



CASE STUDY

A Decade in the Making:
**The Evolution of Mobile
Applications to Secure
Tenure (MAST)**

JULY 2022

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Photo by Freddy Feruzi

Introduction

Mobile Applications to Secure Tenure (MAST) is a blend of participatory mapping approaches and flexible technology tools that USAID developed to empower communities to document and secure their land and resources rights in support of a range of development objectives ranging from women’s empowerment and food security to climate change mitigation and biodiversity preservation. The MAST approach provides flexibility to accommodate different technology options, including mobile apps and web-based data management platforms, designed and adapted to help communities document their rights quickly and affordably. MAST’s participatory mapping methodology emphasizes on-the-ground engagement and training to empower citizens as data collectors and build their capacity to maintain land information and manage their land and resources. Using MAST, community members can efficiently collect and verify information necessary to enhance tenure security—for example, verifying names and photographs of people using and occupying land, including names of neighbors who share a border, details about land use, and providing a basis for their land claims—and use that information to obtain land documents.

The concept behind MAST was first conceived in rural Ghana a decade ago, but it took until 2014 for the idea to become real. Since then, MAST has moved from a small pilot in Iringa District, Tanzania to a multi-country approach that USAID and partner organizations have used to map and document more than 93,000 land parcels across Tanzania. The UK Foreign, Development and Commonwealth Office (FCDO) has adopted the MAST approach in its own land registration project in Tanzania, scaling it further to 300,000 parcels and counting. MAST is now also being deployed in Mozambique, Zambia, Liberia, Malawi, and Ghana.

This case study examines the evolution of the MAST approach, from conception to piloting, assessment, and scaling. This work demonstrates how MAST can be used to address issues including poverty reduction, women’s empowerment, conflict prevention, and food security. It also demonstrates how a land documentation approach such as MAST can iterate and adapt to new contexts and challenges and, in the process, take on new forms and functions.



It started in 2011, in the middle of a field in Ghana.

Frank Pichel, who later joined USAID, was dragging a land surveying kit containing a camera, laser distometer and a handheld Garmin GPS.

He thought to himself: “this land survey I’m conducting could probably be done through an iPhone app.”

The idea lay dormant until 2013, when an academic paper by Robin McLaren raised the possibility of improving the speed and accessibility of land registration by “crowdsourcing” property information from local people (McLaren, 2011).

USAID’s Land and Resource Governance division was developing a new global mechanism. Pichel and his colleagues saw the opportunity to include a small pilot to test McLaren’s concept and look at how mobile phone technology can help people map their land rights and strengthen their tenure.

In 2014, Frank and the implementer of the Evaluation, Research and Communication activity, led by the Cloudburst Group, officially kicked off the MAST pilot. The goal of the pilot was to test whether a participatory approach to capturing land rights information using mobile technology could be used effectively to create an inventory of data on land rights, and whether authorities could use these data to generate land documents. The team got to work on developing a combination of a GIS-enabled mobile app that could be used to collect property boundaries and demographic data, take photos, and receive and store this information through a web-based data management platform.

FROM IDEA TO PILOT

The pilot made sense on paper, but how do you convince a national government to gamble on a largely untested technique to document something as sensitive as its citizens' property?

In 2014, USAID, working through the ERC contract, identified Tanzania as a potential host for the MAST pilot. The country was under increasing pressure to provide land documents to its citizens—neighboring Rwanda had just completed a much lauded nationwide systematic registration effort, and the Tanzanian government had made a commitment to deliver 5 million customary land documents called CCROs—but the government’s efforts to date hadn’t produced anywhere near the volume of CCROs it had hoped for.¹ At the same time, foreign agricultural investments in Tanzania’s Kilombero Valley were resulting in highly publicized “land grabs” and fueling local conflict over contested property boundaries, and civil society was pressuring its leaders to protect the rights of villagers against these incursions.

¹ CCRO stands for Customary Certificate for the Right of Occupancy

ERC consultant Jeff Euwema worked with staff members from the Ministry of Lands, Housing and Human Settlements Development (MOL) and encouraged them to come to the field to see MAST in action. Those staff reported their observations of MAST to their superiors in Dar es Salaam, and interest in the proposed pilot slowly began to develop.

In Tanzania, pre-MAST estimates indicated that only 27 percent of landowners were women. In the pilot villages, that figure nearly doubled.

A key to getting the government to support the pilot was working within the parameters of Tanzania's land laws. The MAST team was able to show the MOL that it could use the MAST approach while complying with the country's regulations and surveying accuracy requirements.

“The key thing, when you look back, was that our approach with MAST was to reinforce the institutions and help the institutions, and work within the legal framework,” Euwema said. “So it was seen as less threatening.”

Still, it wasn't until the pilot kicked off and results started flowing that the government began to buy into the approach.



Between 2014 and 2015, USAID piloted MAST in the Iringa District of Tanzania (USAID, 2016).

The two goals of the pilot, broadly, were to:

- Develop an easy-to-use mobile application that met the requirements for delivery of CCROs to villagers; and
- Develop a participatory methodology for securing land rights that met the requirements of Tanzania's land laws, provided focused training on women's land rights, and engaged with villagers in the land mapping and documentation process.

Working closely with National, District and village authorities, MAST relied on village youth—called “Trusted Intermediaries”—to map and register nearly 4,000 parcels across three villages using the MAST mobile mapping tool. The Iringa District Land Office then used that data to register villagers' land and issue CCROs.

A remarkable result of the pilot was that it achieved gender parity in land registration. In Tanzania, pre-MAST estimates indicated that only 27 percent of landowners were women (USAID, 2020c). But in the pilot villages that figure nearly doubled, with 49 percent of plots registered to women. This outcome was far from accidental: one of the hypotheses in Maclaren's paper was that an inclusive participatory mapping approach would better capture the needs of women, youth and other vulnerable groups. MAST

prioritized this approach in its implementation. For example, MAST deployed women’s land rights training in each pilot village and ensured that half of the Trusted Intermediaries trained were women.

“In all three pilot villages, men were originally opposed to the idea of women owning land and receiving CCROs. However... through education, training, and outreach, the project achieved parity between land registrations for women and men” – MAST Pilot Final Report (USAID, 2016)

Another critical result was that the Government of Tanzania agreed to recognize the maps created through MAST and use them to deliver land documents. The MAST team gained the Government’s trust by enlisting land ministry staff as active project participants. Land Officers worked collaboratively alongside MAST project staff in the field to provide introductions to district officials and assisted in the selection of pilot villages based on defined criteria. This day-to-day involvement created a partnership with the Government. It also served as quality control, allowing Land Officers to verify and report back to their superiors that the MAST approach met Tanzania’s legal requirements and accuracy standards for land registration and was generally trustworthy and of high quality.

After five days of training, a team of eight youths selected in the targeted villages in Iringa Region, Tanzania were able to map their entire village—937 parcels in total—in under three weeks.



Assess

Since the purpose of a pilot is to assess the viability of a new approach, measurement and evaluation is absolutely critical. To that end, USAID developed a process to assess the MAST Pilot in two different ways.

First, USAID commissioned a [performance evaluation](#) to understand how beneficiaries and other stakeholders perceived MAST. Second, USAID commissioned a [cost and time study](#) to assess whether delivering land documents using the MAST approach was indeed cheaper and faster than traditional land registration processes, as USAID had hypothesized.

Based on interviews with nearly 100 people, evaluators found that beneficiaries thought the MAST process was transparent and participatory, despite occasional disputes. The interviews also indicated that the significant outreach and communications activities conducted by the MAST team prior to mapping were viewed positively by most participants.

The technology adapted to support the MAST approach was also user-friendly, especially for youth: the performance evaluation found that young volunteer surveyors were able to learn and use MAST relatively quickly to map and document an entire community’s land and resources. After five days of training, a team of eight youths selected in the targeted villages in Iringa Region, Tanzania were able to map their entire village—937 parcels in total—in under three weeks (USAID, 2017a).

The performance review also found that the use of MAST made the collection of data needed to issue CCROs so efficient that District authorities were challenged to keep up with the pace of data collection. Therefore, by the time the pilot ended, while thousands of parcels were mapped across the pilot villages, almost none had been delivered. This was a critical lesson learned, which was addressed in the expansion of the MAST pilot.

Separately, USAID measured the cost and time spent delivering CCROs using MAST and compared it to the cost and time of similar efforts to deliver CCROs led by the Government and by NGOs. The study found that while the cost of the MAST approach was higher than some of the other efforts, MAST also appears to have provided CCROs to village land users substantially more quickly than other efforts. While it took MAST between one to two hours to deliver a single CCRO, it took local NGO Haki Ardhi an average of four hours to deliver a single CCRO, and it took the Tanzanian Government as long as eight days to deliver a single CCRO. The study also found that MAST's locally-led education and sensitization components, which were absent from most other land registration programs, helped build the trust of CCRO recipients in the process.



Photo by Freddy Feruzi



LAND TENURE ASSISTANCE ACTIVITY

Encouraged by the promising results of the pilot, USAID/Tanzania decided to scale MAST through a larger land registration activity called [Land Tenure Assistance \(LTA\)](#), implemented by DAI. One of the principal goals of the 5-year activity was to issue CCROs in 54 villages in Iringa and Mbeya Districts of Tanzania.

The LTA team's focus turned immediately to how to make MAST more affordable, make the technology more user friendly, work out bugs identified in the pilot, and ensure that MAST could support the collection of data on subsequent land transactions that might occur for a given parcel (including bequests, inheritance, and leases). The LTA team automated the CCRO signature process with scanned signatures, improved the accuracy of data collection through the use of external GPS devices, and added field options that allowed data collectors to capture information about existing rights.

Between 2015 and 2019, the LTA project issued nearly 60,000 CCROs. As the project scaled up, the cost of issuing CCROs decreased. By the project's end, each CCRO cost only \$7.85 to produce, compared to roughly \$20 under the original MAST pilot and \$40 using traditional methods (USAID, 2020b).

A randomized control trial impact evaluation of the LTA project identified many benefits of the MAST approach. The impact evaluation found that issuing CCROs improved landholders' land tenure security, reduced the likelihood of land disputes, and led to a strong positive increase in the proportion of women with legally documented and formalized customary land rights (USAID, 2021).

However, the impact evaluation found little evidence that increased tenure security has thus far led households to make new or different investments in their land, or increased their economic empowerment.² While this can be explained by the relatively short time frame since the issuance of customary land documentation, the evaluation suggested that while tenure security was necessary for improving citizens' economic prospects, by itself, it was not sufficient:

Formalized land rights are clearly an important step in unlocking formal sources of credit and economic opportunities for the rural poor, but the IE's qualitative findings show that substantial demand- and supply-side barriers may also need to be addressed before this can be realized at scale (USAID, 2021).

² A possible reason for this finding is that the endline was taken soon after the delivery of CCROs, and not enough time had passed for major economic empowerment impacts to bear out.

Recognizing the early success of LTA, USAID extended the project for an additional two years and charged it with a daunting but critical mission: move away from providing CCROs for free, and explore models under which villagers would pay for documents for ensuring local sustainability. Payment would cover the costs of mapping parcels, gathering parcel owners' information, processing the data, and printing documents. LTA, in consultation with relevant authorities including the Ministry of Lands and District councils, developed a beneficiary contribution model that required village residents to

contribute TSH 30,000 (around \$12) to the cost of registration of their customary village land (LTA Staff, 2020).

By the project's end, each CCRO cost only \$7.85 to produce, compared to roughly \$20 under the original MAST pilot and \$40 using traditional methods.

"It was hard because people were asking, 'my neighbor got it for free. Why do I have to pay?'" recalls Mustapha Issa, Deputy Chief of Party on the LTA project. "But we invested a lot in public outreach activities. We went to the villages in collaboration with local government authorities, district land officers, and we aired radio programs ... to ensure the land governance institutions play an active and focused role to encourage beneficiaries to pay their contribution is essential. We sharpened LTA's key messages and delivered the messages for easy understanding [by] village residents."

So far, the approach has worked. According to Issa, LTA has succeeded in implementing its beneficiary contribution model in 24 villages. In some of these villages, as many as 80% of villagers have paid for their CCROs. This finding is significant because it is the first time that significant numbers of rural Tanzanians have paid for CCROs, and demonstrates the possibility of providing land documents as a paid service.

To date, LTA has registered nearly 100,000 CCROs in 65 villages located in Iringa and Mbeya regions of Tanzania.

SCALING WITHIN TANZANIA

As the LTA project gained steam, other donors began to notice.

In 2016 the Land Tenure Support Program (LTSP), which was funded by FCDO, the Swedish International Development Cooperation Agency (SIDA) and the Danish International Development Agency (DANIDA) to deliver CCROs in Tanzania's Morogoro Region, asked the LTA team for help in adopting MAST (Sullivan et al., 2019). LTA staff trained LTSP on the use of MAST, and to date, LTSP has relied on MAST to issue more than 300,000 CCROs across the country.

The World Bank, which is negotiating a loan to the Tanzanian government to register land in 200 villages and multiple urban centers, has also expressed interest in using MAST for land registration once the loan is finalized.

The LTA project has also received requests from more than a dozen local NGOs and projects that are interested in using MAST for everything from environmental conservation to water resources management. A few of these NGOs have already begun using the approach and technology. For example, the Jane Goodall Institute has adopted MAST into its Landscape Conservation in Western Tanzania project, which is working to protect chimpanzee habitats in Kigoma and Katavi Regions (USAID, 2019a). In order to help protect these habitats, the Jane Goodall Institute is using MAST to conduct land use planning in four communities; it plans to scale this work to 20 villages.

USAID's Water Resources Integration Development Initiative, which worked across multiple Tanzanian regions to address water scarcity and climate change impacts, also used MAST to assist with land use planning in villages that were experiencing land use conflicts.

And the Lawyers Environmental Action Team, a Tanzanian NGO, is using MAST to assist with land use planning as part of its Resilient Natural Resources Governance project in southwest Rukwa Region.

SCALING OUTSIDE OF TANZANIA

Based on its early experiences, in 2016, USAID began to deploy MAST outside of Tanzania.

Scaling MAST's use outside of Tanzania was initially challenging because the software tool had been customized to fit Tanzanian land laws and regulations. Tanzania had also proven a hospitable pilot site because of its flexible land laws and forgiving surveying accuracy requirements. In other countries, strict land regulations require more customization of MAST or may preclude its use altogether.

Nevertheless, because MAST is technology-agnostic and “fit-for-purpose”—meaning that it is compatible with many types of mobile tools and can be adapted to different combinations of spatial, legal, and institutional frameworks—USAID and its partners have so far been able to adapt and configure it to work in Burkina Faso, Liberia, Zambia, Mozambique, and Ghana.

In Burkina Faso, the National Land Observatory was able to modify the MAST mobile application and data management system to collect demographic and tenure information in a significantly different legal and social environment from Tanzania. The newly-modified technology included a French-language user interface that created forms needed by local land

The MAST approach mapped and documented customary land holdings roughly nine times faster than traditional mapping and surveying techniques.



offices and cadastral agents to secure land rights (USAID, 2017b). The MAST approach mapped and documented customary land holdings roughly nine times faster than traditional mapping and surveying techniques. USAID's Amélioration et Sécurisation des Terres vers la Résilience project has since scaled the use of MAST to 30 villages.

In Zambia, USAID's Integrated Land and Resource Governance (ILRG) program also uses MAST to support participatory mapping and village governance structures. The MAST approach in Zambia brings community level information together with government records and works with government, chiefs, and civil society leaders to customize MAST for local uses. In parts of rural Zambia, MAST saved villagers from having to travel to the capital, Lusaka, to obtain their land documents. ILRG found that as a result of using MAST, the distance villagers had to travel to access their land certificates decreased from 371 miles to less than 18 miles.

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In Liberia, USAID's Land Technology Solutions project used MAST to help communities around the Blei Community Forest document their forest resources (USAID, 2019b). The pilot demonstrated a new model for community forestry programming based on the MAST approach and technology, with a particular emphasis on community-level engagement. Prior to MAST, two thirds of community members said they knew the process for documenting forest resources. But after the MAST pilot, that number grew to 96 percent (USAID, 2020a).

USAID continues to document MAST uptake and successes through its [MAST Learning Platform](#), which contains implementation tools, examples from the field, and guidance for adopting the MAST software to new contexts.



In Tanzania, the LTA activity will come to an end in 2021. This leaves the question: how will MAST live on after the project wraps up?

To answer this question, USAID/Tanzania and the LTA activity have decided on a creative sustainability approach: they have supported the establishment of a Tanzanian NGO whose mission is to enable land registration and land use planning using MAST. Mustapha Issa, LTA's Deputy Chief of Party, will be the new NGO's director.

The Land Tenure Assistance NGO will train national, district, and village stakeholders, as well as NGOs and donors, on how to use MAST to map and register land. The NGO will also assist with mapping and registering land for a fee. The LTA activity's successful experimentation with cost recovery models has given the NGO confidence that Tanzanian citizens are willing to pay for CCROs.

Conclusion: Lessons Learned

How do you take a novel idea from concept to pilot and then to scale? The MAST journey offers several lessons. These include:

- **Treating communities as equal partners is key.** A critical component of the MAST approach involves treating beneficiary communities as equal partners. This includes consulting with communities about their needs and desires, and sensitizing them to land laws (including provisions related to gender equality), registration procedures and the benefits of land documents. It also includes physically involving them in the land mapping. These upfront efforts allow MAST to be seen as more inclusive and trustworthy. For example, an [evaluation of the MAST project in Liberia](#) found that “Stakeholders and beneficiaries from the Blei communities viewed the MAST process as clear, transparent, empowering, and beneficial.” Not only that: these close ties have allowed the LTA project to make the case to Tanzanian communities that CCROs are worth paying for.
- **Flexibility and adaptive management are critical.** MAST has evolved considerably over the course of its implementation. These adaptations are too numerous to name, but to provide just one example: the LTA project realized that MAST did not have the ability to capture land transfers made after a CCRO was issued, so they altered the MAST tool in order to allow subsequent transactions. These adaptations were directly informed by conversations with beneficiaries and partners. Constant communication with these groups allowed USAID and its implementing partners to spot opportunities to improve MAST. Similarly, MAST adapted considerably to fit the country contexts of Burkina Faso, Zambia, Liberia, and other countries in which it was deployed. Having the flexibility to adapt the MAST approach to the country context was key to its success.
- **Spotting political opportunities is important.** Land registration can be time intensive and costly, and often does not reap immediate benefits (instead, those benefits accrue over time). As a result, political support and buy-in is key to the success of a land registration project. In Tanzania, USAID spotted and took advantage of two political opportunities. First, the Government was [coming under fire](#) from civil society for failing to protect local landholders from corporate land grabs. Second, in response to this criticism, the Government had begun making commitments to deliver CCROs. USAID positioned MAST as a cost-effective approach to help the Government meet its land registration commitments and help reduce conflict and help rural landlords secure their tenure.
- **Soft skills matter. Taking time matters.** A critical juncture in the success of MAST was convincing the Government of Tanzania to take a chance on piloting a new approach to documenting land rights. USAID and its implementing partner relied on soft skills to gradually build rapport with Tanzanian decision-makers, gain their trust, and help them see the value of the new MAST approach. For USAID, building in the time and funding to allow for this gradual, low pressure process to take place is key to laying the groundwork for innovative experiments

like MAST. Not only that: sustained donor coordination resulted in FCDO adopting MAST in its LTSP project, scaling three-fold the number of CCROs issued with MAST.

- **Evaluation is essential to make a compelling pitch.** The results from the MAST performance evaluation and cost and time study were key to helping USAID pitch the expansion of MAST, both within Tanzania and abroad. Decision-makers frequently asked: “how do we know that MAST works?” Being able to point to rigorous and documented evidence helped USAID answer these questions.



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Learn More

<u>What is MAST?</u>	<u>MAST in the Field</u>	<u>MAST Technology</u>
<u>MAST Implementation</u>	<u>Case Study: Leveraging MAST in Natural Resource Management</u>	



Questions? Contact the EEI/LRG team at landmatters@usaid.gov

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For more information:

<https://land-links.org/project/integrated-natural-resource-management-inrm-activity/>

A Decade in the Making: The Evolution of Mobile Applications to Secure Tenure (MAST)

Date of Publication:	July 2022
Author:	Yuliya Panfil, Tim Robustelli
Back cover photo:	Young woman in Burkina Faso displaying the MAST app on her mobile phone. Photo by USAID Land.

This document was produced for review by the United States Agency for International Development under the Strengthening Tenure and Resource Rights II (STARR II) IDIQ contract number 7200AA20F00010.

The authors' views expressed in this publication do not necessarily reflect the views of the United States Agency for International Development or the United States Government.

