Urban land consumption rate using geospatial technologies: The Colombian experience

SDG indicator 11.3.1: Ratio of land consumption rate to population growth rate

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

Target 11.3.1: by 2030 enhance inclusive and sustainable urbanization and capacities for participatory, integrated and sustainable human settlement planning and management in all countries

Indicator 11.3.1: Ratio of land consumption rate to population growth rate

Advances

2015	2016	2017	2018
Pilot project Barranquilla	**Time processing optimization**	**Calculation for 138 cities (2003 -2015)**	**Results socialization**

2005

2010

2015

Google Earth Engine

GLOBAL PARTNERSHIP
FOR SUSTAINABLE DEVELOPMENT DATA

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SDG Indicator 11.3.1: DANE Methodology

As a measure of land-use efficiency, indicator 11.3.1 benchmarks and monitors the relationship between land consumption and population growth

SDG 11.3.1 = $\dfrac{\textbf{Land consumption rate}}{\textbf{Population growth rate}}$

Identification of the cities for indicator calculation	Satellite imagery processing	Rates calculation (Land – consumption and population growth)	Indicator calculation

Sources:

- Landsat images to calculate **land consumption rate**
- Population projections (2003 y 2015)

The indicator 11.3.1 was calculated for 138 Colombian cities
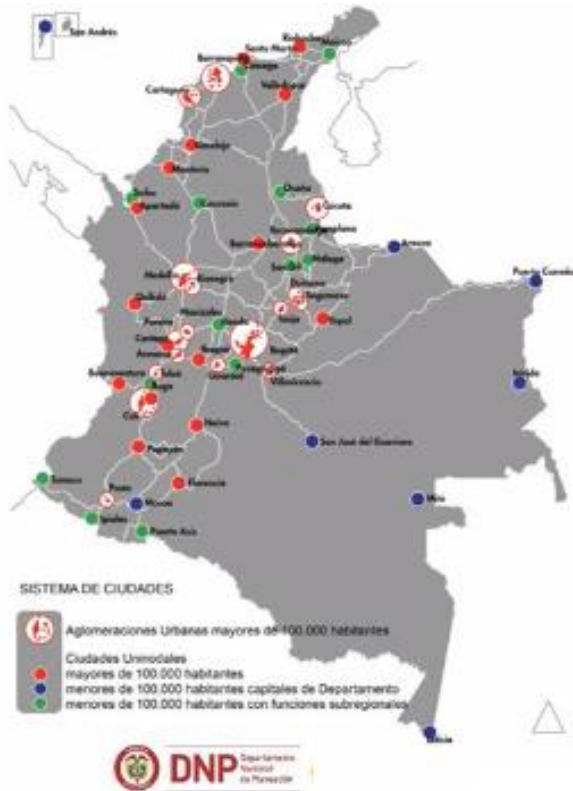
- 62.7% urban population

- Functional cities or urban agglomerations: Set of contiguous cities and urban centers between which there are functional relations in terms of labor commutation.

- Cities with an urban population equal to or greater than 100.000 inhabitants in 2010.

- Departmental capitals with less than 100.000 inhabitants.

- Cities with lesser than 100.000 inhabitants with a strategic hierarchy at the national level.
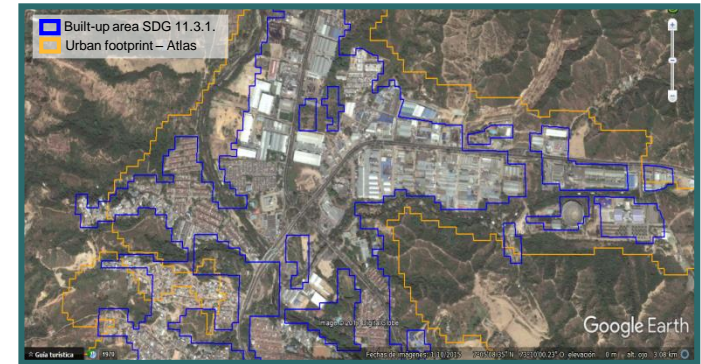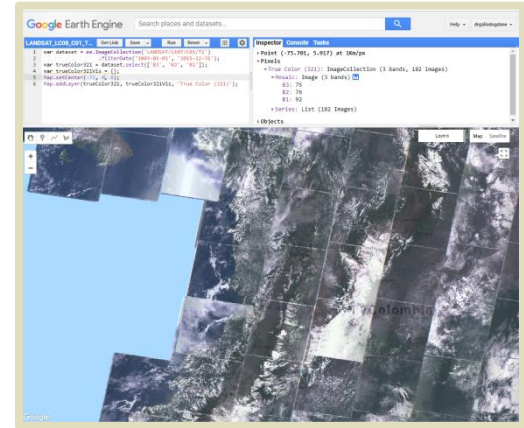
Satellite imagery processing

Selection of Landsat (cloud free images)

Processing images: Geometrical correction

Supervised classification: Identification of the built-up area

Post classification comparison (2003 – 2015) to estimate change

Built-up area SDG 11.3.1.
Urban footprint – Atlas

Allowed to optimize the processing and classification of the images since there are configurable scripts that facilitate the replication in other zones.

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Google Earth Engine

Results

- The national land consumption rate was calculated from the total sum of the built-up area of the 138 cities in 2003 and 2015

- The national population growth rate was calculated from the sum of the projections of inhabitants in these cities for 2003 and 2015

- The national land consumption rate was 1,65, the national population growth rate was 1,45 and the SDG 11.3.1 was 1.14

Land consumption and population growth rates by city
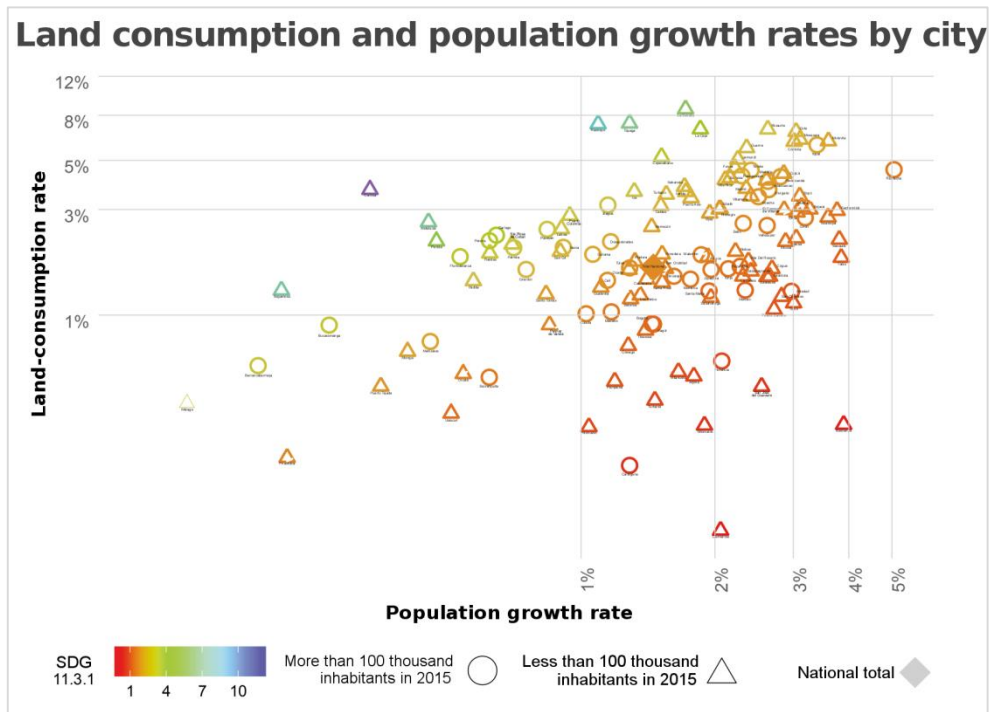
SDG Indicator 11.3.1 in the 138 Colombian cities during 2003-2015

80 Colombian cities have an indicator greater than 1. It means that its land consumption rate is higher than population growth rate

Percentage of cities with an indicator greater than 1

58 %
80 cities

Percentage of cities with an indicator lesser than 1

42 %
58 cities

Average of land consumption rate **2,5 %**

Average of population growth rate **1.8 %**

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The indicator 11.3.1 was calculated for 138 Colombian cities

Fuente: DANE - Marco Geoesdístico Nacional 2015.

Uninodal cities

	Land-consumption	Population growth
Arauca	1,84	1,93
Barrancabermeja	0,59	0,19
Cartago	2,30	0,65
Ciénaga	0,73	1,28
Florencia	0,62	2,07
Fusagasugá	4,26	2,30
Guadalajara de Buga	1,07	-0,05
Honda	0,04	-0,98
Ibagué	3,14	1,15
Inírida	3,61	1,72
Leticia	2,46	0,90
Maicao	1,30	2,34
Málaga	0,40	0,13
Mitú	10,97	2,26
Mocoa	2,15	2,88
Montería	1,45	1,76

	Land-consumption	Population growth
Neiva	2,02	0,91
Ocaña	1,61	1,28
Palmira	2,29	0,71
Pamplona	0,50	1,19
Popayán	2,44	0,84
Puerto Asís	3,39	1,77
Puerto Carreño	1,06	2,72
Riohacha	4,54	5,05
San Gil	1,99	0,90
San José del Guaviare	0,48	2,55
Santa Marta	1,29	1,94
Sincelejo	1,50	1,62
Turbo	1,13	3,01
Valledupar	2,54	2,62
Yopal	5,88	3,39

● Land-consumption
● Population growth

Indicator 11.3.1 for the Colombian urban aglomerations

City	Indicator
Sogamoso	3,49
Pereira	2,72
Girardot	2,59
Rionegro	1,89
Duitama	1,83
Bucaramanga	1,69
Manizales	1,58
Villavicencio	1,58
Cali	1,56
Tuluá	1,42
Medellín	1,21
Cúcuta	0,94
Bogotá, D.C.	0,84
Tunja	0,79
Barranquilla	0,65
Cartagena	0,44

Land consumption rate **Lower** than population growth rate

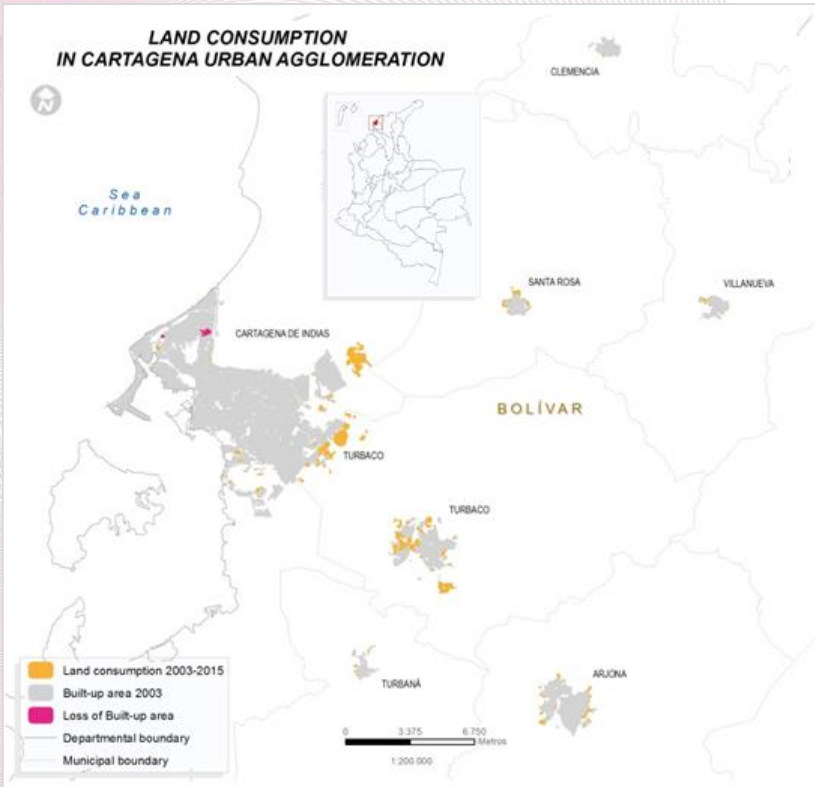Land consumption rate **greater** than population growth rate
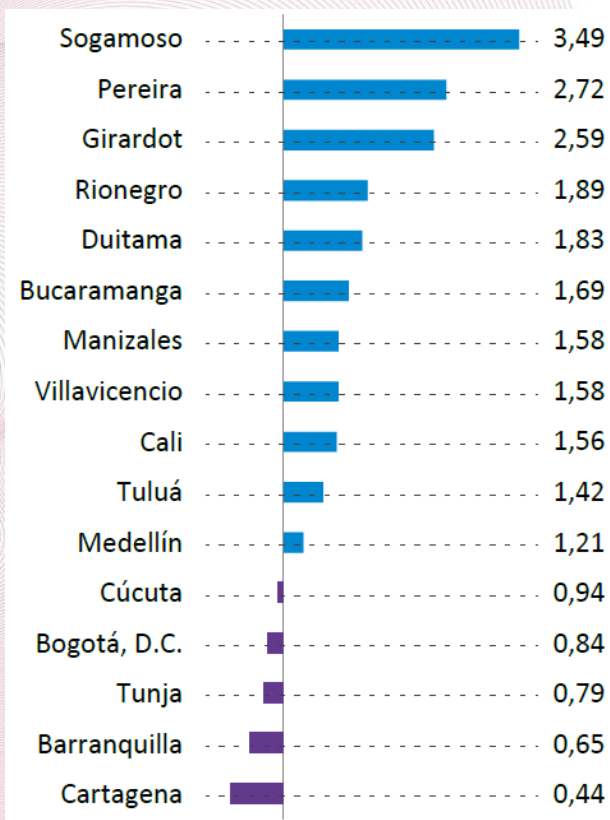
- Of the 16 urban agglomerations studied, 11 have higher land consumption in relation to the population growth rate.

- The urban agglomeration of Cartagena has the lowest indicator.

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Cartagena urban aglomeration

LAND CONSUMPTION IN CARTAGENA URBAN AGGLOMERATION

	Cartagena	0,21	1,29		Turbaná	0,41	1,47
1	Cartagena	0,21	1,29	6	Turbaná	0,41	1,47
2	Arjona	0,53	1,79	7	Villanueva	0,55	1,66
3	Clemencia	0,11	2,06				
4	Santa Rosa	1,41	1,52				
5	Turbaco	3,52	1,55				

Tasas
- Consumo Suelo
- Crecimiento Población

Rate
- Land consumption
- Population growth

TURBACO	2,27
SANTA ROSA	0,93
VILLANUEVA	0,33
ARJONA	0,30
TURBANÁ	0,28
CARTAGENA	0,16
CLEMENCIA	0,05
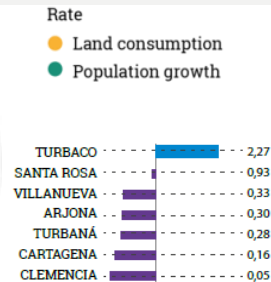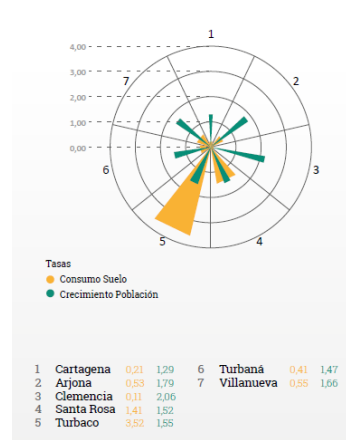
With the exception of Turbaco, the cities from the urban agglomeration of Cartagena have a rate of land consumption lower than the population growth rate

Pereira urban aglomeration
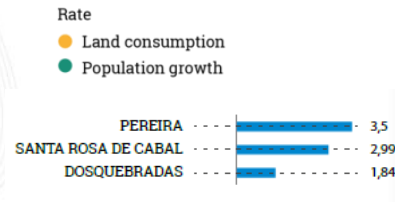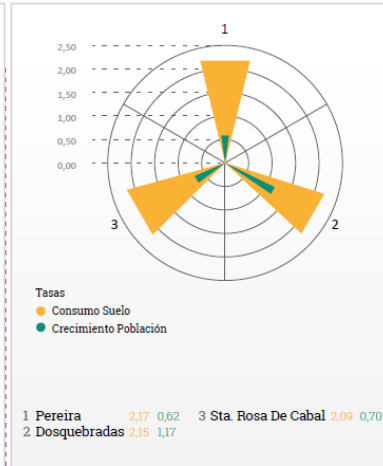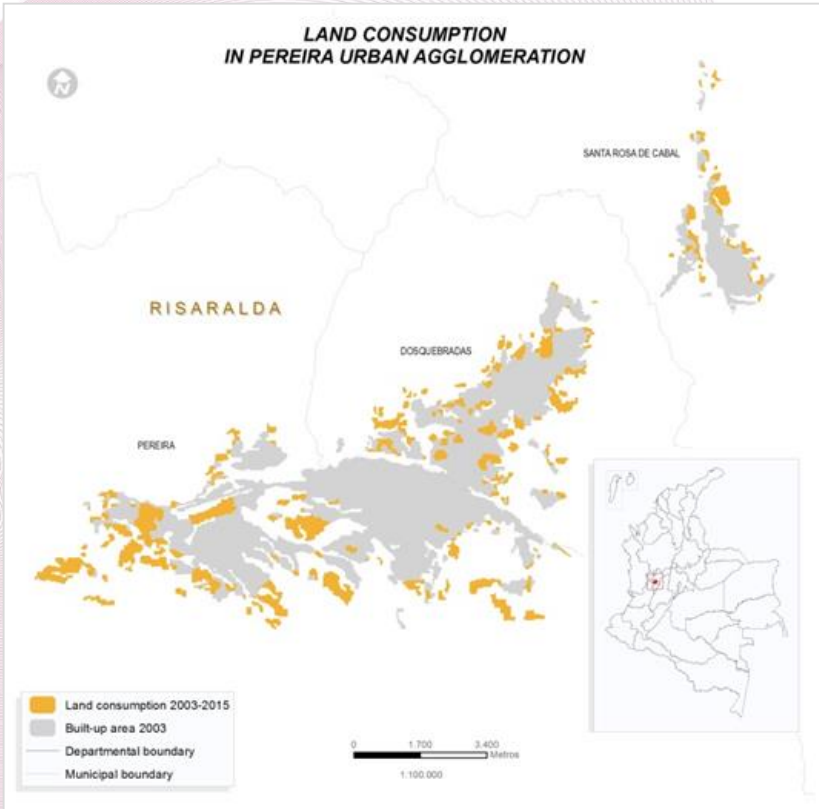
The urban agglomeration of Pereira include the cities of Pereira, Santa Rosa de Cabal and Dosquebradas, which have a land consumption rate higher than the population growth rate.

Moving forward

Results socialization

- Bulletin
- Geographical files
- Methodology document
- Scripts
- Statistics in different formats

Thank you

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