INTERNATIONAL SEMINAR ON UNITED NATIONS GLOBAL GEOSPATIAL INFORMATION MANAGEMENT

"Geospatial Information for Sustainable Development"

Application of geospatial science in public space monitoring:
methodological advances, challenges and opportunities

6th December 2018

Laura Petrella
laura.petrella@un.org
Head, City Planning Extension and Design Unit
UPDB, UN-Habitat

Significance of the City-wide Public Space Assessment:
Global Agenda

- **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"

- **Indicator 11.7.1:**
  - "the average share of the built-up area of cities that is open space for public use for all, by age, gender and disability"

Mentioned **10** times in **8** discrete paragraphs and **2** times in the vision

- With commitments to social, economic and environmental sustainability referenced to safe, inclusive, accessible green and quality public space for all

Definition of terms for indicator computation

Urban extent is defined as the total area occupied by the built-up area and the urbanized open space. The built-up area is defined as the contiguous area occupied by buildings and other impervious surfaces.

Open public spaces are those areas within the urban environment that are freely accessible to the public for use, regardless of ownership, and are intended primarily for outdoor recreation and informal activities irrespective of size, design or physical feature.

Streets are defined thoroughfares that are based inside towns, cities and neighbourhoods most commonly lined with houses or buildings used by pedestrians or vehicles in order to go from one place to another in the city, interact and to earn a livelihood.

Pocket open public spaces (>0.003Ha <= 0.04Ha)

Neighbourhood open public spaces (>0.04Ha <= 0.4Ha)

City open public spaces (>0.4Ha <= 10Ha)

Larger city open public spaces (>10Ha <= 50Ha)

Metropolitan open public spaces (>50Ha <= 200Ha)

Advertising
Sidewalks
Waste containers and bins other than at public transit stops
Trees and vegetation
Tram/bus signposts
Tram/bus station
Overhead lines
Traffic lights
Street lighting
Posts and poles
Transport and technical infrastructure columns and boxes
Sidewalk cafes
Street furniture
Benches outside shelters
Boarding islands or bulbs (capes), tram platforms
Tramway structures
Roadways

TOWARDS SAFE, INCLUSIVE AND ACCESSIBLE PUBLIC SPACES

Addis Ababa, Ethiopia Snapshot

Legend:
- Urban extent
- Metropolitan open spaces
- Larger city open spaces
- City open spaces
- Neighborhood open spaces
- Pocket opens paces
- Street network

1. Start with satellite imagery

2. Extract Urban extent

3. Extract open spaces an streets within urban extent

4. Correlate the extracted data with data from open source and local authority/mast plans/land use plans

5. Classify open spaces by 5 categories: Pocket spaces, Neighbourhood spaces, City spaces, Larger city space and Metropolitan spaces

6. Calculate land allocated to streets

7. Calculate land allocated to open public spaces

8. Calculate land allocated to open public spaces+ streets within the urban extent

TOWARDS SAFE, INCLUSIVE AND ACCESSIBLE PUBLIC SPACES

UN@HABITAT
FOR A BETTER URBAN FUTURE

Process and tools

Process

City-wide assessment   **Pilot projects**   **Design principles**   **Strategy and Policy**   **Action plan**   **Monitoring and Evaluation**

Tools

- City wide public space assessment tool

- Minecraft For community Participation
- Place analysis tool

- Global Public Space Toolkit

- Global Public Space Toolkit
- Guide on City-wide Public Space Strategy
- Compendium of best practices

- Guide on City-wide Public Space Strategy

- Guide on City-wide Public Space Strategy

TOWARDS SAFE, INCLUSIVE AND ACCESSIBLE PUBLIC SPACES

UN@HABITAT
FOR A BETTER URBAN FUTURE

The Methodology: Knowing where you are?

Identify **gaps**:

Accessibility

Safety

Inclusivity

Monitor and Report on the SDG 11.7 and the NUA

Nairobi, Kenya snapshot

Quick Facts

All points used after data cleaning

1,798-16.52Km²

2016-**3.1** million
2030-**6.3** million

Addis Ababa, Ethiopia snapshot

Quick Facts

All points used after data cleaning

1,372-16.52Km²

2017-**3.4** million

2030-**4.5** million

Data collection : snapshot

13 Sub-Districts

168 Data entry points

141 Cleaned data points

Area of Assessed public spaces: **2.0 sq Km**

Area of Potential public spaces: **1.4 sq Km**

Data analysis: **City scale**

Spatial Accessibility

- % of land accessible within 400m (5mins walk)
- Street connectivity and density

Quantity

- Public Space per capita
- % of built up area that is public space including streets

Location and spatial distribution

- Number of public spaces per km2

Environmental and Biodiversity

- Green area per capita
- Mesh size of green patches (landscape connectivity)
- Ratio land consumption to pop growth
- Expend per cap preserve natural heritage
- % protected areas
- % permeable area
- Native biodiversity (birds) in built-up areas
- % invasive alien species

Network

- Number of public spaces per km2

UN@HABITAT
FOR A BETTER URBAN FUTURE

Data analysis: **Public space site scale / Quality**

Access

- Accessibility level
- Infrastructure condition
- Proximity to residential/commercial areas
- Bicycle parking
- Vehicular parking

Use

- Number of users
- Type of activity

Comfort

- Air quality
- Noise level
- Cleanliness
- Visual amenity
- safety

Facilities

- Lighting
- Seating
- Garbage bins
- Toilet facilities
- Signage
- Drainage
- Artificial shading

Green coverage

- Tree canopy coverage
- Urban Agriculture

Distribution: **Spatial accessibility**

23.24 Km of streets are less spaces accessible

Use of public spaces: **Presence and condition of Public facilities**

- Only 0.6% of OPS have water taps and 32% have lighting

Majority of the amenities we present in play grounds while all spaces that did not have lighting were perceived to be usafe during the night

LEGEND

Typology of Public Spaces
- Playground
- Park
- Garden
- Plaza/square
- Community yard
- Institutional spaces
- Riparian area
- Waterbody frontage
- Side walk
- Business open space
- Parking lot
- Potential public spaces
- Escarpment
- Bamenda Rivers
- Natural_zones
- City Extension
- Urban Fabric
- Bamenda Contours

The boundaries and names shown and the designations used on this map do not imply official endorsement or acceptance by the United Nations.
Creation date: 22 Feb 2017   Sources: Humanitarian Data Exchange, www.hdx.org, Bamenda City Administration, Google Satellite Map, Open Street Map

Percentage of Public Infrastructure Present in Different Public Space Typologies and their Overall Condition

23% Playgrounds   18% In good condition

23% Playgrounds   17% In good condition

Percentage of Public Spaces with different Public Infrastructure

41%   25%   17%

0.6%   4%   20%

22%   28%   32%

29% Playgrounds   29% In good condition

31% Playgrounds   31% In good condition

UN@HABITAT
FOR A BETTER URBAN FUTURE

Quality assessment: **perception of safety**

9% Percentage of PS with crime incidence

6% Percentage of PS with traffic accidents

9% Percentage of PS with traffic accidents along adjacent streets

Not safe 7%
Partially safe 40%
Very safe 53%

97% (CCTV as indicators of safety)

The result of the citywide assessment found that 97% of the public spaces with CCTV cameras were perceived as partially to very safe during the day.

50% of the vandalized public spaces had no CCTV cameras. 64% (90) of all public spaces with CCTV camera were found to have no crime incidence.

Not safe 16%
Partially safe 20%
Very safe 65%

91% (street lighting as indicators of safety)

Out of the 113 public spaces that have street lighting, 103, which accounts for 91% were perceived as partially to very safe at night. This results shows the importance of street lighting in making public spaces feel safer.

The condition of the street lighting infrastructure was also linked to safety of public spaces. 53% (60) of all public spaces with street lighting were in good condition, out of these, 56 public spaces were perceived as very safe at night.

PERCEPTION OF SAFETY IN PUBLIC SPACES

Very safe
Partially safe
Not safe

12%
49%
39%

西湖区 (Dongxihu)

江岸区 (Jiang'an)

口区 (Qiaokou)

阳区 (Hanyang)

The boundaries and names shown and the designations used on this map do not imply official endorsement or acceptance by the United Nations
Creation date: 23 Oct 2017   Sources: Wuhan City Land Use and Urban Space Planning Research Center, Humanitarian Data Exchange, Open Street Map

TOWARDS SAFE, INCLUSIVE AND ACCESSIBLE PUBLIC SPACES

UN@HABITAT
FOR A BETTER URBAN FUTURE

Use of big data

Way Forward: To know where to go?

- CITY-WIDE PUBLIC SPACE INVENTORY AND ASSESSMENT
- PROPOSE PILOT PROJECTS
- MINECRAFT AS A PARTICIPATORY DESIGN TOOL TRAINING
- PREPARE DESIGN GUIDELINES FOR SELECTED PUBLIC SPACE TYPOLOGIES
- CITY-WIDE PUBLIC SPACE STRATEGY
- ACTION PLAN
- MONITORING AND EVALUATION

UN@HABITAT
FOR A BETTER URBAN FUTURE

SIAD tool: Comparing cities performance

Addis Ababa

478.5Km2

3.4 M (2017)
4.5 M (2030)

Bamenda

61Km2

0.5 M (2017)
2.1 M (2030)

Jianghan, Wuhan

28.3Km2

0.7 M (2017)
0.5 M (2030)

Nairobi

595.8Km2

3.9 M (2017)
6.3 M (2030)

Nairobi	Addis Ababa	Bamenda	Wuhan
37.5	41.2	50.9	56.8

Spatial Gaps: Nairobi, Kenya

Spatial Accessibility

Public space distribution

Street connectivity density

Residential density

Spatial Gaps in Public space provision

Areas that require creation of public spaces and improvement in street connectivity

Non-spatial Gaps: Areas to priorities for creation of public space

29 (21%)
Most improvement

City-wide public space strategies and policies

Case of Jianghan, Wuhan

Pocket parks

Inner city lakes and parks

Linear parks

> " Public Spaces in Jianghan District to be of high quality, more accessible, unique and diverse. "

Near-term development strategy 2017-2022

Key pilot projects for upgrading and development of green networks to achieve a per capita of 4.2m2

Long-term development strategy 2023-2030

A green network of 1 belt, 2 axes and 3 zones will development to attain a 40% green coverage and 5.2m2 per capita

UN@HABITAT
FOR A BETTER URBAN FUTURE

Summary of data availability on indicator 11.7.1

TOWARDS SAFE, INCLUSIVE AND ACCESSIBLE PUBLIC SPACES

Countries with data available on the indicator

Region	Cities covered as of December 2017	Countries covered as of December 2017
Asia and the Pacific	91	16
Europe and North America	66	24
Latin America and the Caribbean	55	17
North Africa and Arab States	47	19
Sub-Saharan Africa	30	18
Total	**289**	**94**

*Link to full database: SDG 11.7.1 Database

City	Country	Region	DATA AVAILABLABILITY Share of Built-up Area Occupied by Streets	Share of Built-up Area Occupied by Open Space	Share of Built-up Area Occupied by potential public space
Melborne	Australia	Asia and the Pacific	19.5	0.09	19.59
Dhaka	Bangladesh	Asia and the Pacific	12%	32%	44%
Leshan, Sichuan	China	Asia and the Pacific	18%	40%	58%
Vinh Long	Vietnam	Asia and the Pacific	10%	41%	51%
Vienna	Austria	Europe and North America	18%	31%	49%
Gomel	Belarus	Europe and North America	16%	30%	46%
Antwerp	Belgium	Europe and North America	13%	43%	56%
Montreal	Canada	Europe and North America	19%	21%	40%
Astrakhan	Russia	Europe and North America	20%	33%	53%
Madrid	Spain	Europe and North America	29%	34%	63%
Chicago	United States	Europe and North America	25%	27%	52%
Buenos Aires	Argentina	Latin America and the Caribbean	15%	24%	39%
Cordoba	Argentina	Latin America and the Caribbean	21%	31%	52%
Cochabamba	Bolivia	Latin America and the Caribbean	19%	36%	55%
Curitiba	Brazil	Latin America and the Caribbean	16%	30%	46%
Santiago	Chile	Latin America and the Caribbean	18%	21%	39%
Kabul	Afghanistan	North Africa and Arab States	20%	34%	54%
Algiers	Algeria	North Africa and Arab States	25%	38%	63%
Baku	Azerbaijan	North Africa and Arab States	18%	27%	45%
Cairo	Egypt	North Africa and Arab States	24%	32%	56%
Ahvaz	Iran	North Africa and Arab States	23%	32%	55%
Tel Aviv	Israel	North Africa and Arab States	22%	39%	61%
Shymkent	Kazakhstan	North Africa and Arab States	17%	35%	52%
Luanda	Angola	Sub-Saharan Africa	17%	28%	45%
Kinshasa	Congo Dem. Rep.	Sub-Saharan Africa	13%	26%	39%
Ndola	Zambia	Sub-Saharan Africa	13%	39%	52%

UN HABITAT
FOR A BETTER URBAN FUTURE