

# INSTITUTION OF SURVEYORS OF KENYA DEMONSTRATES ALTERNATIVE APPROACHES

## Handheld Land Administration Mapping Methods in Kenya



Fit-for-purpose approaches to land administration have been tested in Kenya, with a focus on the provision of land titles with inclusiveness for all in an approach that is affordable, fast and 'good enough'. Earlier this year a group of Kenyan surveyors performed a field test in Makueni County, collecting land data using handheld devices. This first test was a learning experience; a more comprehensive test must be conducted to prove the scalability of the approach.

The fit-for-purpose approach recommends the use of 'visual boundaries' to identify the delineation of land rights. There are many naturally

visible boundaries in rural areas in Kenya, and the local people have made some other boundaries visible using sisal plants. During the field test performed by a group of Kenyan surveyors to trial a fit-for-purpose approach, all boundaries were easy to identify in the field and on satellite imagery. After being identified in the field, the visual boundaries were then drawn in an analogue manner using a pen or 'digitally drawn' using handheld GPS devices on top of imagery.

### All land rights

Making an overview of all existing people-land relationships includes formal ownership and informal land use, as well as possession and occupancy of lands. The overview of the existing situation should also reflect overlapping claims, disputes and conflicts, since it is crucial for the authorities to get an overview of spatial units or boundaries under dispute. This 'dispute map' is the starting point in supporting the dispute resolution procedures. Dispute mapping is already done in other countries, just as imagery is used for cadastral mapping. The test in Kenya was an initiative by the surveying community to find out how to organise support and nationwide introduction of a fit-for-purpose approach.

## Participation

Community involvement is the basis for success. Cadastral survey requires the participation of neighbours, family members, etc. Therefore, the village elders and other villagers are informed in advance to ensure awareness and involvement of all parties (see Figure 1). Everyone can monitor the on-site process in the field. During the field test, the collected data was transmitted from the mobile device directly to a cloud-based GIS environment, enabling everyone to follow the process remotely and creating 'remote participation'.

## How does it work?

Fieldwork is about creating an overview of all existing people-land relationships, including formal ownership and informal land use and also overlapping claims. Villagers and farmers are invited to walk the perimeters of their land parcels and point to the vertex points of the boundaries themselves using a GPS antenna. An experienced surveyor or grass-roots surveyor records the observations with the Collector app from Esri. Satellite imagery of the area is displayed on the screen of the mobile device (see Figures 2a-2c). Data collection is done in an integrated way: the perimeter is stored as a closed polygon together with the claimed type of right combined with a photo of the owner or claimant and a photo of the owner's or claimant's ID (Figure 3). A preliminary identifier is used as linking key. Accuracy is not so much about the geometry, but is rather focused on linking spatial and administrative data or, in other words, linking people to polygons. Since citizens are required to provide proof of their identity, the government has to be represented in the field. This is of general importance for the success of this methodology.

## Disputes

It is crucial to get an overview of parcels or boundaries under dispute and at the same time an overview of all the areas which are not under dispute. 'Dispute holders' need to 'agree' on the area and location of the dispute. During the adjudication process in the field, disputes may lead to the creation of overlaps between polygons. In that case, those overlaps are mapped and the corresponding authorities know the exact location of which type of land-related conflict.

## Data handling

After field data collection, the data must be checked for completeness and prepared for public inspection. Some editing was needed in order to present the spatial data – this concerned mainly the calculation of average locations of boundaries based on the input from the neighbour on each side of the boundary.

## Public inspection

Usual procedures, such as public inspections, are conducted at village meetings – often in the local town hall – accompanied by trusted third parties. At a village meeting (which in the field test was held in the local church), community members gather to view all the collected data on a map and discuss and reconcile the results. In the field test, the presented data was loudly confirmed by the community.

## Configuration

The design environment in this case is based on Esri's Collector app, which enables very efficient data collection. The app is used in combination with a GPS device for sub-metre accuracy, via a Bluetooth connection. Devices from Trimble and other suppliers can be used. Lightweight devices in the field are very efficient to use in mountainous Kenya, and the tools and technologies to develop the application are available. The GPS device requires a correction signal for correction of atmospheric distortions of the GPS signals. Sub-metre accuracy is sufficient. High accuracy is not needed – no beacons need to be placed. It is important to gain an overview of the plots with a highly reliable link to the type of right and the owner. If necessary, placing beacons and highly accurate surveys can be done later during the maintenance phase. This can also be done by the people themselves.

## Field test

The field test conducted in Makueni County in 2017 demonstrated that the field data collection and data handling can be carried out quickly, affordably and reliably. This test was carried out by the Institution of Surveyors of Kenya, the National Ministry of Lands, Housing and Urban Development and the Ministry of Lands, Mining and Physical Planning in Makueni County, in close collaboration with software and hardware providers.

## Institutional commitment

There is attention to this approach at the highest level. Prof Jacob Kaimenyi, the Minister of Lands, Housing and Urban Development of the Republic of Kenya, welcomed a delegation from the Institution of Surveyors of Kenya (ISK) and Kadaster International to his office at Ardhi House in Nairobi. The delegation informed the minister about the goals and potential impact of the test and introduced the fit-for-purpose approach to land administration. The chair of ISK explained the benefits of the approach, and this topic now has the minister's attention.

Prof Kivutha Kibwana, a representative of the Governor of Makueni County, and the Minister of Lands, Mining and Physical

Planning of Makueni County welcomed the delegation to the Governorate of the County. The test was done in this county and had permanent attention of the minister herself. The word of welcome was followed by intensive discussions on the approach: on participation, on quality and costs, on time effectiveness, on the need for monumentation, on accuracy versus coverage, etc. The minister underlined the importance of alternative approaches. However, this innovative approach may have some impact on existing regulations, and there is also the issue of how to store and manage the integrated data. Should the data be divided into a cadastral subset and a registry subset, with different object IDs? These are important issues to discuss as the basis for future development. A further issue is whether the data can be kept fully digitally after the fieldwork, or whether paper-based storage is needed. Or perhaps a paper copy of the satellite image should be left to the local community as the 'people's data'. Notably, in Kenya it is already commonplace for the boundaries to be drawn by hand on top of imagery, including in the test area (see Figure 4).

## Concluding remarks

The field test conducted in Makueni County in 2017 demonstrated that the field data collection and data handling can be carried out in an integrated, participative, fast, affordable and reliable manner. Figure 5 shows the results. Two surveyors collected data about 40 parcels in the space of six hours in a mountainous environment and the results were well received. However, the legal and institutional set-up requires attention in order to be able to implement the approach, and most of the participants agreed that the approach needs further attention in order to bring land titles for all.

It is estimated that, at this point in time, approximately 20% of the land parcels in Kenya have been surveyed (in one way or another) and are registered. The current cost to adjudicate, demarcate, survey, map and register a two-hectare parcel in Kenya is at least a few hundred dollars per parcel. In terms of the total cost, there are an estimated 15 million of parcels still to be included in the registry. It is clear that this amount of money is simply not available.

Alternatives are needed – or should at least be a topic of debate amongst professionals. An alternative methodology is presented here to ignite this debate. It is proposed to organise this debate now, with an open mind and a focus on the future. A more comprehensive test will lend support into this debate, and ISK is optimistic about the potential.

## Further reading

Enemark, S., McLaren, R., Lemmen, C., 2015. *Fit-For-Purpose Land Administration – Guiding Principles*. UN-HABITAT / GLTN, Nairobi, Kenya. Available at:

FIG and World Bank, 2014. *Fit-For-Purpose Land Administration*. FIG Publications No 60, FIG Office, Copenhagen.

Molendijk, M., Morales, J.M. and Lemmen, C.H.J. (2015) Light mobile collection tools for land administration : proof of concept from Colombia. In: *GIM International*, Volume 29, November 2015.