



[maupp.ulb.ac.be](http://maupp.ulb.ac.be)

# URBAN GROWTH IN SUB-SAHARAN AFRICA BETWEEN 1995 AND 2015

YANN FORGET <sup>1,3</sup>, MICHAL SHIMONI <sup>3</sup>, MARIUS GILBERT <sup>1</sup>,  
AND CATHERINE LINARD <sup>1,2</sup>

<sup>1</sup> SPATIAL EPIDEMIOLOGY LAB, UNIVERSITÉ LIBRE DE BRUXELLES, BELGIUM

<sup>2</sup> DEPARTMENT OF GEOGRAPHY, UNIVERSITY OF NAMUR, BELGIUM

<sup>3</sup> SIGNAL IMAGE CENTRE, ROYAL MILITARY ACADEMY, BELGIUM





## Objectives

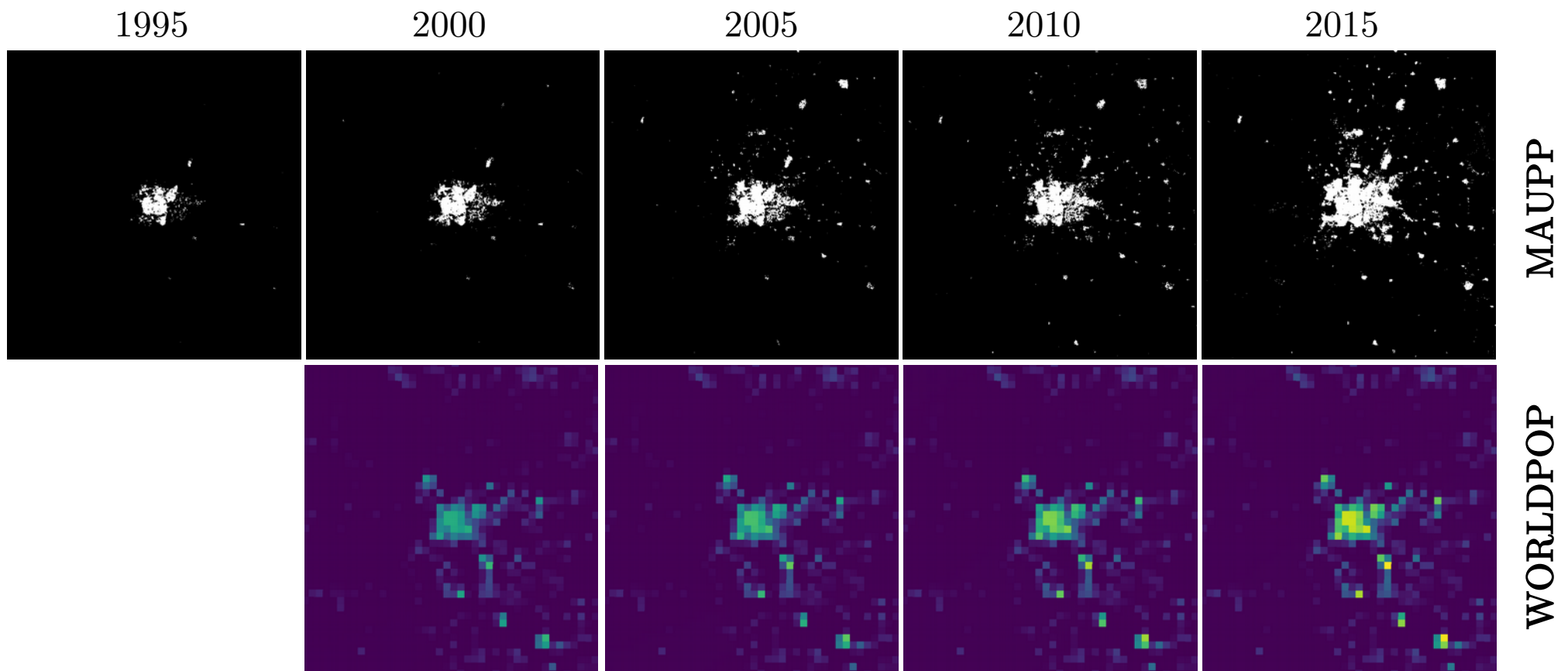
- Multi-temporal analysis of urban growth in the 44 urban areas of the MAUPP dataset
- Built-up areas growth rates
- Relationship with population growth

# INTRODUCTION



## Data

- Maps of **built-up areas** in 1995, 2000, 2005, 2010 and 2015
- WorldPop **population** maps for 2000, 2005, 2010 and 2015

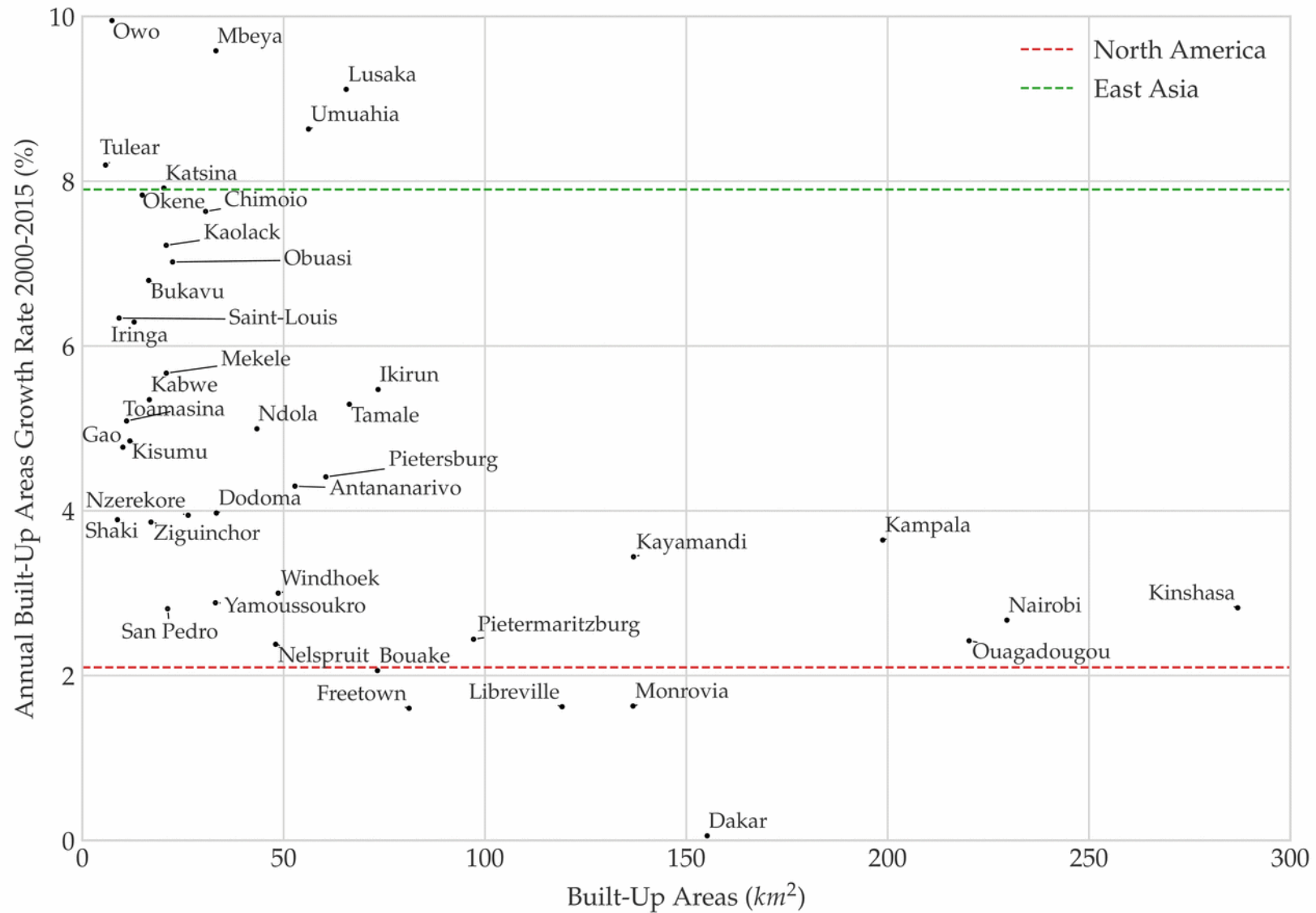




## Growth rates of built-up areas

- Average compound annual growth rate (CAGR) of **4.8%** between 2000 and 2015 across the case studies.
- Higher than the urban population CAGR of Sub-Saharan Africa (~4.1%, UN)
- Not so far from the CAGR of built-up areas in the US between 1990 and 2000 (~5%, Atlas of Urban Expansion)
- High variability across the case studies

# BUILT-UP AREAS



**Figure 2.** Annual built-up areas CAGR between 2000 and 2015 depending on the total surface occupied by built-up areas.



## Growth rates of built-up areas

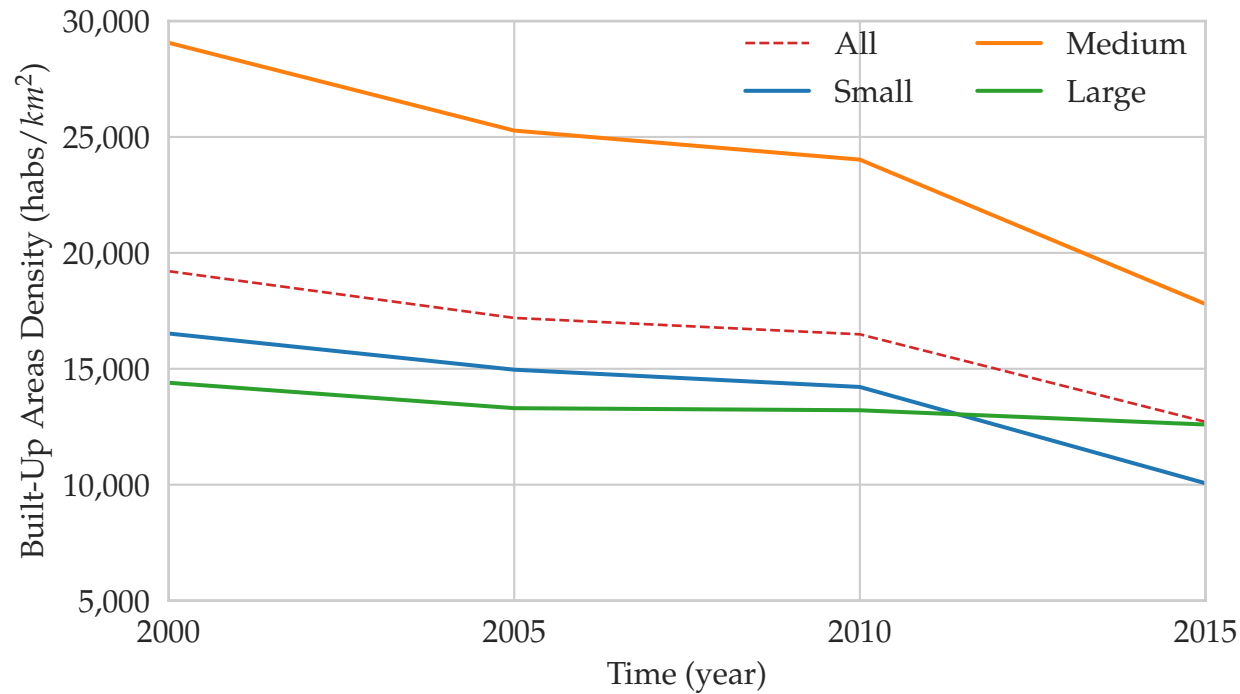
- **Large** urban areas (more than 1,000,000 inh. in 2000)  
e.g. Antananarivo, Nairobi, Kampala, Kinshasa...  
CAGR = **3.2%**
- **Medium-sized** urban areas (between 500,000 and 1,000,000 inh.)  
e.g. Bukavu, Libreville, Kisumu, Katsina, Monrovia...  
CAGR = **4.6%**
- **Small** urban areas (less than 500,000 inh.)  
e.g. Windhoek, Yamoussoukro, Mekele, Chimoio, Dodoma...  
CAGR = **5.4%**



## Population densities in built-up areas

- In average, ~**16,100** people per sq. km of built-up area in 2000
- ~**11,000** people per sq. km in 2015 (35% decrease)

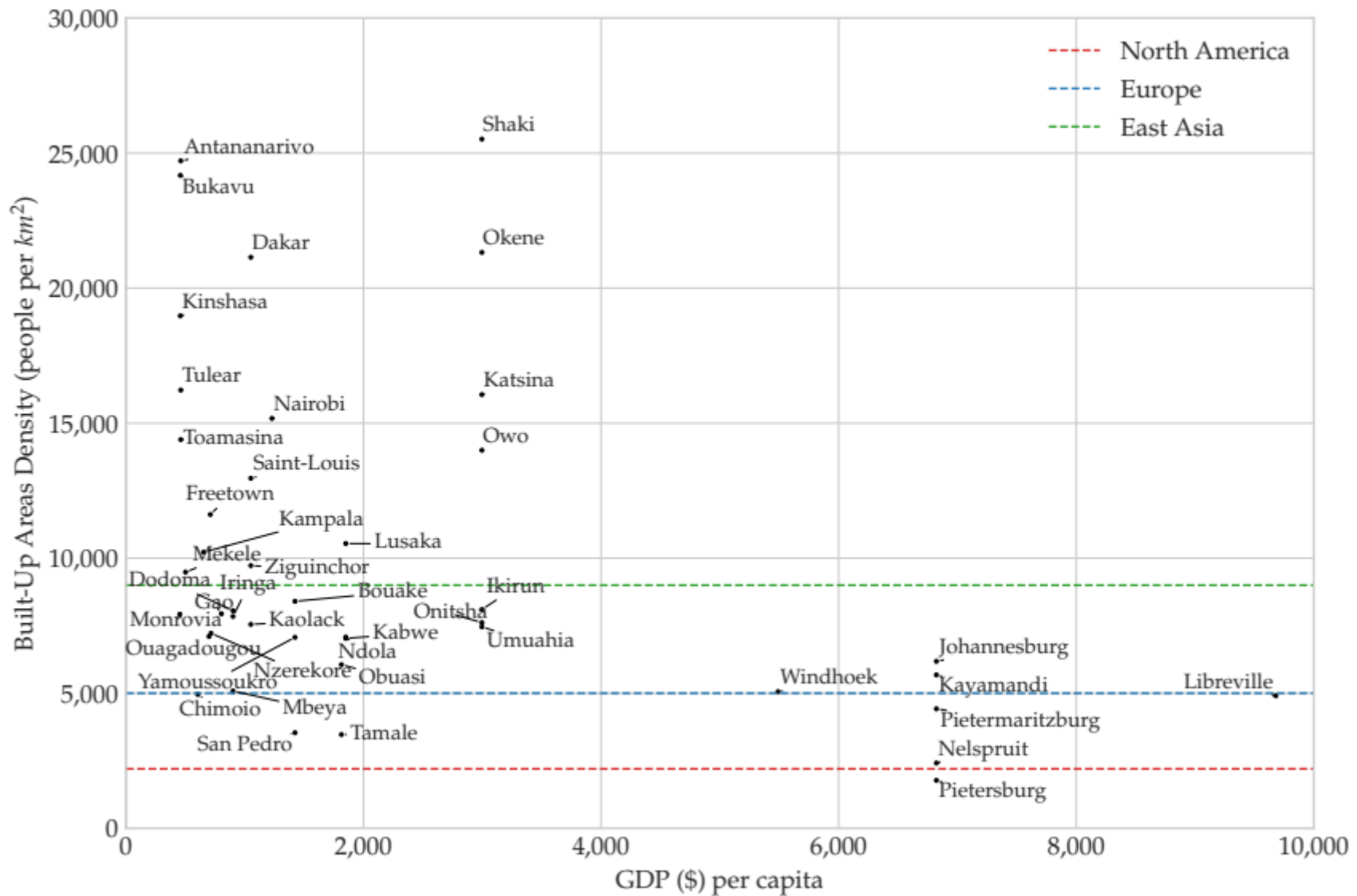
# DENSITIES



**Figure 3.** Evolution of the average population density in built-up areas depending on the size of the urban area.



# DENSITIES



**Figure 4.** Population densities in built-up areas (people per sq. km) depending on the GDP per capita of the country.



## Population densities in built-up areas

- Urban areas in **low and lower-middle income** countries  
e.g. Dakar, Freetown, Ouagadougou, Kampala...  
~**12,300** people per sq. km in 2015
- Urban areas in **upper-middle income** countries  
e.g. Windhoek, Johannesburg, Libreville, Pietersburg...  
~**4,400** people per sq. km in 2015



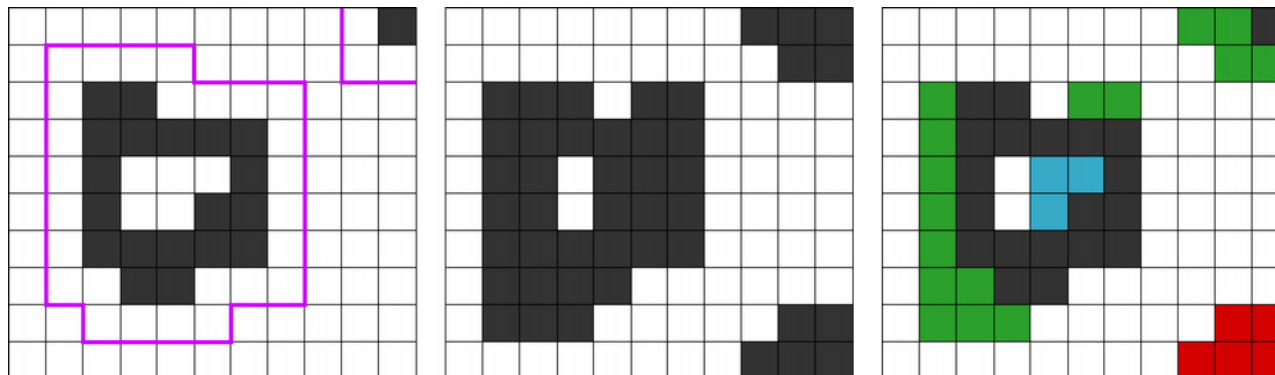
## Three categories of newly built-up areas

→ “**Infill**”: areas already included in an existing urban cluster

→ “**Extension**”: areas extending an existing cluster

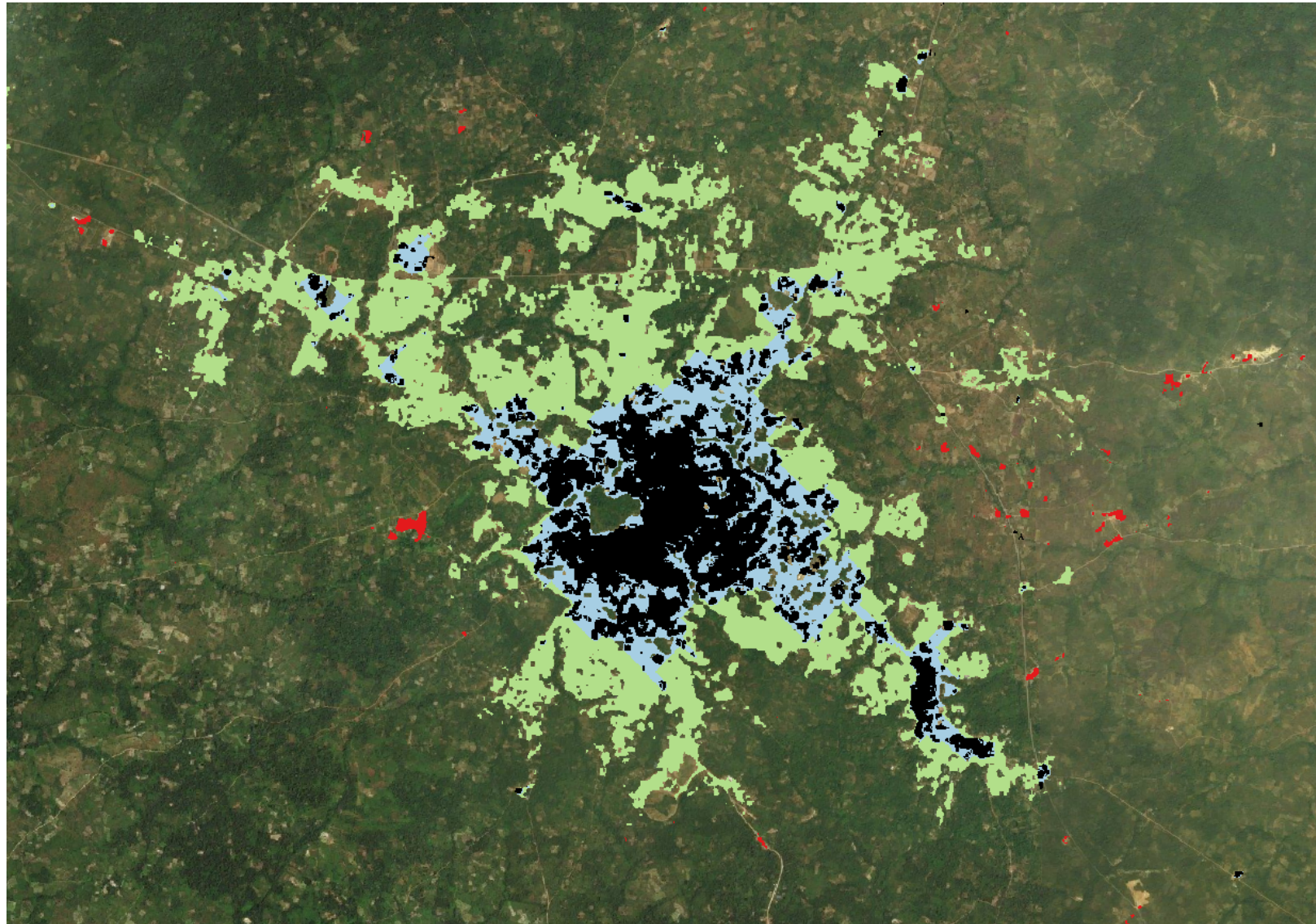
→ “**Leapfrog**”: areas unattached to any existing cluster

Sprawl



**Figure 5.** Schematic example of characterizing newly built-up areas in 200m grid cells. **a)** initial built-up areas and urban clusters, **b)** final built-up areas, and **c)** characterized newly built-up areas (existing, infill, extension, leapfrog).

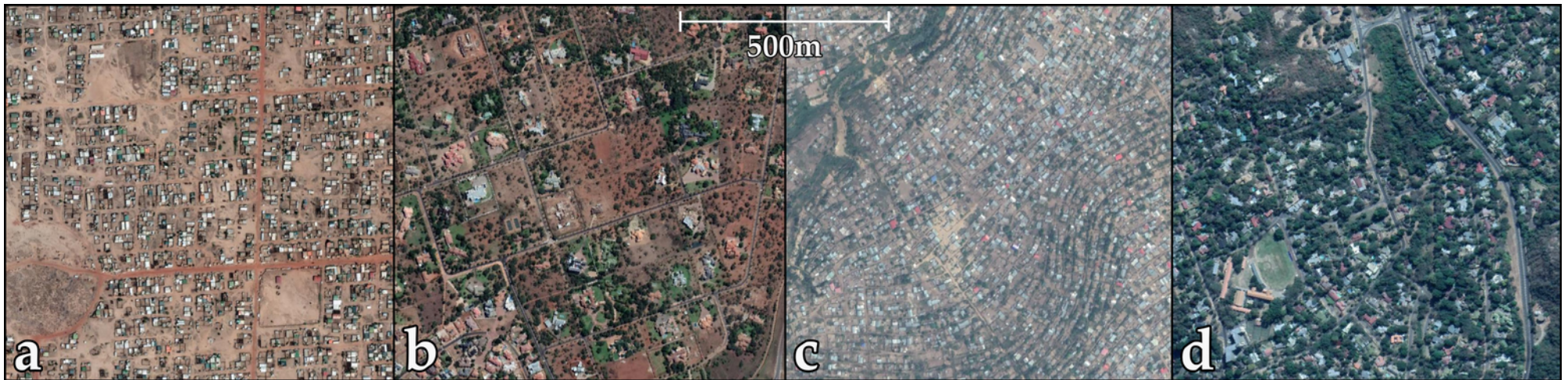
# URBAN SPRAWL



**Figure 6.** Characterized urban expansion between 2000 and 2015 in Owo, Nigeria  
Legend: **initial built-up areas**, **infill**, **extension**, **leapfrog**



# URBAN SPRAWL



**Figure 7.** Various sprawl areas at the same scale: **a)** Ouagadougou, Burkina Faso, **b)** Pietersburg, South Africa, **c)** Kinshasa, D.R. Congo, and **d)** Nelspruit, South Africa.



## Sprawl per new dweller

	Small	Medium	Large	
<b>Low Income</b>	141.62 (12)	33.62 (3)	37.04 (5)	99.28 (20)
<b>Lower-Middle Income</b>	157.70 (8)	92.80 (6)	89.04 (2)	124.78 (16)
<b>Upper-Middle Income</b>	522.90 (3)	153.03 (2)	107.19 (2)	298.45 (7)
	196.95 (23)	87.61 (11)	64.19 (9)	

**Table I.** Sprawl (in sq. meters) per new dweller between 2000 and 2015 depending on income class and population size.



## Population densities in built-up areas

- Urban growth in SSA is highly **heterogeneous**.
- Built-up areas are growing at higher rates in small and medium-sized urban areas.
- Urban areas in upper-middle income countries are characterized by a lower population density in built-up areas.
- The surface of sprawl per new dweller is highly variable across the case studies: from **~37 sq. m** per new dweller in large low-income urban areas, to **~523 sq. m** in small upper-middle income urban areas.