02

How do land use and building morphology indicators reflect rurbanity in Accra, Marrakech and Bengaluru ?

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What is rurbanity?

A **state of being** where urban and rural features **co-present in one space**, each keeping its identity; not a point on a gradient. Four perspectives capture it together (Hoffmann et al. 2023).

From the **Endowments & Place** entry point: map and characterise where built form and rural land are co-present in settlement units, and how they change.

Cities grow by **lateral sprawl** and by **densification and high-rise** (Hoffmann et al. 2023). C01 maps the composition in three regions; A04 follows Bengaluru's growth from the core outward and upward, along with the building growth vertically (Ghosh et al. 2025).

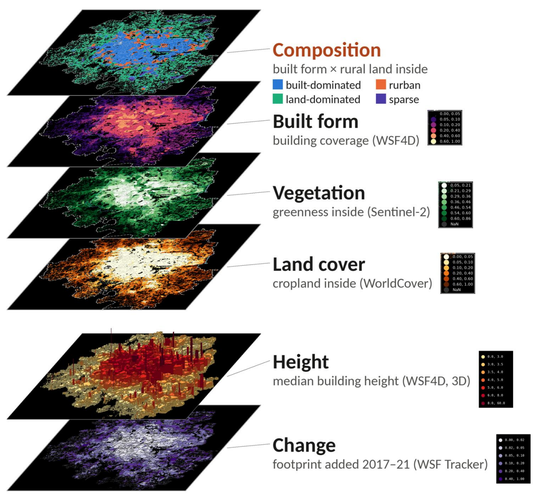


Fig. 1 Layers per settlement unit, Bengaluru. Composition (top) from built form, vegetation and land cover, Height (3D) and Change.

What we measure- Indicators

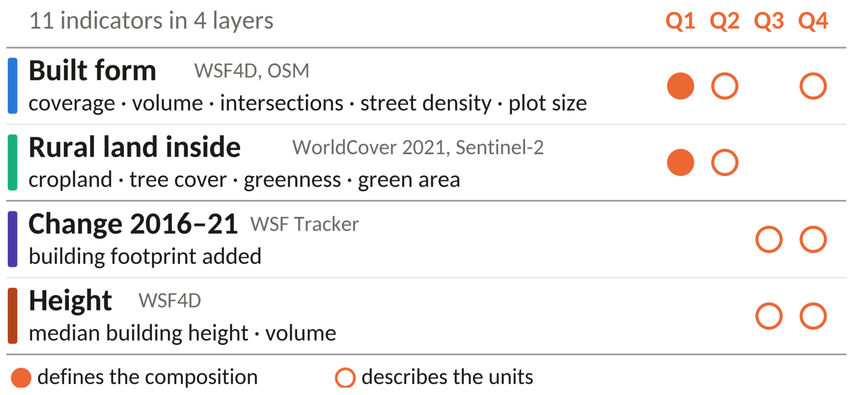


Fig. 2 Indicators and the questions they answer.

Units: buildings → road-bounded sub-units (building blocks) → settlements (→ admin units).

Q1 How built form and rural land co-present are existing?

Built-dominated and land-dominated units meet: 13 % of units in Accra, 17 % in Marrakech, 8 % in Bengaluru.

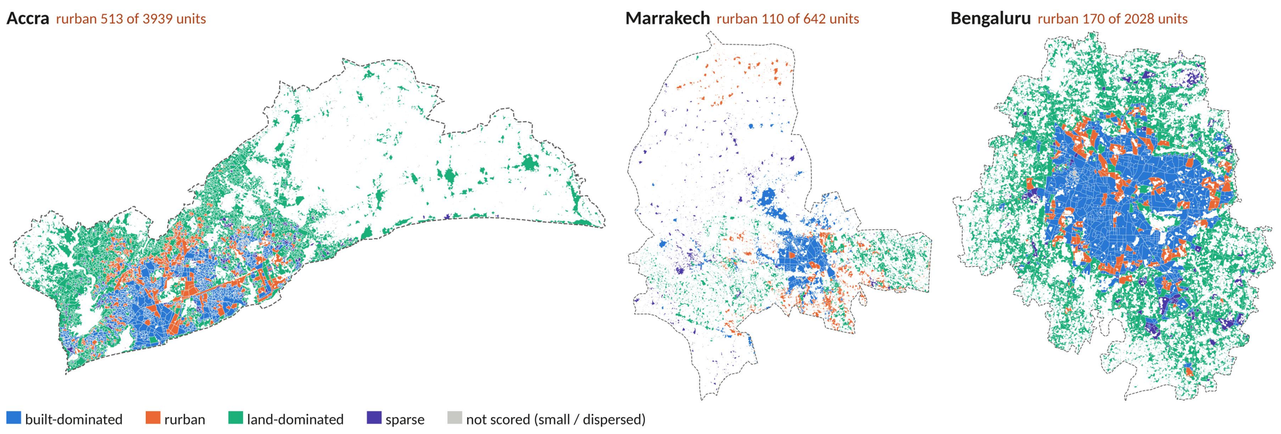


Fig. 4 Composition per settlement unit, 2021. Accra; Marrakech; Bengaluru;



Fig. 3 How a unit gets its composition (example: median ranks of rurban units, Bengaluru).

Central message

In all three regions, rurban units combine built form with tree cover inside, where built-dominated and land-dominated units meet. In Bengaluru they are units lying between a core that grows upward and an edge that grows outward. Endowments & Place is the entry point; flows, institutions and lifestyles follow.

Q2 What are the main factors of rurban unit?

Building coverage in-between across regions; tree cover is high anywhere.

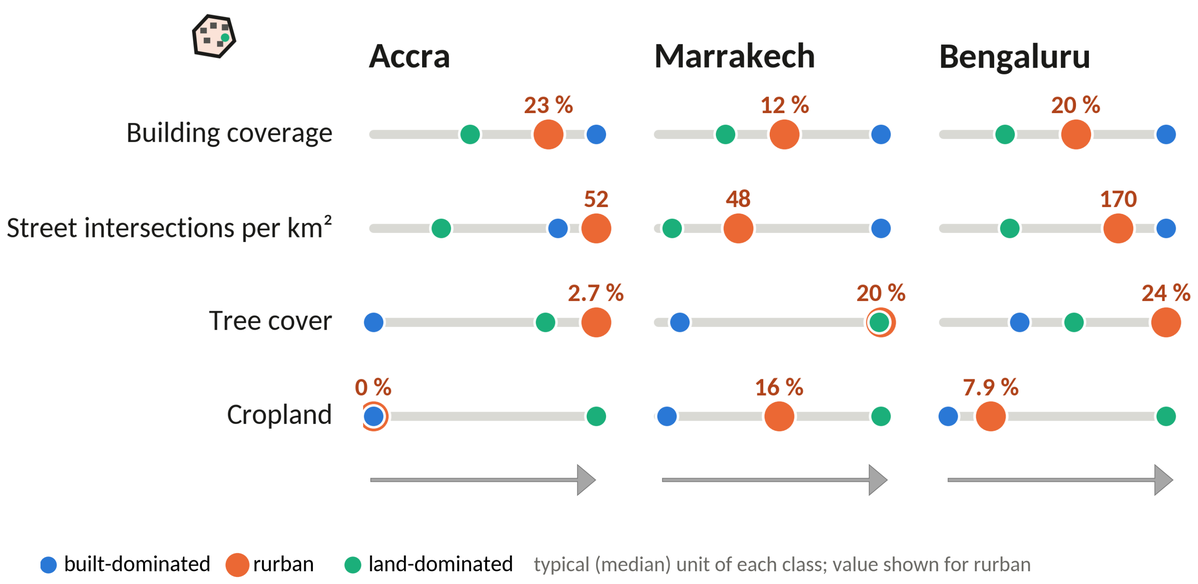


Fig. 5 Median unit per class; line from 0 to the highest class median in the city.

Q3 Do settlements grow outward or upward?

Outward at the land-dominated edge, upward in Bengaluru's core.

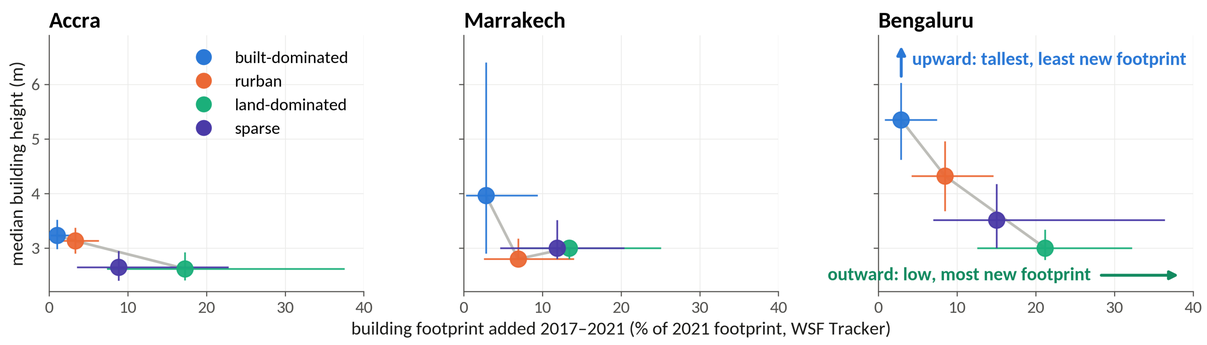


Fig. 6 Dot: typical unit of each class; lines: where the middle half of its units lie.

→ **Land-dominated** units add the most footprint (13–21 %)
→ **Rurban** units add footprints moderately upwards and outwards (3–9 %)

Q4 What are the building types in Bengaluru?

Commercial and industrial land; growing upward since 2010.

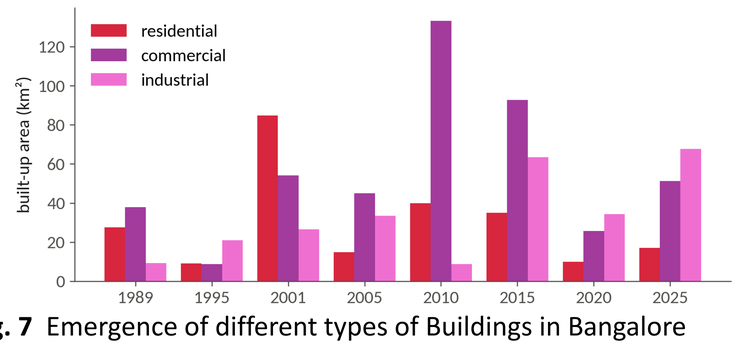


Fig. 7 Emergence of different types of Buildings in Bangalore

- The granite excavation has a strong role to shape the building morphology in Bangalore North and urban district.
- Increase of buildings and transport network impact on the excavation, that works as a fundamental key factor to build new Rurban condition, more in vertical direction.

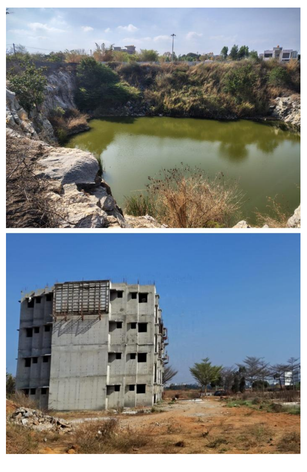


Fig. 8 Emergence of Granite Mining area to build new high rise buildings (A04).

Q5 Do new buildings go upward?

Yes in the core and in rurban units; mostly outward at the land-dominated edge.

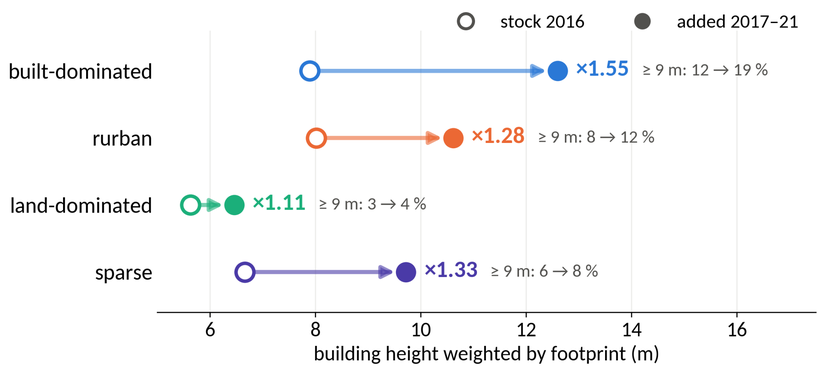


Fig. 9 In Bengaluru, buildings added since 2016 (●) are taller than those already standing (○), most of all in the core.

A04 Growth turns vertical (since 2010)
C01 In the core, buildings added since 2016 are **13 m** tall on average; older ones **8 m**

A04 Outer clusters grow along new roads, creating rurban conditions
C01 The land-dominated edge grew by **about a fifth** since 2016, mostly low

A04 Commercial, industrial and new mid-rise on open land
C01 In rurban units, **1 in 8** new buildings has 3+ storeys (before: 1 in 12)

References:
Hoffmann E.M. et al. (2023) Rurbanity: a concept for the interdisciplinary study of rural–urban transformation. Sustain. Sci. 18:1739–1753 ·
Ghosh D. et al. (2025) Measuring utility of vertical expansion in Kolkata region. doi:10.1007/978-981-97-8370-0_11 · Data: WSF4D, WSF Tracker (DLR); ESA WorldCover 2021; Sentinel-2; OpenStreetMap; Overture Maps.

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