more extensive training than GPS data collection, additional time to establish community structures and roles for data management, and increased equipment costs. There are also difficult questions about how to support and incentivize communities to maintain their spatial data over the long-term. Even with empowerment as a guiding principle of Namati and Cadasta's pilots, to date the management of the data created remains in the hands of civil society organizations, not the communities directly. While the organizations have agreements with the communities about how they can access their data in the future, it remains to be seen if this is sustainable and if it provides sufficient access. As well, Namati and partner organizations have so far found it challenging to establish meaningful and detailed data sharing agreements with communities due to the technical complexity and abstract nature of some aspects of data use, data sharing, and data management. Namati and partners are continuing to test methods to improve data sharing agreements.

- **Many questions remain about the cost-effective distribution of roles between communities, civil society organizations, larger organizations or mapping professionals, and government:** Decentralizing the mapping of community boundaries raises questions about who is most

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[5] In response to experiences during the pilot, the Cadasta Foundation is working to make the Cadasta platform a more accessible tool for simple map design and digitization so that more organizations will be able to use it to create community maps that show boundaries, features, and some limited landscape information and then export those maps into pre-formatted map templates.

appropriately placed to undertake mapping efforts and trade-offs between costs, efficiency, quality, and empowerment. From an empowerment perspective the ideal may be that community members themselves complete their own community mapping process, but this likely is not practical due to the costs and technical skills required and may not be ideal for efficiency or quality. This makes it difficult for organizations to determine how much to invest in training and equipping community members to complete mapping tasks, versus training and equipping a team of field staff who can work with multiple communities. Likewise, when providing training or technical support to civil society organizations, Namati and Cadasta grapple with whether it is more efficient and cost-effective to train an inexperienced organization to be able to trouble-shoot their own challenges or if it is more appropriate to simple provide the technical support to fix a problem quickly. In the design of a mapping process, organizations should be prompted to consider whether it would be more efficient for them to work with consultants, specialists, or government staff (if available) for certain tasks. For some organizations, this may apply to almost all steps of the mapping process.

In light of these challenges or other constraints, if extensive participatory mapping or GPS data collection is not feasible or appropriate for an organization or community to undertake, other emerging mapping tools can be used to enhance community mapping efforts. Tools that Namati, Cadasta, and partner organizations have found to be useful include: free satellite imagery for non-profit organizations (such as that available through the Cadasta Platform), the Field Papers website (www.fieldpapers.org), and Quantum GIS software and the open-source spatial data available within it (such as Open Street Map). Supporting partners to think through the design of each part of a mapping process can help to identify where these low-cost improvements and opportunities are the most applicable. Even without GPS data collection, the process of participatory community mapping remains a highly motivating and effective activity for communities to document their local knowledge about their use of land and natural resources, discuss boundaries, and engage with the spatial aspects of land management.

Conclusion

Community-based, participatory mapping is a powerful way for communities to independently document their customary or indigenous rights to lands and natural resources, which is a vital component of legal empowerment efforts that focus on improving land tenure security. Namati and Cadasta's two years of pilots with partner organizations found GPS mapping to be highly motivating for communities and organizations, especially when communities, local organizations, and technical partners were all empowered to co-design the mapping process. Co-designing the process gives communities and implementing organizations a sense of agency and control over how the maps are made, which is critical for the successful implementation of a mapping process and the legitimacy of the final maps.

Based on these experiences, Namati and Cadasta have developed training tools and techniques based on a co-design approach, rather than presenting a fixed technical process. The experiences during the pilots and feedback from partner organizations and communities are directly informing the refinement of Cadasta's online platform and other integrated tools. Namati is also strengthening other aspects of our community land protection efforts based on learning from the mapping pilots, including how to: use mapping activities to ensure that agreed boundary with neighbors are documented clearly and precisely, increase involvement by community leaders and local government, and improve transparency between communities and organizations concerning the use of community data.

Creating better, more accessible mapping technology and software is only one piece of what is necessary to revolutionize the documentation and recognition of communities' customary land rights. Mapping organizations like Cadasta and capacity-building organizations like Namati also need to improve how we support organizations and communities to design and implement their own fair, rigorous, and complete mapping processes without requiring external support. And we need to engage leaders and government at all levels to create space and support for community-led mapping efforts within official legal and technical frameworks. The rise of crowd-sourced geospatial data, including community mapping, represents a dynamic democratization of data that requires more than a single, standard approach to design, training, or procedure. Instead we need flexibility, dialogue, and creativity to find ways to foster and harmonize the diversity of voices that are starting to add their stories to our collective human map.

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Box 1: Namati's Guiding Questions for Mapping Process Design

Mapping Process Design Questions

1. **How do we understand the problem or need?**
   Why is there a need for community mapping? Are there multiple needs, or problems to address? How and where does mapping fit within the larger CLP process?

   Example: Communities cannot register their land officially without accurate spatial data describing the location of their land area.

   Example: Community members do not know where the boundaries of their lands are and this is causing conflicts and land management problems.

2. **What are the goals and outputs for this mapping process?**
   Based on the problem(s)/need(s), what are we trying to accomplish by mapping? Make the goals and outputs as specific as possible, and try to keep them realistically within the scope and control of the project (e.g. avoid goals like 'Communities register their lands').

   Example: Goal – Communities can identify and describe their boundaries. Output - The two communities will have a printed map that they approve that clearly shows their agreed boundaries, main community features, and land use areas.

   Example: Goal - Communities are empowered to inform the creation of official spatial data about their lands. Output – Communities create a set of spatial information that they can choose to share with government.

3. **What data and tools are needed to address the problem and achieve the outputs?**
   In order to achieve the outputs identified, what type of information/data will be required? What types of tools or equipment will be needed to collect that data? When will this information be collected?

   Example: Coordinates and descriptive data for community features, like cultural sites, that are evidence of a community's use and management of the area. To collect this, need a device for taking GPS coordinates, a way to take a picture of the site, and a survey tool to record details about the site.

   Example: Evidence of agreement on boundaries between community and neighbours. To collect this, communities will record their agreements in a simple MOU with signatures and a group photograph. Later, neighbours will approve the maps with a signature and the county surveyor will officially approve the boundary coordinates.

   Example: Anticipate that come boundaries of the community will be identifiable features like rivers and roads – coordinates for these can be created from digitizing satellite imagery rather than needing to travel along them. To use this, will need access to satellite imagery that is relevant to the context and that has a level of detail sufficient to see relevant features.

4. **What information may already exist?**
   Is any of the information needed already existing? Have there been any community maps made in the past with government or other organizations? Are there government maps or datasets that can be used to inform this process? Who in government, or other organizations, can be contacted to track down existing information?

   Example: Many local or national government base map (show some infrastructure, natural features, and place names. These are useful for planning, sketch-mapping, and digitizing. If governments do have existing maps, check if these are available as digital datasets also.

   Example: What satellite imagery is publicly available through the Cadasta platform or Field Papers?

5. **Who needs to be involved, when, and how?**
   Consider and design community engagement through each step of the process. Begin this planning internally, but co-develop the plan collaboratively with communities. Consider:

- Who are your allies and potential opponents to this work? How to involve the allies and manage/include the opponents?

- Who in the community holds information about boundaries, features, important sites, and land use areas? How should they be involved and in what stages? Are there other knowledge holders from outside the community who could assist (e.g. local officials for administrative boundaries, rangers who visit more remote areas, herders who travel to far reaches of the community)

- How and when will neighbors and other land users be involved? (E.g. pastoralists who use access routes through the community)

- For each stage in the process, who is important to include and what will their roles be?
  - Will community members assisting with data collection in the field receive any stipend or resources to support their donation of time? How much? Who will provide that, the organization/ community?
  - Who will review and approve the maps from the community? How to ensure that it is fully accepted by community and their neighbors?

- How/If to involve the government in the mapping planning, data collection, and/or map finalization?

6. **What are potential barriers or obstacles we should anticipate?**
Consider and design community engagement through each step of the process. Begin this planning internally, but co-develop the plan collaboratively with communities. Consider:
   - Concerns or fears from community members, user groups, neighbors, officials etc.
   - Logistical challenges (e.g. vast areas with limited vehicle access, barriers to communication or coordination)
   - Safety and security issues (e.g. wild animals, heat, getting lost, boundary conflicts and tensions)

7. **What are our organizational capacity and available resources?**
Does the organization have what is required to complete the target outputs and activities through each stage of the mapping process? If there are gaps, how will these be addressed? Consider:
   - Staff time
   - Staff skills
     - Training needs?
     - Turning the data into draft maps (using mapping software)
   - Logistics and field costs (vehicles, water, food, communications)

     - Need to rent vehicles? Use motorbikes? Costs?
     - Estimates of how long it will take to collect these points (consider how many hours people can be out per day, how many days people can collect data before they need a rest)
       - How can you estimate the length of time when you don't know the land very well? How can the community assist you in this planning?
       - Consider how long a field day can be – how early will you start? When does it get too hot/dark to keep working? How long for rest breaks? Etc.
       - Think about how tiring the field work will be – you may want to alternate field days with rest/data processing days to allow staff and community members to rest.
     - Costs for logistics – how much budget is available?
       - Will community volunteers who do days of field data collection be reimbursed at all? How will this be negotiated and clarified with communities and individuals in advance of the field days?

   - Equipment and tools

     - What do we already have or can produce ourselves? What needs to be purchased?
     - What is the budget available for purchases?
     - When and from where do these need to be purchased?

   - How many meetings are needed for the mapping process, and what costs will these have?

   - Production costs (e.g. printing/laminating costs – remember to consider sketch maps, draft maps, and final maps)

- Long-term data management and access by communities – is the organization in a position to guarantee this? If not, what other options are there?

8. **Who will do what? (Organizational roles and responsibilities)**
Discuss the specific roles and responsibilities for all staff and organizations involved in each step of the mapping process. If necessary, revisit the questions about staff time and staff skills in #7.
Consider for each step in process: Who will do what parts of the task? Is there a need for support from experts or technicians at any point? Who will that be (consultants, other partners, universities, etc.)?

9. **What is our work plan and budget?**
Create an estimated – but feasible - timeline for the stages and activities of the mapping process. Include specific next steps and assign them to specific people. Remember to consider when and how the community will be involved in the planning for mapping.

Create a budget for any equipment, resources, meetings, transportation, allowances, staff time, etc. and determine where these funds will come from.

Table 1: Namati's Mapping Process Framework

	1. Discuss	2. Agree	3. Plan[6]	4. Collect	5. Make	6. Review	7. Use	8. Manage
Description	Community meets to learn about mapping and make initial sketch maps.	Community negotiates and confirms boundaries with neighbors.	Community and organization make plans for mapping.	Community's mapping team and organization visit locations and record data.	Organization uses data to create a draft map.	Community reviews draft map(s) and makes edits.	Community adopts and uses final map, sharing data if desired.	Organization manages and protects community data.
Outputs	•Community awareness •Sketch maps and estimates (to inform negotiations and planning)	• Harmonized boundaries • Documented agreements (to reduce conflict during mapping)	• Co-designed plan (process + logistics) • Informed consent and permission to map	• Coordinates and data about boundary points and important features (cultural sites etc.)	• Draft map (from data + digitize from imagery)	• Community & neighbours review, revise, and approve map (may need multiple drafts)	• Final print map for community • Datasets for future use or sharing (with government etc.)	• Organized, secure data • Future access for community to use or update data
Suggested Tools	-Google Earth, Cadasta, or Field Papers (for imagery) -Base maps	-MOUs -Sketch maps -Field Papers imagery (-Boundary markers)	-Sketch maps -Field Papers imagery -Data Sharing Agreement[7] -Work plan -Budget	-Tablet/mobile -External GPS Bluetooth receiver -GeoODK app & form -Imagery/Sketch maps (-Boundary markers)	-Computer -Cadasta (-QGIS)	-Draft maps -Imagery/ Sketch maps -MOUs (-Data Sharing Agreement)	-Final maps -Cadasta (-LandMark, Open Street Map, or other platforms)	-Cadasta -Internal file management
People	-Community members -Staff -Mobilizers	-Community negotiating team -Neighbours -Mobilizers -Local officials (optional)	-Staff -Mobilizers -Community members -Local experts (e.g. rangers, elders) -Selected mapping team	-Staff -Mobilizers -Community mapping team -Representatives of neighbors -Surveyors (optional or if required)	-Staff -Technical partners (Namati, Cadasta etc.)	-Staff -Mobilizers -Community mapping team -Representatives of neighbors - Surveyors (optional or if required)	-Staff -Technical partners (Namati, Cadasta etc.)	-Staff (-Cadasta) (-Government)

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[6] Some organizations choose to complete these meetings prior to sketch-mapping and/or boundary negotiations.

[7] Namati suggests discusses data ownership and protection during the 'Plan' phase, not earlier, because these questions can be confusing, complex, and difficult to discuss in a large community meeting. As well, it is likely that the community will not be able to answer all the questions fully until they plan the specifics of the data they want to collect. It may be appropriate to discuss some, or all, of the questions about data ownership and permissions earlier in the process to address concerns about the sensitivity of the information shared in mapping activities. Organizations should also expect – and be willing – to revisit these questions during later steps because community members may have realizations about the importance or sensitivity of their data or come to a deeper understanding about questions of data ownership and privacy.