Advanced Mapping of Urban Population Patterns in Sub-Saharan Africa

Monitoring Urban Trends in Africa Using Spatial Data
UN-Habitat's Experiences and Future Prospects

Global Urban Observatory Unit
Research and Capacity Development Branch
UN-HABITAT

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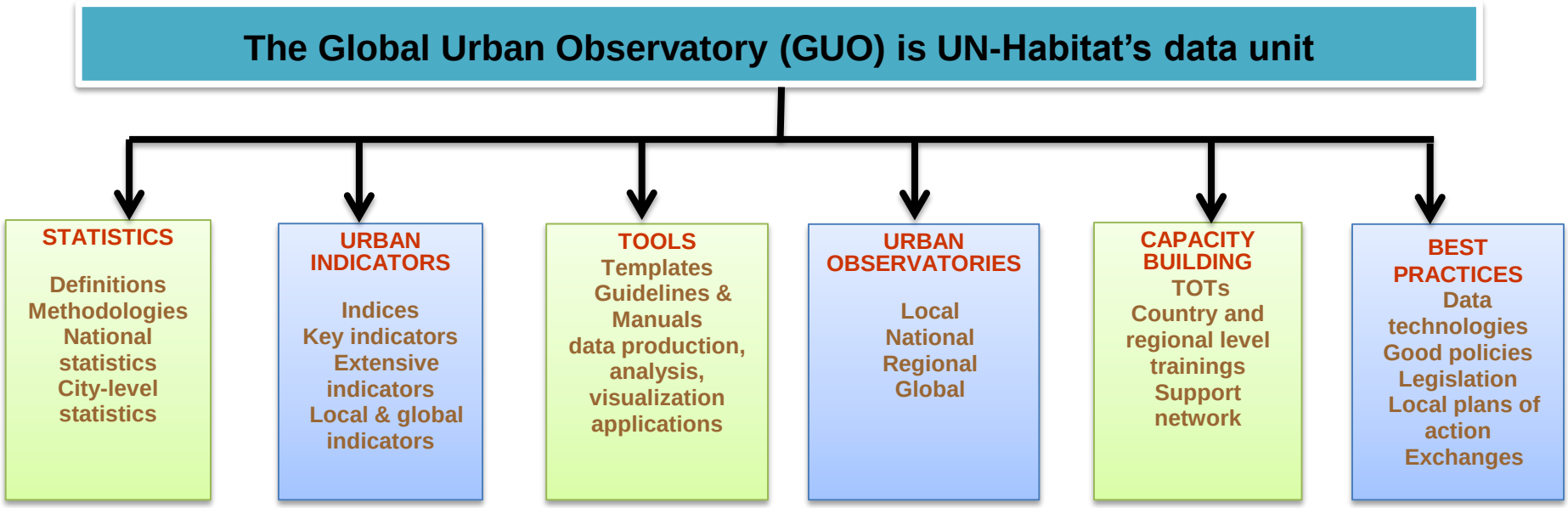
UN-Habitat and urban data

- UN-Habitat's General Assembly mandate is **to promote socially and environmentally sustainable towns and cities with the goal of providing adequate shelter for all**
- Sustainable development demands informed decisions and actions
- Informed decisions rely on accurate, up-to date data



GUO and the Urban Indicators

- GUO is in charge of 72 + urban indicators from SDGs, NUA, urban observatories, urban surveys, etc
- Indicators shared openly via the urban indicators database
- City performance compared through CPI platform under 6 broad themes:
  - *Productivity, Infrastructure Development, Quality of Life, Equity and Social Inclusion, Environmental Sustainability, Urban Governance and Legislation*

- All 72+ indicators are linked to space, but some rely directly on spatial data (EO and GI methods) for measurement
- SDG monitoring framework requires use of alternative/non-conventional data sources – surveys, **spatial data/ methods**

E.Gs of indicators that can measured using spatial data	
Urban Footprint area	Slum Household
Urban Sprawl	Improved Shelter
Land Use Mix	Sufficient Living Area
Green area per capita	No. of Homes/Households
Access to open public spaces	Population in households
Access to public transport	Access to Electricity
Length of Mass Transport Network	Access to Improved Sanitation
Intersection Density	Access to Improved Water
Land Allocated to Streets	Number of Monitoring stations
Street Density	PM10 Concentration
Use of Public Transport	PM2.5 Concentration
Average Daily Travel Time	

Spatial data is key to SDG 11 monitoring

Delineation of settlements – identifying urban from non-urban settlements

11.1.1 characterization of settlements to formal / informal based on physical character

11.2.1 – mapping transport networks, location of public transport facilities, habited and serviced areas

11.3.1 - extraction of information on settlements, form/character and urban growth patterns

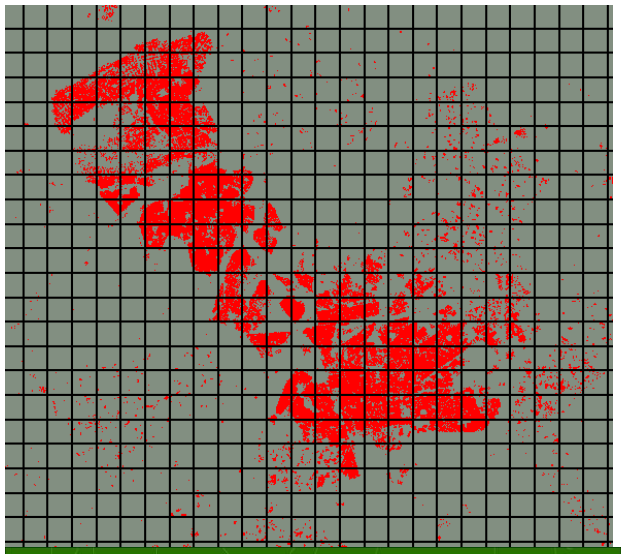
11.5.2 – mapping of effects of disaster on key infrastructure

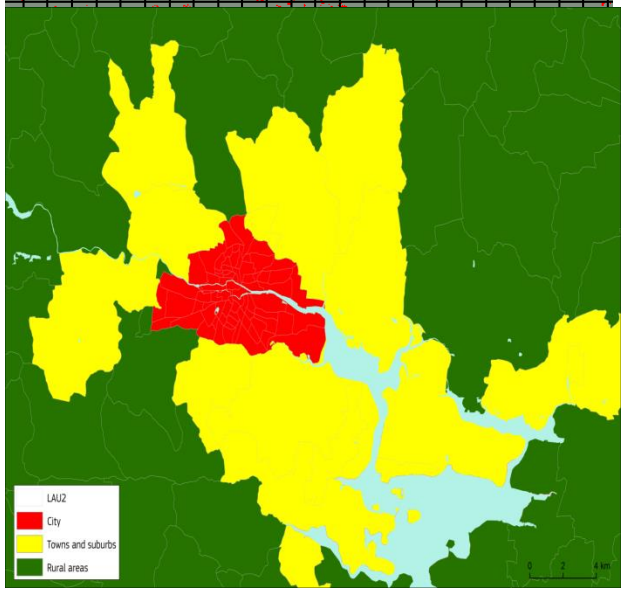
11.7.1 – extraction of data on location of open spaces, sizes and distribution, serviced areas

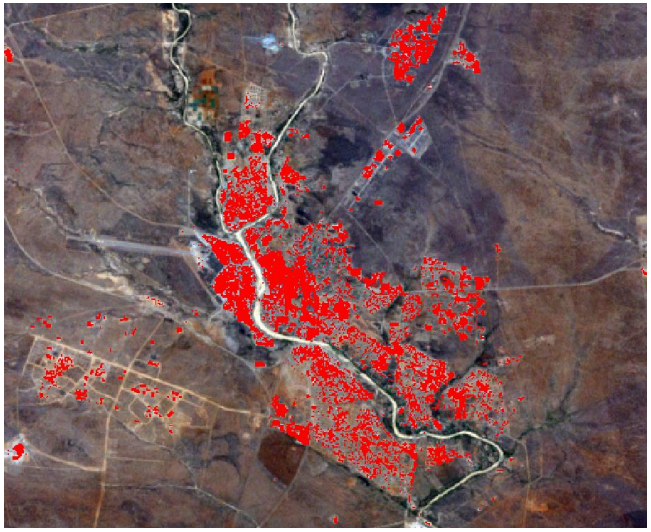
Spatial data and Settlement delineation

Official city is different from functional city – growth in many cities happens beyond the formal/official boundaries

Spatial data used to identify areas with urban character





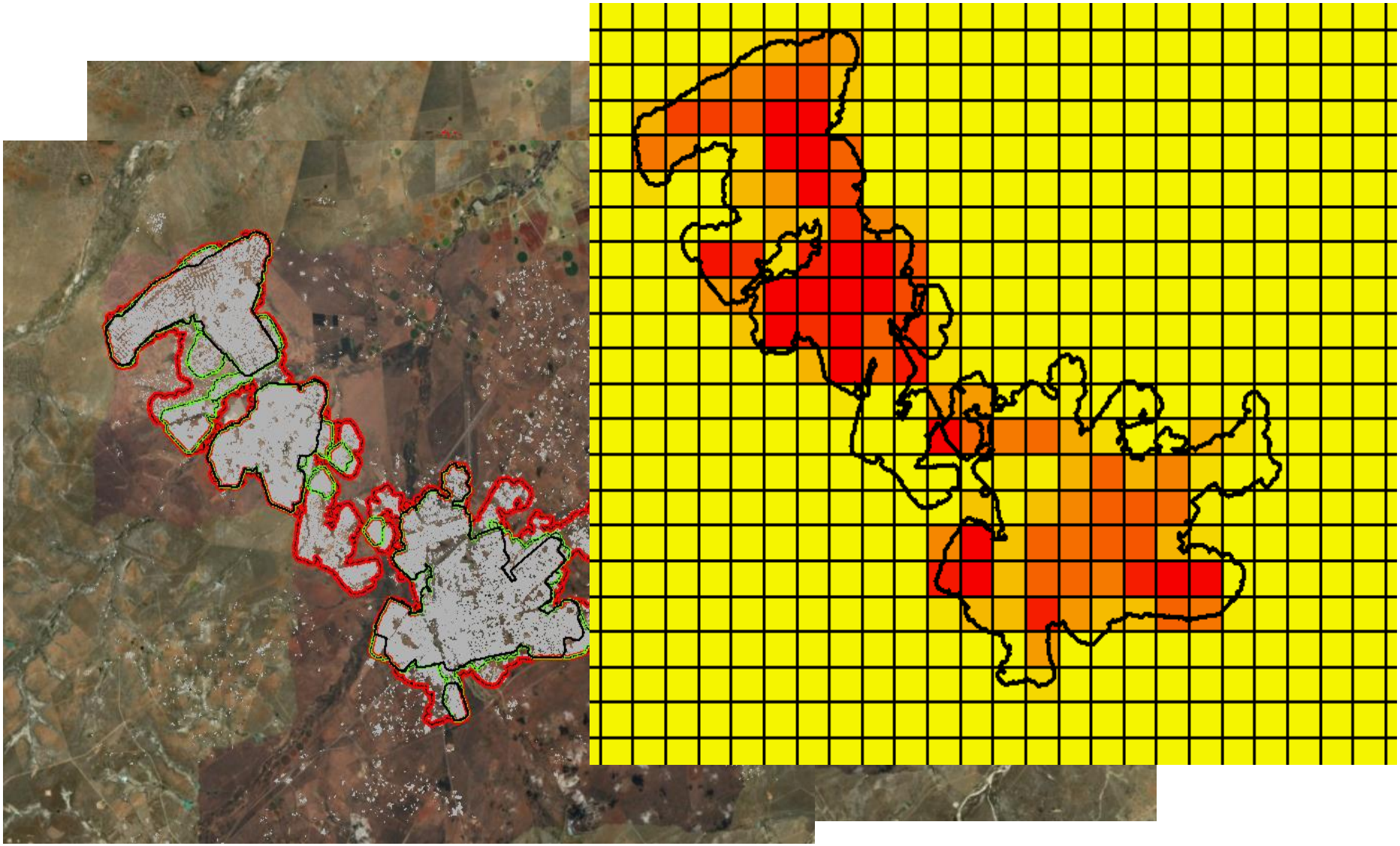


City as defined by its:

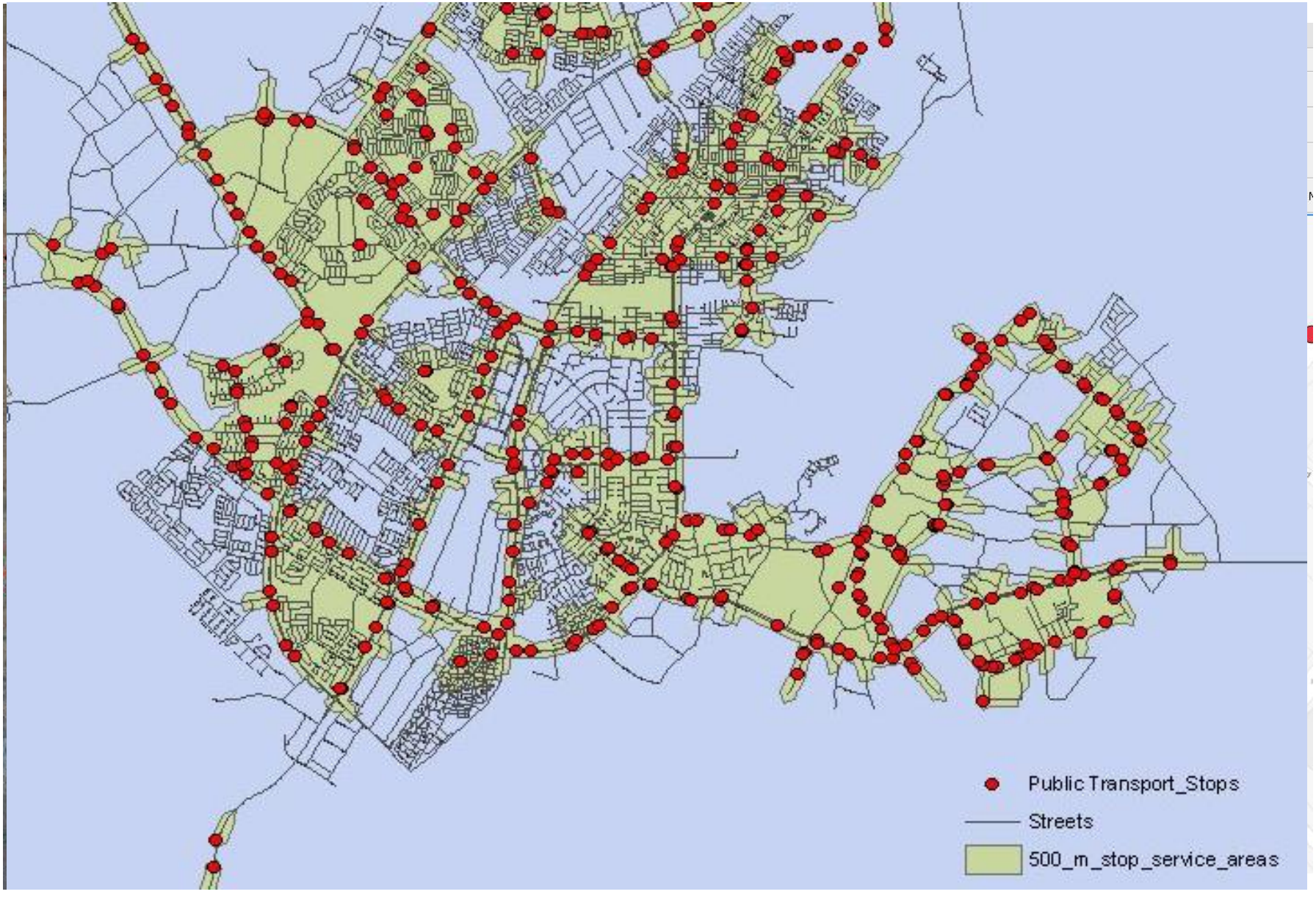
Degree of urbanization

Urban extent

Spatial data for measurement of urban land consumption



Spatial data for measurement of access to public transport

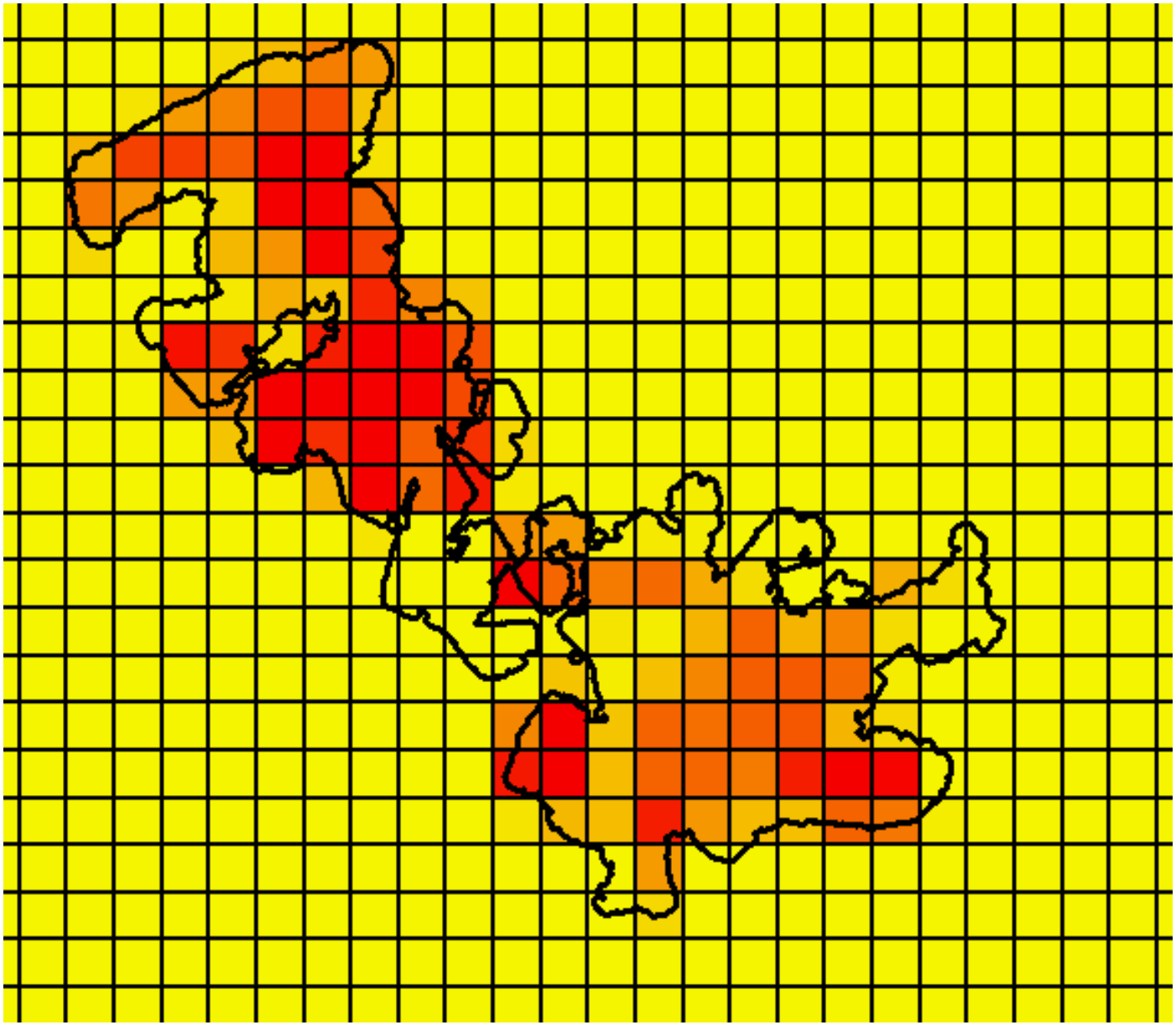


Spatial data is central to population disaggregation

All spatial SDG 11 indicators require highly disaggregated population data

Grid level data, generated using GI technologies is helping with computations

Some gridded pop datasets GPW4, WorldPop, GHSL-PoP .....



Select African countries of focus

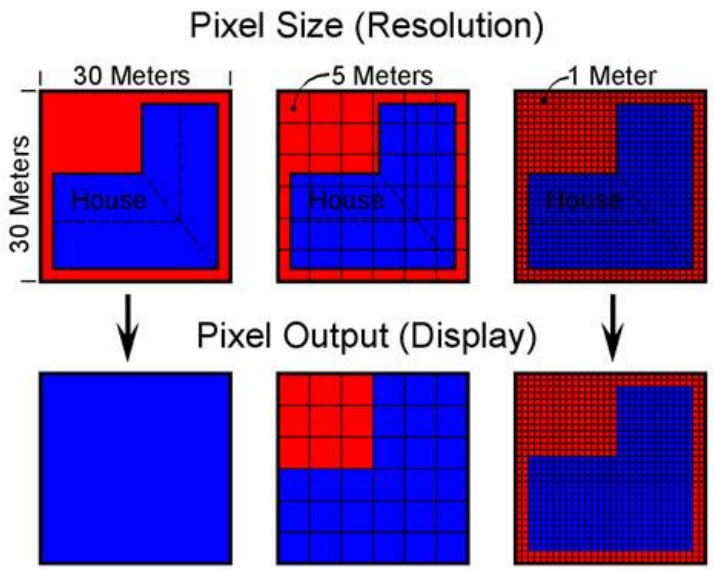
Ghana	Tunisia	Comoros
Ethiopia	Uganda	Djibouti
Egypt	Sudan	Malawi
Algeria	Rwanda	Rwanda
Tanzania	Angola	Uganda
Mali	Congo Dem. Rep.	Zambia
Mozambique	Morocco	
Egypt	Kenya	
Nigeria		
South Africa		

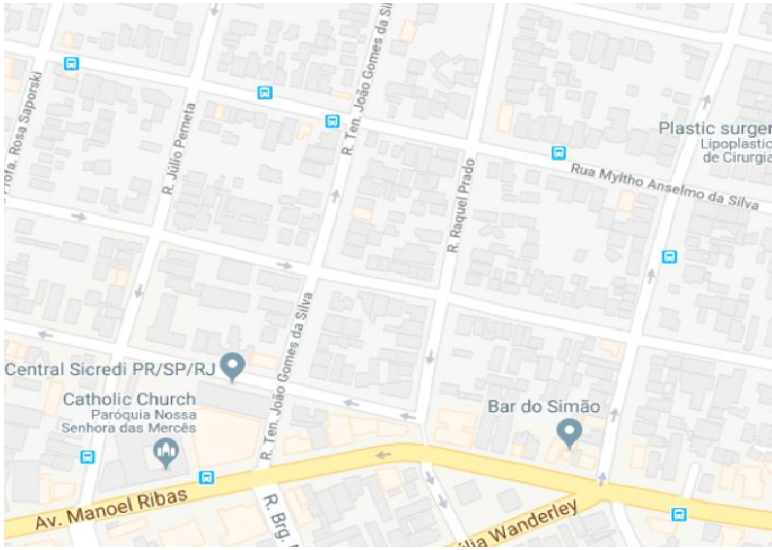
Our support

- Off-site data generation, analysis, indicator computations
- Data and methodologies sharing
- Local capacity development, on-the job training
- Guidance on reporting, use of data for informed decision making (CPI, LUOs, National urban policies, etc)

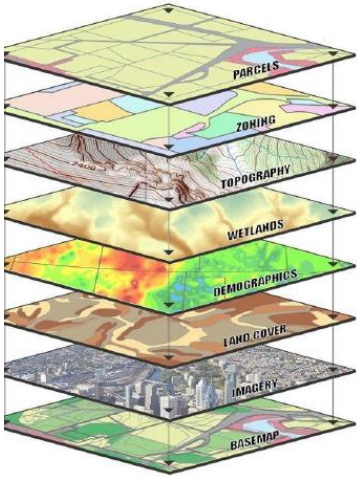
Some challenges

- High costs associated with high resolution imagery for data extraction – we have mid-resolution 20m sentinel, 30m Landsat
- Lack of high resolution population data at country level to support high quality population grids – data sharing challenges
- Labour intensive tasks in support of countries with no data – e.g digitization of potential open spaces, public transport stops
- Limited skills at country level, requiring continuous training and support
- Some limitations in integration of spatial data into official statistics (needs for relevant legal and policy frameworks)





The opportunities



- High potential of spatial data to support monitoring
  - Cheap to implement methods producing accurate data
  - Replicable and repeatable approaches
  - Ability to monitor and track human settlements trends over time
  - Ability to collect data in hard to reach areas –disaster prone, war torn
  - Important baseline layers in places with no data

- High acceptability of spatial data and related technologies for monitoring by countries
  - Many requests received for training from UN-Habitat based on proven methodologies, related cheap costs of data generation
  - Attractiveness of what spatial data can do among traditional data producers, quick adoption

- Rapid advances in useful applications, support from geospatial community
- Despite limited capacities, ability of technical staff to relate with methods, contribute for representativeness
- Availability and increase in open source software, data and imagery resources
- Emerging partnerships and activities by earth observation, scientific communities to avail better quality data – SANSA, JRC, ESA,NASA, CI, research & scientific institutions

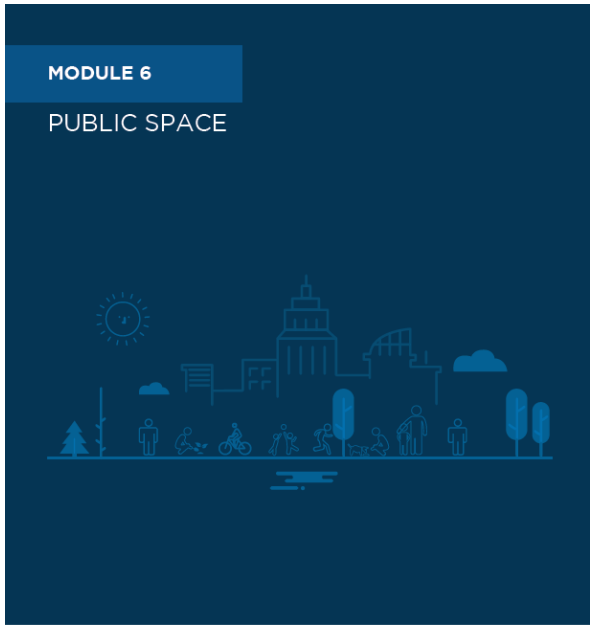
- **Many countries are already integrating GI into 2020 round of censuses because of its associated value**

Next steps

- In 2019, some of our activities include
  - Pilot settlement characterization for identification of slum and non-slum areas
  - Use of satellite imagery for cross validation of survey data on populations living in slums and informal settlements
  - Support and partnership with countries undertaking 2020 for disaggregation by type of settlement

- Our long term mandate is to provide support to countries
  - Developing relevant methods, tools and testing them in diverse contexts
  - Collecting new knowledge, translating it to easy to understand and apply methods and tools
  - Training technical staff on adoption of GI for data computation
  - Use of data as evidence for informed decision making, policies

How can we upscale all the great work you're doing and leverage on your expertise to support global monitoring of the housing indicator?



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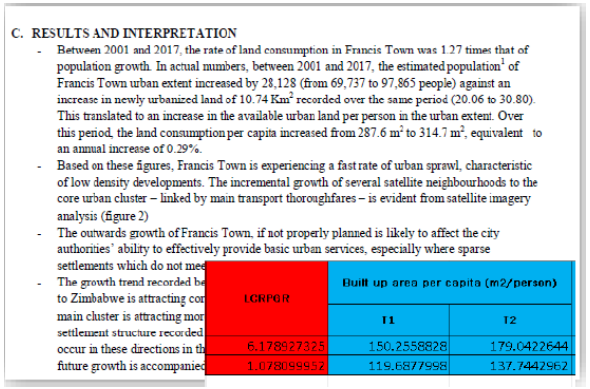

C. RESULTS AND INTERPRETATION

- Between 2001 and 2017, the rate of land consumption in Francis Town was 1.27 times that of population growth. In actual numbers, between 2001 and 2017, the estimated population[1] of Francis Town urban extent increased by 28,128 (from 69,737 to 97,865 people) against an increase in newly urbanized land of 10.74 Km^2 recorded over the same period (20.06 to 30.80). This translated to an increase in the available urban land per person in the urban extent. Over this period, the land consumption per capita increased from 287.6 m^2 to 314.7 m^2, equivalent to an annual increase of 0.29%.
- Based on these figures, Francis Town is experiencing a fast rate of urban sprawl, characteristic of low density developments. The incremental growth of several satellite neighbourhoods to the core urban cluster – linked by main transport thoroughfares – is evident from satellite imagery analysis (figure 2)
- The outwards growth of Francis Town, if not properly planned is likely to affect the city authorities' ability to effectively provide basic urban services, especially where sparse settlements which do not med
- The growth trend recorded be
to Zimbabwe is attracting cor
main cluster is attracting mor
settlement structure recorded
occur in these directions in th
future growth is accompanied

LCRPOR	Built up area per capita (m2/person)	
	T1	T2
6.178927325	150.2558828	179.0422644
1.078099952	119.6877998	137.7442962

THANK YOU

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