AFRICAN URBANIZATION: SOME KEY ISSUES

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Introduction

- **New project on urbanization in Africa.**
  - World Bank funded—but independent research agenda.
  - Led by joint research team from Oxford University & London School of Economics.

- **Project leaders:**
  - Paul Collier (Oxford)
  - Tony Venables (Oxford)
  - Vernon Henderson (LSE)

Some Aims of the Project

- **To better understand the spatial development of African cities and the scope for public policy to improve it.**
  - We will be examining the patterns, causes, consequences and policy implications of urban development across Sub-Saharan Africa.

- **To compile a comprehensive dataset on African urbanization.**
  - Satellite data
  - Historical aerial photos & maps
  - Geo-referenced firm & household data
  - Census data
  - Cadastral surveys, etc.

Spatial Analysis

- **Within-cities:** to understand the spatial patterns of development within cities and its determinants and implications.

- **Across-cities:** to understand how systems of cities have evolved over time.

Within-city Analysis

- **We want to know how both populations and capital (buildings and roads) are:**
  - Distributed within cities
  - Their evolution over time
    - What drives conversion of rural land to urban use?
    - What about conversion of informal to formal land?
      - Under what circumstances (e.g. economic growth, institutional settings, policy initiatives, etc.) do we see conversion?
    - What drives conversion at fringe (formal vs informal)
    - Densification
      - In-filling vs higher buildings (what would be mostefficient)

Within-city Analysis

- **Initially, we will focus on six priority cities (Dar es Salaam, Nairobi, Addis, Kampala, Kigali & Accra)**
  - Right now, we have population data, night lights data and low resolution ground cover data ("built" or impermeable surface).
  - Have just gotten high resolution (1.5 to 2.5 meter) satellite data
    - Early 2000s and early 2010s.
    - Measures of building density and irregularity of positioning
    - Access to roads
  - Will get some building height data.

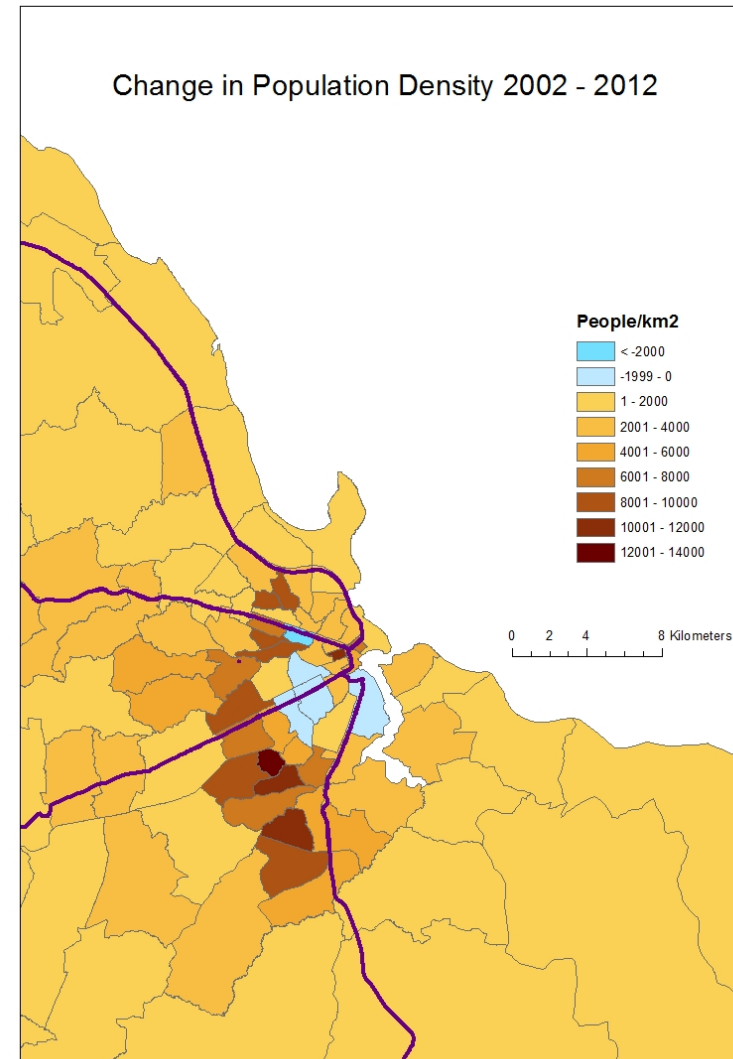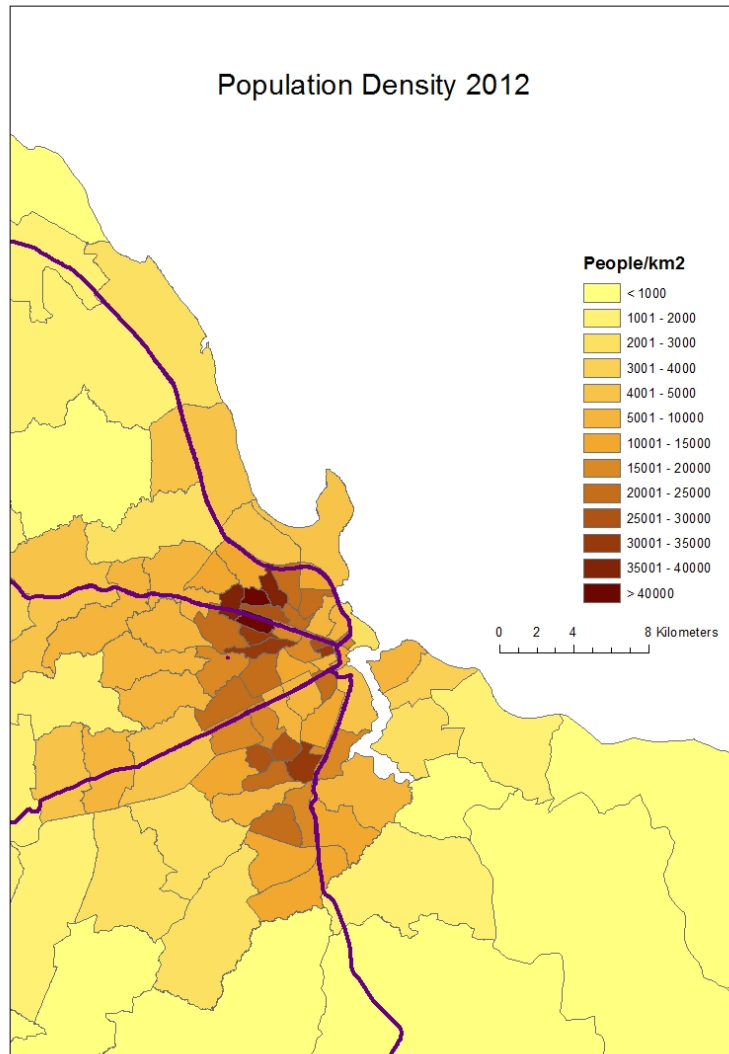# Preliminary look at Dar es Salaam

- Has some semblance of a monocentric structure as do most cities in the developing world.

- Two big differences:
  - **Low average density** at the center compared to other big cities in developing world especially those at its income level.
  - **Extreme extent of "unplanned" [informal] settlements**
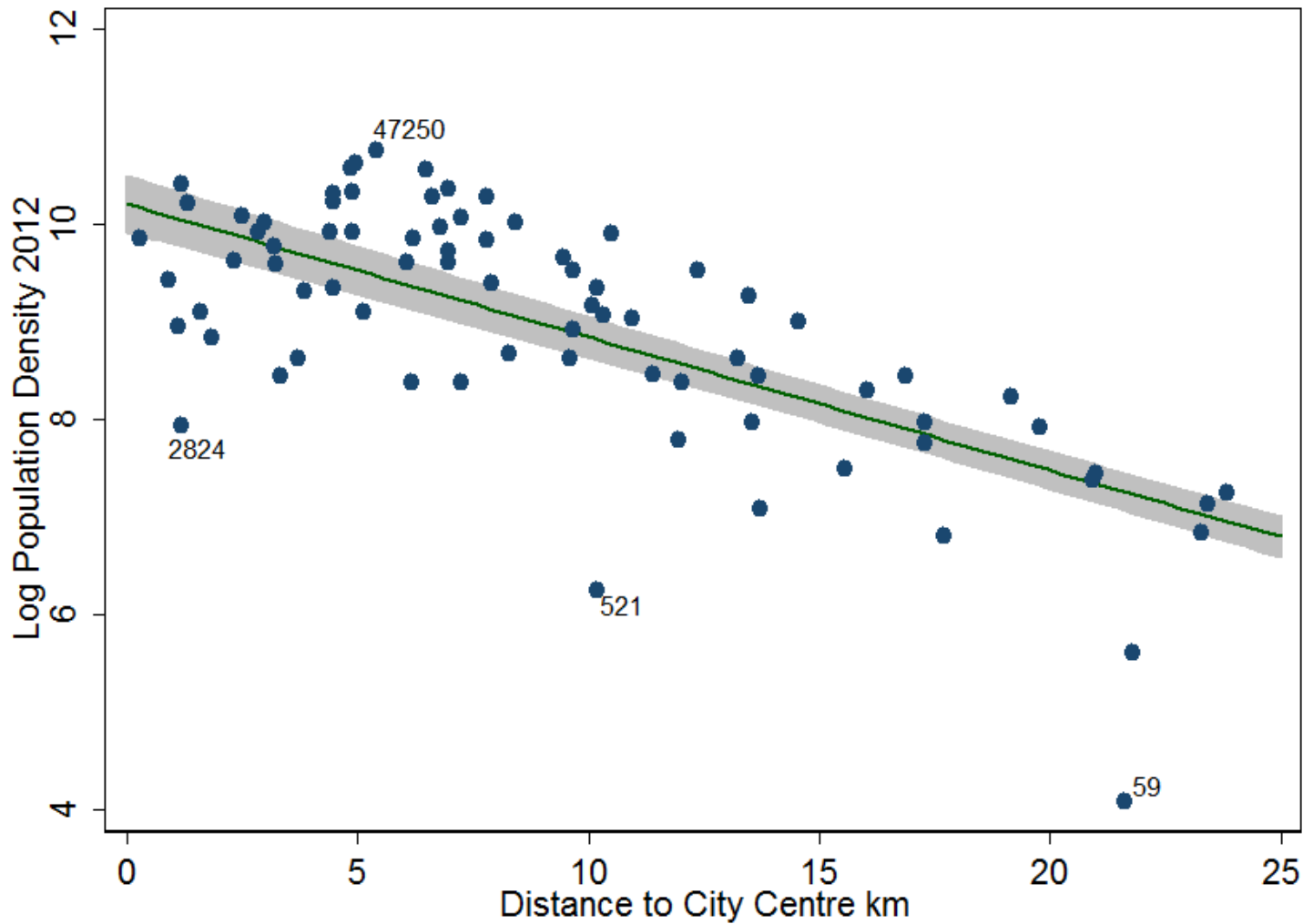   - 80+% of buildings in in unplanned sector

Preliminary look at Dar es Salaam

- **Some findings on:**
  - Population density and its evolution
  - Built cover (low resolution)
  - Ratio of population to build cover

- **Methodologies that we're using to learn more about built cover and capital investments using high resolution data.**

Urban Density

Population Density 2012

Change in Population Density 2002 – 2012

People/km2
- < 1000
- 1001 - 2000
- 2001 - 3000
- 3001 - 4000
- 4001 - 5000
- 5001 - 10000
- 10001 - 15000
- 15001 - 20000
- 20001 - 25000
- 25001 - 30000
- 30001 - 35000
- 35001 - 40000
- > 40000

People/km2
- < -2000
- -1999 - 0
- 1 - 2000
- 2001 - 4000
- 4001 - 6000
- 6001 - 8000
- 8001 - 10000
- 10001 - 12000
- 12001 - 14000

0 2 4 8 Kilometers

Source: NBS Census data and OSM
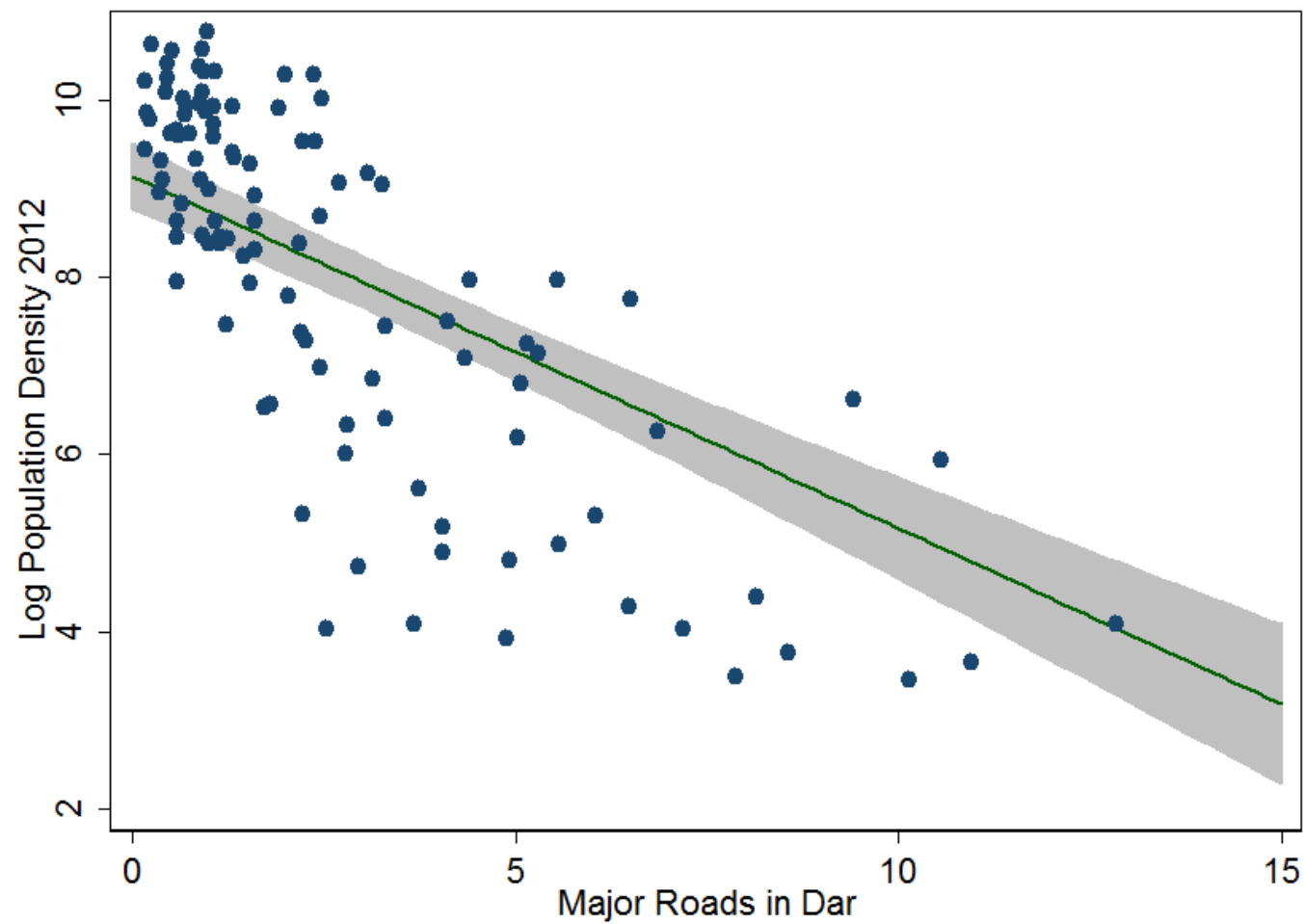
Population Density Level (low average)

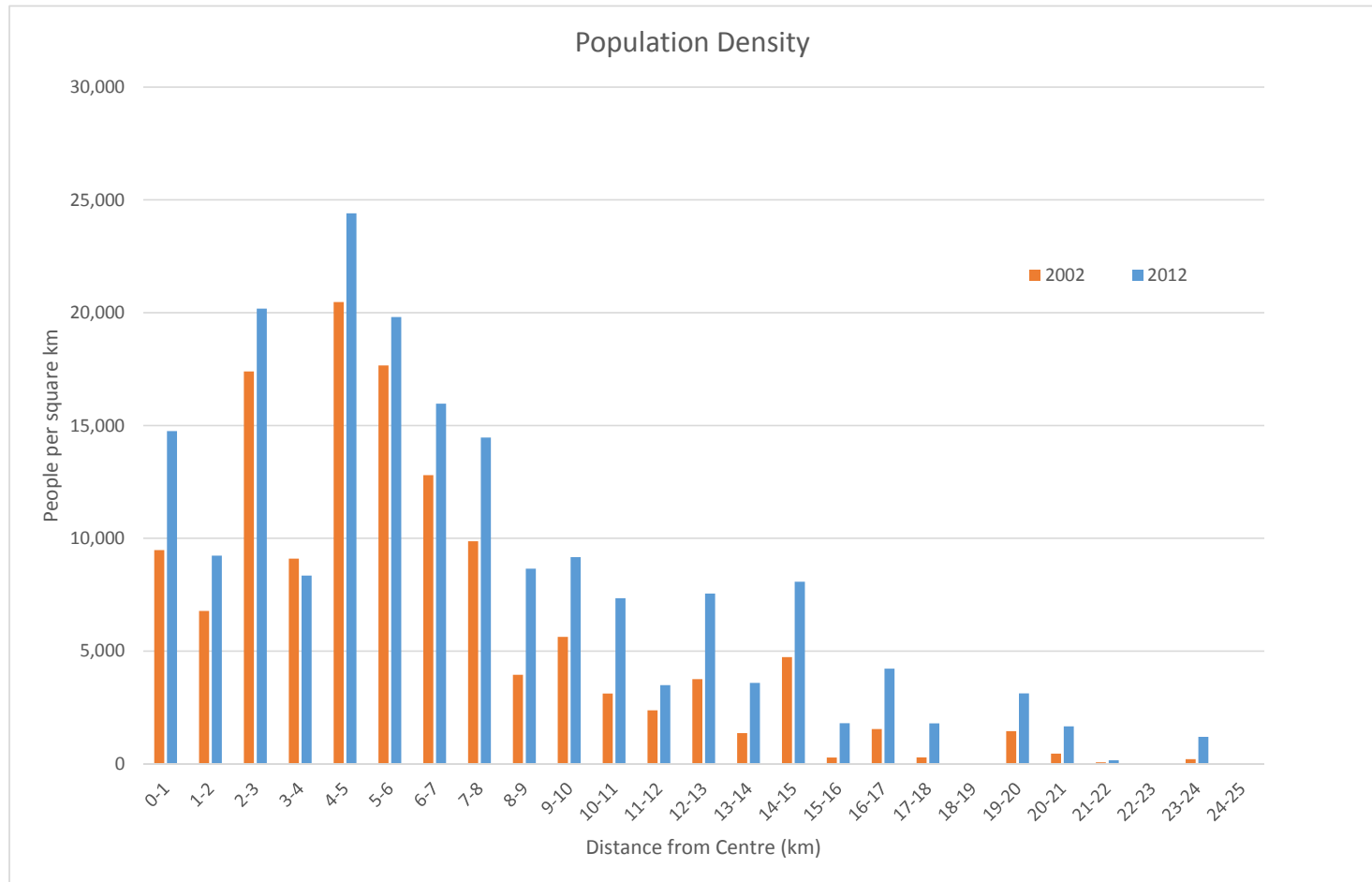Average density near center is 20-25000 per sq km.
Versus, say, Jakarta 1980: 40,000+
Shanghai and many big cities even higher historically, with peaks at 100,000+ per sq km.

Density without building height
Informal settlements: low livability.

Density by distance to major roads

Population Density Gradient

Population Density Levels and Changes

	(1)	(2)	(3)	(4)
	Log Population Density 2012		Change in Log Population Density	
Distance to City Centre	-0.137***	-0.110***	-0.0329***	-0.0343***
	(0.00701)	(0.00760)	(0.00786)	(0.00792)
Distance to Major Roads		-0.159***		-0.0297*
		(0.0319)		(0.0164)
Log Pop. Density 2002			-0.262***	-0.307***
			(0.0495)	(0.0542)
Constant	10.21***	10.27***	3.047***	3.496***
	(0.130)	(0.119)	(0.508)	(0.557)
Observations	109	109	109	109
Adjusted R^2	0.806	0.859	0.255	0.268

INFRASTRUCTURE: Usual decline in density from center but major roads play a significant role in settlement patterns.
Future: Effect of BRT or opening of limited access highway on settlement patterns
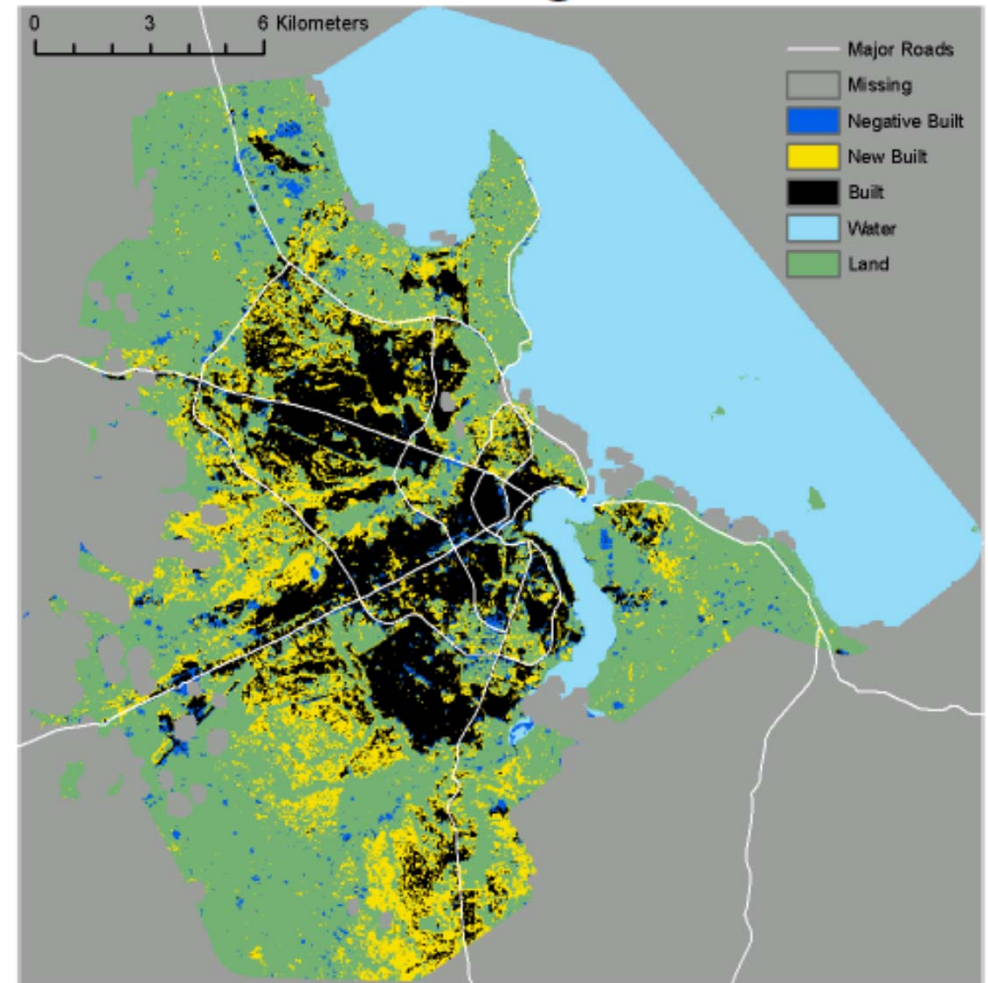
Built area

- What is covered, or built?

- What is the density and irregularity of buildings

- What are their heights?

- How do these interact with public capital (roads)?

- How does this evolve over time?
  - Irregular to regular; dense to less dense;
  - Dense and irregular to even more dense; building upward in dense/irregular areas
  - Unserviced to serviced

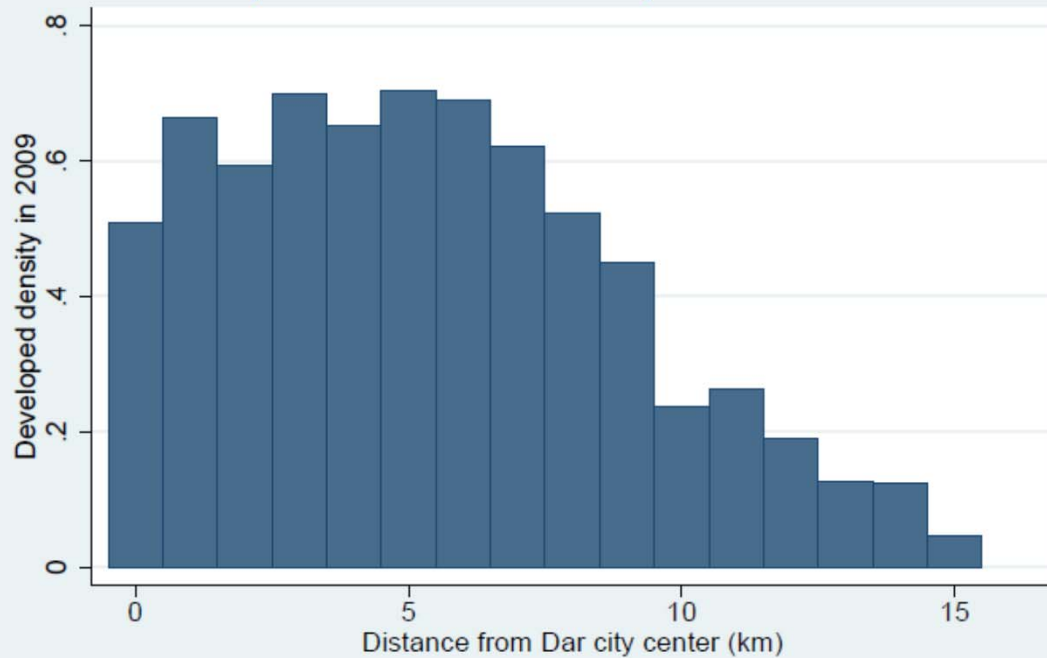# Change at pixel level (30m x 30m); must be one use or another
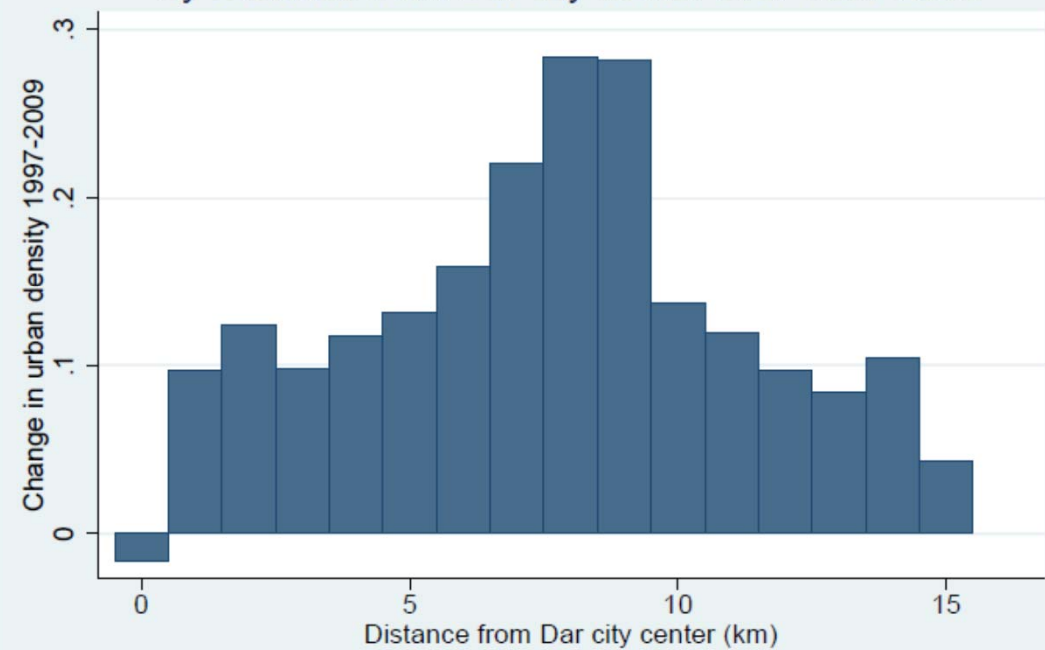

Built Cover in 2009

——	Major Roads
	Barren
	Built
	Water
	Missing
	Vegetation
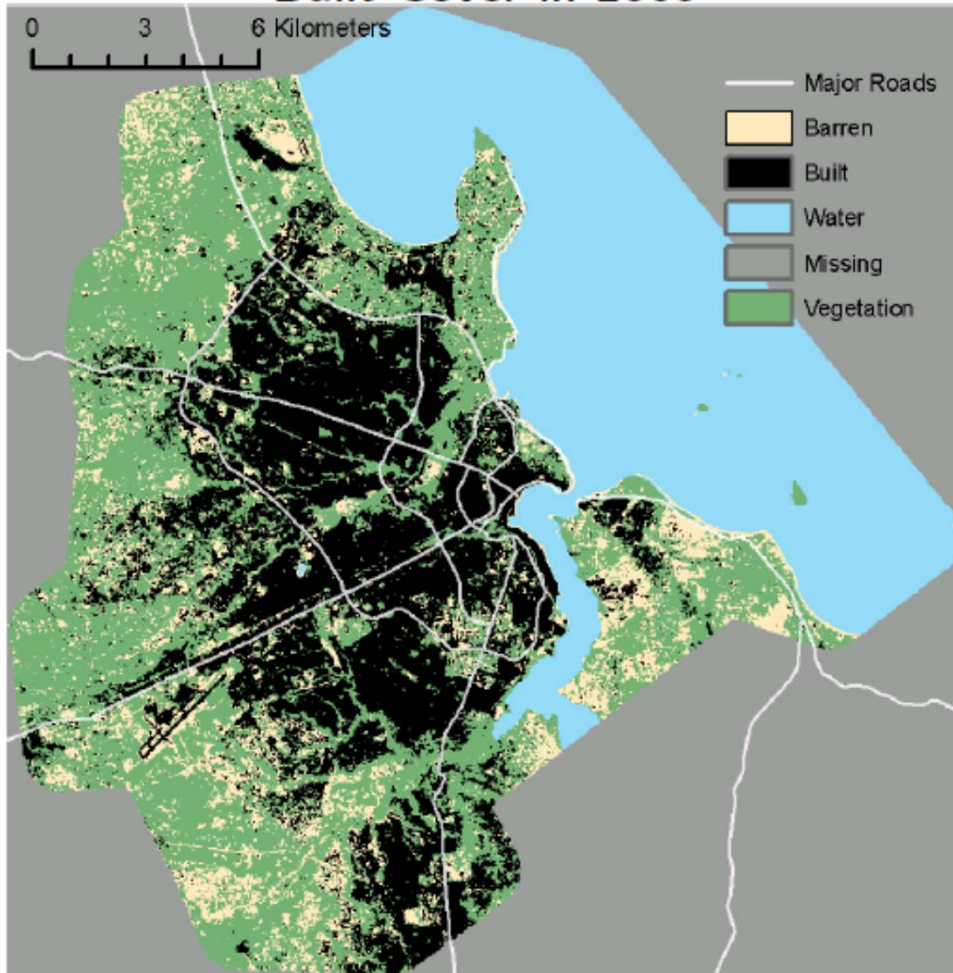
Built Cover Change 1997-2009

——	Major Roads
	Missing
	Negative Built
	New Built
	Built
	Water
	Land

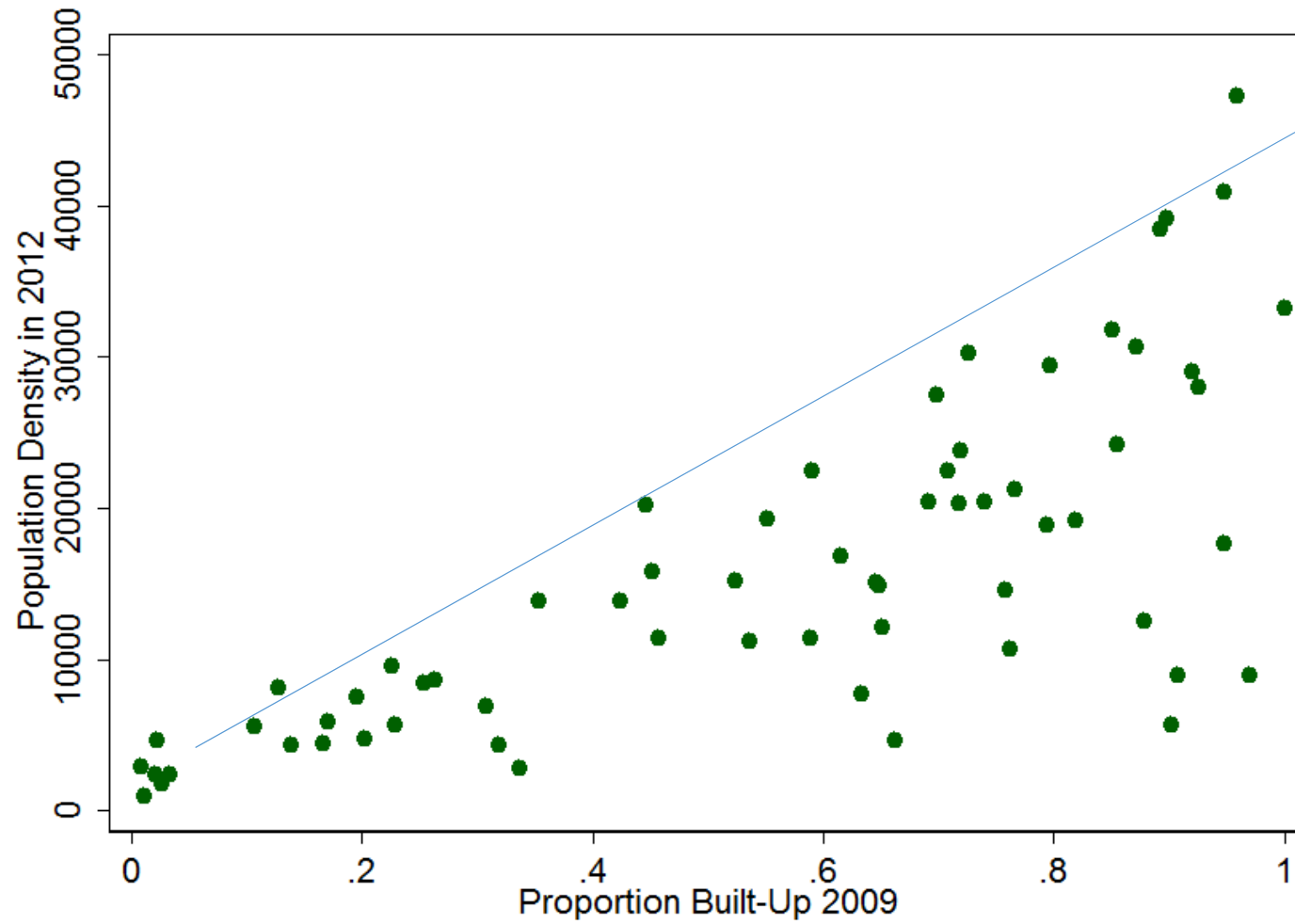Urban development density by Distance from Dar city center in 2009

Change in Urban development density by Distance from Dar city center over 1997-2009
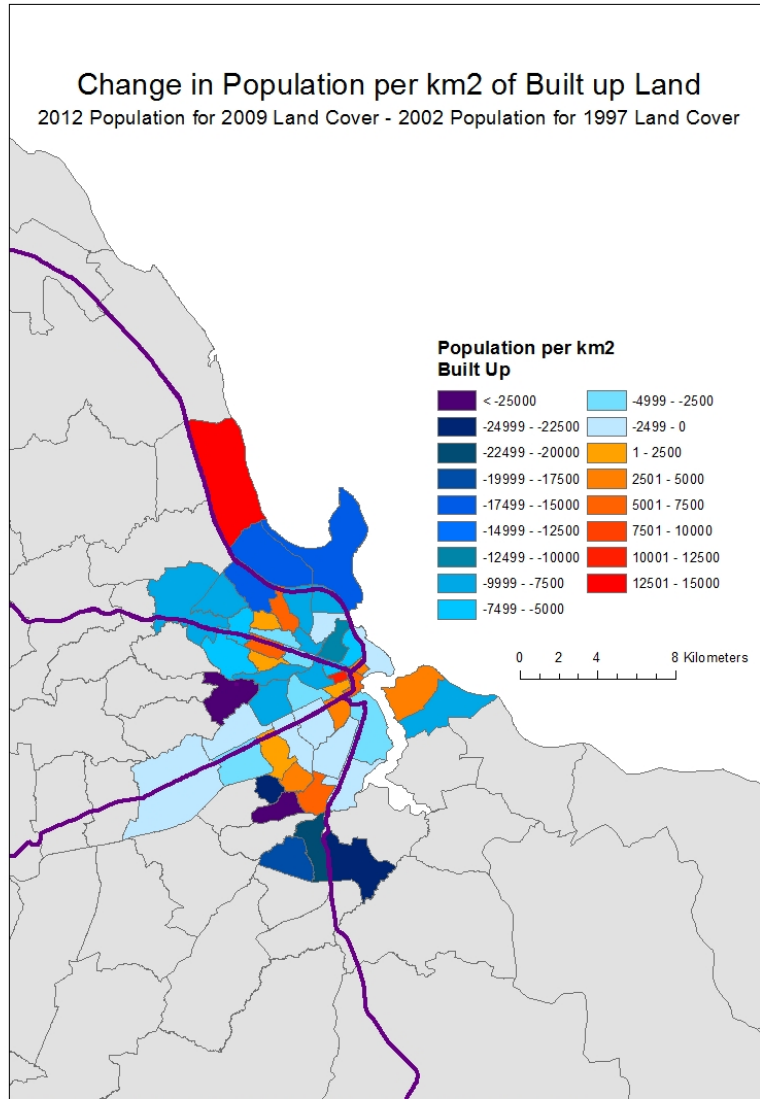
% changes also similar in pattern

Is the "frontier" the neighborhoods where there is height?

Population to built area

Change in Population per km2 of Built up Land
2012 Population for 2009 Land Cover - 2002 Population for 1997 Land Cover

Population per km2
Built Up

< -25000	-4999 - -2500
-24999 - -22500	-2499 - 0
-22499 - -20000	1 - 2500
-19999 - -17500	2501 - 5000
-17499 - -15000	5001 - 7500
-14999 - -12500	7501 - 10000
-12499 - -10000	10001 - 12500
-9999 - -7500	12501 - 15000
-7499 - -5000	

0   2   4   8 Kilometers

Note: Wards with over 50% missing land cover, and wards less than 8% built-up, are excluded

- Areas of greatest increases
  - Tandale, Manzese, Tandika, & Mwananyamala informal settlements to the West.
  - Kigamboni (ward connected by ferry to CBD across creek),
  - Kariakoo and CBD, plus wards just to the south of here.
  - Wards just to NE of airport, and spreading across to Tandika.
- **Suggestive that the informal settlements and densest original places are seeing increased density despite lack of space to develop more land.**
- Interesting to see population spreading north faster than build up increasing
  - This is an area where we are seeing high numbers of formal firms.
  - Also on major road towards Bagamoyo new port
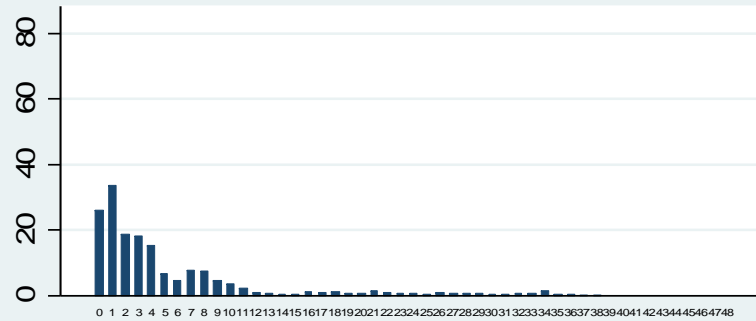
Dar es Salaam 2010/12 land cover

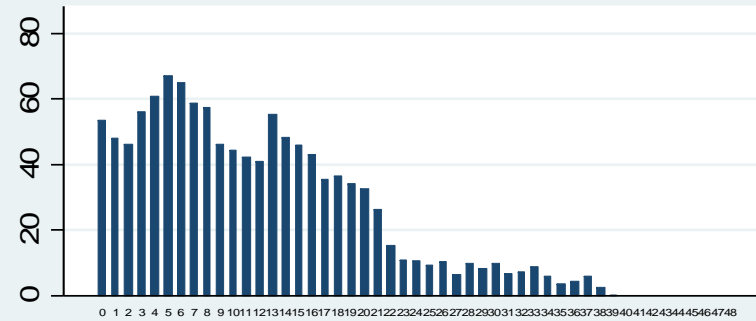Land cover was derived from classified VHR imagery
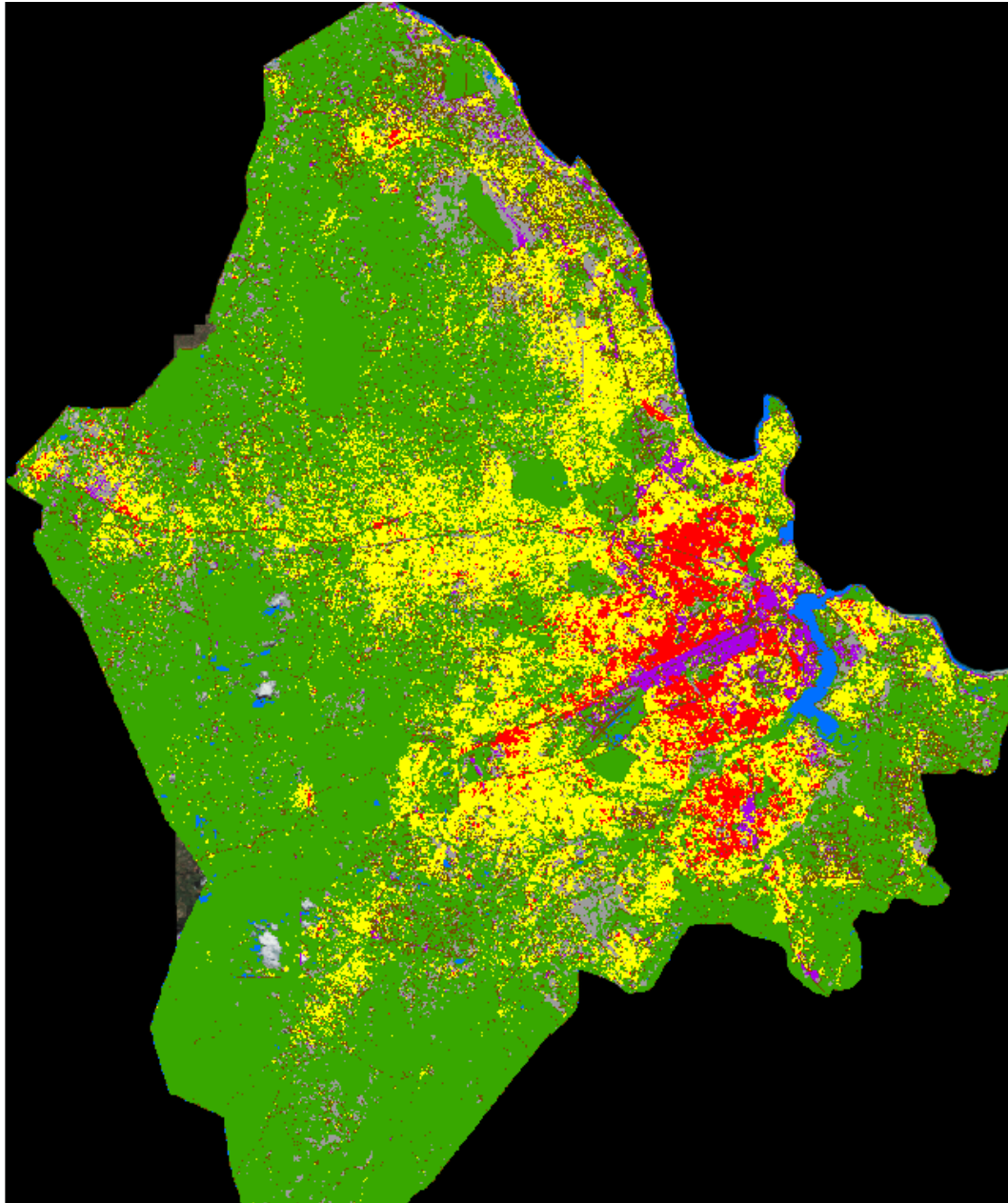
Commerical/Industrial
Residential non-slum
Residential slum
Roads
Vegetation
Barren
Water

Percent of Class by Distance from CBD in K

Commercial
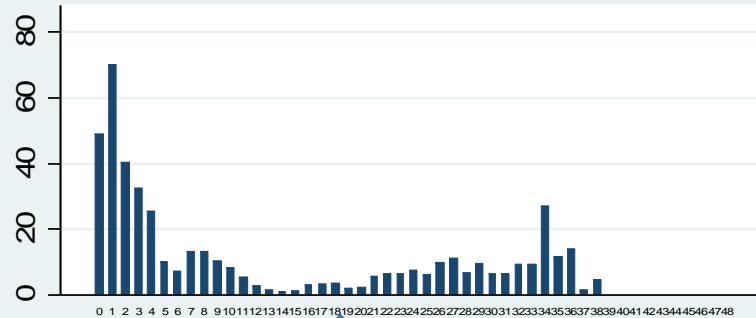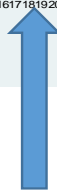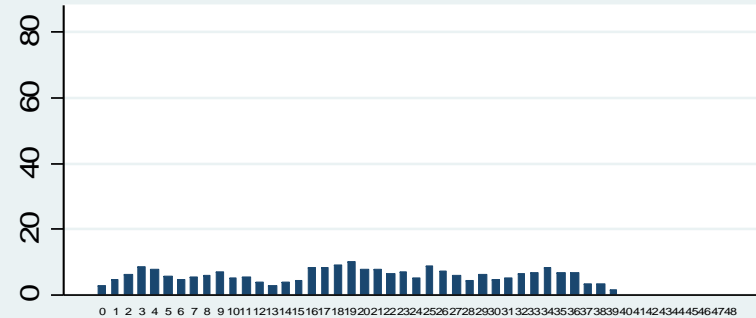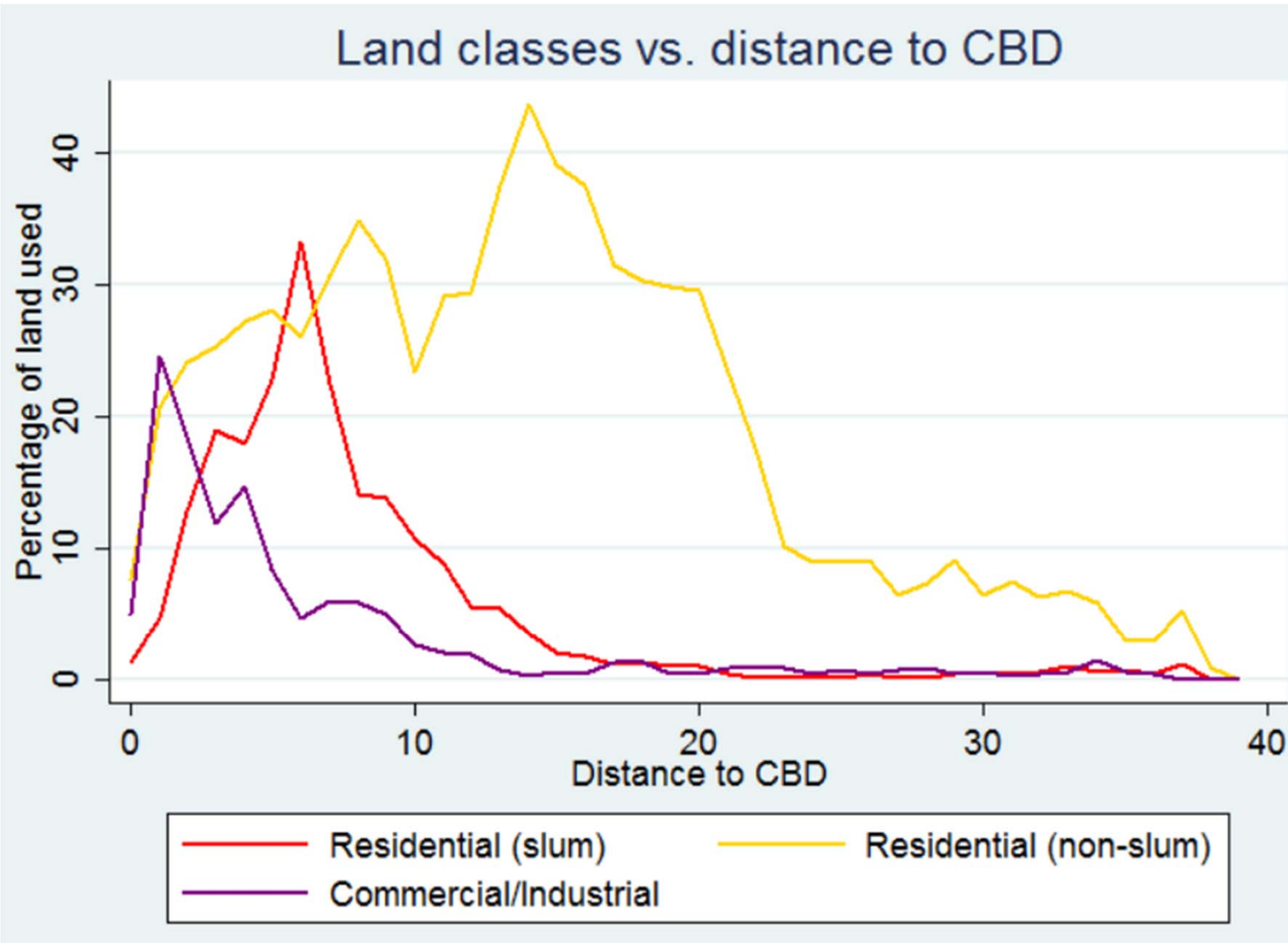
Residential

Ratio Comm/Res

Barren

The problem of strict classification

Land classes vs. distance to CBD

Percentage of land used vs. Distance to CBD

Legend:
- Residential (slum)
- Residential (non-slum)
- Commercial/Industrial

But 80% of buildings are in unplanned Settlements.
UN Habitat (2010) based on government census of buildings.

What is the problem:
- Lots of formal sector land but not buildings?
- Misclassification

Need information about Buildings!

Next Step

- **Focus on two key functions of the city:**

  - **Livability**
    - housing quality, especially floor space & height
    - Access to public services
    - Security of tenure

  - **Productivity**
    - Scale
    - Complementarities

Next Step

- **Three complementary spatially specific investment processes:**
  - public infrastructure
  - household residential
  - commercial.

- **Timing issues**

- **Path dependence**

- **Role of public policy**

THE END!