

GLOBAL HUMAN SETTLEMENT LAYER : INFORMATION SUPPORT FOR THE SDGs

Geospatial Technologies and Remote Sensing for Monitoring SDGs

GHSL – Baseline data anatomy



Fine-scale built-up areas
1975,1990,2000,2014
Landsat 75,30,15m



Population grids
1975,1990,2000,2015
250m



Settlement model
1975,1990,2000,2015
250m , 1000m
Harmonized city spatial footprint
“from the hamlet to the megacity”



The urban sustainable development goal



Target 11.3

By 2030, enhance inclusive and sustainable urbanization and capacity for participatory, integrated and sustainable human settlement planning and management in all countries



Urbanization: Global Facts and Figures (per SDG 11):

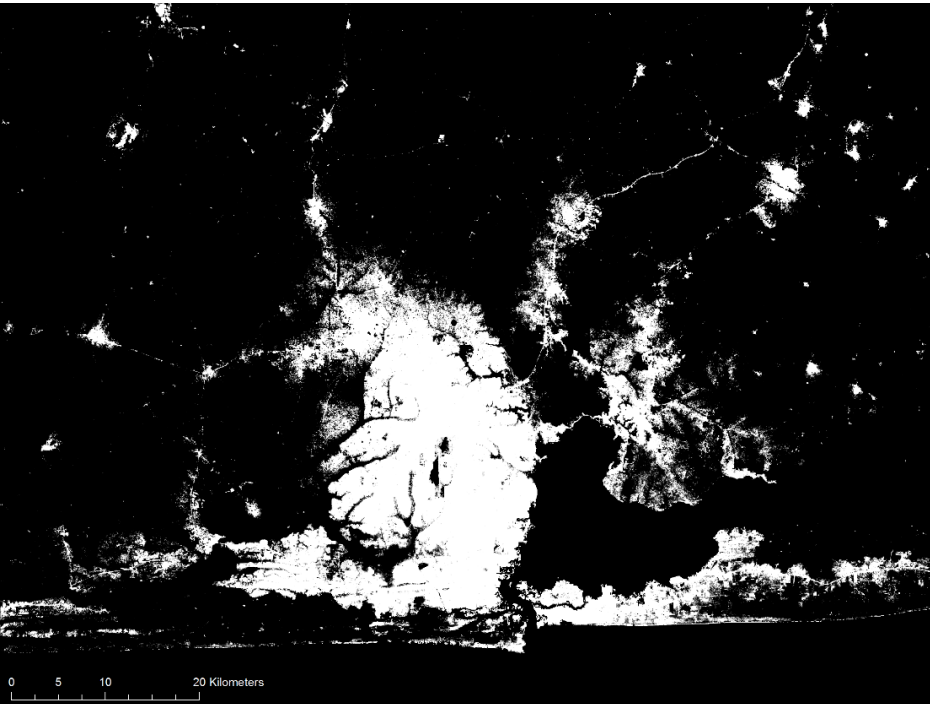
- ***By 2030, almost 60 per cent of the world's population will live in urban areas***
- ***95 % of urban expansion in the next decades will take place in developing world***
- ***828 million people live in slums today and the number keeps rising***
- ***The world's cities occupy just 3 per cent of the Earth's land, but account for 60-80 % of energy consumption and 75% of carbon emissions***

GHSL enables objective comparison

Lagos, Nigeria, 2015

~5 millions inhabitants

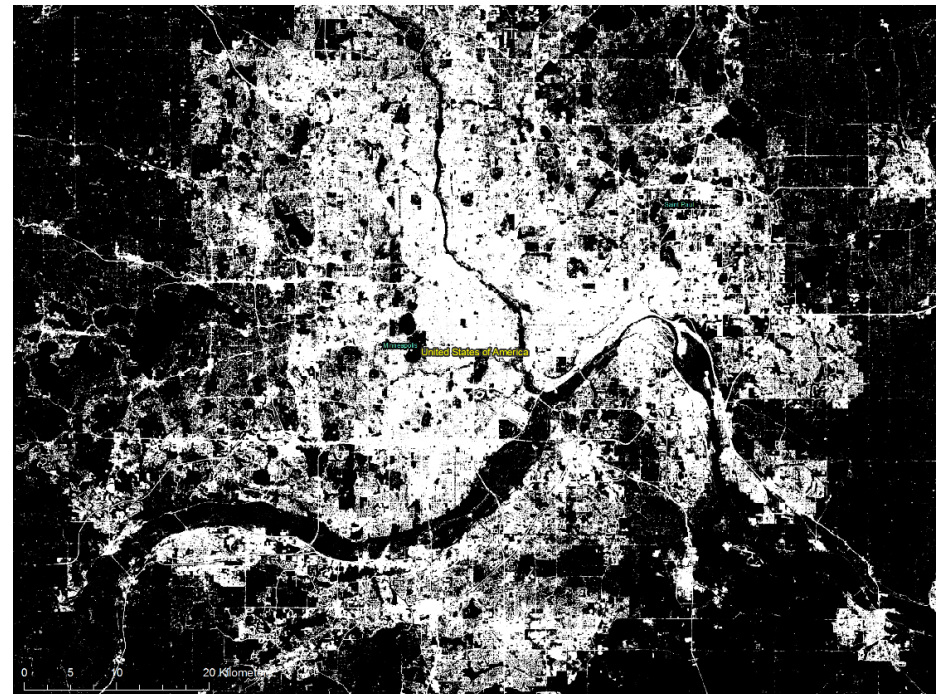
Built-up areas, Landsat 30m-res sensor



Minneapolis, US, 2015

~0.5 millions inhabitants

Built-up areas, Landsat 30m-res sensor

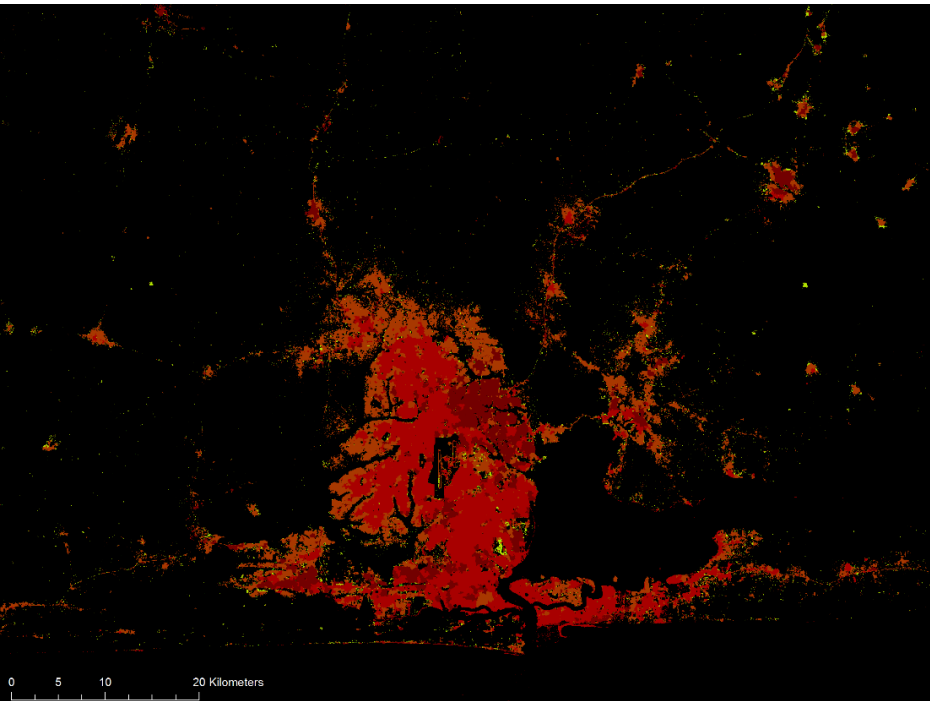


GHSL enables objective comparison

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*Vegetation component in built-up areas,
Landsat 30m-res sensor*

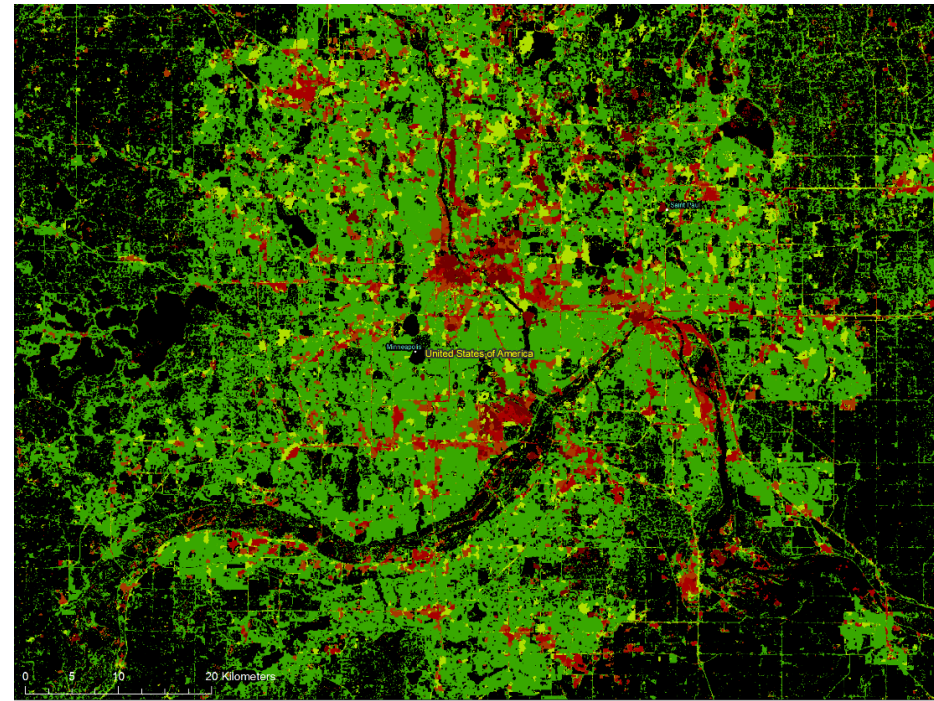


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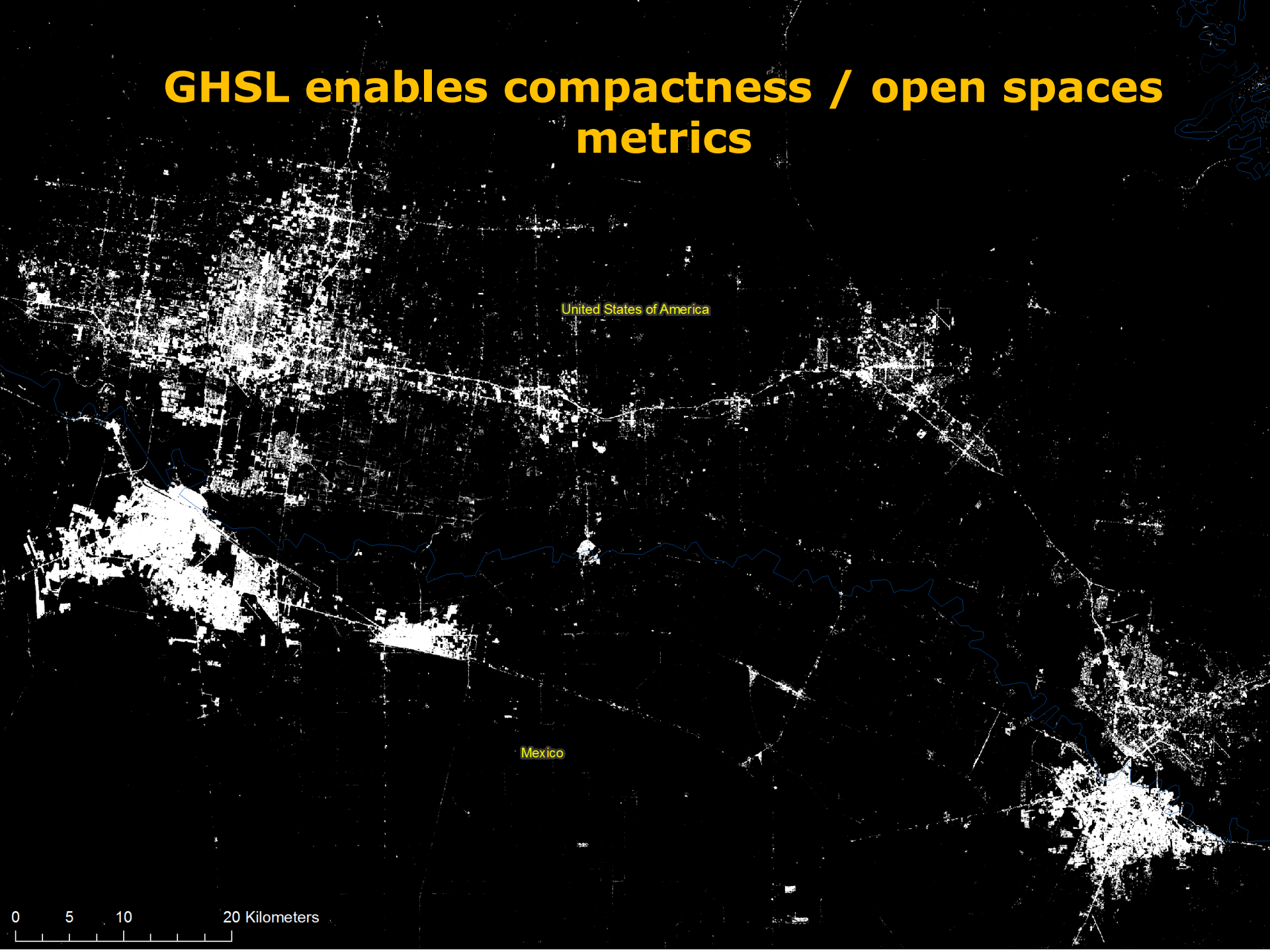
Minneapolis, US, 2015

~0.5 millions inhabitants

*Vegetation component in built-up areas,
Landsat 30m-res sensor*



GHSL enables compactness / open spaces metrics



United States of America

Mexico

0 5 10 20 Kilometers

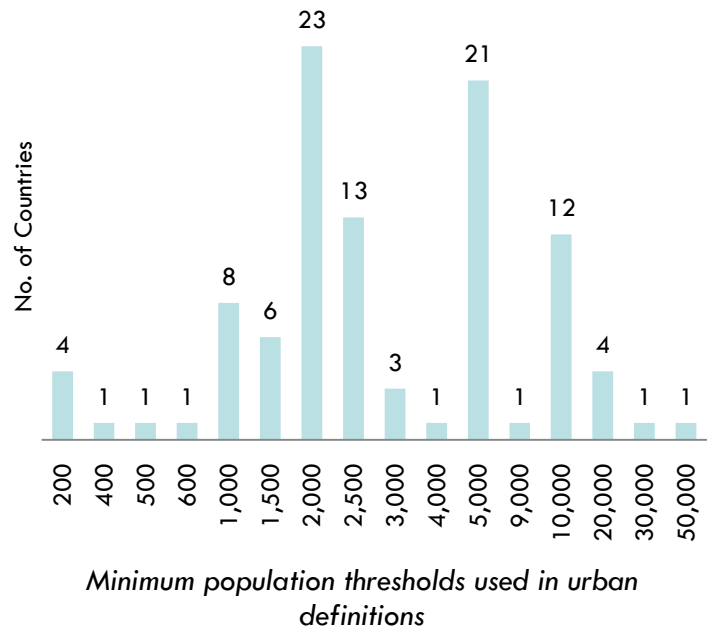
Different thresholds for UN data

Each country defines 'urban' areas and populations differently:

- 101 countries use some form of minimum population threshold
- 9 countries use a minimum population density threshold (min: 150; max: 1500 per sq. km.)
- Other criteria include economic activities, physical characteristics, type of employment, etc.
- *Some simply list their urban areas rather than defining any criteria!*

Median population threshold: 2,000

Mean population threshold : ~5,000

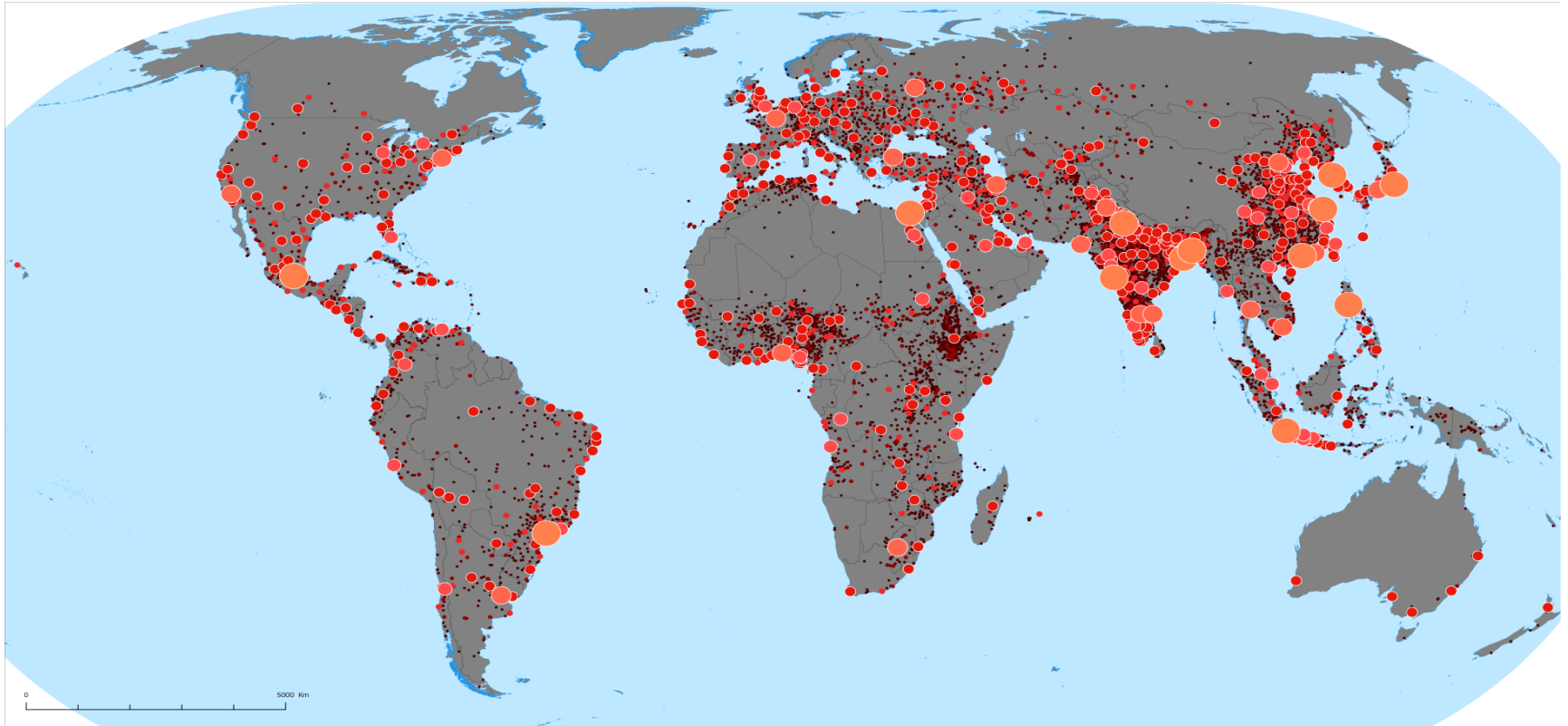


Potential solution

**Apply the degree of urbanisation to the globe
based on the GHSL-BU and GHS-POP**

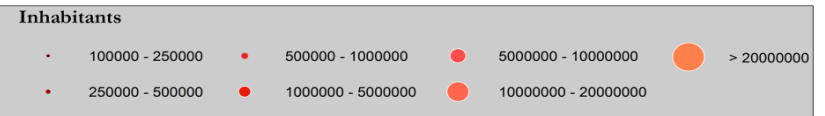
Definition:

**High-density cluster (or urban centre):
Contiguous grid cells of 1 km² with a density
of at least 1500 inhabitants per km² and a
minimum population of 50 000**



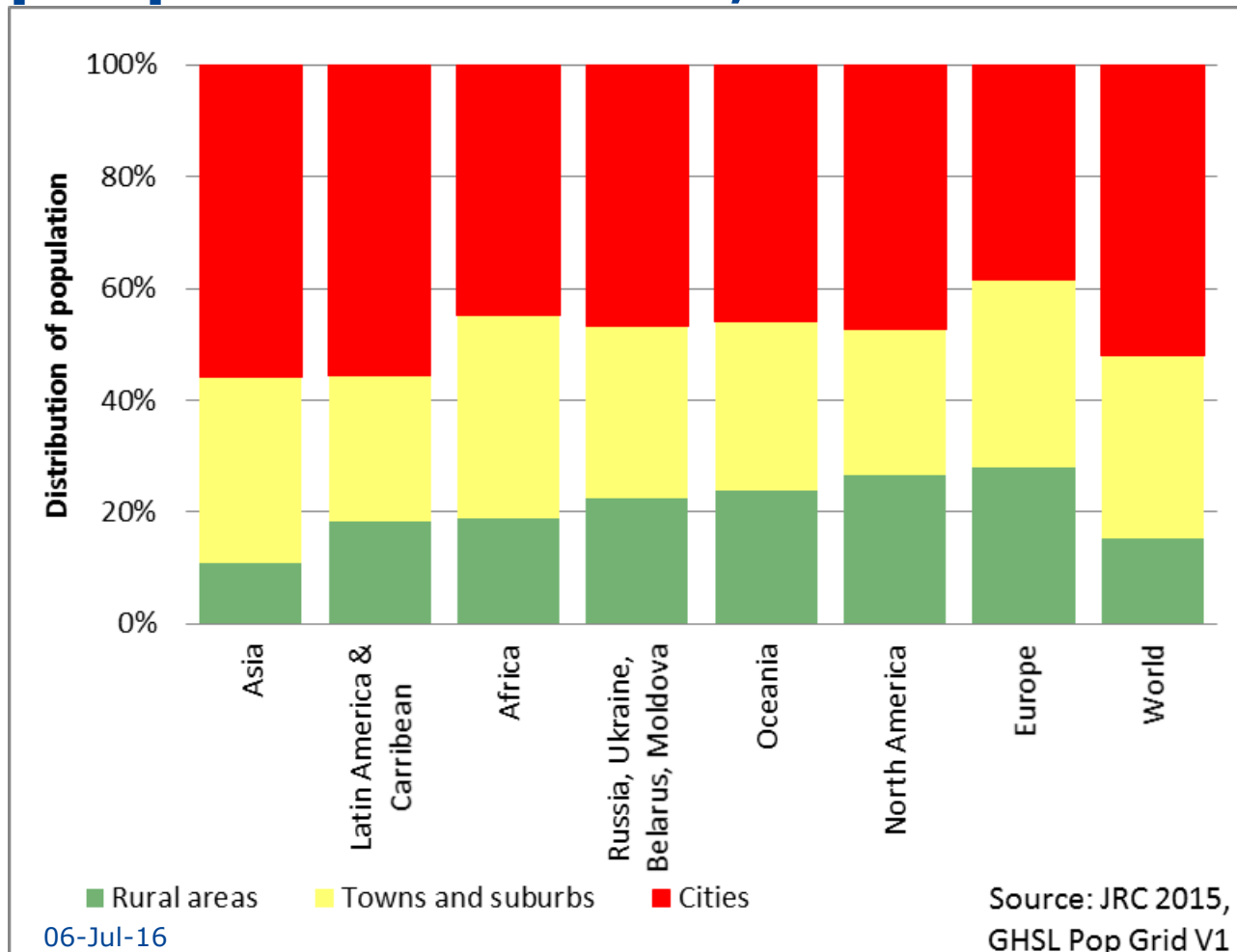
Urban Centres in the world by population size, 2015

Source : JRC (GHS - POP Global Settlement Model)



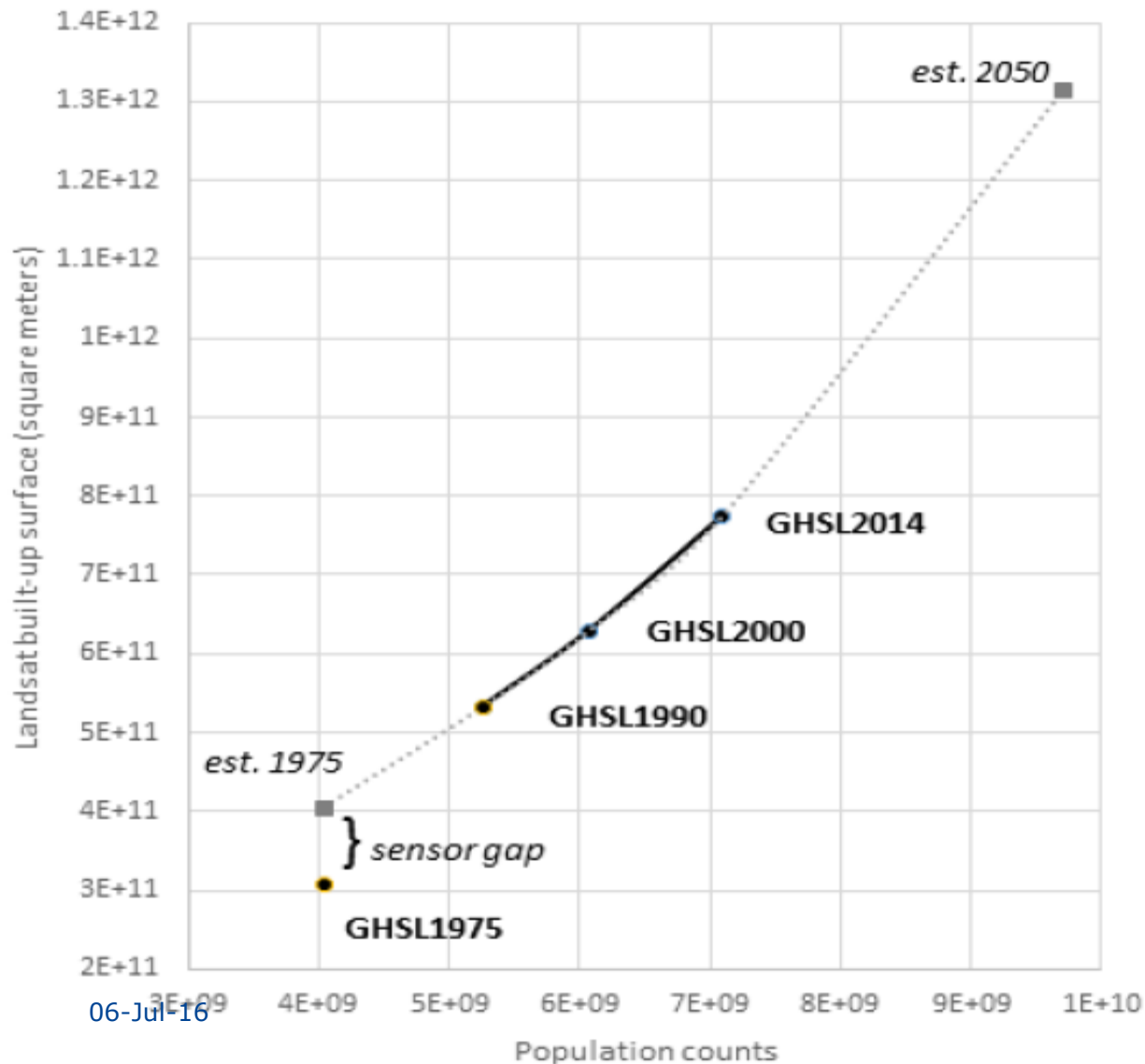
source: European Cities Report, European Commission, DG REGIO

Population share by degree of urbanization per part of the world, 2015



source:
European Cities
Report, European
Commission, DG
REGIO

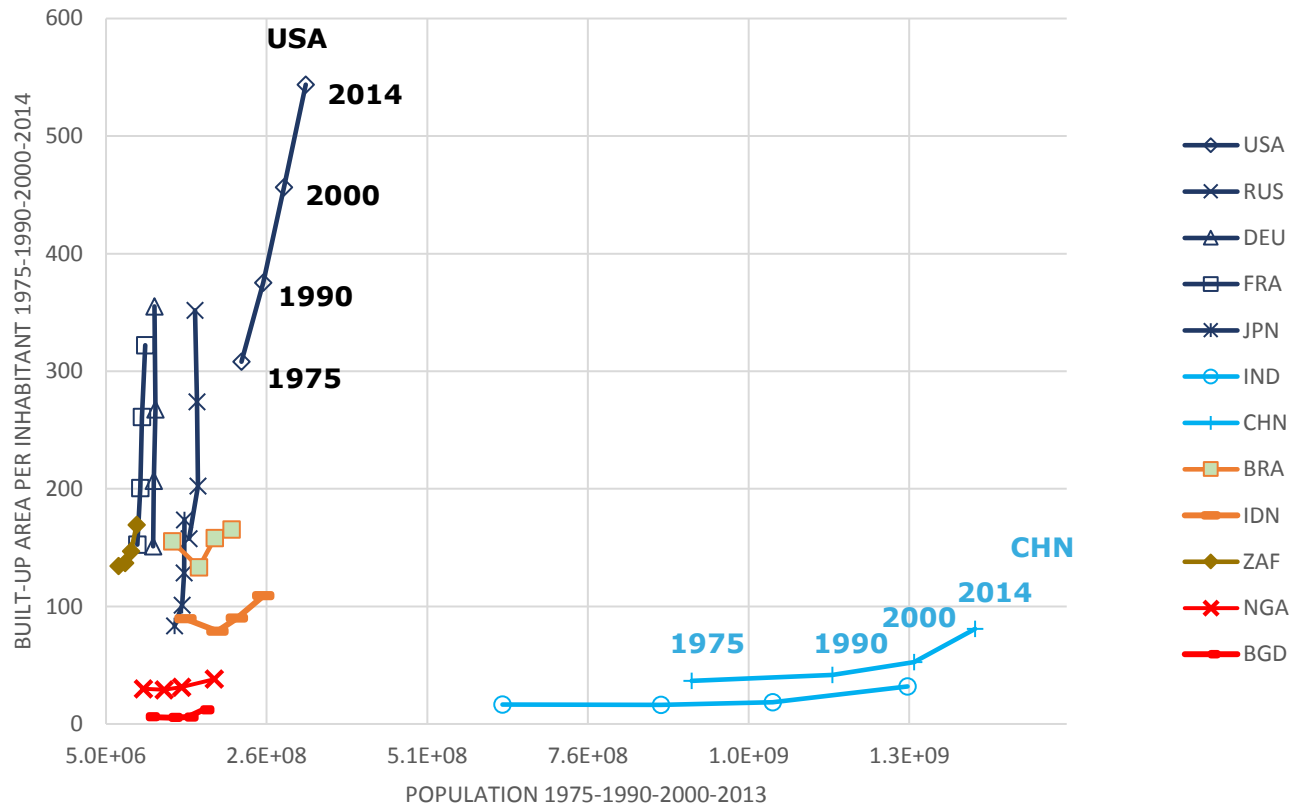
Global dynamics of population and built-up areas



**Source: JRC GHSL
processed from Landsat
data, 2014**

Describe national development trajectories on built-up per capita and population

**Built-up surface per capita
1975-1990-2000-2013**



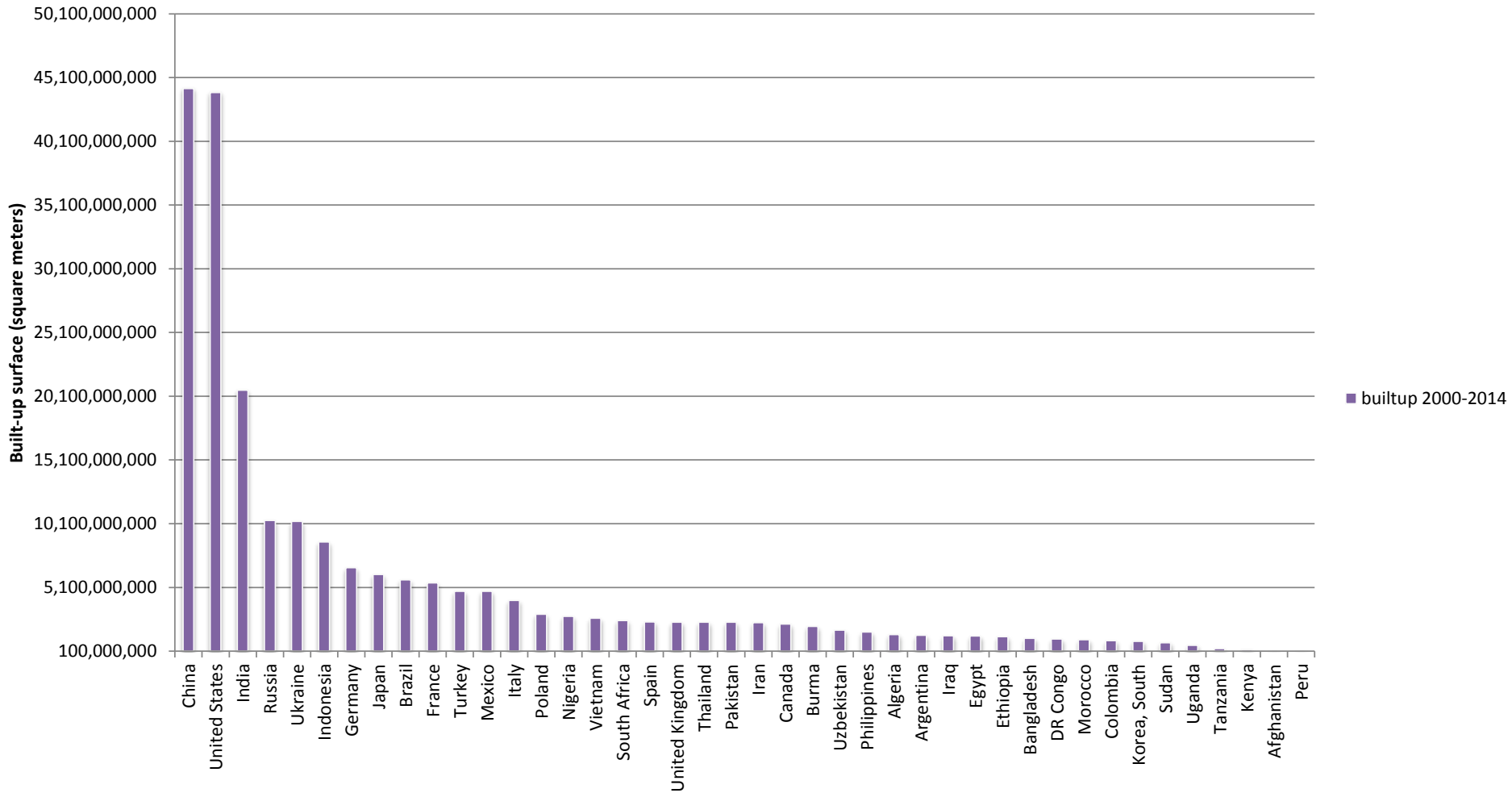
Population 1975-1990-2000-2013

Top global increment of built-up last 40 years

Country		GHSL built-up areas (sq km)					WB population (millions of persons)					BU surface per capita (m ² /person)			
		1975	1990	2000	2014	2014-1975	1975	1990	2000	2013	2013-1975	1975	1990	2000	2013
United States	USA	66,522	93,653	128,794	171,857	105,335	215.97	249.62	282.16	316.13	100.16	308.0	375.2	456.5	543.6
China	CHN	33,580	47,251	66,370	109,782	76,202	916.40	1135.19	1262.65	1357.38	440.99	36.6	41.6	52.6	80.9
India	IND	10,176	14,051	19,285	39,898	29,722	622.23	868.89	1042.26	1252.14	629.91	16.4	16.2	18.5	31.9
Russian Federation	RUS	21,139	29,997	40,147	50,479	29,340	134.20	148.29	146.60	143.50	9.30	157.5	202.3	273.9	351.8
Ukraine	UKR	12,018	16,367	22,937	33,239	21,222	48.76	51.89	49.18	45.49	-3.27	246.5	315.4	466.4	730.7
Germany	DEU	11,875	16,423	21,983	28,633	16,758	78.67	79.43	82.21	80.62	1.95	150.9	206.8	267.4	355.2
Brazil	BRA	19,375	26,975	36,975	46,975	27,600	110.00	110.00	110.00	110.00	0.00	165.5	165.5	165.5	165.5
Indonesia	IDN	11,532	14,078	18,789	27,218	15,686	129.21	178.63	208.94	249.87	120.66	89.3	78.8	89.9	108.9
France	FRA	11,000	11,000	11,000	11,000	11,000	11.00	11.00	11.00	11.00	0.00	15.00	15.00	15.00	15.00
Japan	JPN	9,335	12,483	16,294	22,106	12,771	111.94	123.54	126.87	127.34	15.40	83.4	101.0	128.4	173.6
Mexico	MEX	5,317	7,317	9,317	11,704	6,387	61.71	86.08	103.87	122.33	60.62	102.8	108.6	128.0	147.5
Italy	ITA	5,826	8,333	11,568	15,533	9,707	55.44	56.72	56.94	59.83	4.39	105.1	146.9	203.2	259.6
Turkey	TUR	4,250	6,155	8,831	13,540	9,290	39.19	53.99	63.17	74.93	35.75	108.5	114.0	139.8	180.7
Canada	CAN	6,756	9,522	13,146	15,317	8,560	23.21	27.79	30.77	35.16	11.95	291.1	342.6	427.2	435.6
Australia	AUS	6,306	8,882	12,257	14,605	8,299	13.89	17.07	19.15	23.13	9.24	453.9	520.5	639.9	631.4
Romania	ROU	4,265	5,762	8,093	12,559	8,293	21.29	23.20	22.44	19.96	-1.33	200.3	248.3	360.6	629.1
United Kingdom	GBR	6,648	8,864	11,436	13,813	7,165	56.23	57.25	58.89	64.10	7.87	118.2	154.8	194.2	215.5
Poland	POL	3,740	5,516	7,740	10,743	7,004	34.02	38.11	38.26	38.53	4.52	109.9	144.7	202.3	278.8
South Africa	ZAF	3,321	4,819	6,457	8,969	5,648	24.73	35.20	44.00	52.98	28.25	134.3	136.9	146.8	169.3
Spain	ESP	2,902	4,059	5,661	7,972	5,071	35.53	38.85	40.26	46.65	11.12	81.7	104.5	140.6	170.9
Nigeria	NGA	1,893	2,769	3,830	6,615	4,723	63.57	95.62	122.88	173.62	110.05	29.8	29.0	31.2	38.1
Argentina	ARG	3,471	4,849	6,532	7,885	4,414	26.07	32.62	36.90	41.45	15.38	133.1	148.6	177.0	190.2

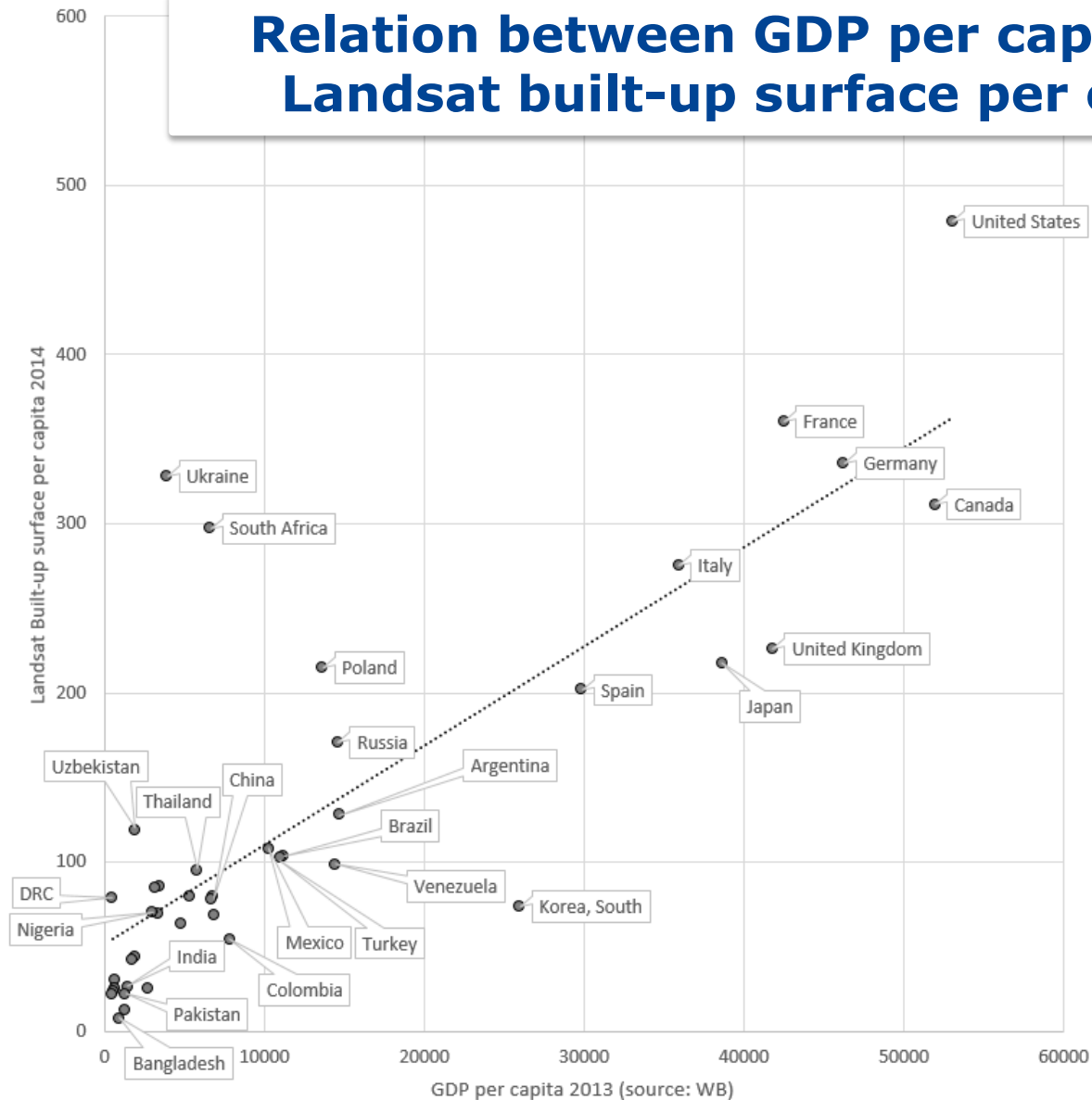
Global seamless standardized baseline data allows Global Sensitivity Analysis of models and indicators

new built-up areas 2000-2014





Relation between GDP per capita and Landsat built-up surface per capita

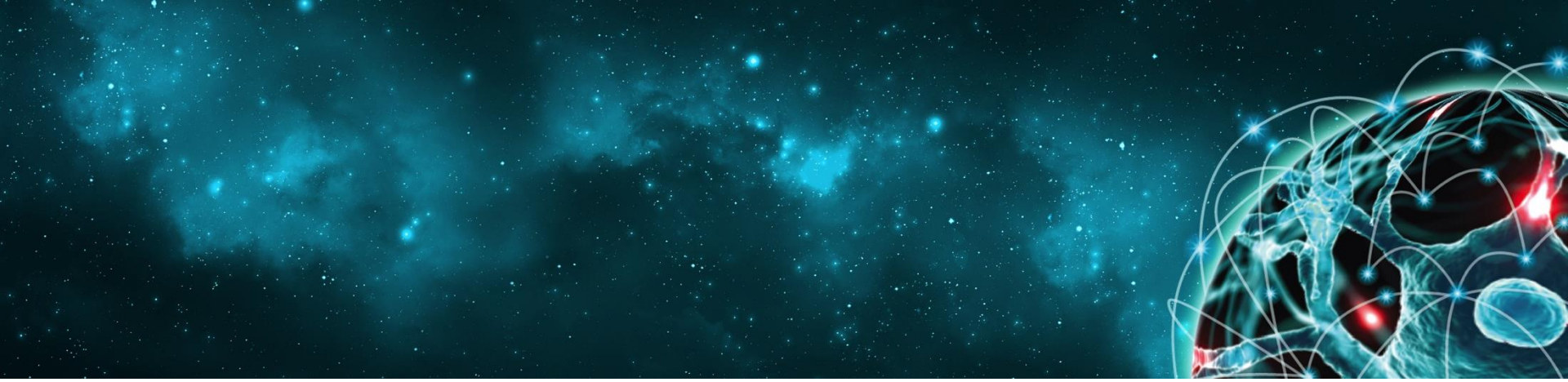


GHSL vision @ post-2015 frameworks

For all: baseline open data platform for testing the operationalization of post-2015 indicators, global model sensitivity analysis (indicators parameters and composition), harmonization of abstractions, assessing global data gaps and anomalies, allow sustainable production of spatial information by member states, maintain comparability

In data-rich countries: contributes to harmonization, standardization and international comparability

In data-poor countries: fill data gaps, allow monitoring with basic indicators, reduce digital divide, augment local capacity



The team

- M. Pesaresi – Project leader, method design, coordination & planning***
- C. Corbane - Copernicus data processing***
- D. Airaghi – IT support***
- D. Ehrlich – application development – risk and exposure***
- A. Florczyk – system development – web services and data integration***
- S. Freire – methodological development - population modelling***
- F. Haag - image interpreter – quality control and validation***
- T. Kemper – application development – IDP camps, slums, vulnerability***
- L. Zanchetta – IT support, computing infrastructure design***

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