

Adequate Open Public Space in Cities

A Human Settlements Indicator for Monitoring the Post-2015 Sustainable Development Agenda

A Presentation of the UN Human Settlements Programme (UN Habitat) at the Expert Group Meeting on the Indicator framework for the post-2015 development agenda, New York City, 25-26 February 2015.

- The proposed Human Settlements Indicator would monitor Goal 11 of the Sustainable Development Agenda, focusing more particularly on Target 11.7:

Goal 11: Make cities and human settlements inclusive, safe, resilient and sustainable

Target 11.7: By 2030, provide universal access to safe, inclusive and accessible, green and public spaces, particularly for women and children, older persons and persons with disabilities.

Proposed Indicator: The average share of the built-up areas of cities in open space in public ownership and use.

1. Rationales for selecting the proposed indicator as the human settlements indicator:

- Cities function in an efficient, equitable, and sustainable manner only when private and **public spaces work in a symbiotic relationship** to enhance each other.
- Urban public spaces—specifically streets and boulevards and public open spaces—are needed to sustain the **productivity** of cities, their **social cohesion and inclusion**, their **civic identity**, and their **quality of life**.
- In optimal conditions, they need to be secured and **laid out in advance of urbanization** to ensure orderly urban expansion. In existing cities, there is a need to revise and expand the ratio of public space in cities to make them more efficient, prosperous and sustainable.
- And they are needed in adequate amounts. Uncontrolled rapid urbanization creates **disorderly settlement patterns** with dangerously low shares of public space. Many cities in developed countries are also experiencing a dramatic reduce of public space.
- In contrast, adequate public lands **facilitate the provision of the infrastructure networks** necessary for the proper performance of cities: streets and boulevards, water, sewerage, drainage, and electricity.
- The road network is the **integrative tissue that binds cities together**. It organizes the geographic space of cities, integrates them both as job markets and as local political spaces.

- Access and use of public open spaces is also a first step toward **civic empowerment** and greater access to institutional and political spaces. Well-designed and well-maintained streets and public spaces result in **lower crime and violence**.
- Connected networks of streets and infrastructure grids enhance the access of all citizens—and especially the **access of marginalized communities—to jobs, markets, and public services**.
- Cities that are **walkable and transit-friendly** require a highly connected network of paths and streets around **small, permeable blocks**. A tight network of paths and streets offering multiple routes to many destinations that also make walking and cycling trips varied and enjoyable. This has clear implications in making cities more energy efficient.
- Adequate public spaces in cities contribute to the achievement of other targets of Goal 11 and have positive implications in various Sustainable Development Goals.

2. The Definition of the Proposed Indicator:

- The **average share of the built-up area of the city that is open public space**¹.

2.1 Terminology for the definition:

- The **‘Built-up area’** of a city is the contiguous area occupied by **buildings and other impervious surfaces including the vacant areas in and around them** but excluding rural areas beyond the urban fringe.²
- The **‘population’** of a city is defined as the sum of the **population in the set of administrative districts** that together encompass the ‘built-up area’ of that ‘city’ in the year measurements are taken.
- **‘Public open space’** is defined as the sum of the areas of the built-up areas of cities devoted to **streets and boulevards**³—including walkways, sidewalks⁴, and bicycle lanes—and the areas devoted to **public parks, squares, recreational green areas, public playgrounds and open areas of public facilities**.
- **‘Public Open Space’ does not include** the areas devoted to public facilities—e.g. schools, stadiums, hospitals, airports, waterworks, or military bases—that are not open to the general public. It also **does not include** open spaces that are in private ownership or vacant lands in private ownership.

¹ In some cases, cities and countries may consider to complement this indicator by computing the average amount of public open space per person. An additional data set -- the city population, defined as the total number of people living in the administrative districts that encompass the built-up area of the city --, is needed.

² The delimitation of the study area distinguishes urban, suburban and rural areas based on the built-up densities. This indicator includes urban (more than 50% built-up density) and suburban areas (between 50% to 10% built-up density) and excludes rural areas.

³ The area of the streets include the carriageway, the median, the roundabouts, the traffic islands, the sidewalk, the cycle tracks, planting zones and storm drainage; in other words, the right of way limited by private properties and/or natural obstacles such as rivers.

⁴ In informal settlements or slum areas where sidewalks are missing, the main references for limiting the street area are the physical boundaries used to demarcate the private properties. Unpaved roads are also considered as streets.

3. Sources of Data and Methods for Measuring the Proposed Indicator:

The method to estimate the area of public space is based on three steps: a) spatial analysis to delimit the built-up area of the city; b) estimation of the total open public space and; c) estimation of the total area allocated to streets.

- a. Spatial analysis to delimit the built-up area.** Delimit the built-up area of the urban agglomeration and calculate the total area (square kilometers).
- *Sources of data:* Satellite imagery: Use of existing layers of satellite imagery ranging from open sources such as Google Earth and US Geological Survey/NASA imagery Landsat to more sophisticated and higher resolution land cover data sets. Images are to be analyzed for the latest available year.

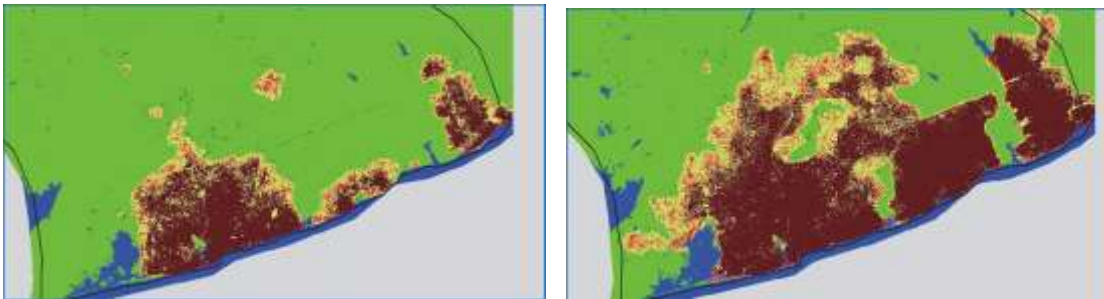


Figure 1: The built-up area of Accra, Ghana, 1985 and 2000 showing the extent of its impervious surfaces and the unbuilt open space in and around them.

- b. Estimation of the total public space.** Map and calculate the total areas of open public space within the defined urban boundaries based on the built-up area.
- Inventory of open public space. Information can be obtained from legal documents outlining publicly owned land and well defined land use plans. In some cases where this information is lacking, incomplete or outdated, open sources, informants in the city and community-based maps, which are increasingly recognized as a valid source of information, can be a viable alternative.
 - The share of land in public open spaces cannot be obtained directly from the use of high-resolution satellite imagery, because **it is not possible to determine the ownership or use of open spaces by remote sensing.**
 - Computation of total area of open public space. The inventory of open public spaces is digitalized and vectorised using GIS software to allow computation of surfaces (Figure 2). The total of open public area is divided by the total built-up area of the city to obtain the proportion.



Figure 2: The open space map of Toronto, Canada, 2011

- c. Estimation of the land allocated to streets.** Calculation of the total area allocated to streets based on sampling techniques as a proportion of the total surface of the built-up area as per definition above.
- The share of the built-up area in streets is obtained by the spatial sampling of the built-up area using a **semi-random selection of 10-hectare locales**. The sampling relies on a **Halton Sequence of coordinates** that, when repeated, always selects the same points (see figure 3 below, left).
 - **Locales** are defined as a **set of city blocks surrounded by streets**, and bounded by the medians of all blocks that intersect the randomly selected 10-hectare circle (see figure 3 below, right). Blocks are considered built-up if more than half of the block is built-up.
 - The **share of the land in streets** in the locale is then calculated as the **ratio** of the area of the locale in streets and boulevards and the total built-up area in the locale.

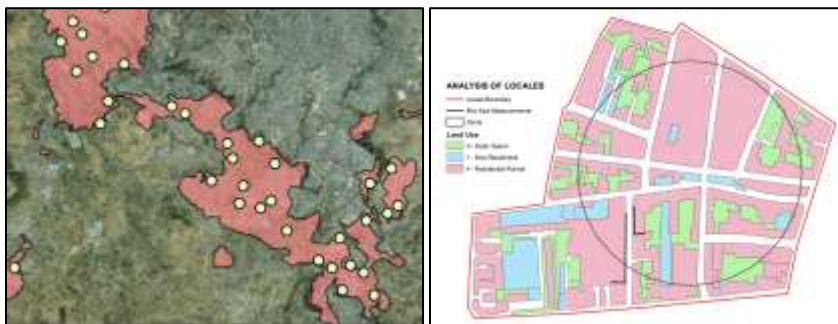


Figure 3: The spatial distribution of randomly selected 10-hectare locales in an area of Addis Ababa, Ethiopia, built between 1990 and 2012 (left); and the analysis of a 10-hectare locale in Paris, France (right).

- The average share of land in streets in a given city is then calculated by sampling more and more locales until the **variance between the shares of land in streets declines below an agreed-upon value**. Using this stopping rule, it becomes possible to obtain a statistically reliable average value.⁵

⁵ In Toronto, for example, 11% of the built-up area of the city is in public open space. In Manhattan, to take another example for the land allocated to streets, a third of the built-up area is in streets and boulevards. Monitoring this indicator will allow us

3.1 Formula to compute the Indicator

$$\text{Share of the built – up area of the city that is public open space}(\%) = \frac{\text{Total surface of open public space} + \text{total surface of land allocated to streets}}{\text{total surface of built up area of the urban agglomeration}}$$

4. Monitoring and Reporting of the Target

4.1 Monitoring and Reporting at National (local) level.

- Member States are encouraged to measure, monitor and report on this target using this proposed framework, which will entail enhancing their statistical capacities, tapping into the potential new and non-traditional data sources for spatial analysis.
- In the monitoring of this indicator it is recommended that Governments define a national sample of cities based on their own system of cities that is proportionally representative of all sub-regions and sizes of urban settlements. This will enable countries to report on a nationally representative sample.
- In addition to this sample, cities are also encouraged to monitor and report on this target in close collaboration with national governments. UN-Habitat has been supporting more than 300 cities across the world to monitor this and other proposed indicators and targets of Goal 11 through the **City Prosperity Initiative**.

4.2 Global Monitoring of the Target (11.7)

- UN Habitat and partners have been monitoring this target in a **Global Stratified Sample of 200 cities**. The existence of this sample is an excellent mechanism to ensure a global monitoring and reporting on adequate public space in cities, as well in other targets of Goal 11.
 - The global sample has been drawn from a universe of **4,000+ cities and metropolitan areas** that had 100,000 people or more in the year 2010 (see figure 4 below). Cities of this size accommodated more than **70% of the world's urban population** in 2010.

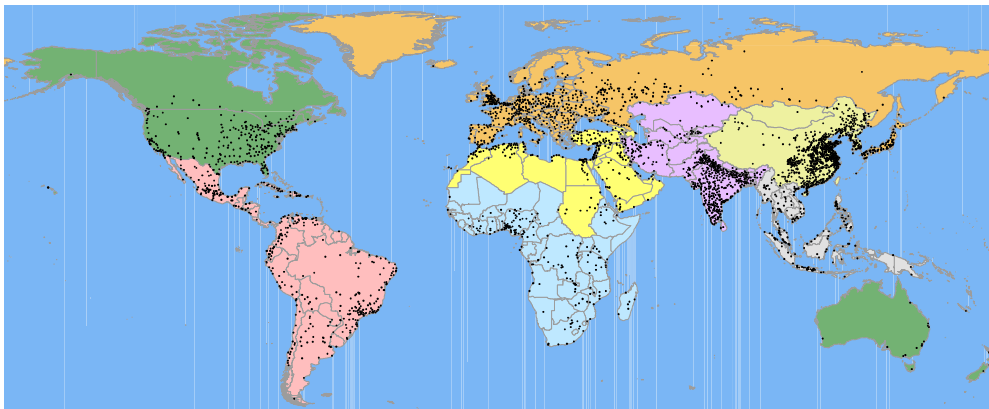


Figure 4: The 4,000+ cities and metropolitan areas that had populations of 100,000 or more in the year 2010.

to establish both global and regional norms as well as acceptable minimums, as suggested by UN-Habitat (City Prosperity Initiative(CPI), refer to benchmarks of the indicator in the Guidelines and Metadata of the CPI, UN-Habitat, 2015).

- The Global Sample of Cities is stratified by 9 geographic regions, 4 city population categories, and 3 categories pertaining to the number of cities in the country (see Figure 5 below).

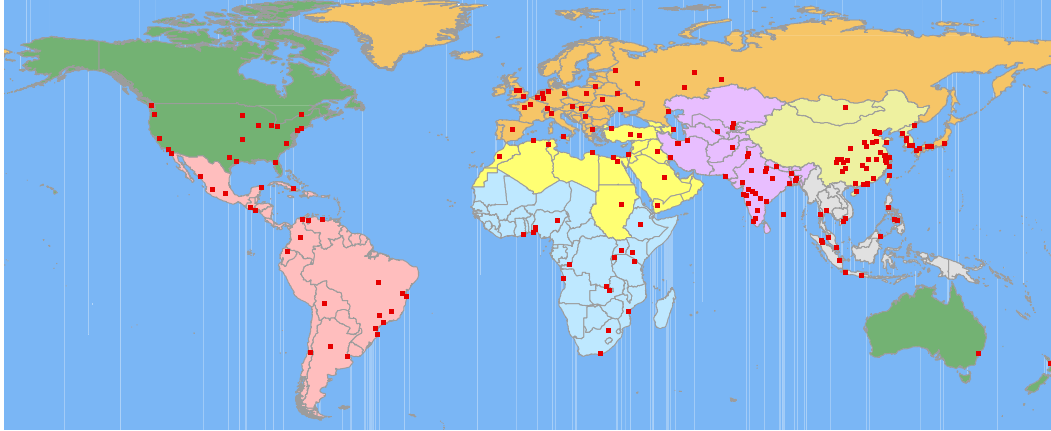


Figure 5: The stratified global sample of 200 cities to be used for obtaining data on the proposed indicator

- The Global Sample of Cities makes it possible to calculate an **unweighted global average** as well as a **weighted global average** of the proposed indicator on a regular basis. The weighted global average is obtained by weighing a city in the sample by the urban population in its class.

4.3 Frequency in the monitoring of the Indicator

- The monitoring of the indicator can be repeated at regular intervals of 5 years, allowing for three reporting points until the year 2030.
- **Monitoring in 5-years intervals** will allow us to determine whether the shares of open public space in the built-up areas of cities is increasing significantly over time, as well as what is the share of the global urban population living in cities where the open public space is below the acceptable minimum.

5. Current use in the Monitoring and Reporting of this Indicator

- The indicator (proportion of land allocated to streets) has been widely use as part of the research project to monitor urban expansions in a global sample of cities (200 cities) developed by the Stern School of Business of New York University and UN-Habitat (2014/2015).
- The indicator is also used as part of UN-Habitat City Prosperity Initiative that is being implemented in 300 cities across the world to monitor local and global conditions of city sustainability and prosperity (2012/2015).
- The indicator was used in a sample of 120 cities as part of the study “Streets as Public Spaces and Drivers of Urban Prosperity” published by UN-Habitat (2013).⁶

⁶ <http://unhabitat.org/streets-as-public-spaces-and-drivers-of-urban-prosperity>.

- The indicator (proportion of open public space) requires more methodological efforts. It is now being tested by UN-Habitat and use in a selected number of cities through the City Prosperity Initiative.

7. Assistance to Countries in Building Capacity

- UN-Habitat and partners participating in the monitoring of this indicator can provide assistance to countries in building statistical and spatial capacity through regional training workshops in various areas:
 - (i) Create a stratified national sample of cities based on the criteria used in the global sample;
 - (ii) Delimit the built-up area of urban agglomerations;
 - (iii) Define a strategy and criteria for identifying and mapping open public spaces using geographic information systems;
 - (iv) Adopt the methodology to identify and estimate the proportion of land allocated to streets;
 - (v) Establish local and national urban observatories and monitoring systems.