RAMANI HURIA – MAPPING INNOVATIONS AND COMMUNITY DATA IN DAR ES SALAAM

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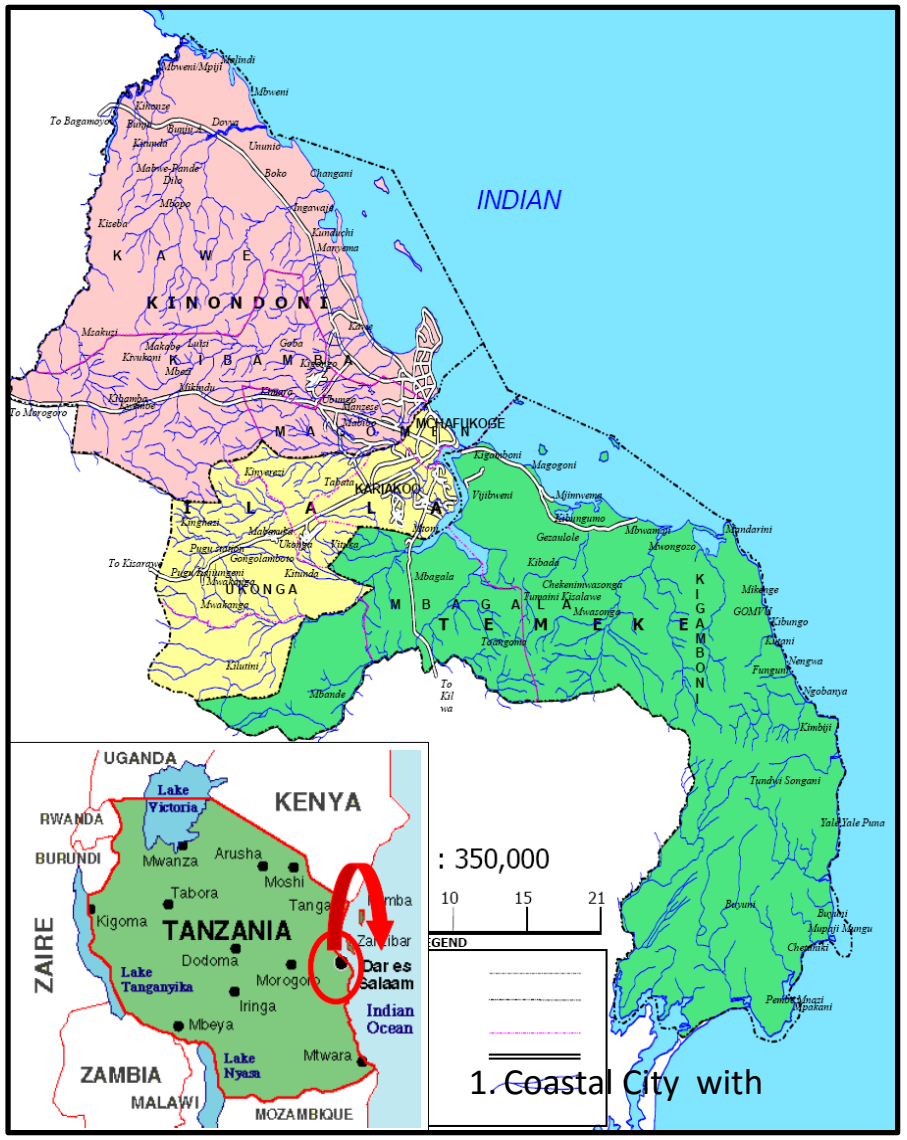
Presentation outline

1. Dar es Salaam Context
2. How the work started
3. Local Data Needs
4. Methods used
5. Key Advantages
6. Challenges
7. Application

BASIC DATA AND KEY FACTS



Dar es Salaam is a Coastal City bounded by the Indian Ocean on the east.

•Total surface area of Dar es Salaam City is 1,800 square kilometers, comprising of 1,393 square kilometers of land mass with eight offshore islands.

•More than 70% of City dwellers reside in Unplanned settlements

• Commercial capital of the Country Generating 40% of GDP & accounts 70% of national domestic revenue

.6 LGA (DCC, Kinondoni MC, Ubungo MC Temeke MC, Kigamboni MC & IMC with mayors & powers to plan & guide urban development

• Port which is a gateway to 6 landlocked countries. Strategic important for the whole Region of East and Central Africa.

Dar es Salaam Context

Rapid Urbanization

Dar es Salaam Context

Rapid Urbanization and Unplanned Growth Brings Challenges

5.5 Million Population

1. Traffic Congestion
2. Solid Waste & Waste Water management
3. Safe Drinking water
4. Youth employment

Dar es Salaam Context

Urban Flooding: Devastating Floods in 2011 and 2013

How we Started

2011 Pilot in Tandale showed that Student and Citizen can be a source of Useful Data

1. Collect very Local Data – eg. drain type, business types, etc
2. Fast changing features – eg. rubbish sites, flooding areas
3. Citizen can voice Issues on the map – eg. children play areas

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Citizen Data in Dar es Salaam: Ramani Huria

In September 2011 25 Town Planning Students worked with 25 community members to map Tandale Ward in 3 weeks

August 2011

September 2011

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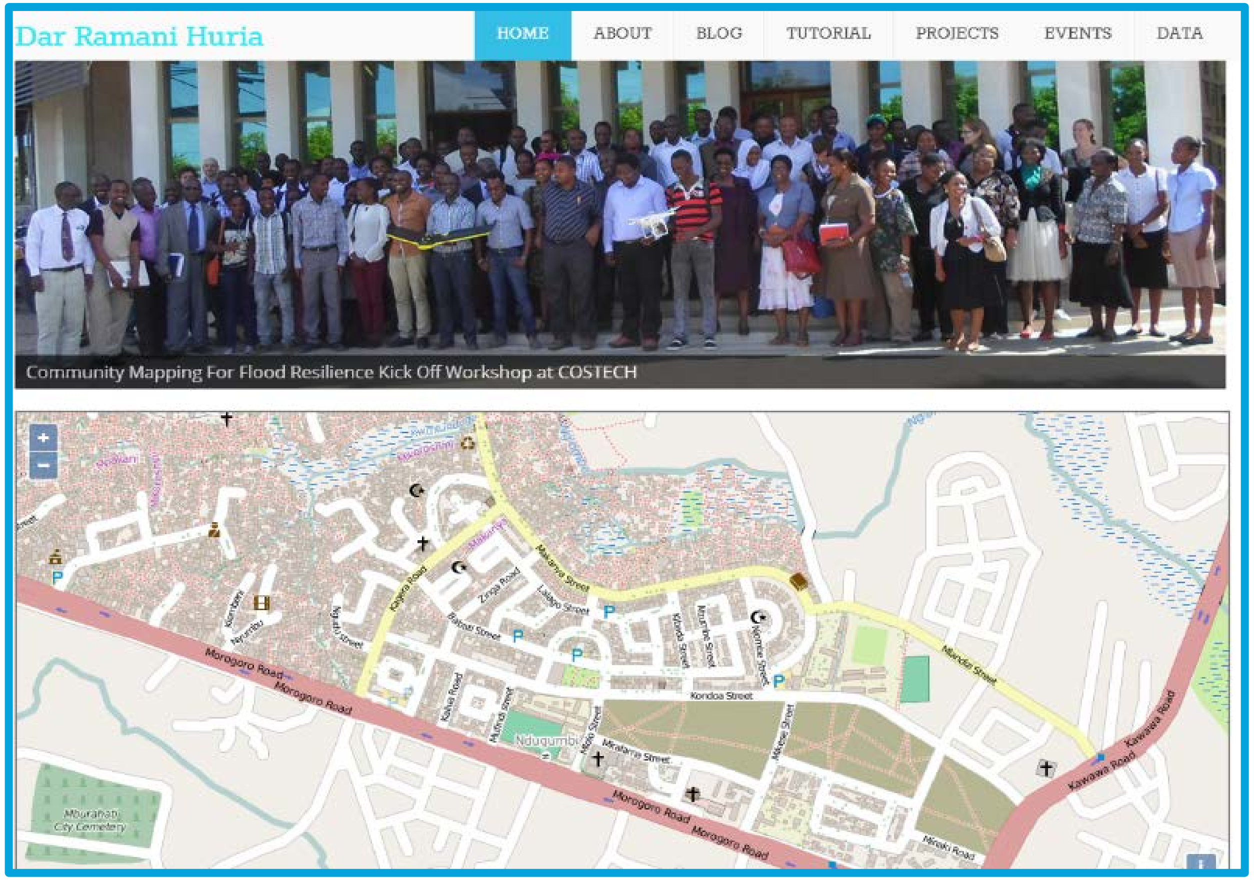
Mapping Campaigns in Dar es Salaam

Started March 2015: 165 Students, 100+ Community Members, 100 Red Cross Volunteers



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Low Cost Mapping Drones are generating high resolution up-to-date data

In 2015 the City of Dar es Salaam, with Commission for Science and Technology used low cost

Mapping drones to update base maps and elevation data

96cm wingspan

700g take-off weight

RGB, Multispectral, thermal cameras

50 minutes of flight time

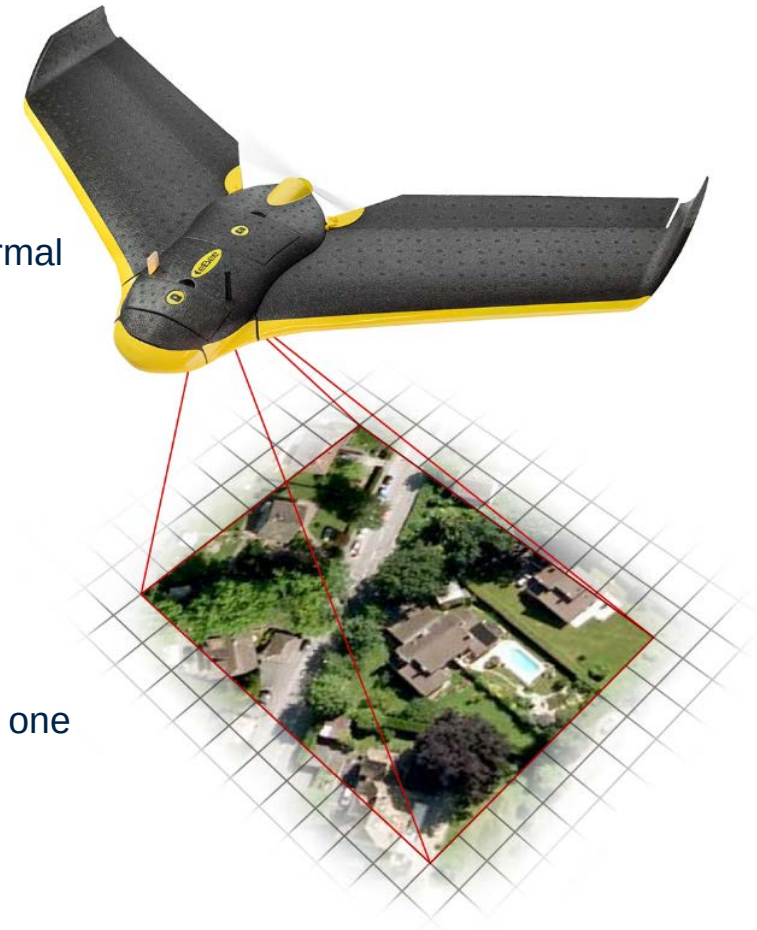
45km/h (12m/s) wind resistance

3km radio link

Covers up to 10sqkm in one flight

Accuracy down to 3cm

RTK: no need for GCPs




Example: Tandale
102km² so far
4cm resolution
8cm Digital Elevation Model (vertical)

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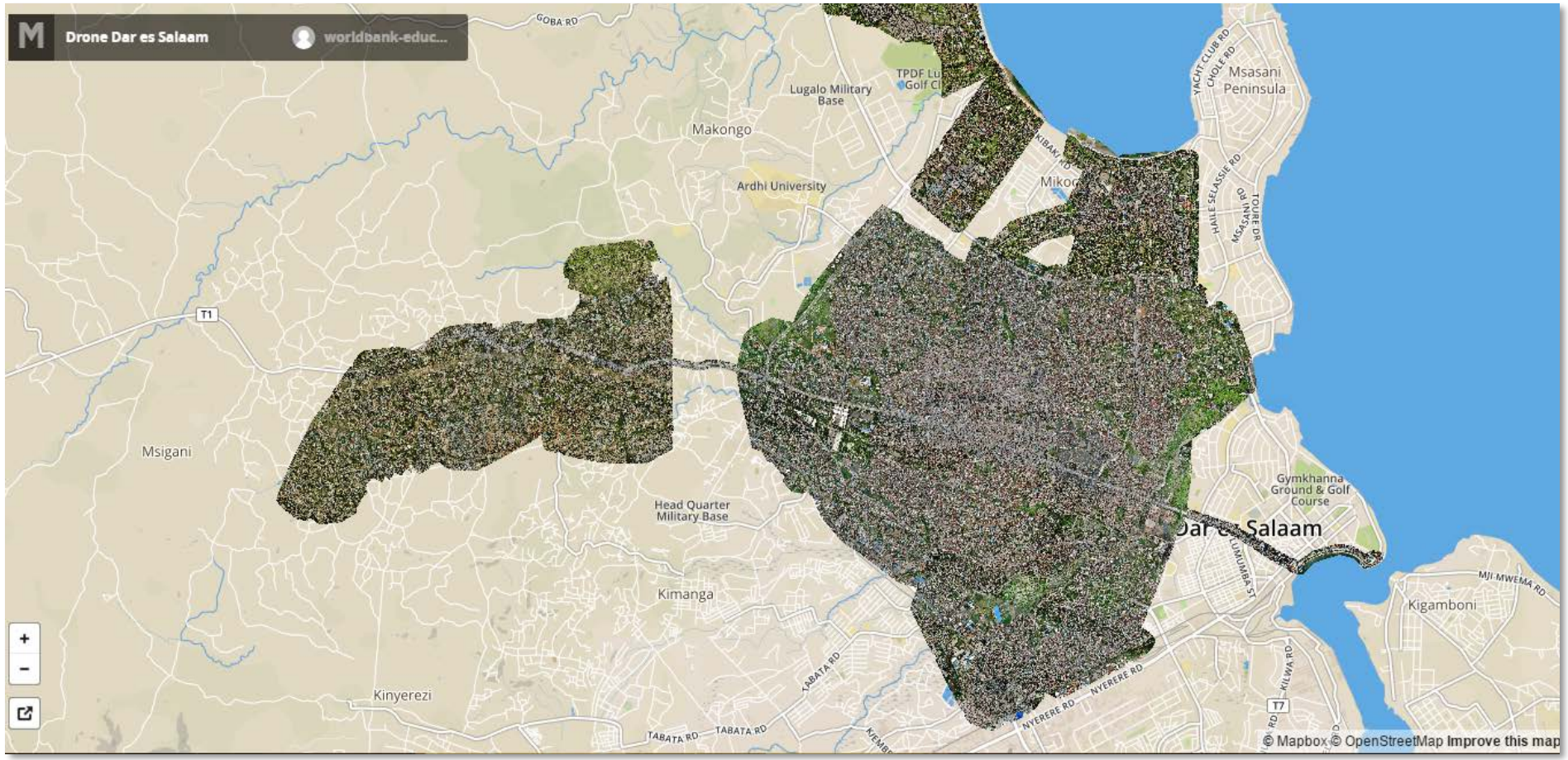
Orthomosaic

3D models visualizations

Hydrological models
Good tool for flood resilience (DEM)

Drone mapping coverage in Dar-es-salaam



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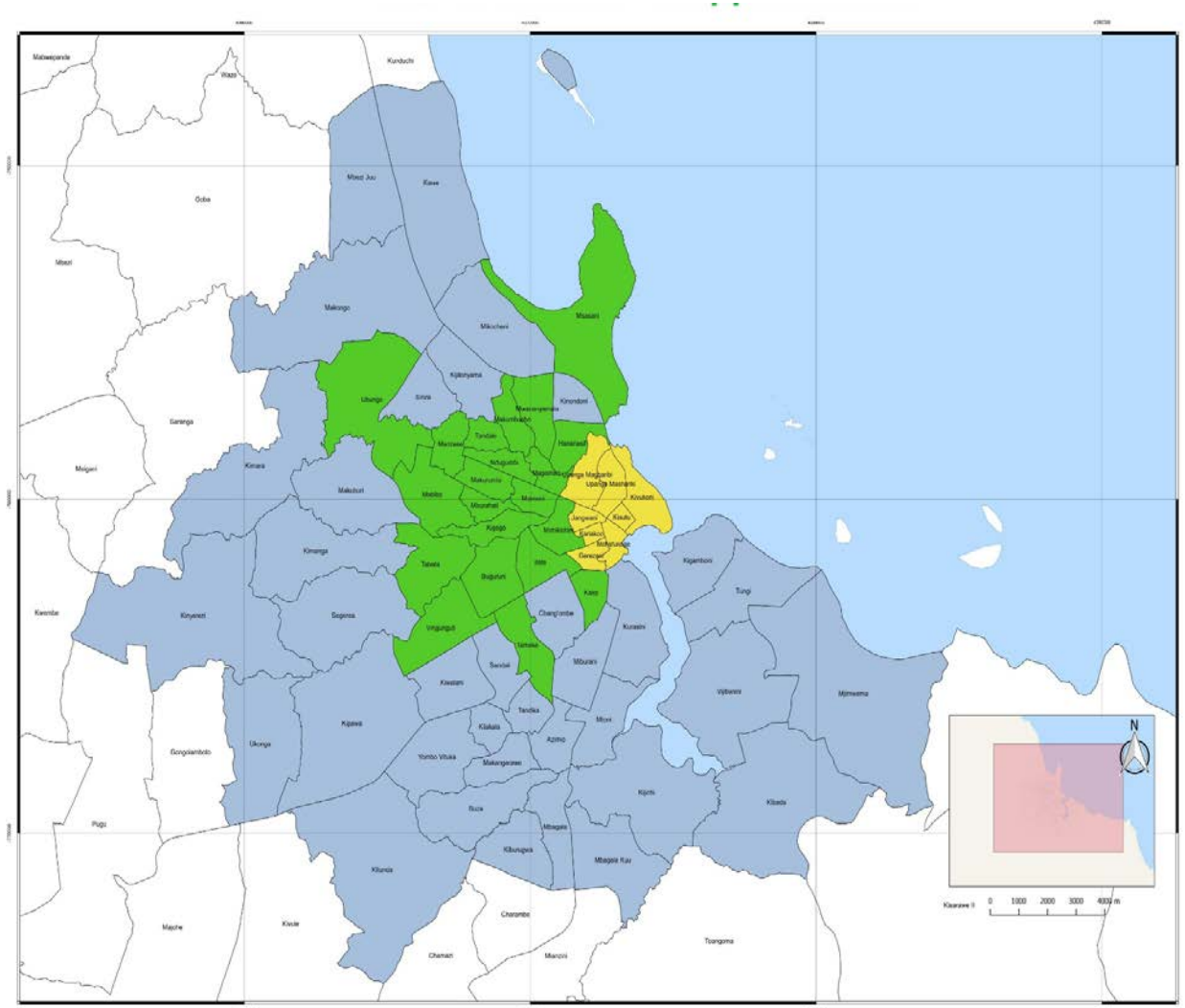
Mapping Campaigns in Dar es Salaam

Goal: 1 million residents in flood prone vulnerable communities – exceed in September 2015



29 wards fully mapped, drainage in **36**

home to **3.5 million** people

(estimated, 3.01 million in 2012 census)

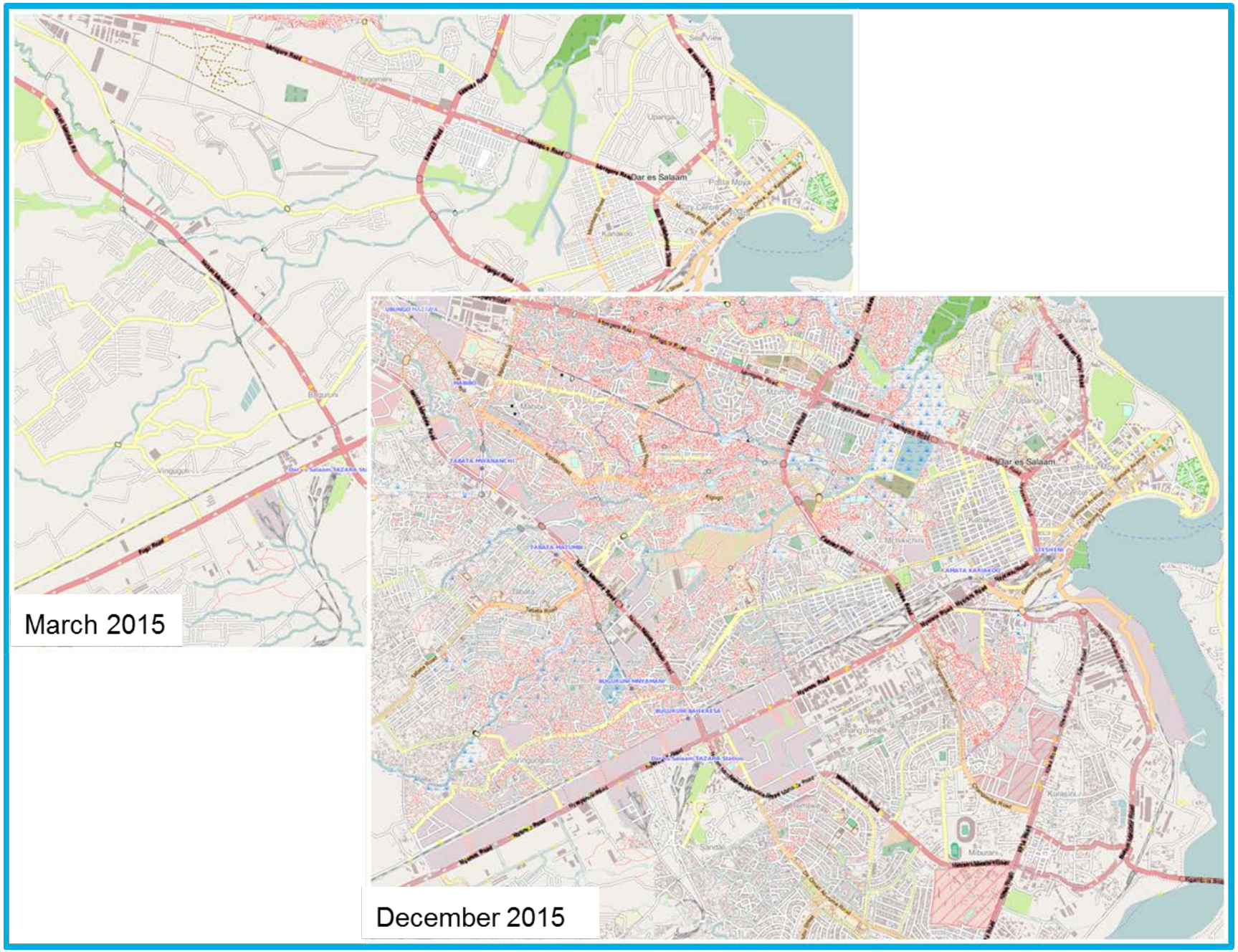
1000+ km of waterways

3000+ km of roads

400,000 buildings

1,700 school buildings

(quadrupling size of Tanzania's OSM dataset)


Dar es Salaam
Vingunguti
March 2015
Dar es Salaam
December 2015

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Mapping Outputs in Dar es Salaam

160,000 Building Footprints, 500km+ of waterways, rivers and drainage, 1000s of toilets, water points

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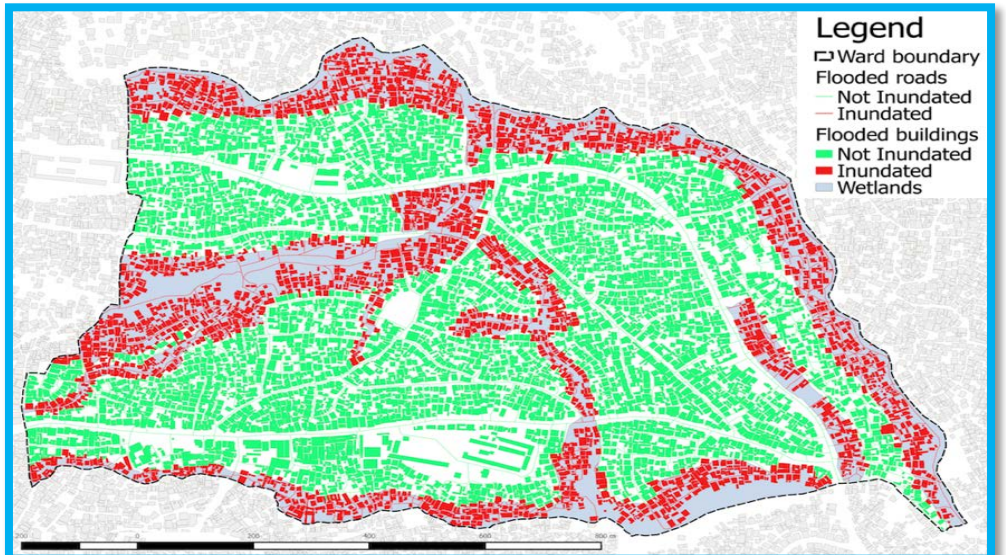
Participatory Mapping

Identifying hazards area together with communities



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Mapping in Dar es Salaam

Target Areas: 2012 Population: 1,127,729

Target Areas: 2015 Population est: 1,296,888 (15% growth)

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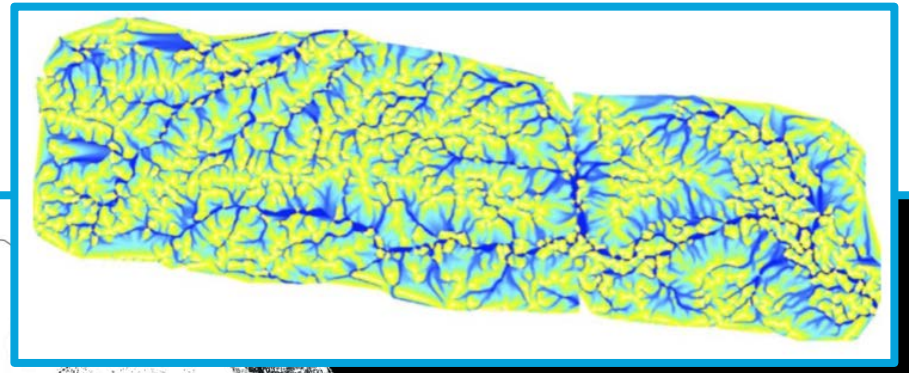
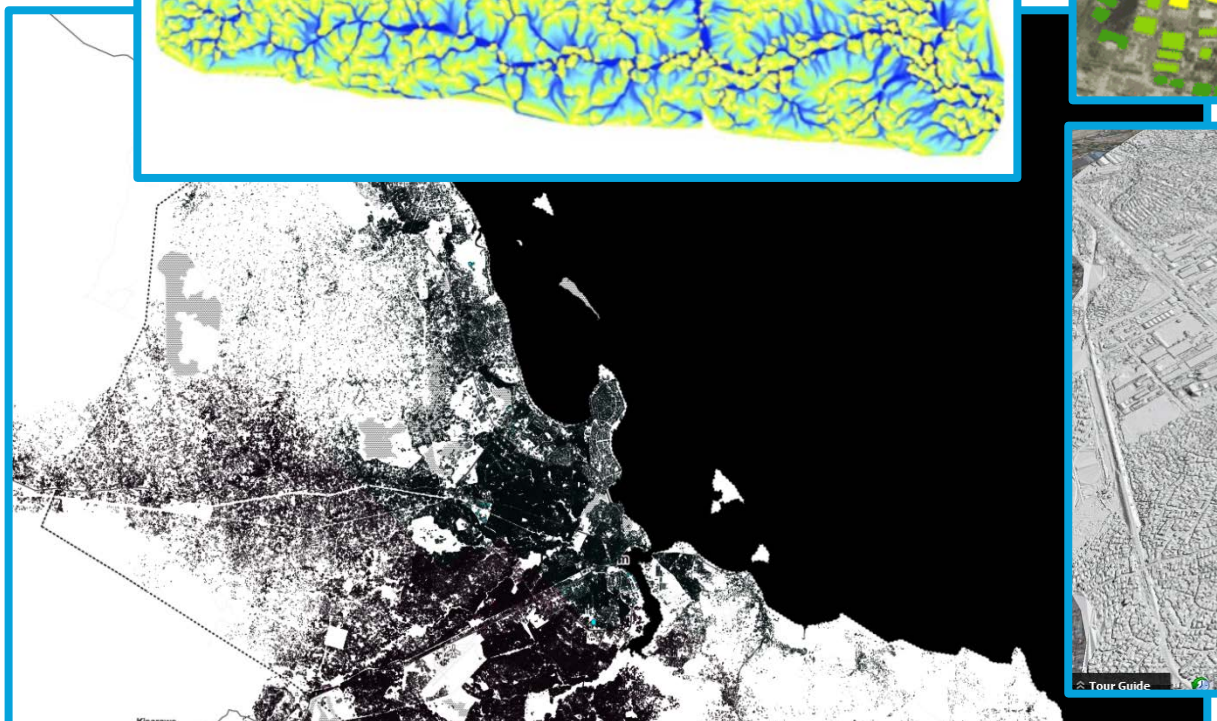
Outputs

- 745,989 Building Footprints
- 88km of Imagery and Surface Models
- 2091km of Roads





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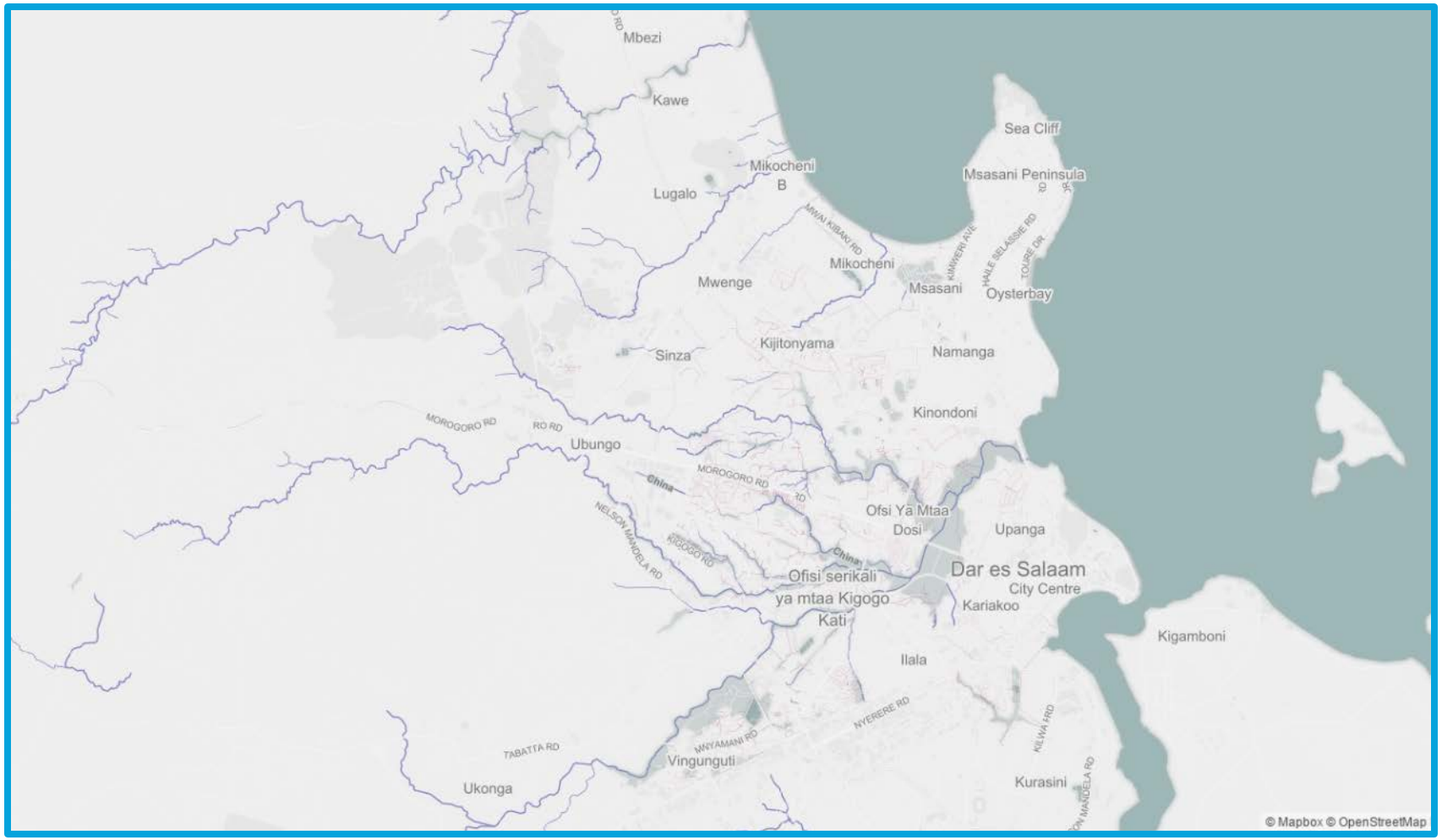
Outputs – Aiming to inform Metropolitan Upgrade Priorities

Drainage Analysis



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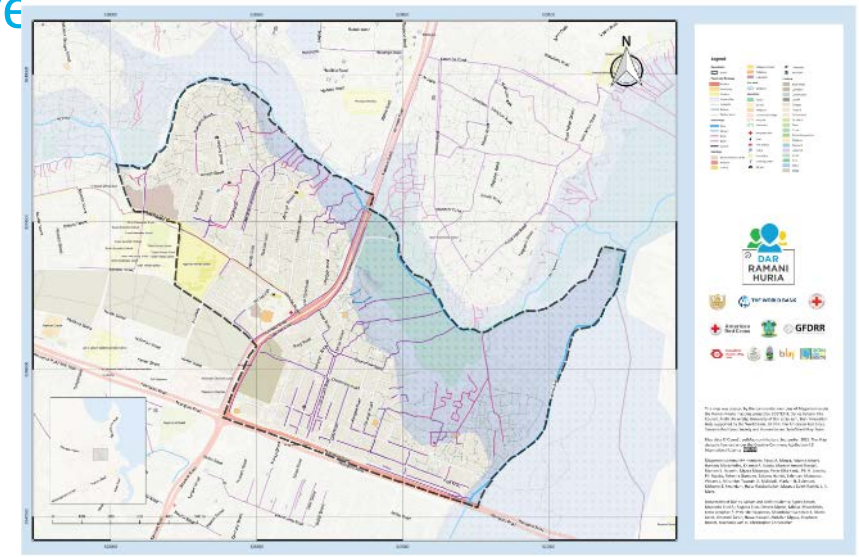
Outputs – At local Ward Office leve

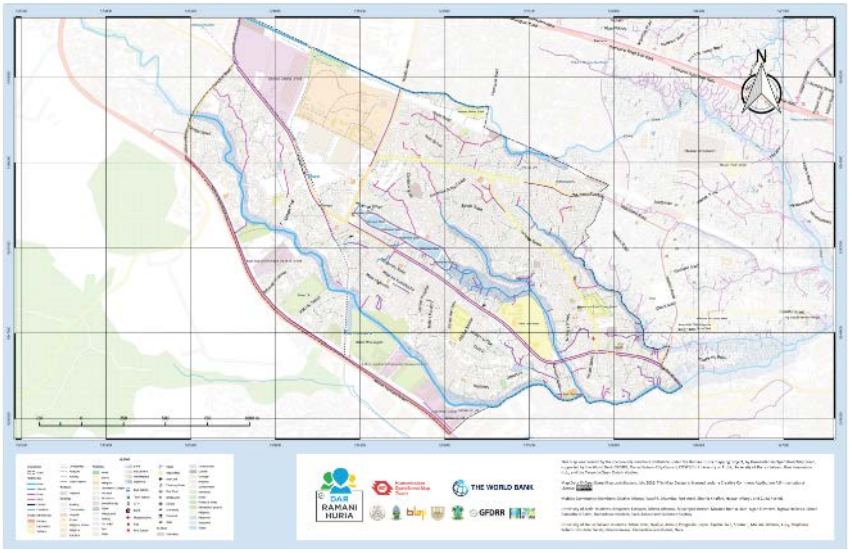
Drainage Analysis by Ward

- Over 265km of drainage mapped
- 4407/357km of drains
- 256/124km Streams/Rivers

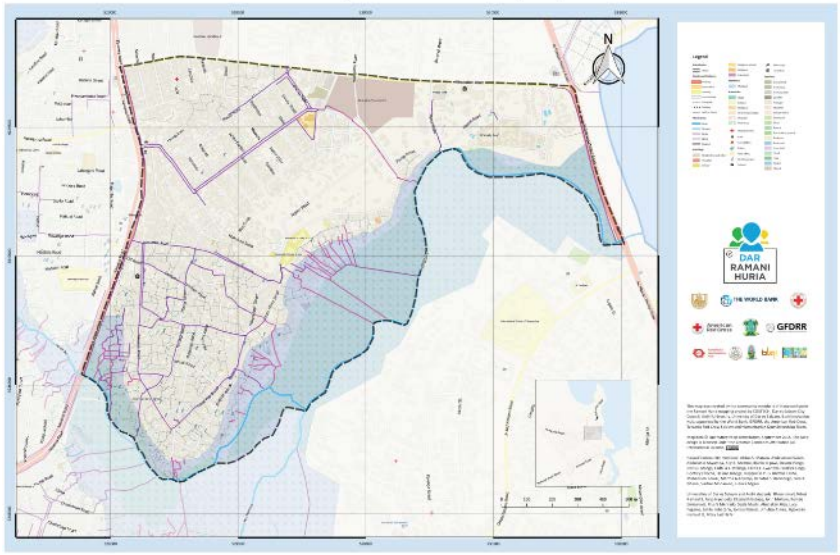
Magomeni, Dar es Salaam – Drainage Map



Mabibo Ward - Drainage Map

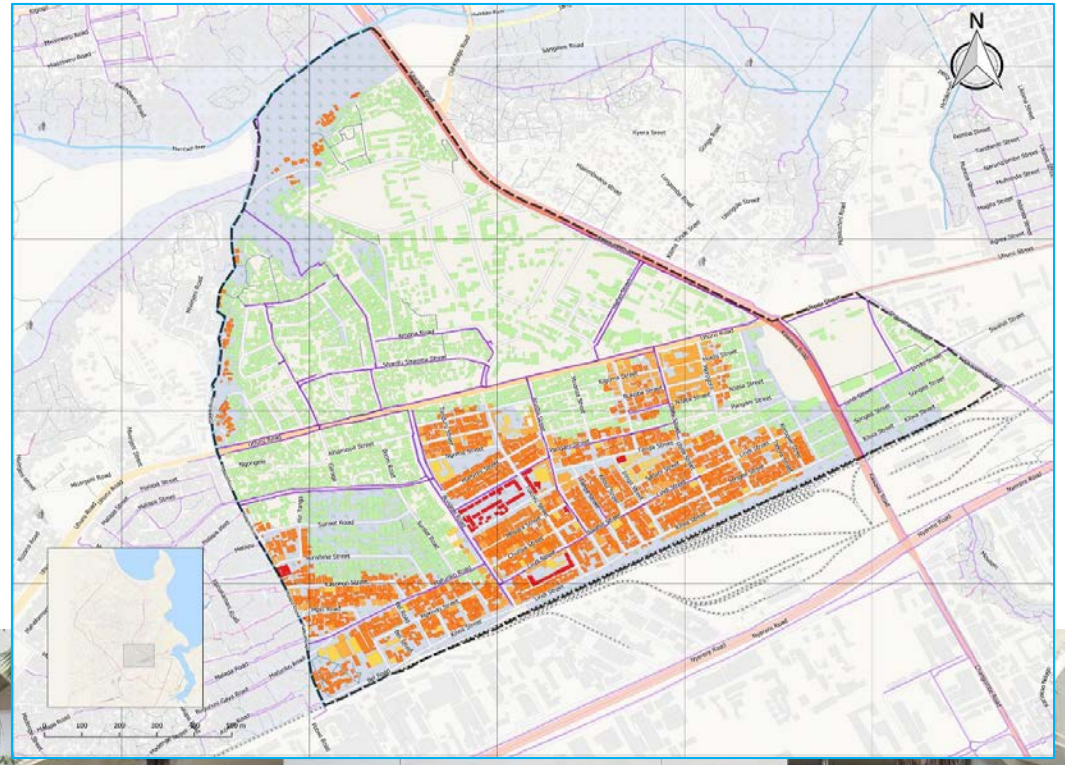


Hananasif, Dar es Salaam – Drainage Map



Inundation Modelling

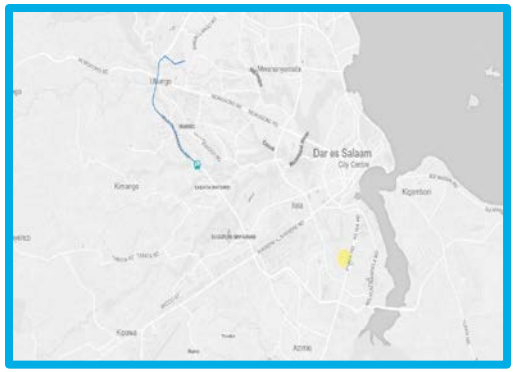
Training Staff and Students with Open Source: InaSafe



Key Advantages

Using Participatory Mapping with Students, Citizens and Ward Offic

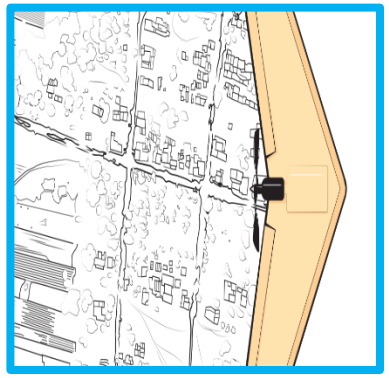
1. Affordable Data Collection for local level – approx. $10,000 per ward
2. Hyper-local details – trees, businesses, water points, facilities, drains
3. Community Context – digitizing critical features for citizens
4. Culture of participating in mapping strengthens relationship of ward office with community

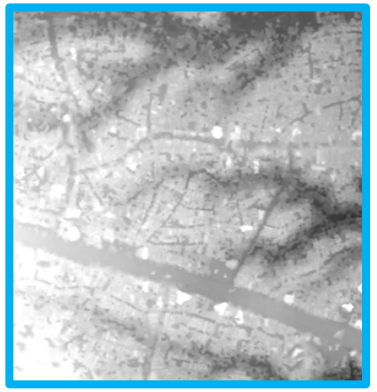


Key Advantages

Using UAVs for Urban Mapping

1. Simple & Affordable – approx. $1,000 for phantom, $15,000 for ebee – low running costs
2. High resolution – up to 3cm Basemap, 8cm Elevation model
3. Timeliness – can choose exact day of mapping to suit project needs for baseline
4. Cloud free – advantages over satellite and manned aircraft as drone fly under clouds





Key Challenges

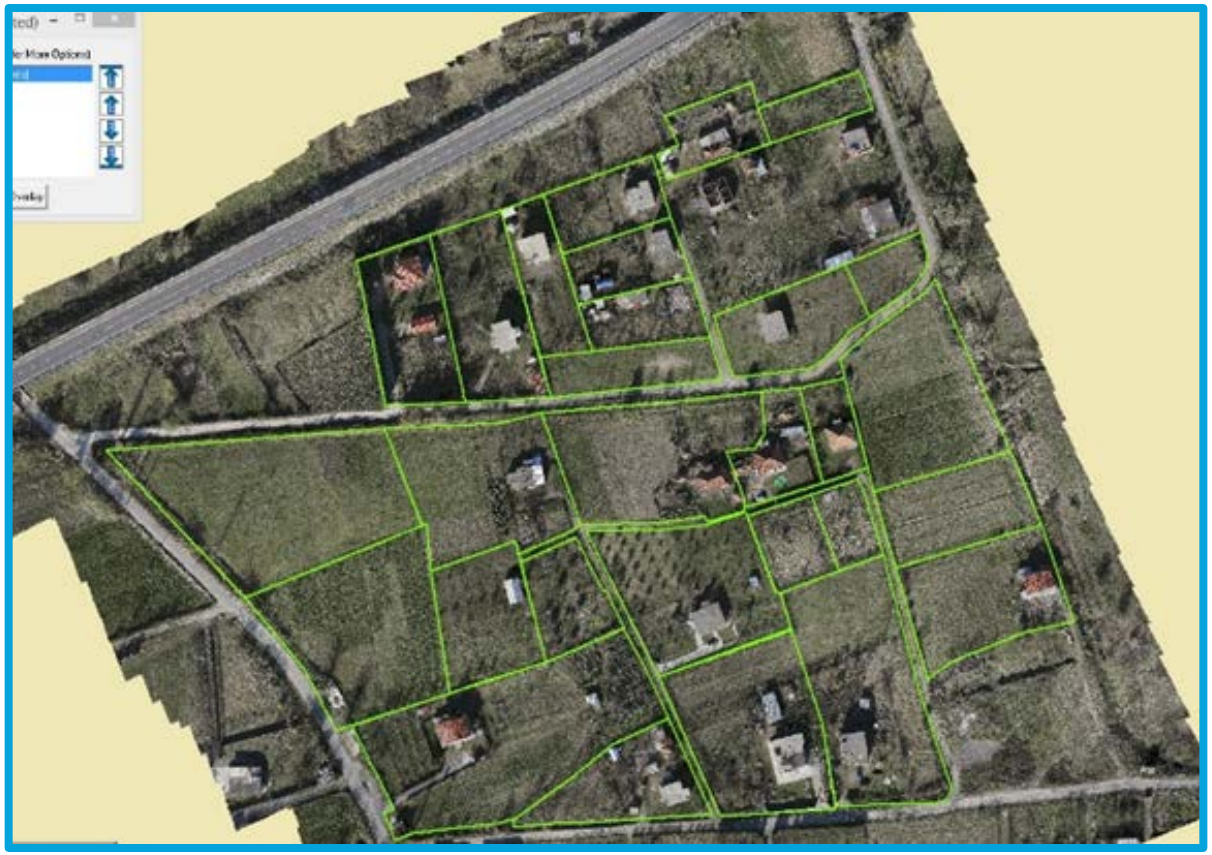
Participatory Mapping

1. Coordination: Mix of Universities, COSTECH, City and Disaster Management Department
2. UAV Permits: require Ministry of Defense, Lands and Survey, Aviation Authority
3. Data Processing: flying is easy, processing takes trial and error for good outputs
4. Community Mapping: low cost but labour intensive – relies on steady supply of students

Future Applications

Land Surveys

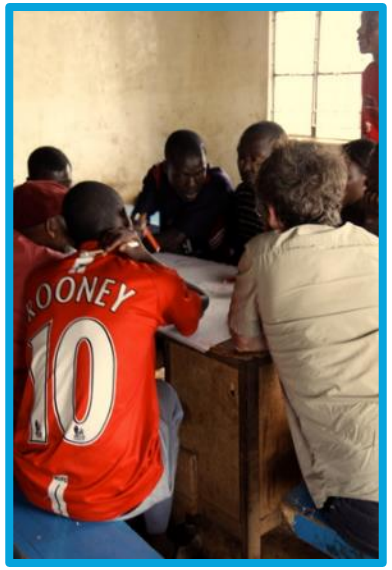
Boundary Adjudication- Local, incremental mapping synchronizes adjudication with reliable visualization and documentation of the event



Participatory adjudication and delineation

Future Applications

Next Steps: Involve Community members in Mapping Risk Reduction Priorities



Community Risk Management

Next Steps: Collaborate for Early Warning & Early Action

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