

# *GLOBAL HUMAN SETTLEMENT LAYER INDICATORS AND KEY FINDINGS*



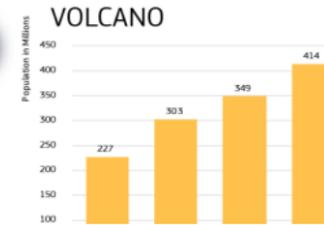
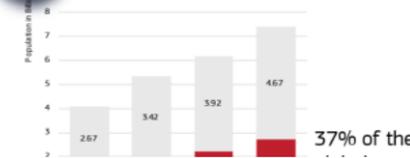
1975 -----1990-----2000-----2014

## Atlas of the Human Planet 2016



Mapping human presence on Earth

## Atlas of the Human Planet 2017



United Nations Framework Convention on Climate Change



PARIS 2015  
UN CLIMATE CHANGE CONFERENCE  
COP21-CMP11



UNISDR  
The United Nations Office for Disaster Risk Reduction



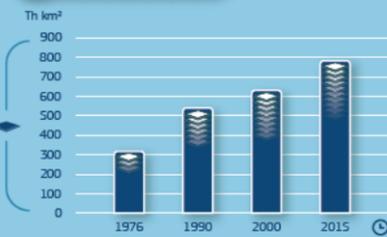
UN World Conference on Disaster Risk Reduction  
2015 Sendai Japan



UN HABITAT  
FOR A BETTER URBAN FUTURE



### Built-up area

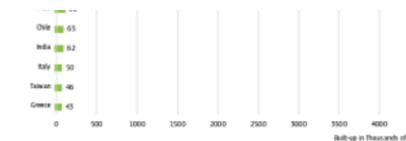


In the last 40 years built-up area increased by approximately 2.5 times

### Population



In the last 40 years population increased by 1.8 times



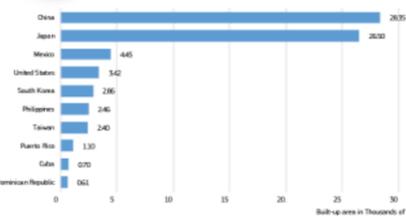
The built-up area potentially exposed to tsunami in Japan is **2 times** the sum of built-up in the other 9 most exposed countries.



Flood, the most frequent natural disaster, potentially affect people in Asia and Africa more than in other regions



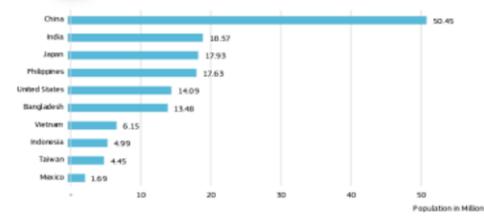
### CYCLONE WIND



China and Japan are by far the countries with the most built-up area exposed to strong cyclone winds (178/208 km/h)



### CYCLONE SEA LEVEL SURGE



Population exposed to cyclone sea level surge in China approximates the sum of the exposed population of India + Japan + the Philippines

### What can it be used for?

To know where and how people live



To map the growth of settlements over time



To know the characteristics of settlements



To measure the size of settlements



How densely populated they are



How green they are

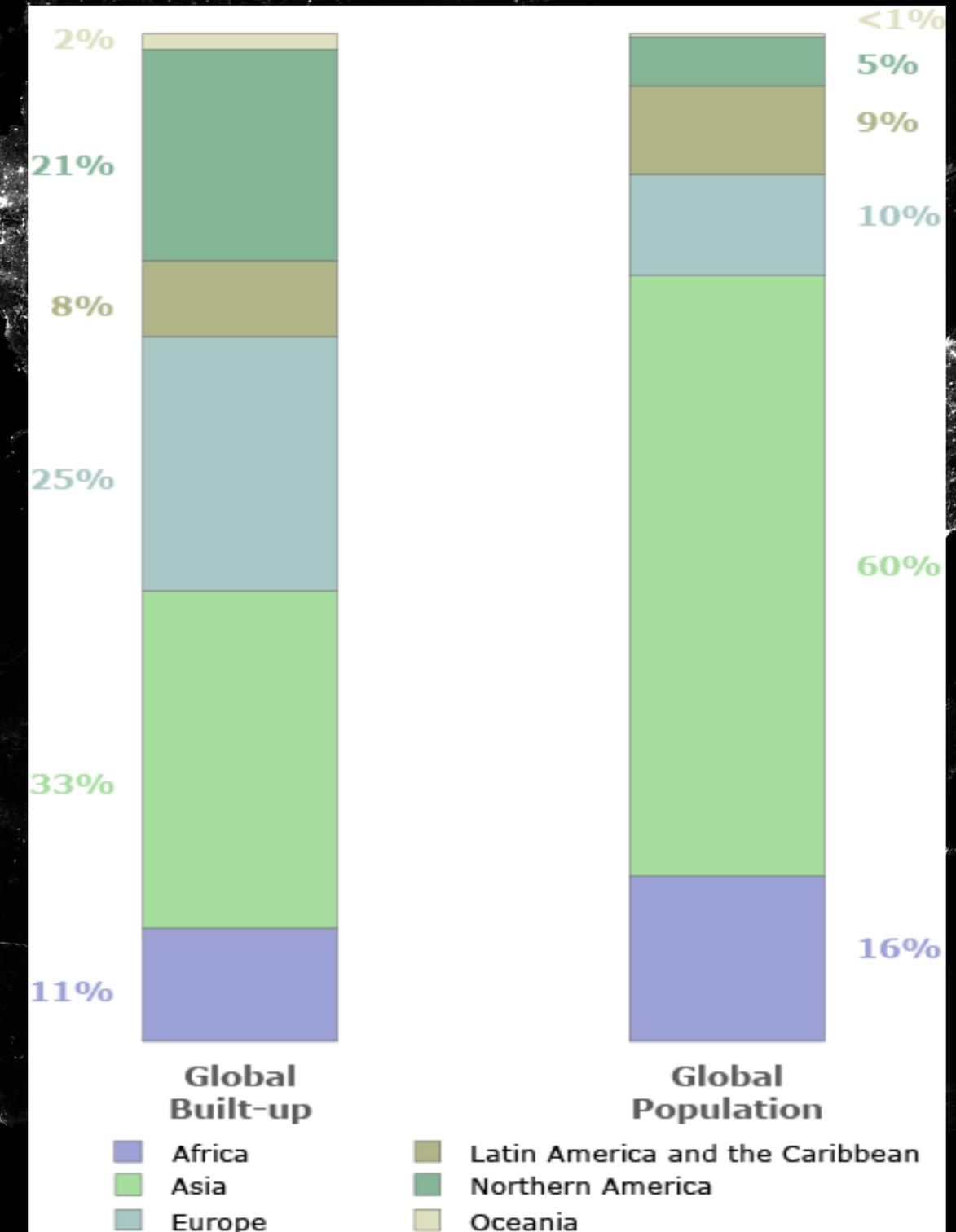
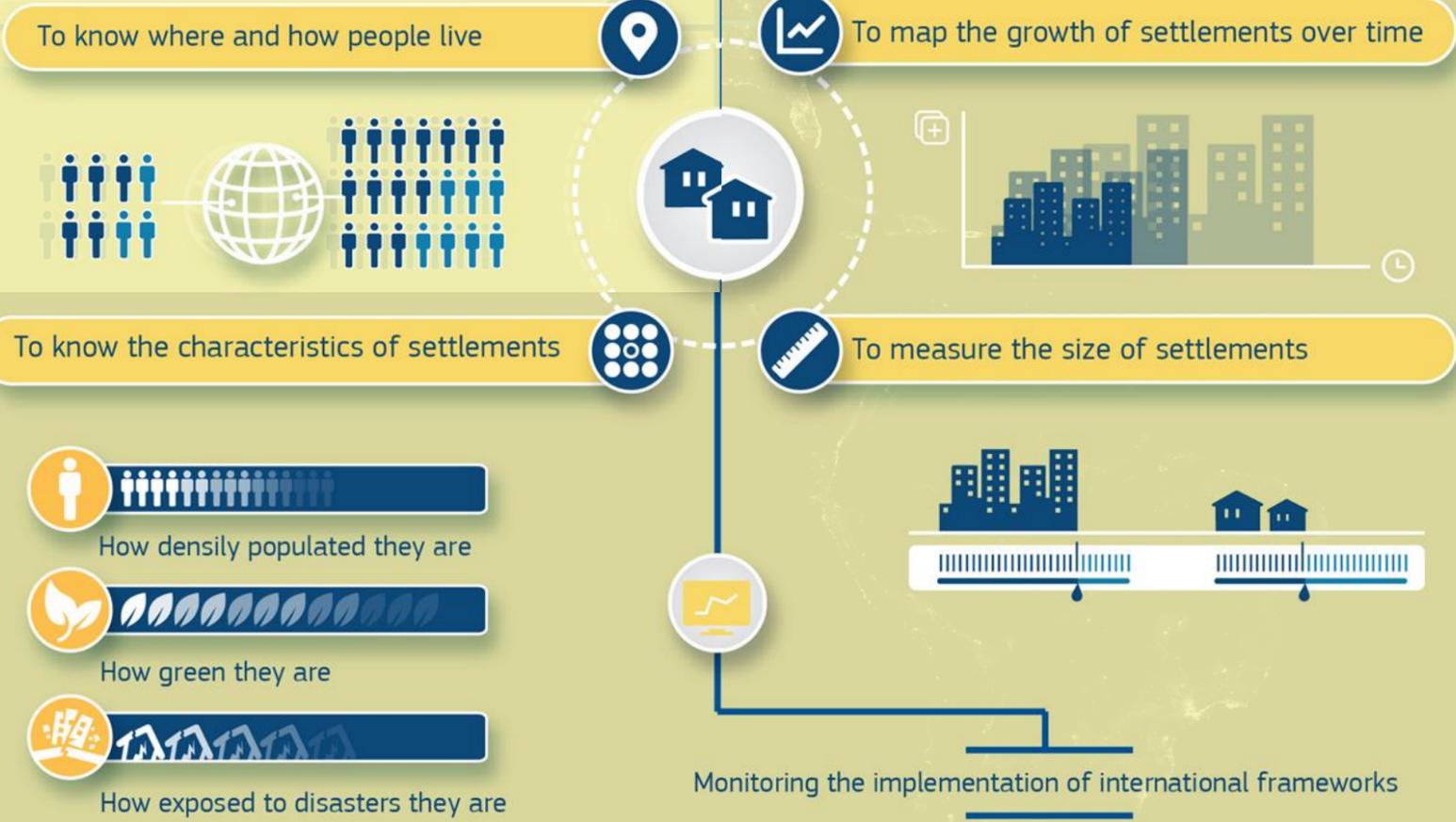


How exposed to disasters they are



Monitoring the implementation of international frameworks

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Great inequalities between rich and poor in built-up space per capita



The High Income Countries (HIC) have increased the available built-up area per capita. The built-up area per capita in Low-Middle Income Countries (LMC) and Low Income Countries (LIC) is only less than one quarter of that of HIC

180,5  
HIC

43,7  
LIC

Square metres per inhabitant

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Today 7.3 billion people live and work in only 7.6% of the global land mass

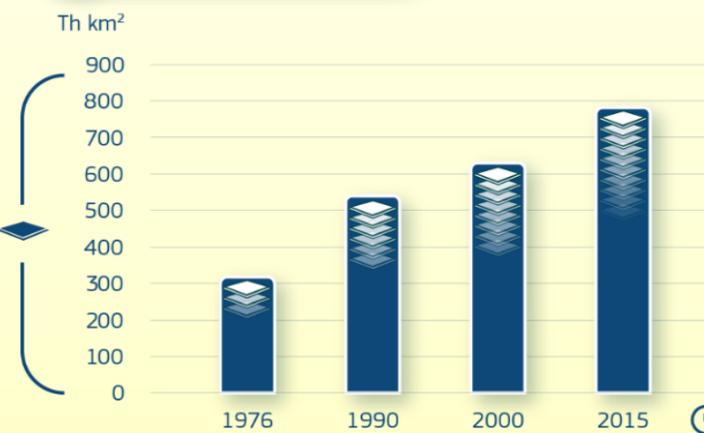


7.3 billion



7.6%

Built-up area



x 2.5

In the last 40 years built-up area increased by approximately 2.5 times

Population



x 1.8

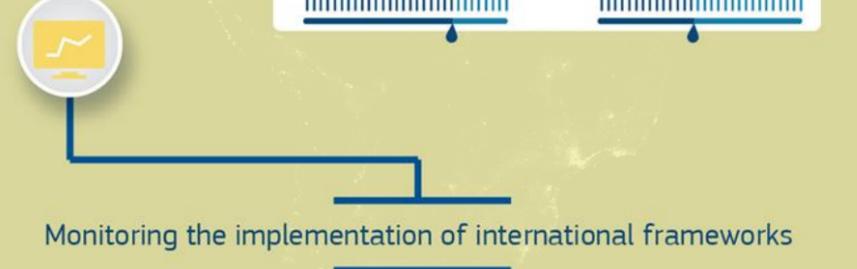
In the last 40 years population increased by 1.8 times

## What can it be used for?

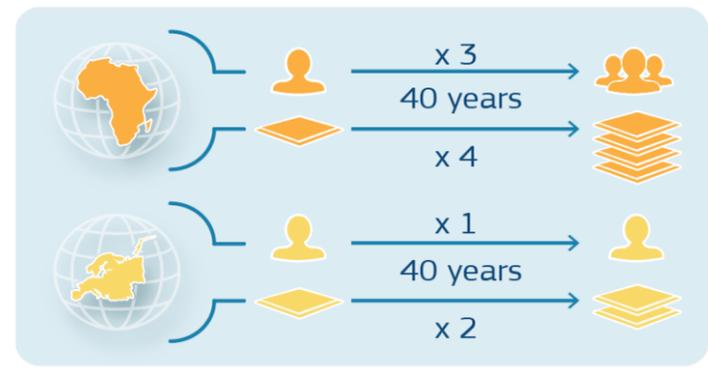
- To know where and how people live
- To map the growth of settlements over time



- To know the characteristics of settlements
- To measure the size of settlements

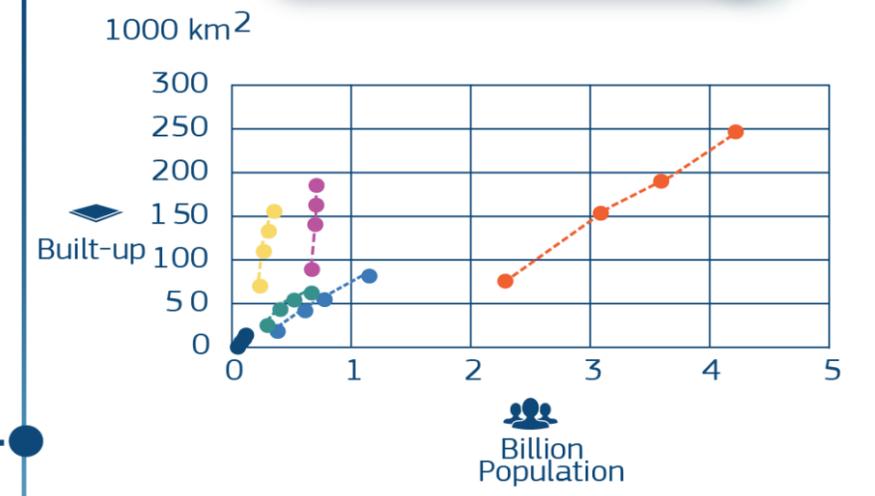


The dynamic of population and built-up increase have very strong regional differences

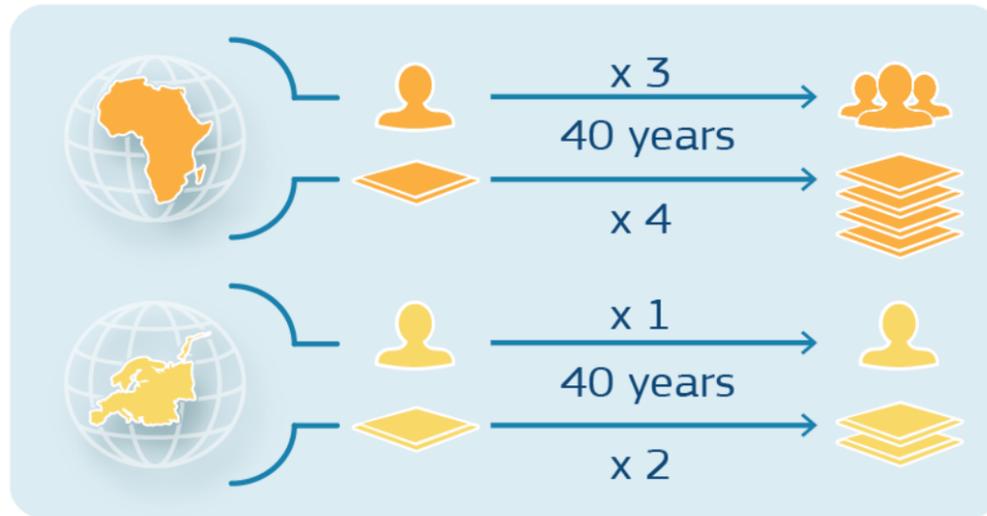


Asia is by far the most populated continent and has since the year 2000 also the biggest amount of built-up areas

## Growth of population and built-up

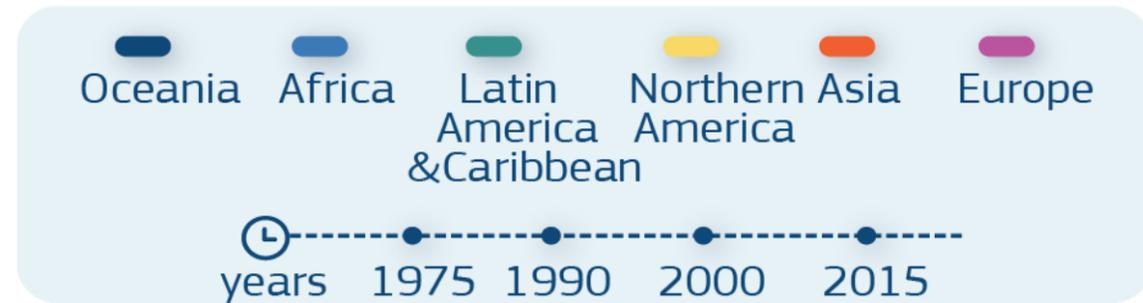
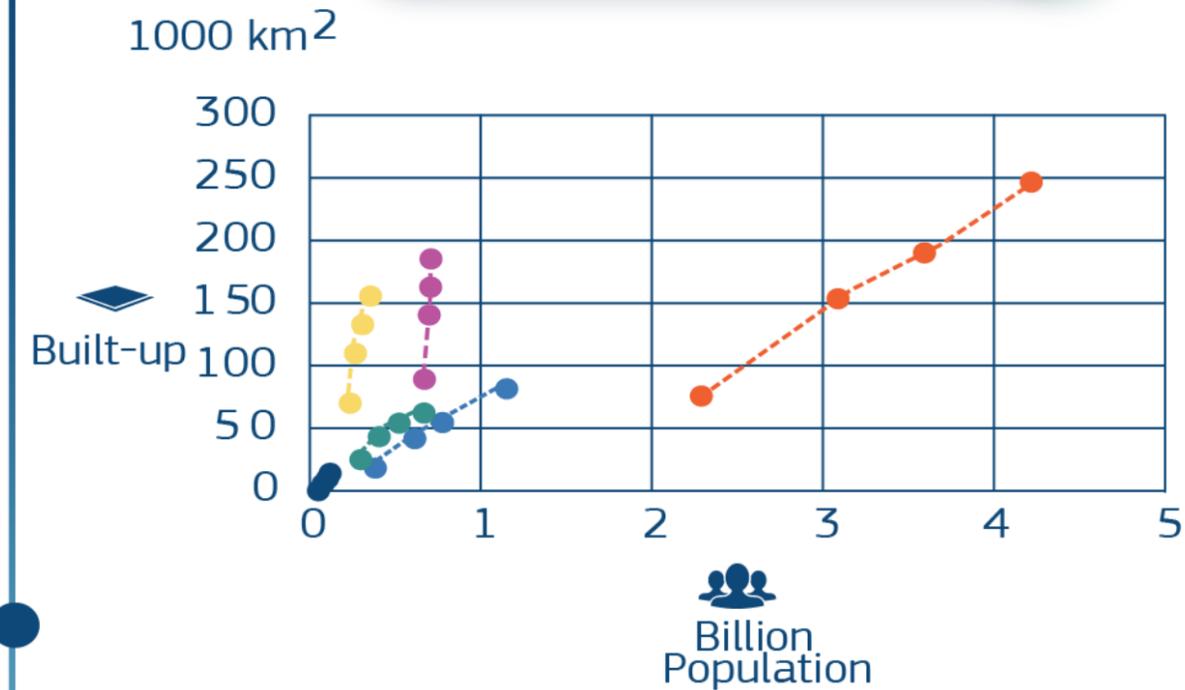


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Asia is by far the most populated continent and has since the year 2000 also the biggest amount of built-up areas

Growth of population and built-up



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How green they are

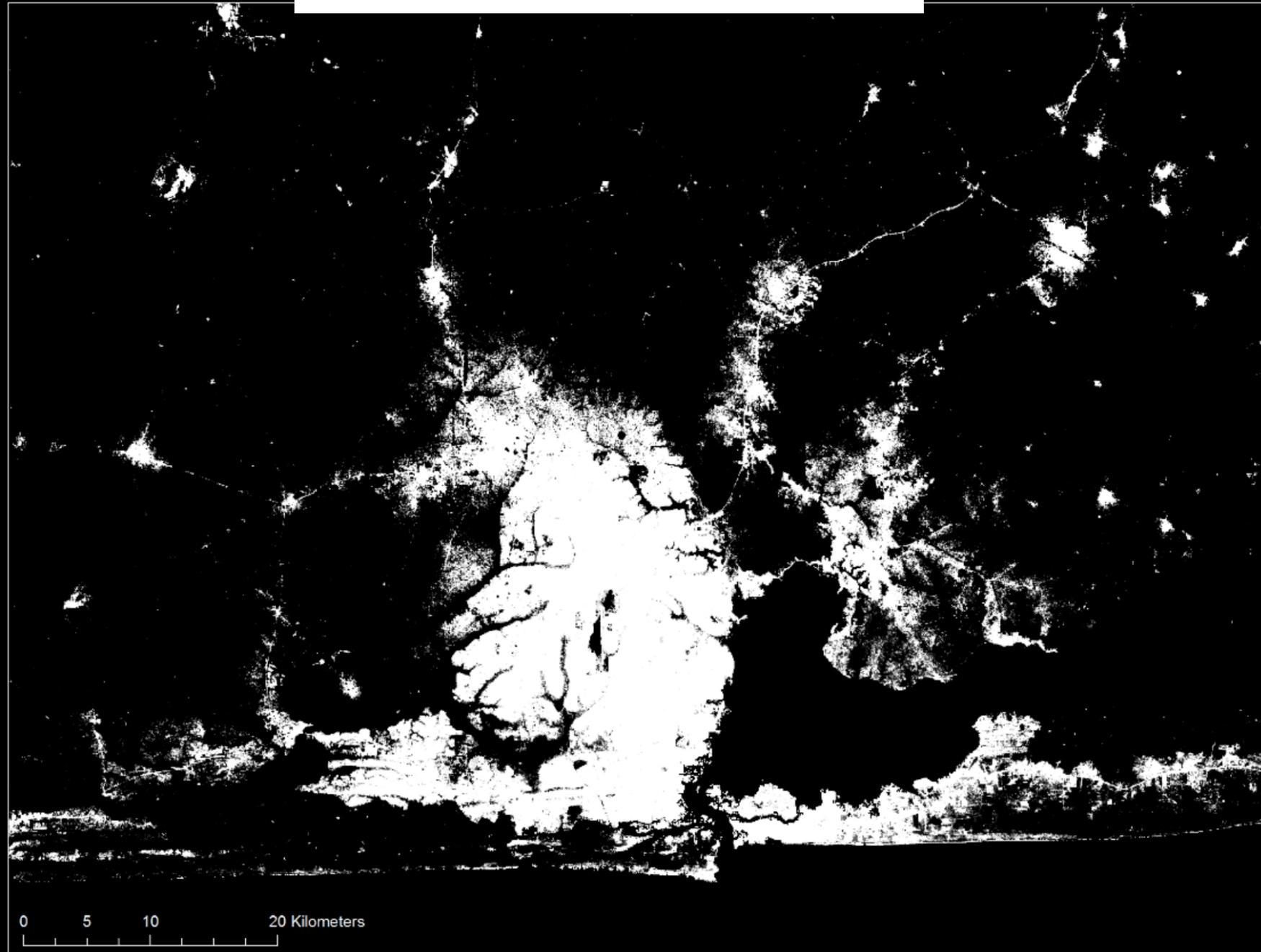


How exposed to disasters they are

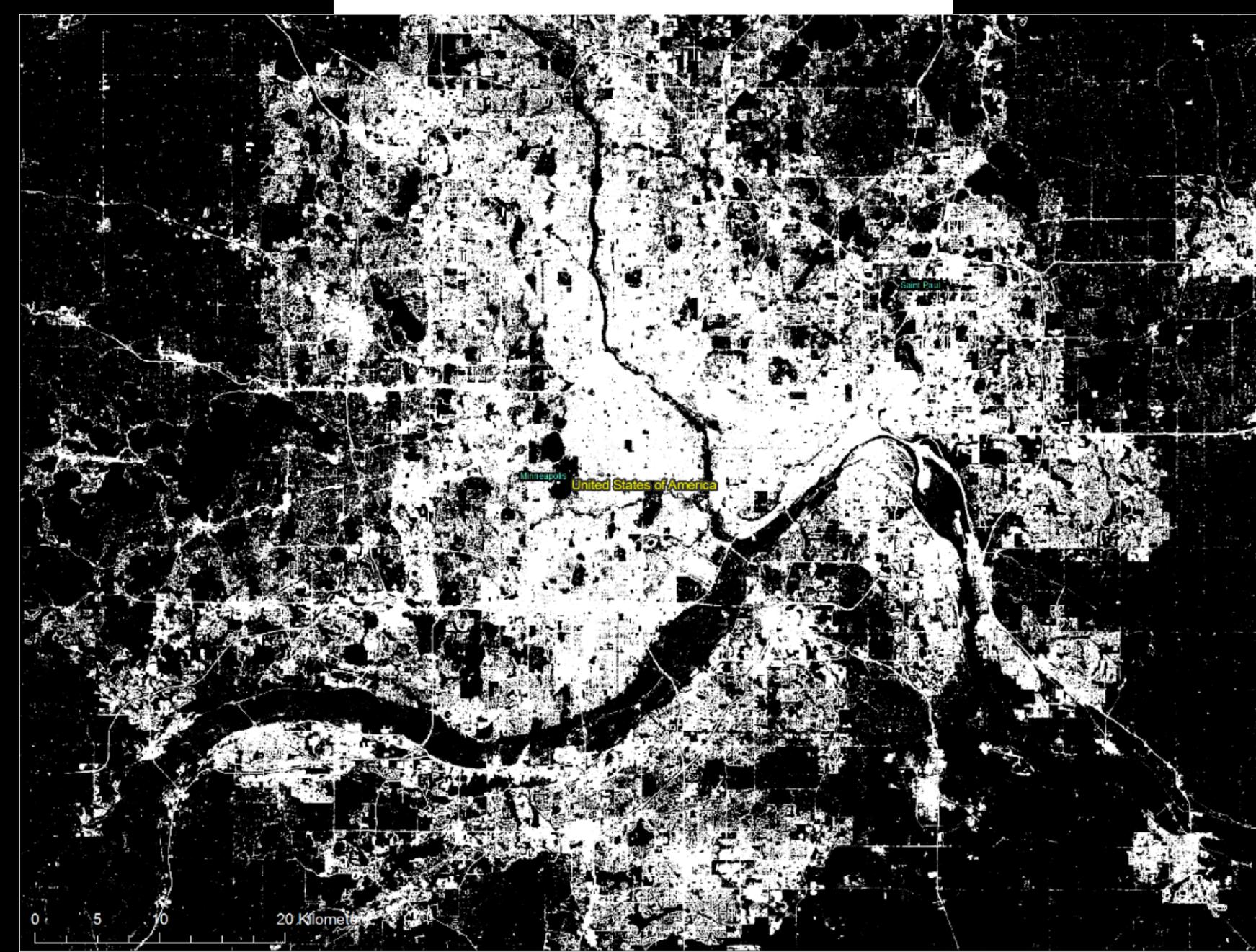


Monitoring the implementation of international frameworks

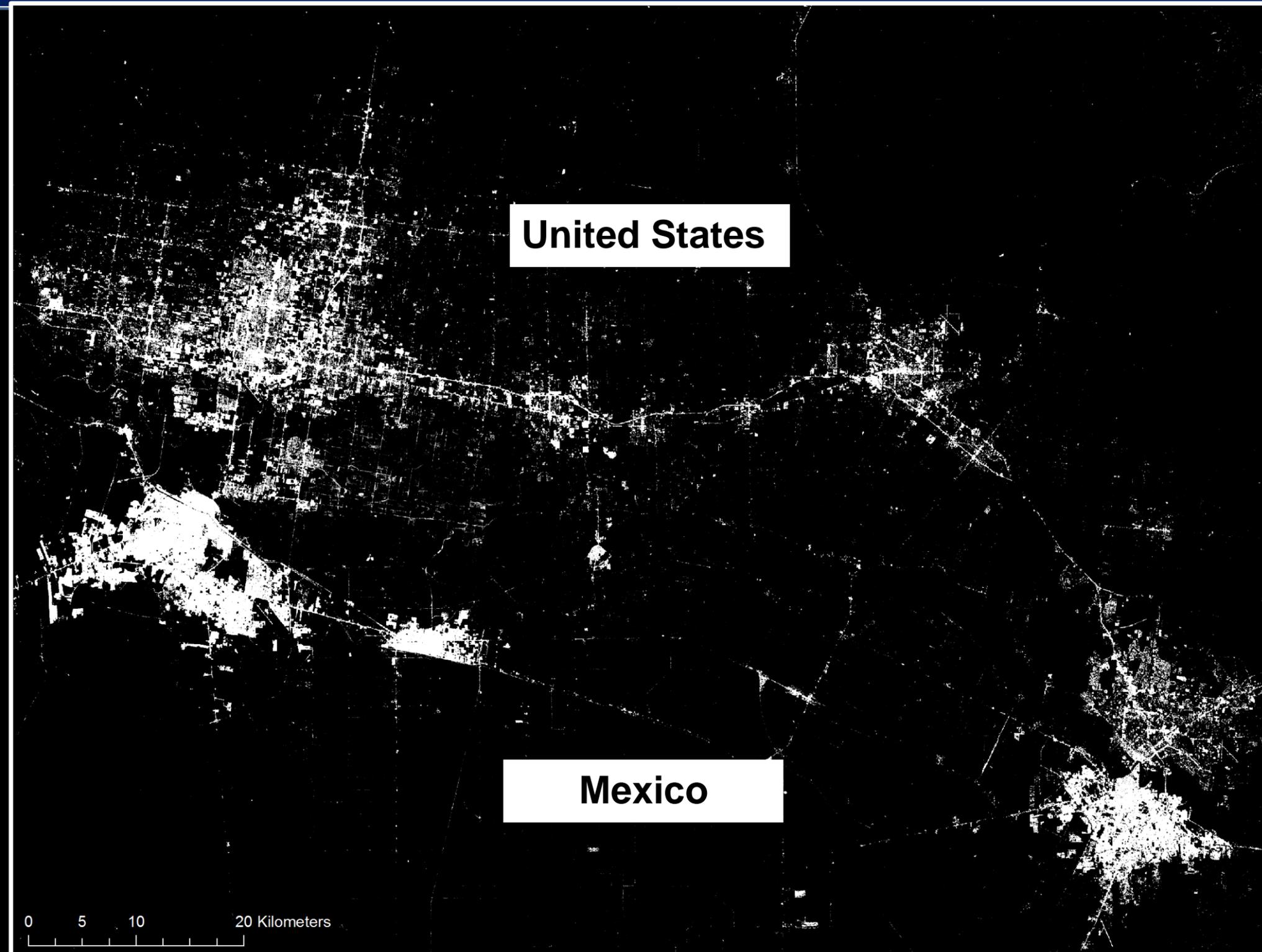
**Lagos, Nigeria, 2015**  
**~5 millions inhabitants**



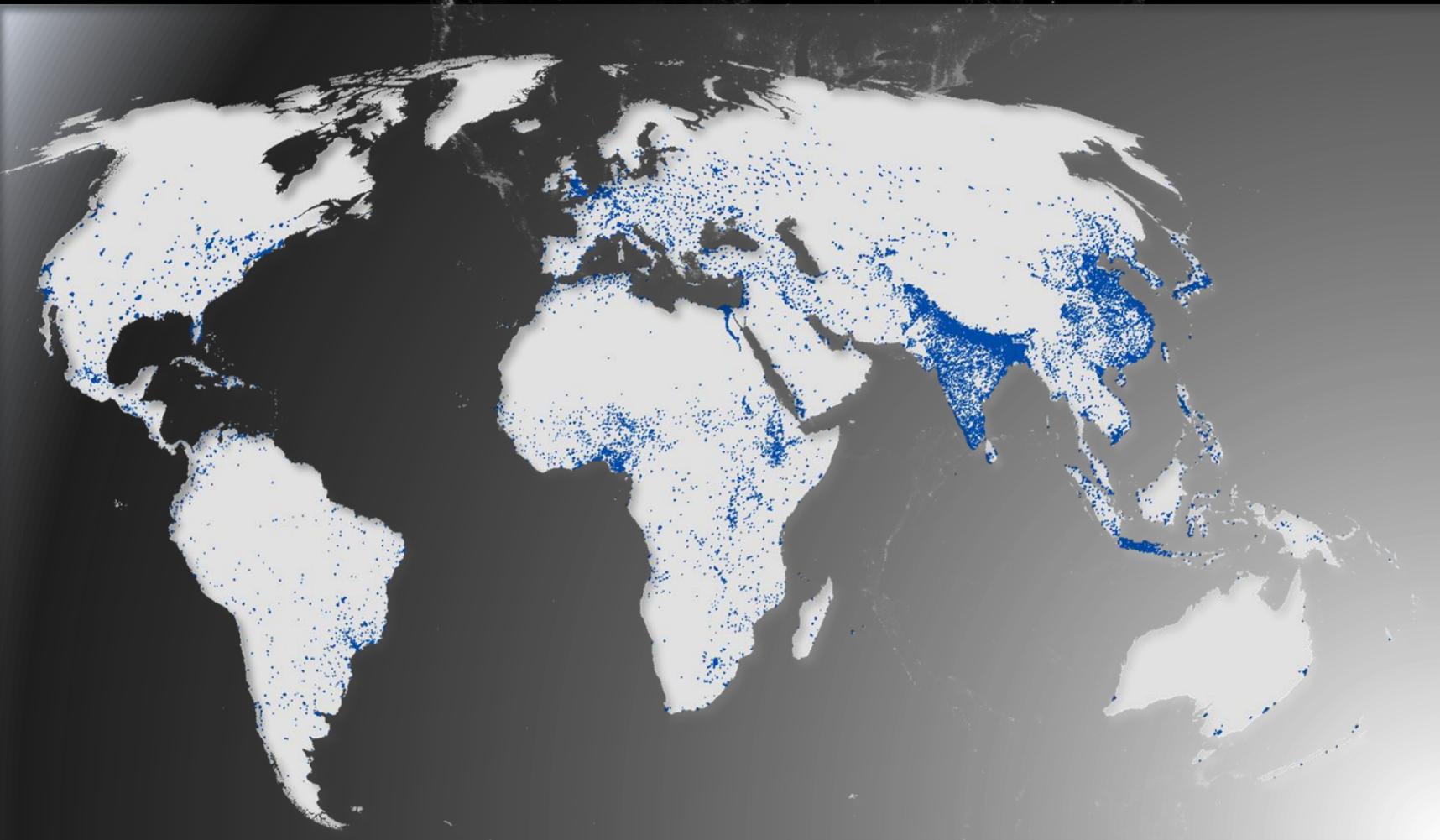
**Minneapolis, US, 2015**  
**~0.5 millions inhabitants**



GLOBAL HUMAN SETTLEMENT LAYER



**The GHSL maps more than 13,000 urban centres in 2015**

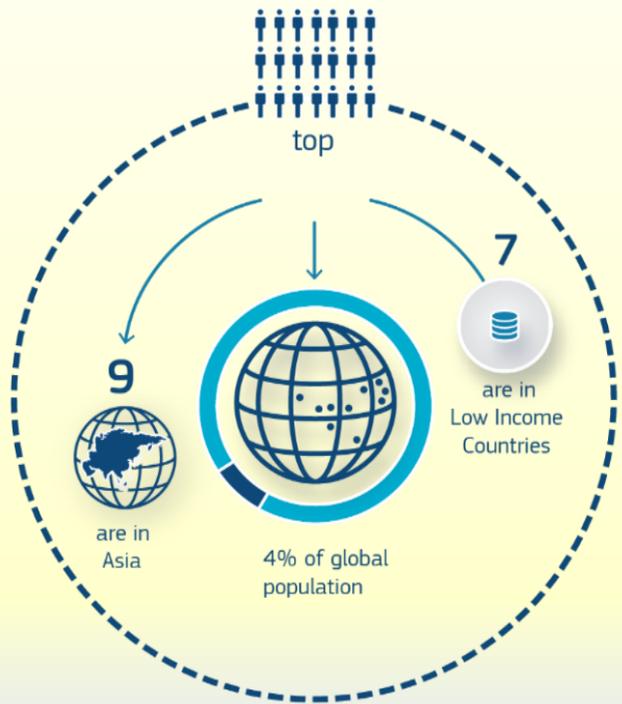


**32 urban centres with more than 10 million of inhabitants in 2015**



## Urban Centres (High Density Clusters with more than 50k inhabitants)

The 10 most populated urban centres

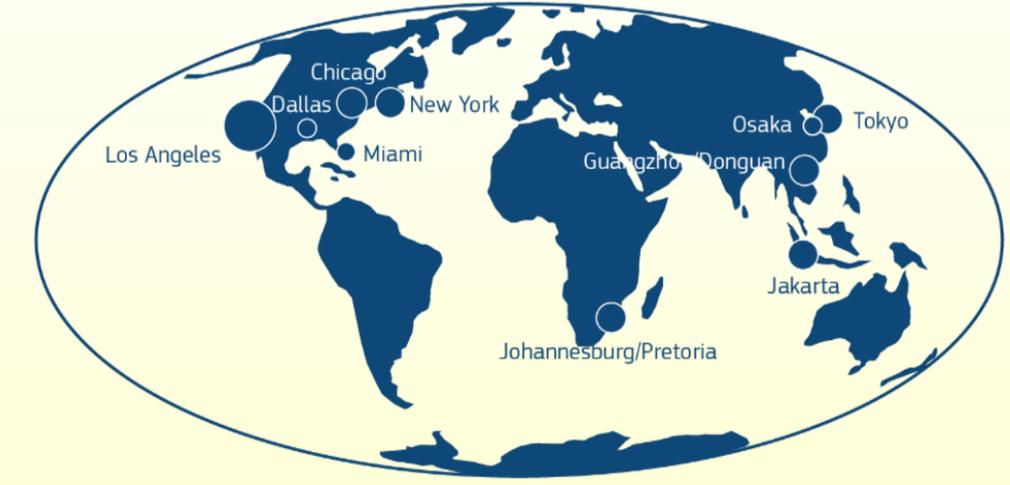


Population in million of inhabitants (2015)

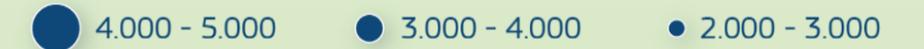


## Urban Centres (High Density Clusters with more than 50k inhabitants)

The 10 urban centres with the biggest built-up area



Built-up in sqKm (2015)



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How densely populated they are



How green they are



How exposed to disasters they are

To measure the size of settlements



Monitoring the implementation of international frameworks

Globally, city centres are becoming greener



+ 25%



Global exposure to disaster has increased



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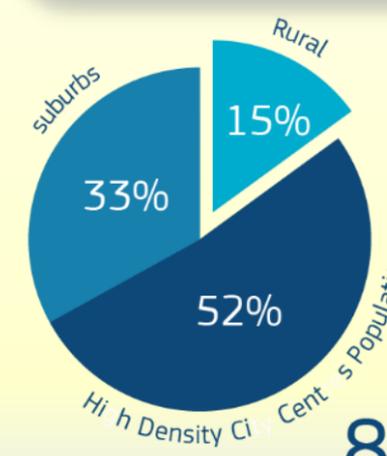


Monitoring the implementation of international frameworks

We are much more urbanised than what we think



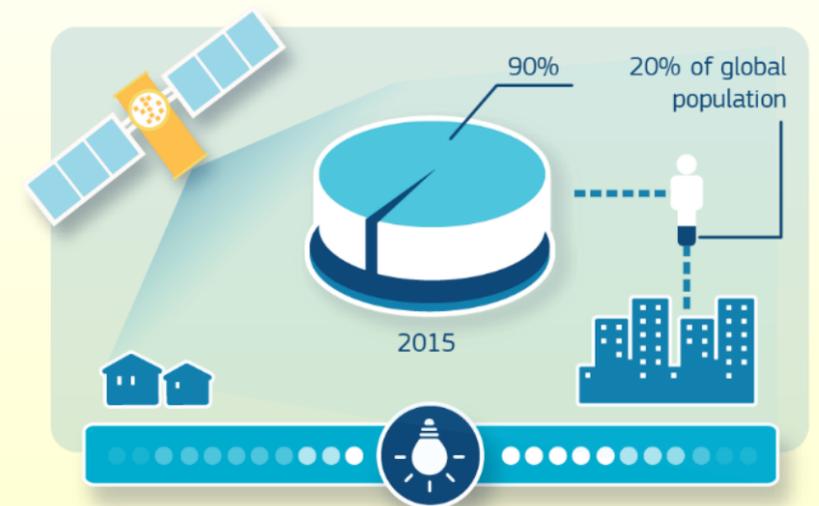
Urbanisation in 2015



3.8 billion people

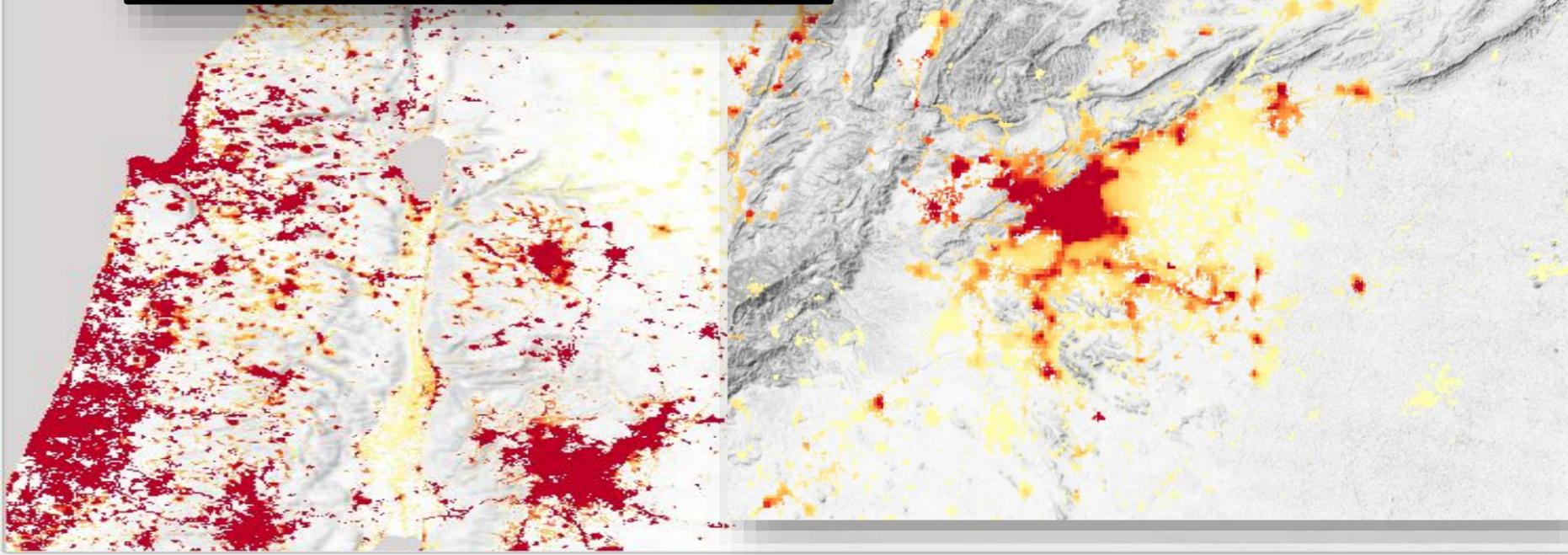
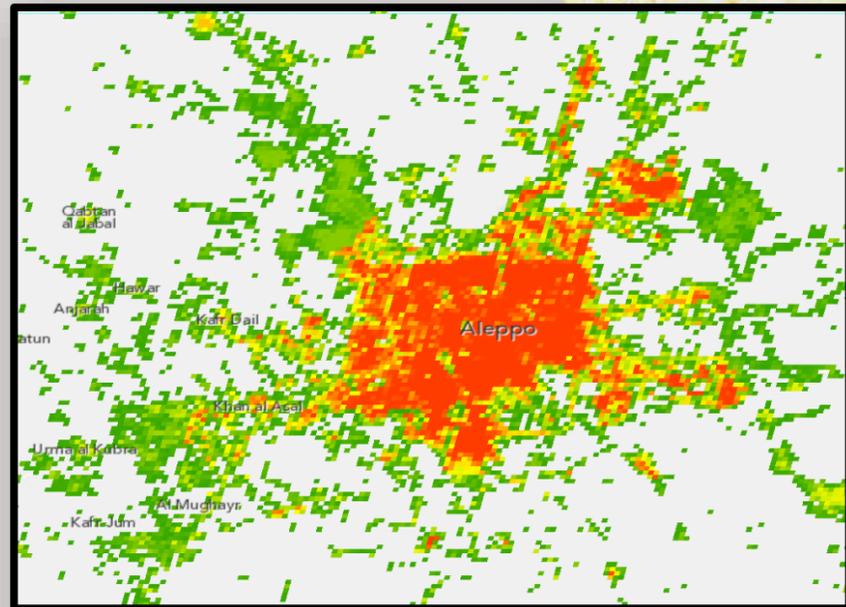
85% urban population

Access to energy is still very unequal



In 2015, 90% of the night light observed from space was emitted from urban areas that host only 20% of the global population

# Monitoring the Syrian Humanitarian Crisis with the Global Human Settlement Layer (GHSL) & Night-Time Satellite Data



The screenshot shows the Google Earth Engine interface. The left sidebar lists various datasets, including 'GHSL\_alpha' and 'NIGHTLIGHTS\_HDC250\_50K\_2...'. The main area displays a JavaScript script named 'VIIRS\_test' that processes population data and night-time satellite data to create a multi-band image of affected population. The script includes the following code:

```
var pop_nov15 = POP.mask(maskNov15);
var pop_dec15 = POP.mask(maskDec15);

// Create a multi-band image from affected population
var Affected_all = ee.Image([pop_Jan13, pop_Jan14, pop_Feb14, pop_Mar14,
pop_Apr14, pop_May14, pop_Jul14, pop_Aug14, pop_Sept14, pop_Oct14, pop_Nov14,
pop_Dec14, pop_Jan15, pop_Feb15, pop_Mar15, pop_Apr15, pop_May15, pop_Jul15, pop_Aug15, pop_Sept15, pop_Oct15,
pop_Nov15, pop_Dec15]);

print(Affected_all, "AffectedPop/month");

Map.addLayer(Affected_all,
  {min: 100, max: 1000,
  bands: ['b1']}, 'AffectedPop/month');

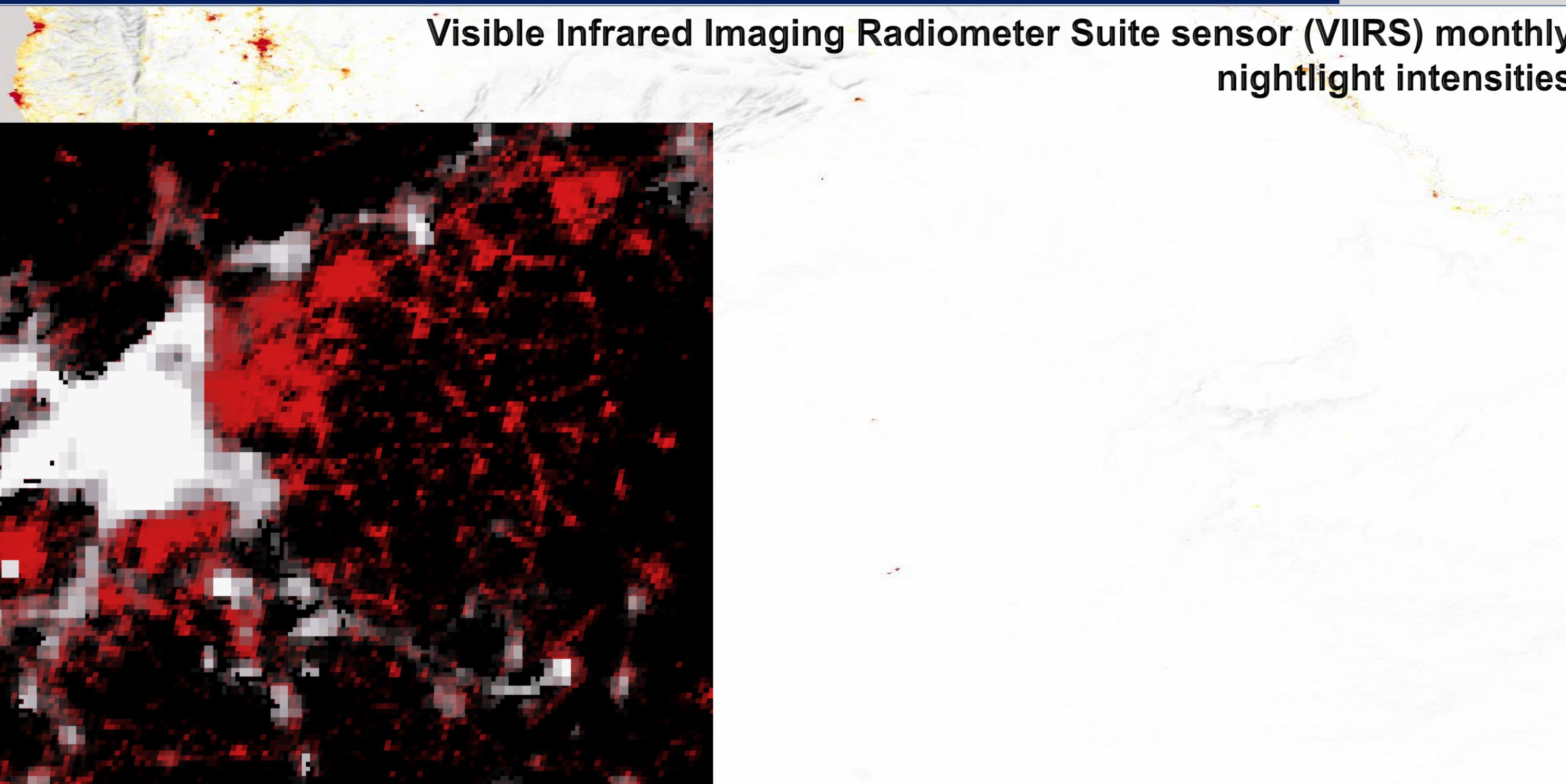
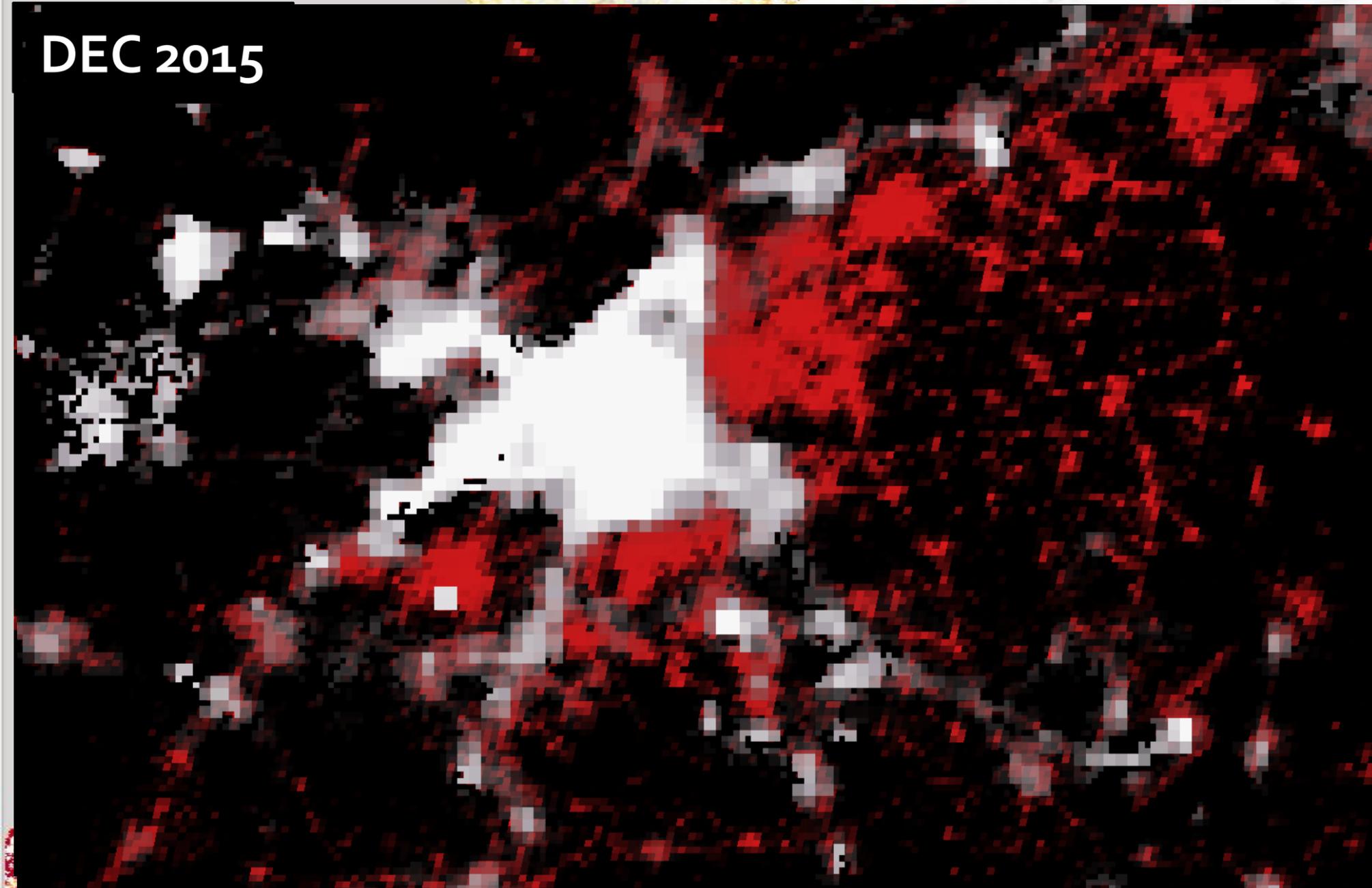
// Map.addLayer(pop_Jul15,
// {min: 0, max: 1000},
// 'Affected pop');

Export.image(Affected_all, 'Affected_pop', {
  scale: 250,
  region: geometry,
});

//calculate sum of affected per district
var sum = ee.FeatureCollection('ft://s3.amazonaws.com/geodata-public/s3-us-east-1-popdata');
```

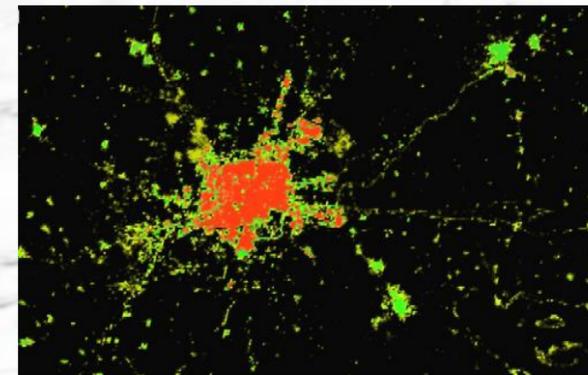
**Visible Infrared Imaging Radiometer Suite sensor (VIIRS) monthly  
nightlight intensities**

**DEC 2015**

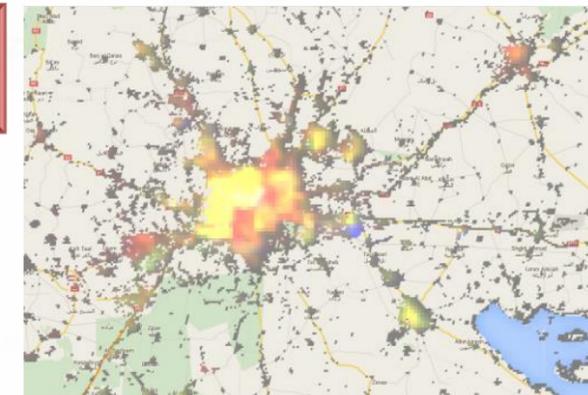


# Integrating GHSL derived population data with night-light satellite imagery VIIRS

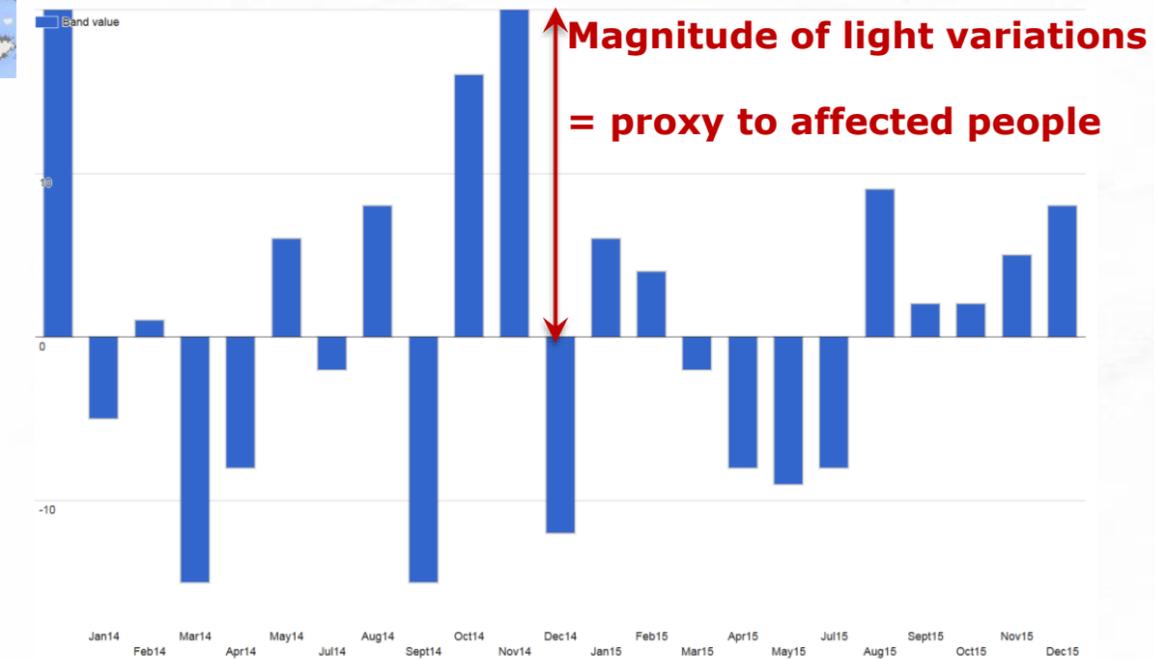
GHSL derived population data (250 m)



Monthly composites of night-time data VIIRS (750 m)-



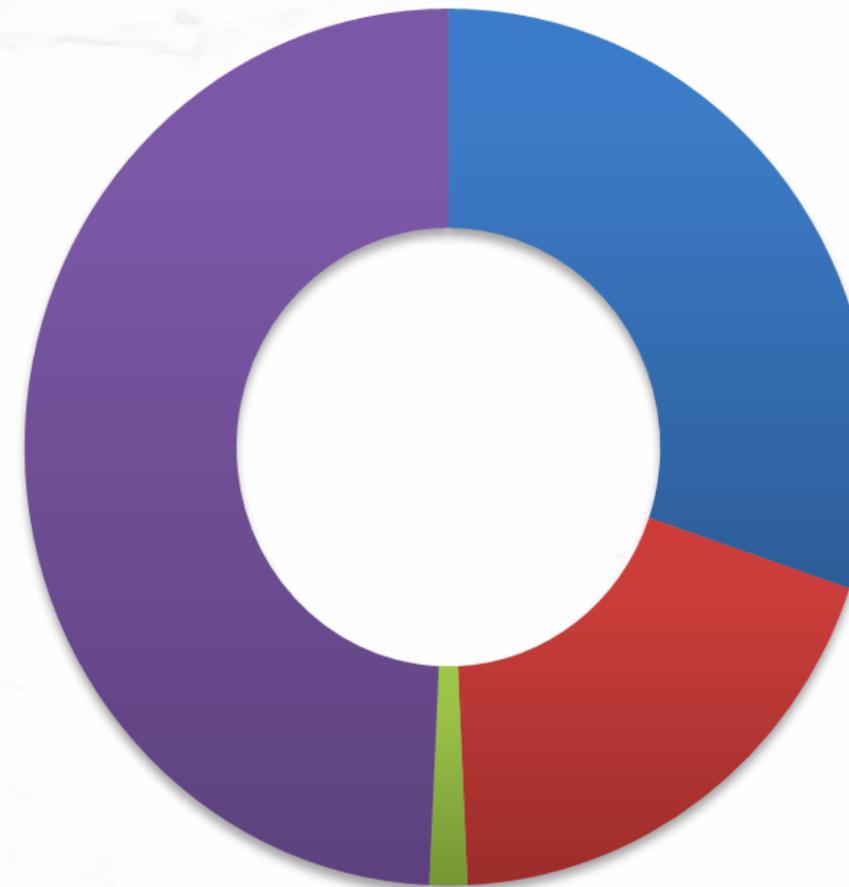
Differences in light intensities between each two consecutive months



## Estimated affected population in Syria (Source: the Syrian Observatory for Human Rights)

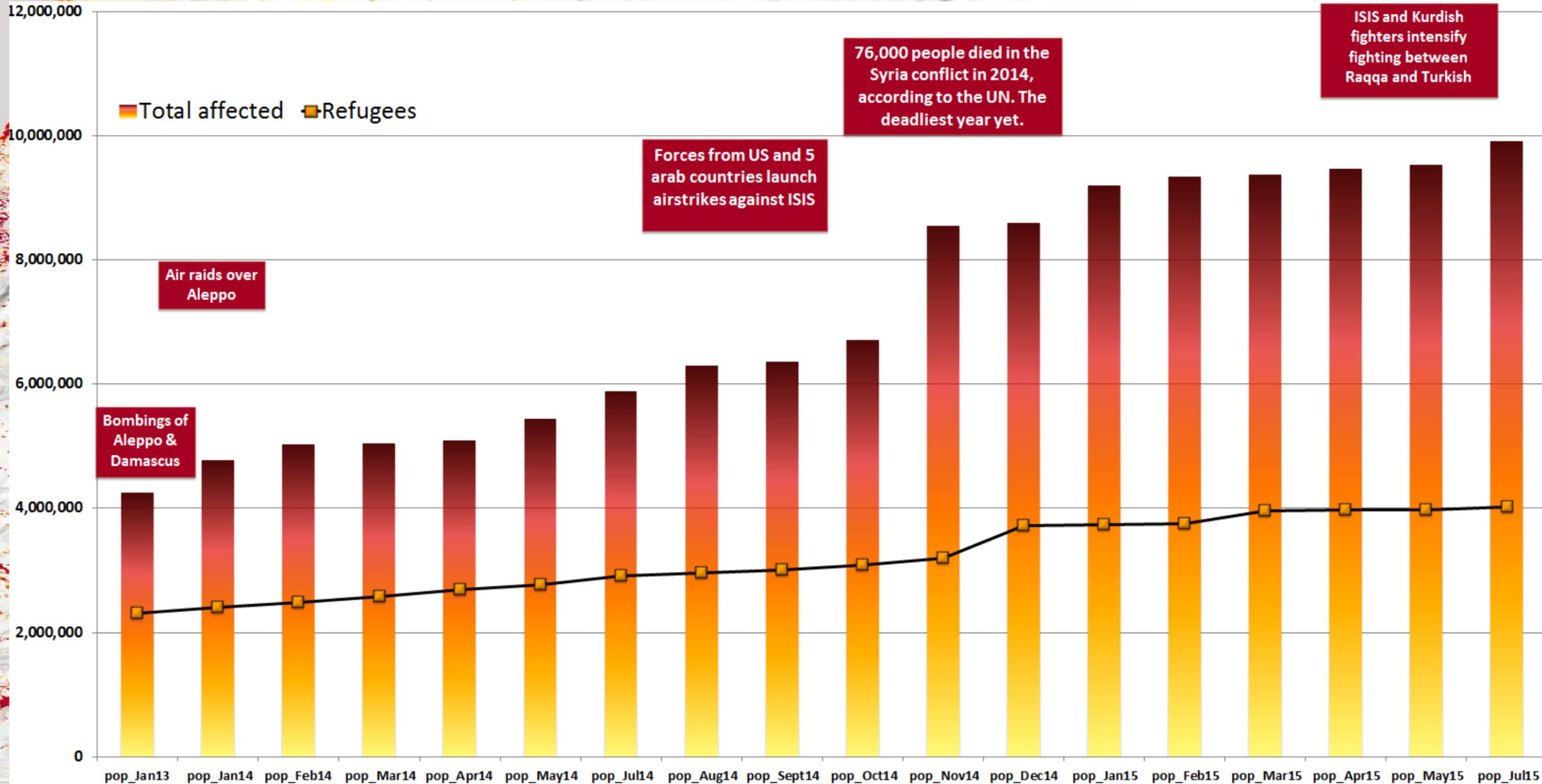
**Half a population uprooted**

One out of two Syrians has fled home since the war began-or been killed



- 6.5 million Displaced within Syria
- 4.1 million Refugees abroad
- 310.000 Killed
- 10.6 million Still in their homes

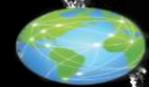
# Affected population derived from geospatial analysis and number of registered refugees (source: UN OCHA)



Thanks for your attention!

Christina. Corbane

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LinkedIn: *Joint Research Centre*



YouTube: *EU Science Hub*



For further information and to  
explore the GHSL:

<http://ghsl.jrc.ec.europa.eu>