



Terri Freemantle (left) is an Earth Observation Specialist with the Satellite Applications Catapult at Harwell, Didcot, Oxfordshire (www.sa.catapult.org.uk)

Down-to-Earth remote sensing

While satellite-derived Earth Observation data is now a common commodity, remote sensing by other means has many advantages for developing nations. Terri Freemantle takes stock of projects in Tanzania that prove the point

In the developed world, we often take maps for granted. Our lives are increasingly driven by technology, innovations in smartphones and GPS mean that we all have maps in our pocket. Too often, we forget that having accurate maps of where we live is a privileged position.

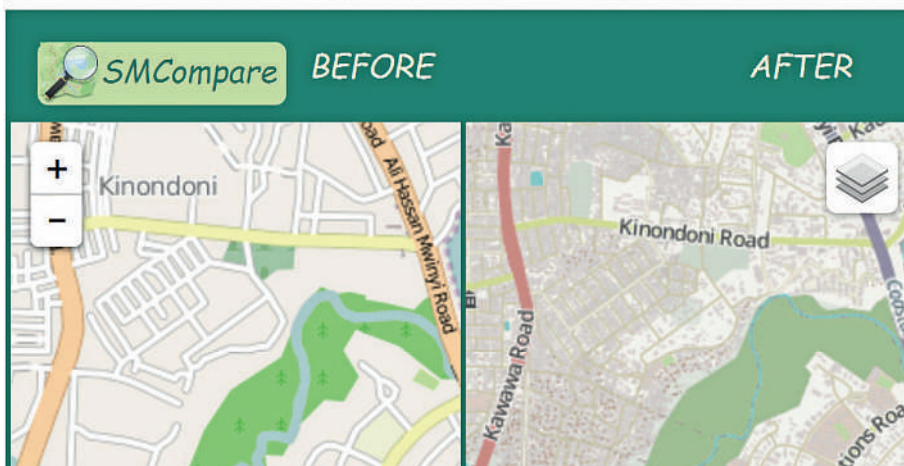
In the developing world, maps often do not exist at all, or when they do, they are often inaccurate and out of date due to rapid urbanisation and environmental change. Satellite Earth observation (EO) can help, by providing imagery that can facilitate the creation of maps. However, in developing nations - particularly those in tropical and sub-tropical regions – the use of satellite EO data is often hindered by dense cloud cover, additionally, the associated high cost of very high resolution imagery and computational power needed to process it, often means that satellite EO data is often out of reach for end users in lower-income countries.

Overcoming the barrier

On a recent visit to Tanzania to attend the World Bank and DFID Urban Resilience Tanzania Conference (URTZ), I was fortunate enough to visit several local projects that are innovating in the sphere of cartography by adopting new, low-cost methods of mapping through the fusion of community engagement and Unmanned Aerial Vehicle (UAV) data.

The World Bank has piloted two projects in Tanzania; the Ramani Huria ('Open Map' in Kiswahili) Project and the Zanzibar Mapping Initiative (ZMI). Both projects are adopting UAV data to create accurate detailed maps of Dar es Salaam and the Zanzibar archipelago.

UAVs can provide a comparably low cost solution for wide scale mapping in developing nations. The lower flight altitude of UAVs compared to satellites means that cloud cover is no longer an issue, and the data



The community-based Ramani Huria ('Open Map' in Kiswahili) project has also utilised UAV-derived data to help create accurate detailed maps of flood-prone areas of Dar es Salaam. In the upper picture, a member of the Humanitarian Open StreetMap Team readies an eBee for flight. Photo: Humanitarian Open StreetMap Team

recorded can provide image resolutions as high as 4cm. The limited constraint of no-fly zones, coupled with the comparative ease of use of fixed wing UAVs, means that local people can be trained to operate the UAVs and acquire the imagery.

Using a fleet of SenseFly eBee drones, teams in Dar es Salaam and Zanzibar can generate imagery over large areas quickly, and using open source tools such as OpenDroneMap, the data can be processed and shared openly and efficiently.

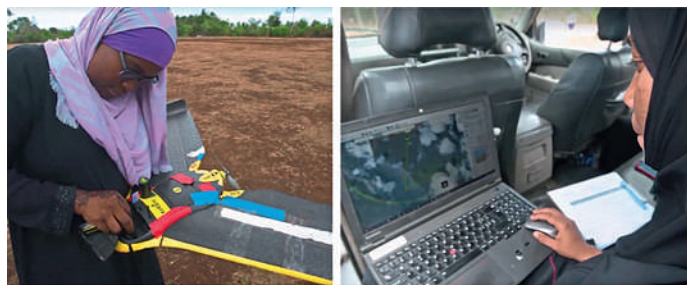
Positive Impact

These newly-generated maps will be a crucial resource for urban planning and environmental management. The rapid urbanisation of cities in developing countries, such as Dar es Salaam (one of the fastest growing cities in Africa) has led to the rapid establishment of informal settlements. Such settlements present numerous challenges, for transport, accessibility and risk.

Dar es Salaam is subject to seasonal heavy rain that often causes flash flooding. Many informal settlements are located in floodplains, and coupled with poor drainage networks, these areas are often subject to severe flooding which can, in turn, risk human life and harbour the spread of water-borne diseases such as Chlorea.

The Ramani Huria project has used a combination maps created using UAV imagery with Digital Elevation Models to map areas at high risk of flooding and inundation. Using this information, and community engagement – local volunteers have been working to create drainage systems to alleviate the impact of flooding, and the positive effects of this initiative can already be seen in Dar es Salaam.

In Zanzibar, the ZMI is creating a high-resolution map of the Islands Unguja and Pemba. The Zanzibar Commission for Lands will use the maps for better planning, land tenure and environmental monitoring. There are plans to combine the UAV data with satellite EO data to provide an enhanced understanding of the changes taking place in the region.



The Zanzibar Mapping Initiative is creating a high resolution map of the islands of Zanzibar and Pemba, over 2300 square km, using low-cost drones. The Zanzibar Commission for Lands will use the maps for better planning, land tenure and environmental monitoring. Photos: World Bank Africa

Satellite and UAV EO data provide complementary datasets, each with their benefits and constraints, but both provide unique insight into the human and natural environment.

For more information on the projects covered in this issue, please visit <http://ramanihuria.org>/<https://opendri.org/project/zanzibar/>

A graphic for the Geodata 2017 event series. The word 'Geodata' is written in a large, stylized font, with a globe icon replacing the letter 'o'. Below it, the year '2017' is written in a large, white font. To the right of the year, the text 'The International Geo-community Event Series' is written in a smaller, white font. The entire graphic is set against a green background with a pattern of white lines.

Scotland Showcase - 12 October 2017
London Showcase - 30 November 2017

www.geoaware.info