

RAMANI HURIA – USING SATELLITE, UAV AND CITIZEN DATA FOR FLOOD MANAGEMENT IN DAR ES SALAAM TANZANIA

SESSION: A NEW ERA FOR OPEN SCIENCE AND EARTH OBSERVATION



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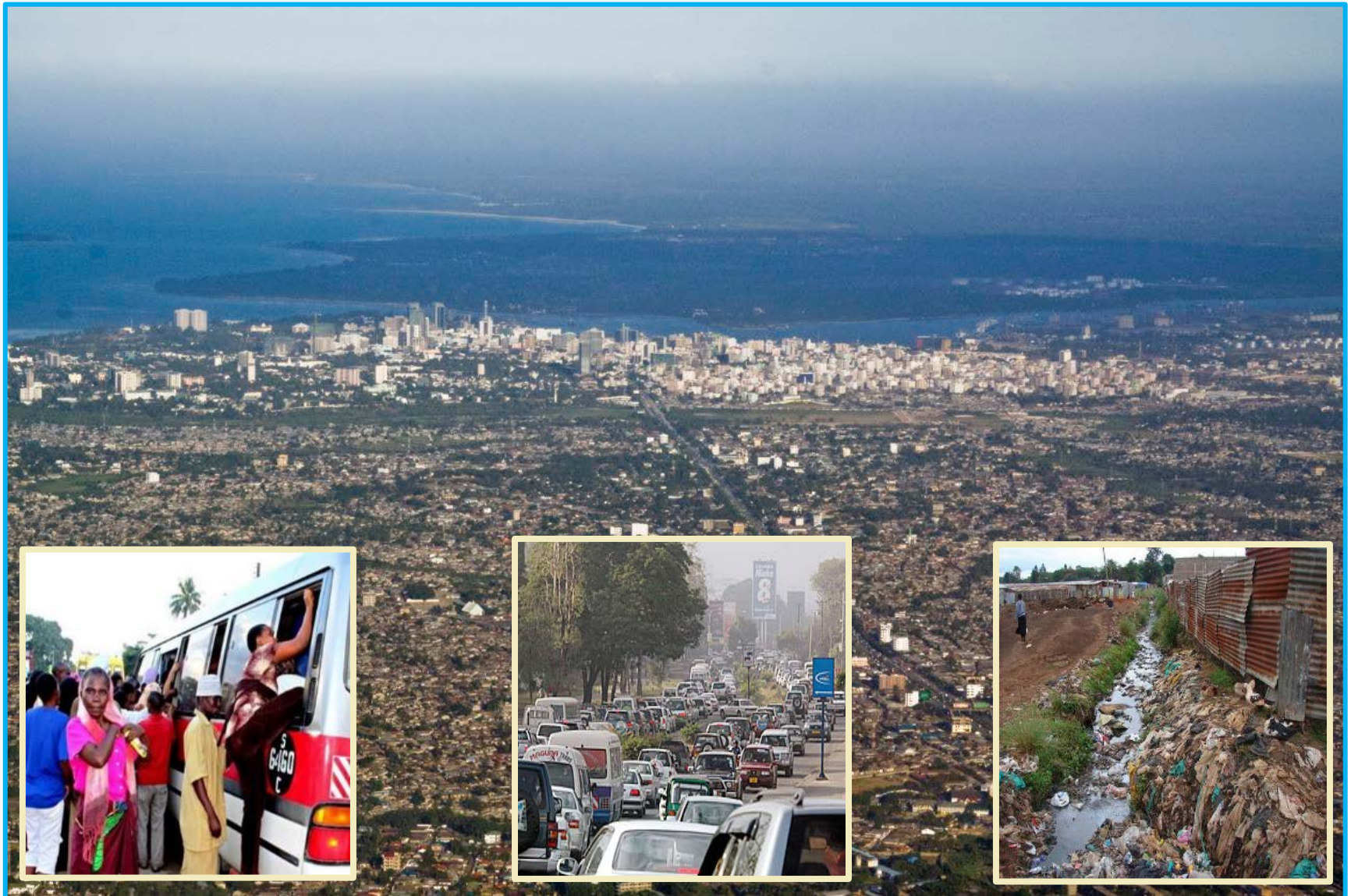
Presentation outline

A New Era for Open Science and Earth Observation

- 1 Dar es Salaam Context
- 2 Ramani Huria Project
- 3 Data Requirements
- 4 Available Resources
- 5 Approach
- 6 Inundation Modelling
- 7 Community Risk Management

Dar es Salaam Context

Rapid and Unplanned Urbanization



Dar es Salaam Context

Informal Settlements and Urban Flooding



Ramani Huria

Citizen Data in Dar es Salaam: Ramani Huria



Started March 2015: 150 Students, 100+ Community Members



Dar Ramani Huria | HOME | ABOUT | BLOG | TUTORIAL | PROJECTS | EVENTS | DATA

Community Mapping For Flood Resilience Kick Off Workshop at COSTECH



Data Requirements

Hazard, Exposure, Vulnerability and Risk

Hazard Analysis:

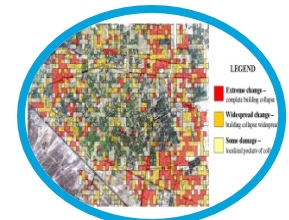
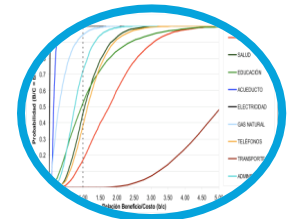
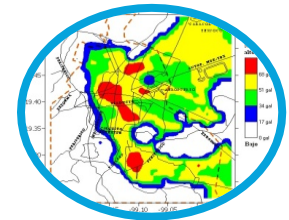
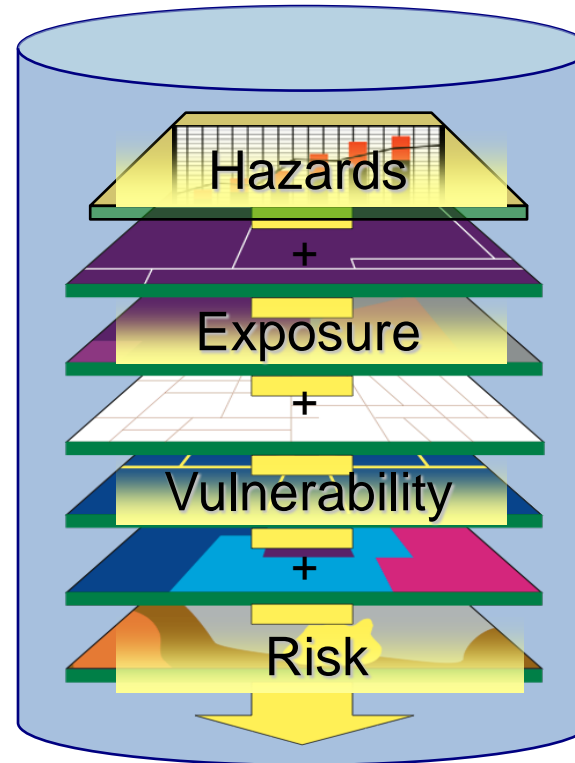
- Elevation Model
- Land Use/ Land Cover
- Drainage network
- Rainfall Intensity Duration frequency

Exposure mapping:

- Buildings, Roads
- Critical facilities
- Population distribution day/night

Vulnerability Assessment

- Disabled
- Livelihoods
- Shelter access
- Early Warning



Data Requirements

Challenges

Limited Data Availability / Access

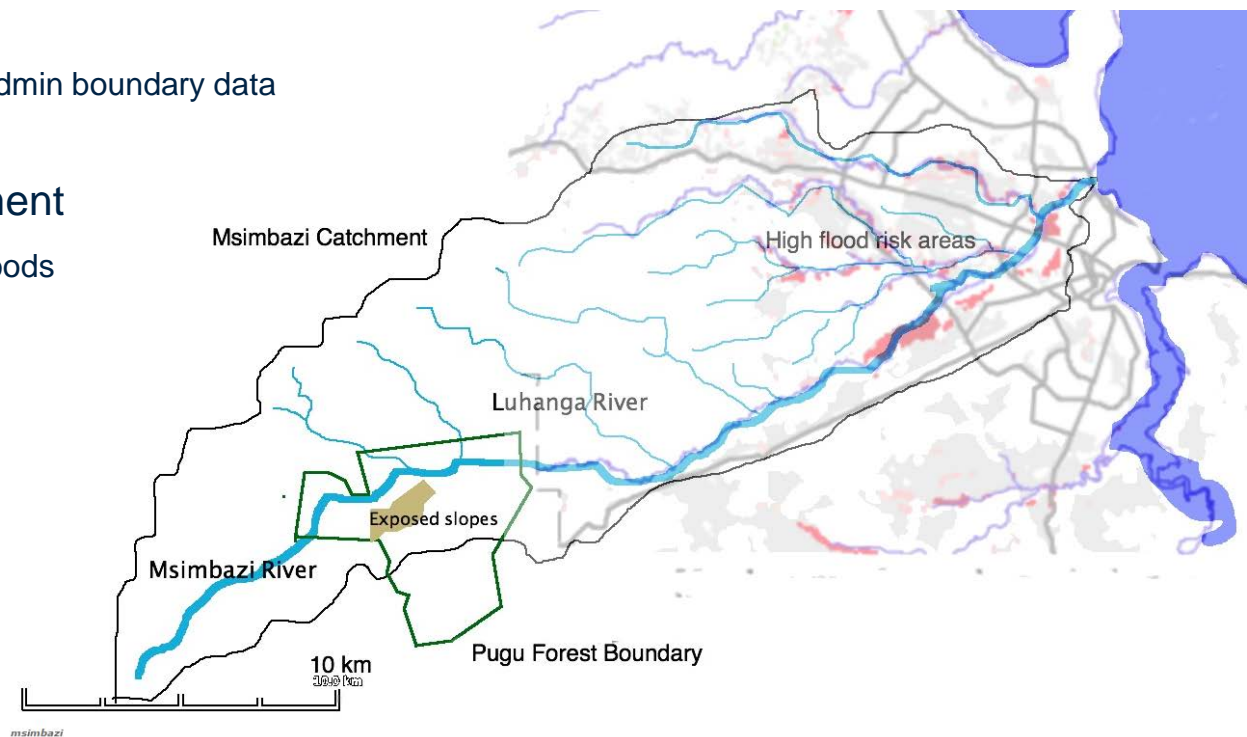
- Elevation Model 5% areas LIDAR 30cm
- Lack of Met data
- Rapid Hydrodynamic changes

Exposure mapping:

- 80% Unplanned Growth
- Inconsistent census and admin boundary data

Vulnerability Assessment

- Informal economy / livelihoods
- Rentals
- Access to information



Available resources

Bing Maps



Available Resources

Digital Globe

- 100km² 30cm, 2015
- Donated in support of Missing Maps. WorldView-3 sensors
- 36GB Compressed – Challenging to download: Remote TMS/ local geotiff

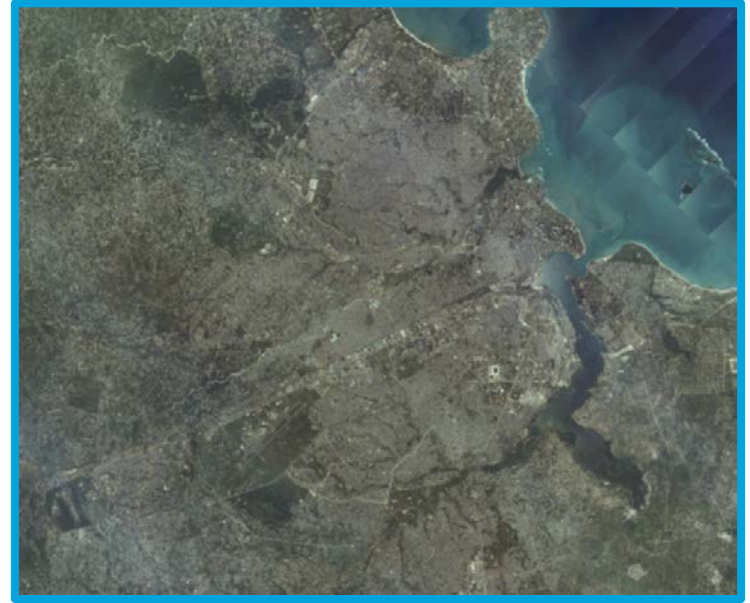


Available Resources

Remote Sensed Imagery

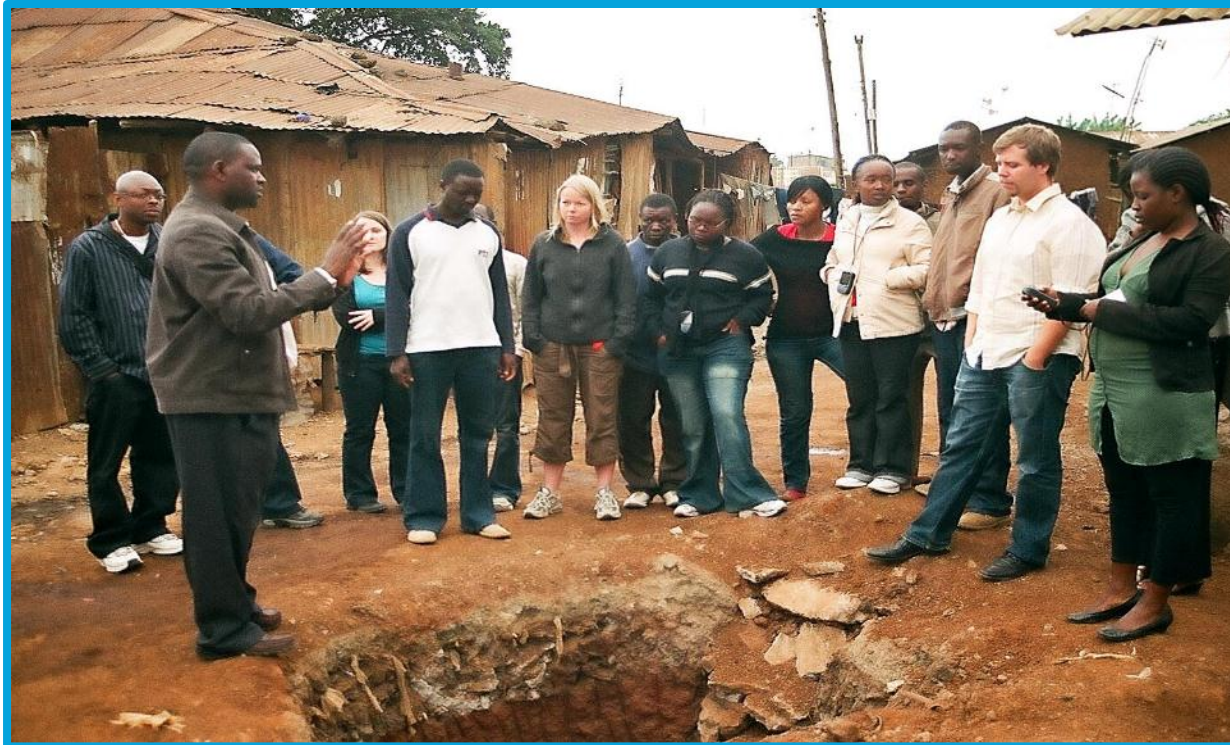
Tanzanian National Bureau of Statistics:

- 1,300km² of 30cm Aerial Imagery
- Collected in 2013
- Little to no associated metadata



Approach

Hyper Local and Temporal Information from Citizens



Citizen Data

Open Street Map



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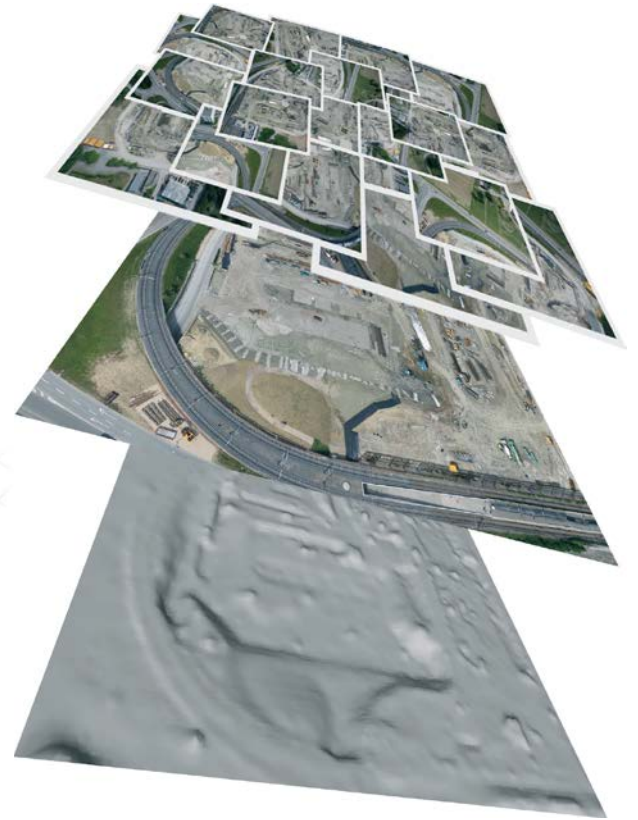


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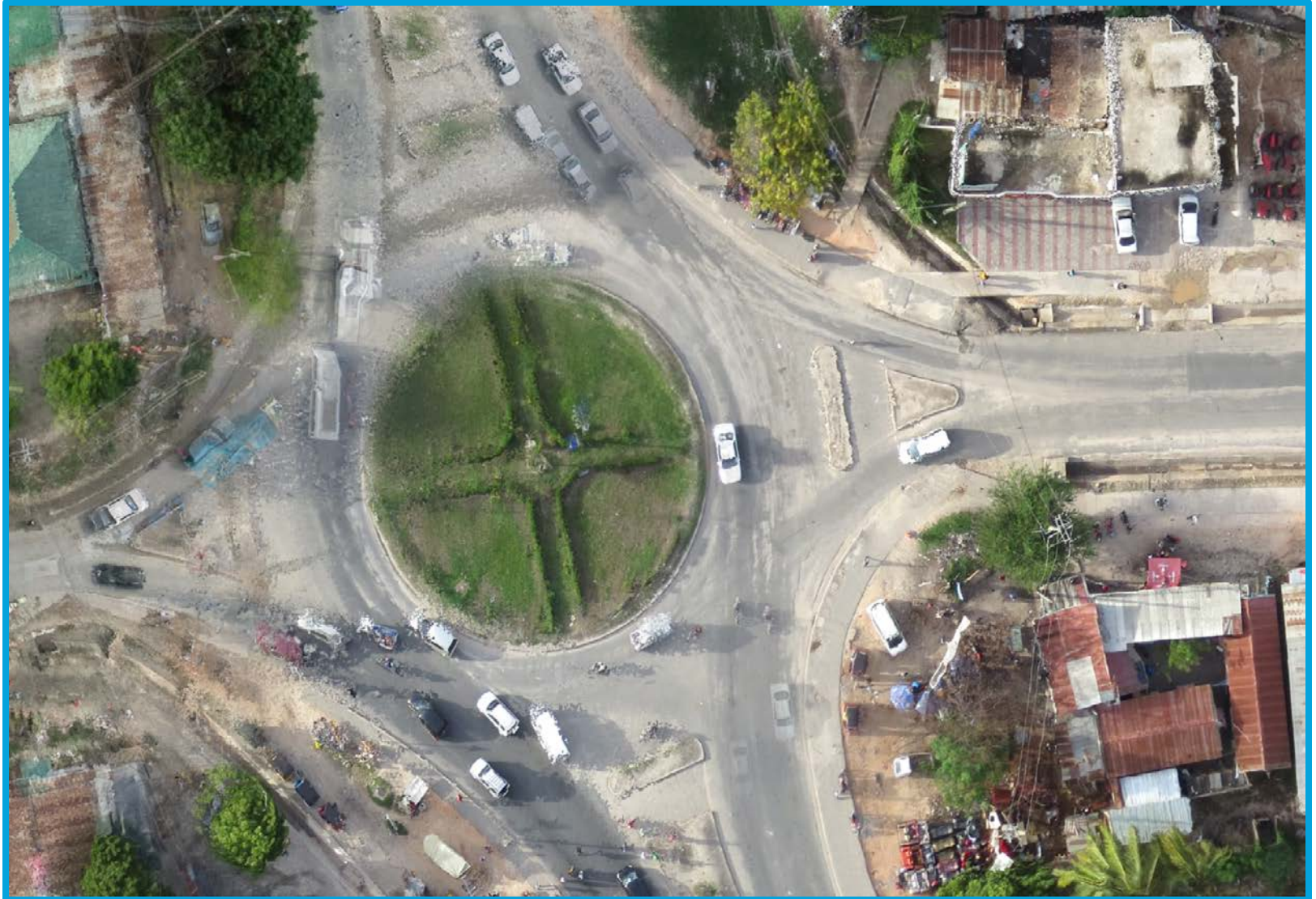
UAVs

Low Cost Mapping Drones



UAVs

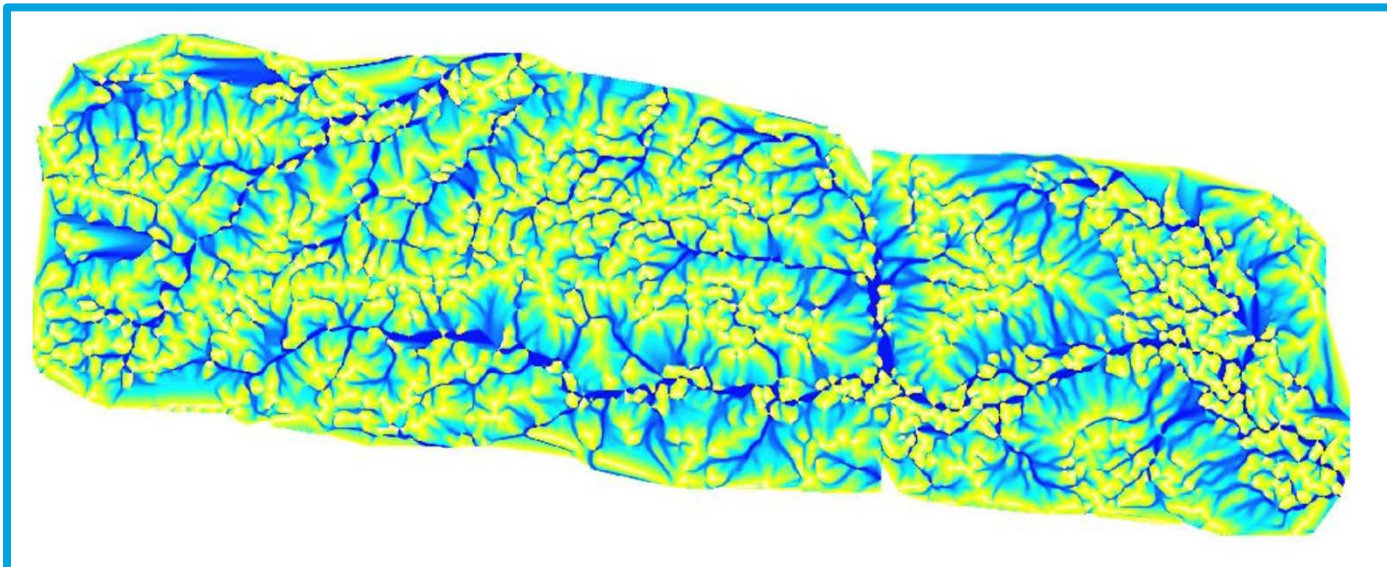
Aerial Imagery, UAV Comparison



UAVs Data

Elevation Model and Point Cloud

- 8cm Point Cloud and Digital Surface Model
- Derived from UAVs
- Density of urban environment challenging when creating an accurate inundation model



Ramani Huria

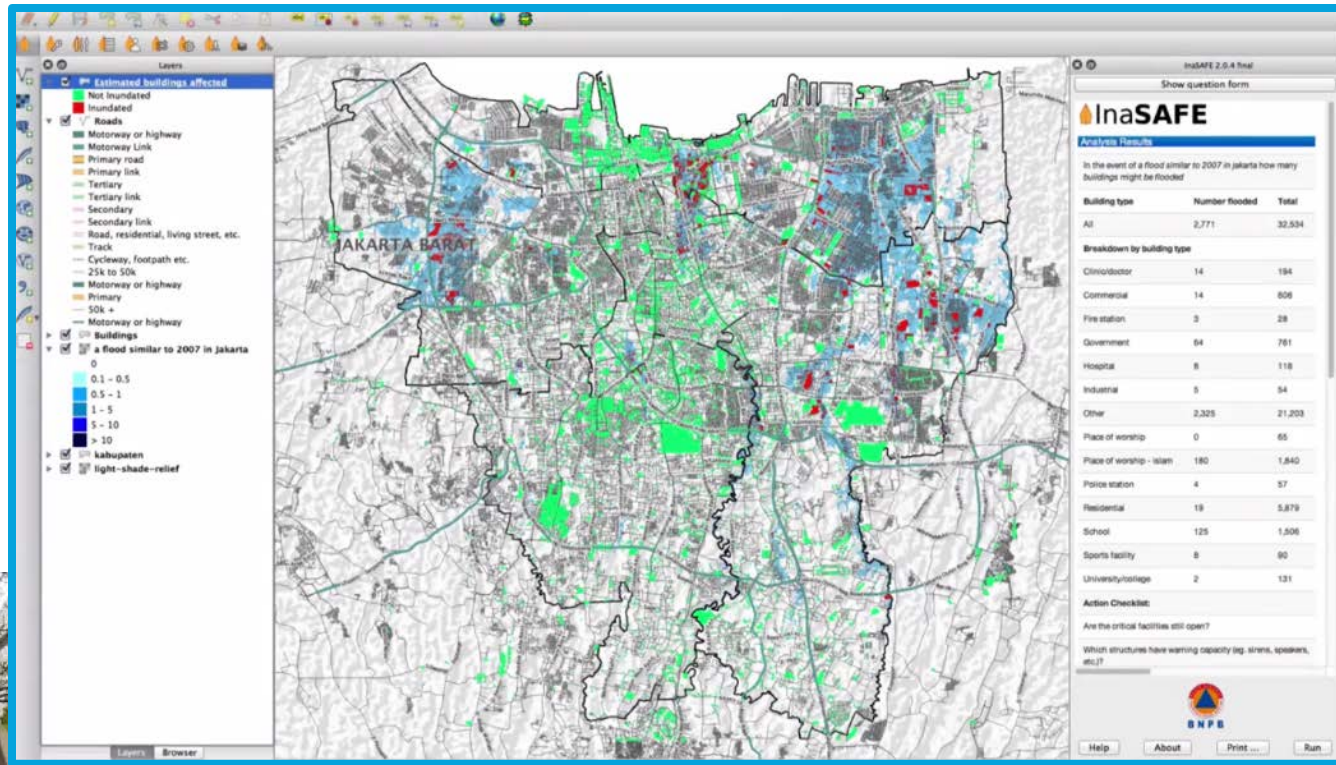
Citizen Data in Dar es Salaam: Ramani Huria

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



Inundation Modelling

Training with Open Source: InaSAFE

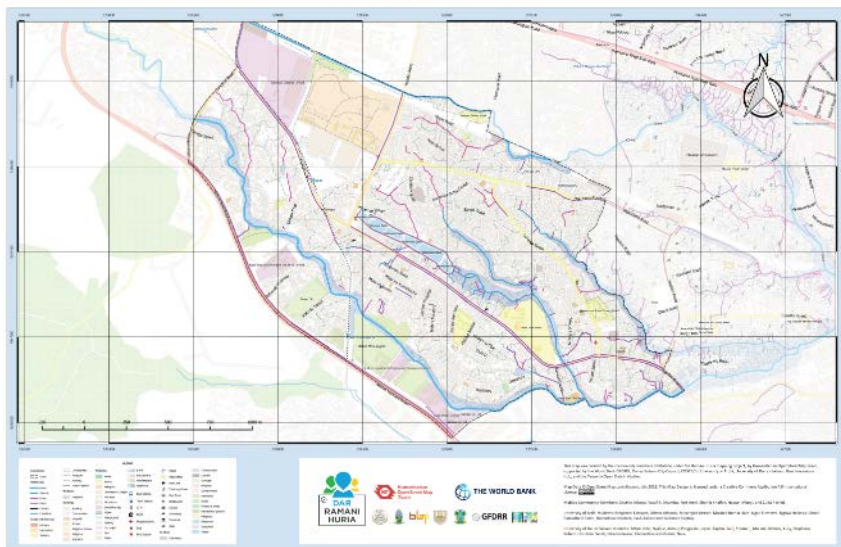


Ramani Huria Outputs

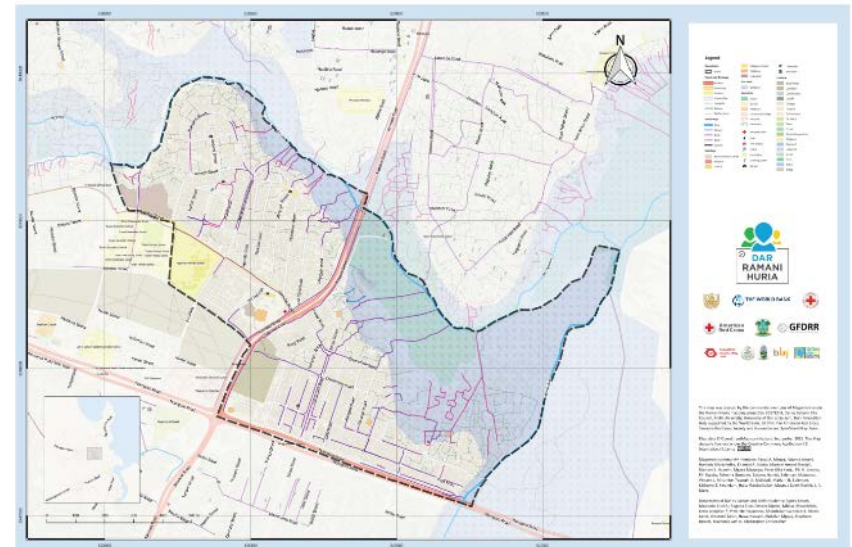
Drainage Analysis by Ward

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

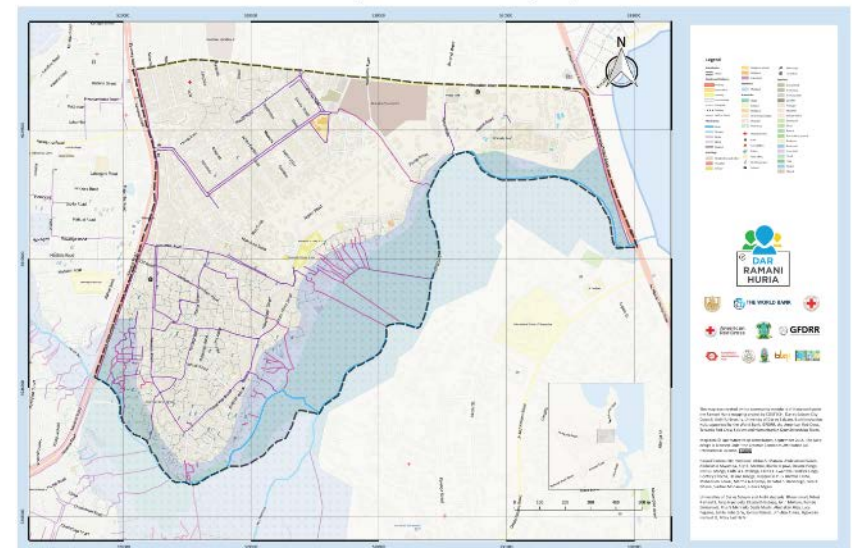
Mabibo Ward - Drainage Map



Magomeni, Dar es Salaam – Drainage Map



Hanasif, Dar es Salaam – Drainage Map



Ramani Huria

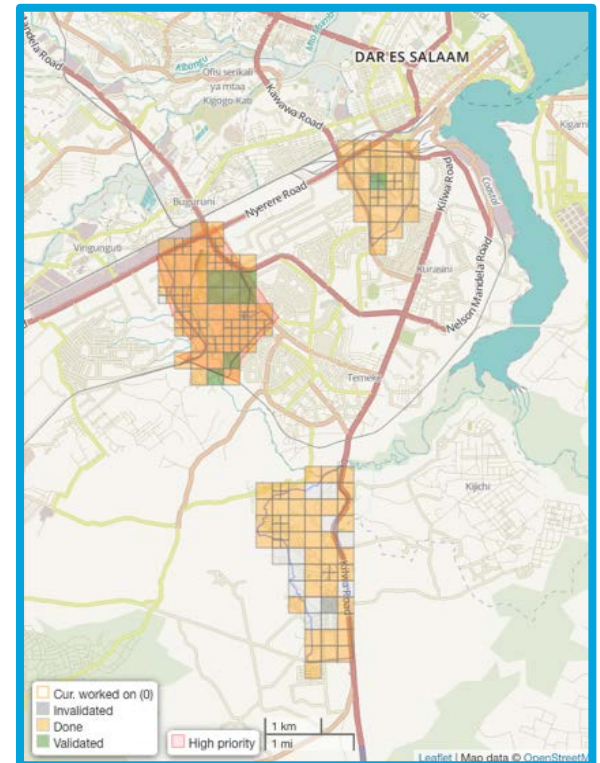
Local Mapping Parties

Local Mapping Events

- Innovation Hubs of Dar es Salaam
- All of Tanzania
- Over 100 Community Members
- 6 Mapping Parties, most recent 29th of September



Global Community Missing Maps

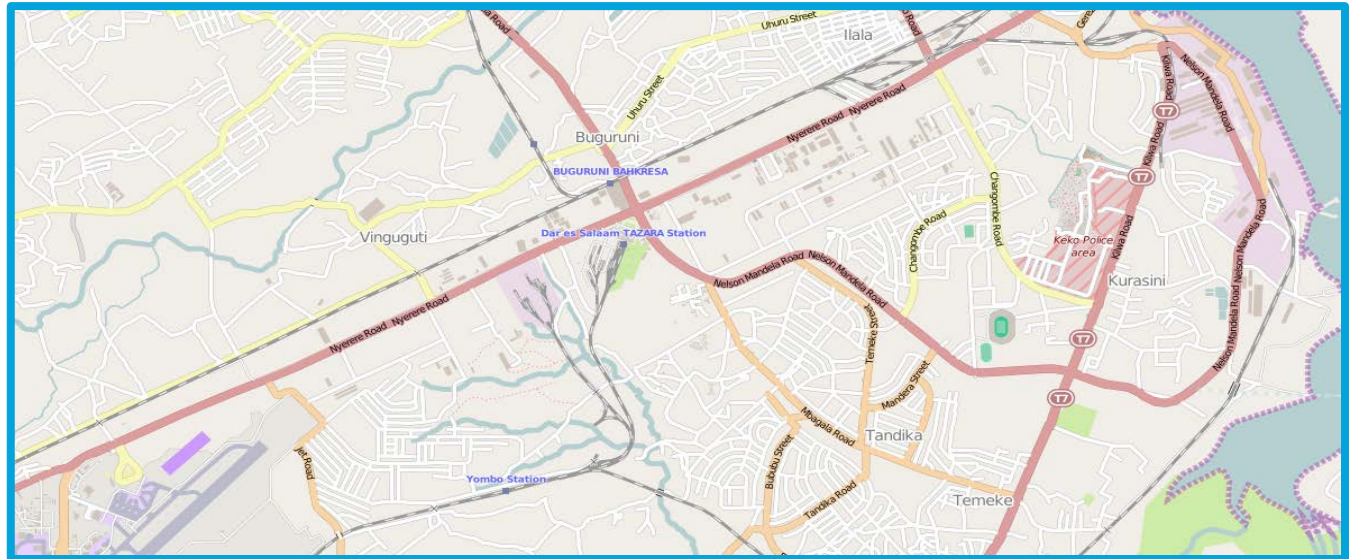


Global Community Engagement

Missing Maps: Keko & Buguruni Wards

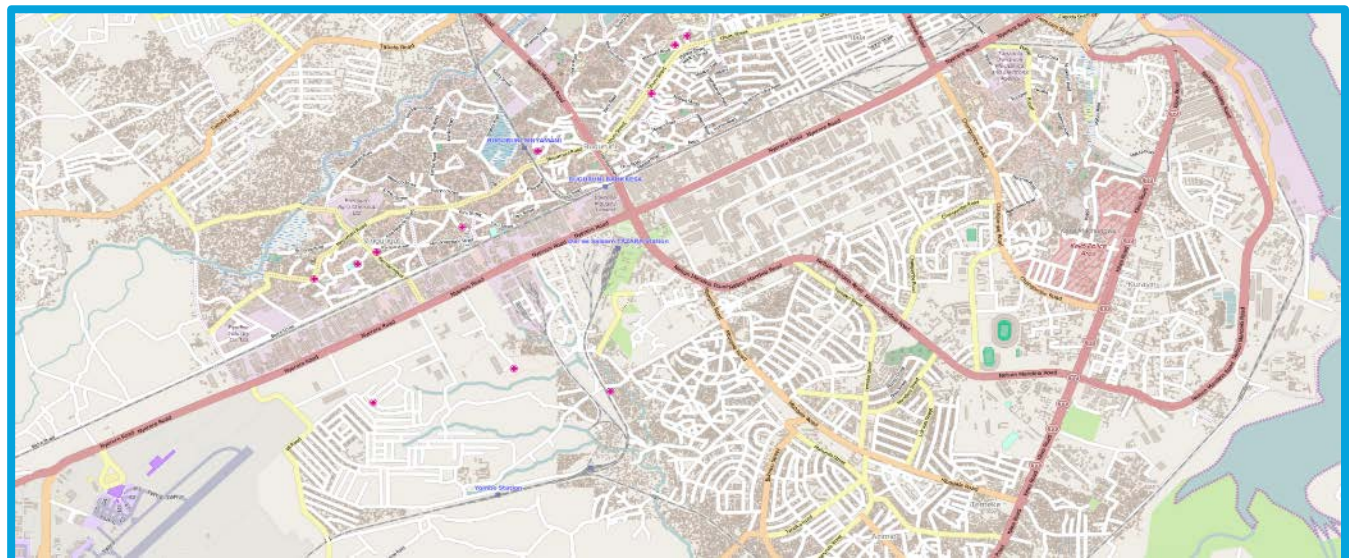
Before

(August 2015)



After

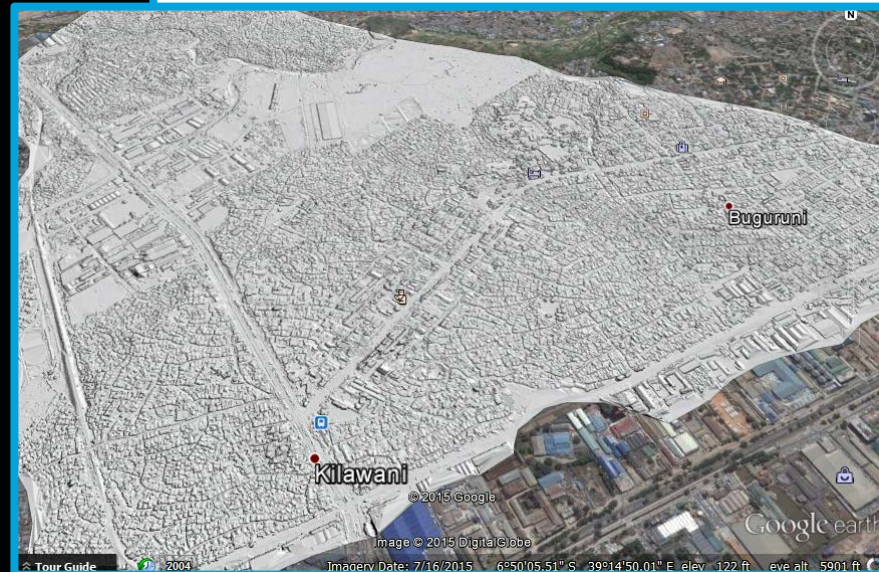
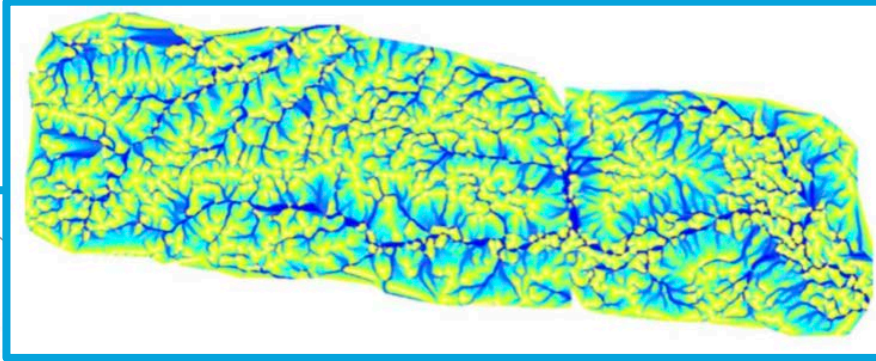
(October 2015)



Ramani Huria

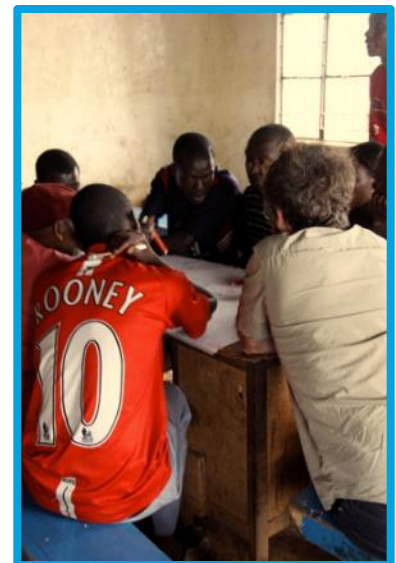
Outputs

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



Community Risk Management

Mapping Risk Reduction Priorities



Community Risk Management

Early Warning & Early Action



**THANK YOU
GRAZIE MILLE
ASANTENI SANA**

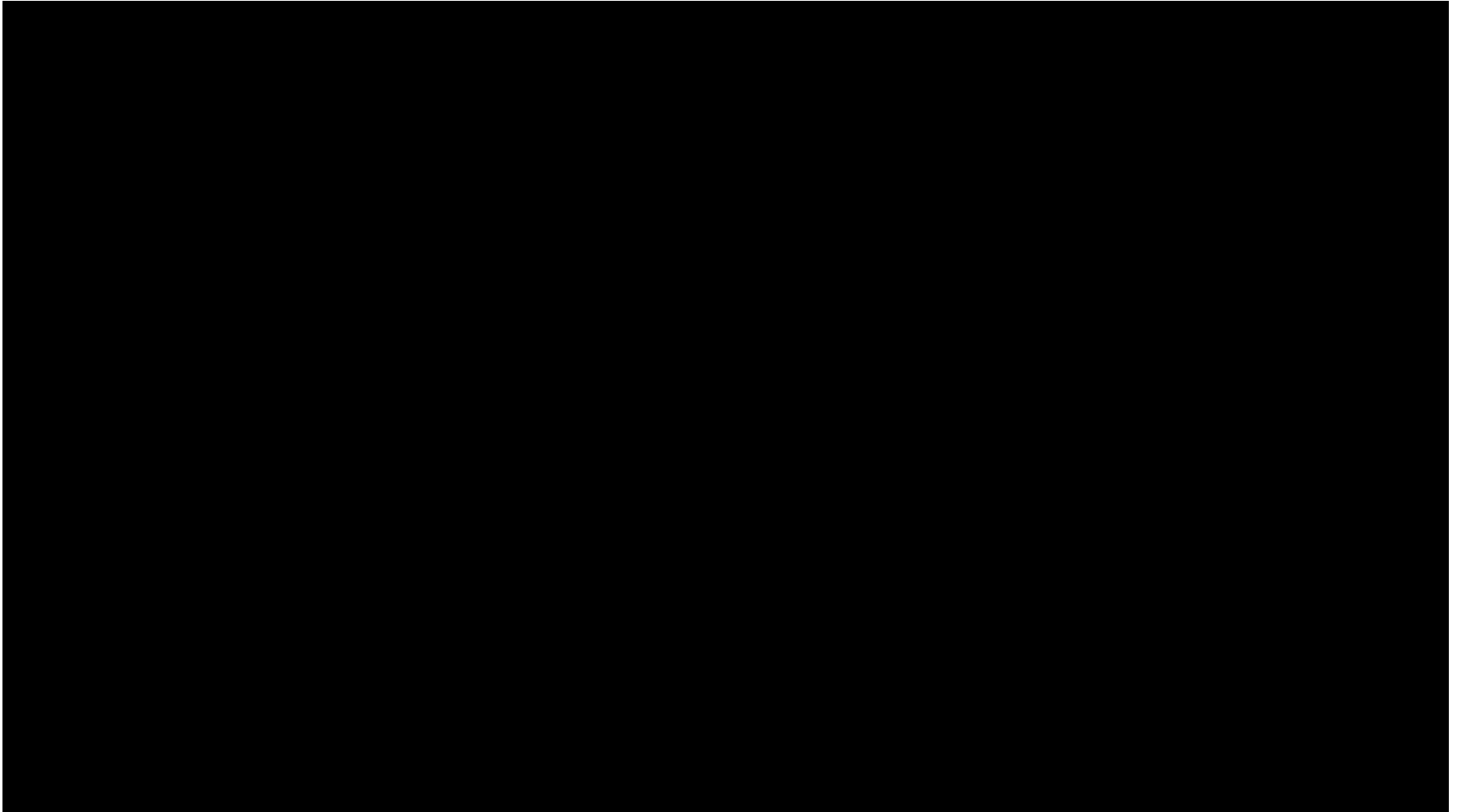


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Citizen Data

Low Cost Mapping Drones



Community Risk Management

Mapping Risk Reduction Priorities

