

## EDUCATIONAL TOOLS FOR FIT-FOR-PURPOSE LAND ADMINISTRATION

# Experiences and Lessons from Mozambique

In most countries, realising the continuum of land rights ideology and the fit-for-purpose land administration approach will require a suite of policy, legal, institutional and technical interventions. Another key component is capacity development; scaled implementation requires individuals, organisations and society as a whole to understand, support and apply the approach. The authors present recent experiences from Mozambique, where a training package based upon the fit-for-purpose mindset was developed, shared and tested in collaboration with local practitioners.

Mozambique has an ambitious plan to map five million land interests in the space of five years, the so-called Terra Segura programme. The fit-for-purpose approach is regarded as one way to achieve this goal, but widespread awareness and training programmes are needed. Whilst the fit-for-purpose philosophy and methods are reasonably well described, much less is documented with regards to appropriate training techniques. The collaborative development of a two-week training programme was undertaken by the Faculty of Geo-information Science and Earth Observation (ITC) of the University of Twente, The Netherlands, and the Netherlands' Cadastre, Land Registry and Mapping Agency (Kadaster) in coordination with the National Directorate of Lands (DINAT) of the Ministry of Land, Environment and Rural Development in Mozambique in order to start filling the gap. The programme has been made possible through the support of the Netherlands Fellowship Programmes (NFP).

## AIM

The overarching aim for the package was to provide participants with field experience in using imagery as a basis for adjudicating and mapping land rights – in both urban and rural areas – and to teach them to consider the implications of the approach when implementing it at scale. Specifically, the aim for the participants was to be able to use satellite or aerial imagery to establish parcel index maps in selected rural and

urban sites and to discuss the advantages and disadvantages of image-based land adjudication and cadastral mapping.

## MINDSET

Emphasis was on process and procedures, rather than specific technologies. The idea was that by focusing on the technical procedures, potential legal and institutional challenges would be brought to the fore. The latter are key in terms of successful

implementation and scalability. There were opportunities for self-reflection and group reflection at selected points in the exercise.

## STUDY SITE

It was estimated that a suitable study area, for a group of approximately 24 participants working in groups of three, would be 8km<sup>2</sup>. This would be easily divisible into two separate groups of four 1km x 1km quadrants. If more than eight groups were



**DEFINIR OS ATRIBUTOS**

ATRIBUTO	1	2	3	4	5	6	7	8	9
NOME CORRETO	/	/	/	/	/	/	/	/	✓
DATA NASCIMENTO	/	/	/	/	/	/	/	/	✓
CÓDIGO DA PARCELA									
IDENTIFICAÇÃO	/	/	/	/	/	/	/	/	✓
LOCALIZAÇÃO	/	/	/	/	/	/	/	/	✓
GÊNERO	/	/	/	/	/	/	/	/	✓
SUJEITO	/	/	/	/	/	/	/	/	✓
PREFEÇÃO	/	/	/	/	/	/	/	/	★
ESTADO CIVIL	/	/	/	/	/	/	/	/	✓
FINALIDADE	/	/	/	/	/	/	/	/	✓
DIMENSÃO	/	/	/	/	/	/	/	/	✓
CONTACTO	/	/	/	/	/	/	/	/	✓
FORMA DE AQUISIÇÃO	/	/	/	/	/	/	/	/	✓
LEGITIMIDADE (SIM - NÃO)	/	/	/	/	/	/	/	/	✓
SIGNATURAS									
TITULAÇÃO									
INFRAESTRUTURA TERRA BENEFICÍARIAS	/	/	/	/	/	/	/	/	★

to take part in the exercise, the number of 1km x 1km grid blocks could be scaled up. Both (peri-)urban and rural land use types were included; the former consisted of regular parcel shapes, whilst the latter was a pastoralist community.

### MATERIALS

Imagery of the study location was required. Products from conventional aerial imagery flights, high-resolution satellite imagery, high-quality imagery captured from unmanned aerial vehicle (UAV) flights or even images captured from web mapping services could be used. Selection was based on fit-for-purpose thinking, with price and availability representing common constraints. The images were cloud free and, preferably, had a 60cm resolution (or better). However, this was not possible for one of the case areas. If possible, the images should be orthorectified and georeferenced, but this is not strictly essential for the fieldwork. Extracts representing a size of just over 1km x 1km in the field should be plotted on a 1:2,000 scale. The 1km x 1km quadrant should be represented with a red perimeter. The actual represented area on the paper plot is

bigger to allow drawing of boundaries that go beyond the printed area. The plots should be provided on high-quality paper, and paper notebooks (logbook), pens and high-quality markers are needed.

### PREPARATORY WORK

Appropriate authorities and community leaders must be contacted in advance – and this was also the case in Mozambique. During these interactions, prior agreement should be reached on: the available working area; availability of land holders or community members to participate; how to inform land holders and community members about the purpose; and the date and time of the field exercise.

### TEAM PREPARATIONS

Groups of three participants should be formed. Each group is allocated a 1km x 1km block as developed from the available imagery. Groups should study their allocated block and make rough estimates of the number of parcels included and the type of terrain involved. Each group should discuss with other groups about the parcels that overlap into neighbouring blocks to decide which group will do the overlapping plots, get agreement, etc. The participants prepare a list of attributes to be collected. These should relate to the specific rights and right holders being recorded. Each group should also develop a workflow they intend to follow for the adjudication and mapping of each parcel.

### FIELDWORK

After travelling to the study location, the group(s) must first make acquaintance with local authorities and take part in the appropriate meet-and-greet ceremonies. Once the reconnaissance is complete and the group and the participating community have reached agreement on the process, data collection can commence. Data collection

involves conducting boundary adjudication activities in a systematic fashion – including sketching boundaries on the aerial imagery and recording accompanying attributes for each parcel (or property object) and accompanying right. Not all boundaries will be visible on the imagery. Such non-visible boundaries can be captured by simple field surveys. Monumentation is not included in the process; the image with drawn boundaries is the maximum available accuracy, but this may be improved later.

### LINKING AND SHARING RESULTS

The owner or occupier of the spatial unit will receive a piece of paper showing the preliminary parcel identifier number of the spatial unit. This is taken to the trusted intermediary who is collecting the information about the nature of the right, the person(s) and the unique (preliminary) parcel identifier number. A link between all the information is made using simple yet standardised forms. A key element of the process is that the community receives tangible evidence of the process very close to the time when the activity is completed. The easiest artefact to reveal is the marked-up aerial imagery – complete with boundaries and owners identified. Ideally, a copy of this image is provided to the community.

### IN THE OFFICE

Whilst a manual adjudication process can be completed well within a day for a 1km x 1km block (depending on information density), the confirmation of maps and certificates usually takes longer. In-office digital processes are needed: scanning and georeferencing of fieldwork, vectorising spatial data, digitising the attribute data related to database development, and certificate production. Ideally, a supportive mobile training and education vehicle would possess these tools.





### LOOKING AHEAD

This approach was piloted in Mozambique and it was a great experience for the participants, all of whom were land professionals. The fieldwork exercise was very helpful in understanding fit-for-purpose thinking. It was based on locally available resources and expertise. Local stakeholders in the land sector such as Verde Azul Consultants and the NGO Community Land Initiative (iTC) played an important role. The training course contributed to further experimentation and the development of a fit-for-purpose approach for Mozambique's ambitious plan to map five million land parcels in five years. ◀

### LIZA GROENENDIJK

Liza Groenendijk is senior lecturer land administration at ITC, University of Twente, The Netherlands and Chair of Commission 2, Professional Education, of the International Federation of Surveyors (FIG).

### CHRISTIAAN LEMMEN

Christiaan Lemmen holds a PhD from Delft University, The Netherlands. He is geodetic advisor at Kadaster International and visiting researcher at ITC, University of Twente, The Netherlands. He is director of the FIG Bureau OICRF.

### ROHAN BENNETT

Rohan Bennett gained his doctorate from the University of Melbourne, Australia. He is assistant professor working in land administration at ITC, University of Twente, The Netherlands.

### FURTHER READING

- Balas, M., et al. (2016). Secured land tenure in Mozambique – A fit-for-purpose approach. Annual World Bank Conference on Land and Poverty, Washington DC, USA, 14-18, 2016.
- Enemark, S., Bell, K.C., Lemmen, C.H.J. and McLaren, R. (2014) Fit-For-Purpose Land Administration Guiding principles. Reference Document – 30 November 2016. GLTN/UN-Habitat/Kadaster
- FIG (2014). Fit-For-Purpose Land Administration. FIG Publication. 60.
- Lemmen, C.H.J., Zevenbergen, J.A., Lengoiboni, M., Deininger, K. and Burns, T.R., 2009: First experiences with high-resolution imagery-based adjudication approach for social tenure domain models in Ethiopia. World Bank Conference: Land governance in support of the Millennium Development Goals, responding to new challenges, 9-10 March 2009, Washington DC, USA
- Zevenbergen, J.A., Augustinus, C., Antonio, D. and Bennett, R.M., 2013: Pro-poor land administration: principles for recording the land rights of the underrepresented. In: *Land Use Policy*, 31 (2013) pp. 595-604.

ASK FOR YOUR FREE TRIAL  
→ [effigis.com/ezsuvr](http://effigis.com/ezsuvr)

# POWER AND PRECISION AT YOUR FINGERTIPS

## EZSURV® POST-PROCESSING SOFTWARE PROVIDES YOU WITH:

- ▶ Access to more than 10,000 CORS stations data all around the world
  - ▶ Support multiple receiver native data format
    - ▶ State-of-the-art processing engine
      - ▶ Easy-to-use application
      - ▶ Flexible licensing mechanism
- ▶ White Label version available for manufacturers

**effigis**   
GEO SOLUTIONS

Compatible with  
*MicroSurvey*  
**FIELDGenius**

**OnPOZ4**   
Precision Positioning