IMPROVING URBAN WATER MANAGEMENT WORKSHOP SERIAL (2021 – 2024)

Essential Quality Assured Data and Information for Integrated Urban Water Management

IMPROVING URBAN WATER MANAGEMENT USING AVAILABLE GLOBAL DATA

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What Data for Urban Integrated Water Management?

Utility Data

- Operational data used for online operation (flows, pressures, WQ, radar for rainfall, security access controls...)
- Operational data used for periodic reporting/invoicing (consolidation of data)
- Statistical data used for making appear trends and specific evolution:
  - pipe bursts for setting maintenance and renewal plans
  - NRW
  - WQ complaints
  - …

Global Data

- Statistical data for making studies and researches
- Referential global data for sizing infrastructures
  - Residential population, industries, per capita consumption, visitors…
  - Rainfall min, Max, seasonal…
  - River flows, Water Table Levels, raw WQ
  - …

External Data

- Alerts from external stakeholders
  - Flood prediction
  - Environmental Pollutions
  - Supply chain
  - …

Data Time Reference

- Second
- Month
- Year
- From Years To Century

Characterization of Data

- Need for a common language -> therefore common definitions and units are essential

- Data Reliability and Accuracy; every piece of information should have its own ID that describes:
  - Its origin,
  - its owner,
  - the way it is transmitted,
  - its control and verification if any,
  - its frequency of acquisition,
  - Its precision (number of digits for example),
  - Its accuracy (can be mentioned as an interval of confidence)
  - …

The context of an information: how it is interpreted and used

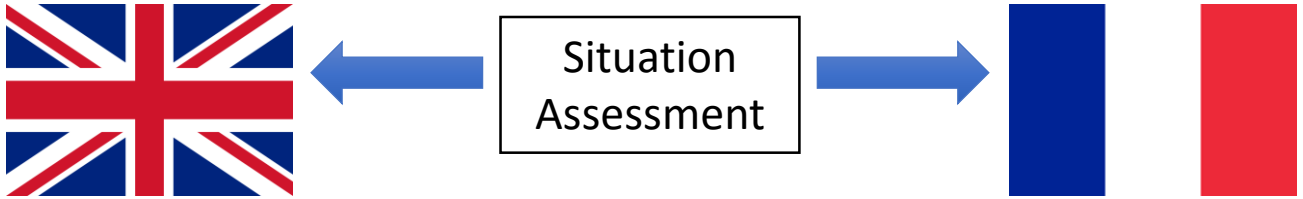
<u>Illustration of the context of an information with the death of Lady Di</u>

Car crash with injured people

Emergency rescue arrive on site

How long did it take for the French Emergency Rescue to take Lady Di to the Hospital after the car crash?

- ❑ Incomprehensibly too long for the British people: Diana could have been saved
- ❑ As usual, nothing abnormal for the French authorities



- The French doctrine and the English doctrine differ.
- None is better than the other.
- The same information should be evaluated according to the local context.

Immediate transport of the victim to the nearest hospital as it is

The victim is treated at the hospital

Taking the patient to the hospital

Apply first treatments on site

Stabilize the victim's constants

Transfer the victim to a specialized hospital if needed

Taking the hospital to the patient

Developments for Data use at Water Utilities

- IWA Water Balance for Non-Revenue Water estimation
- Development of Key Performance Indicators for Water and Wastewater services
- Triggering of Alerts
- Data Mining
- Smart Water Management
  - Early Warning Systems
  - Smart metering – AMI and AMR
    - Screening of data
    - Detection of anomalies thanks to DMA
    - Substitution of missing data and data consolidation
    - Advance billing possibilities
    - Data ownership
    - Water Billing in Peak and off-peak times
  - Artificial Intelligence applications

Basic Principles for Data Use

Thanks to new technologies for sensors and telecommunications, an explosion of the number of data available happened and is expected to continue in the future for many water and wastewater utilities.

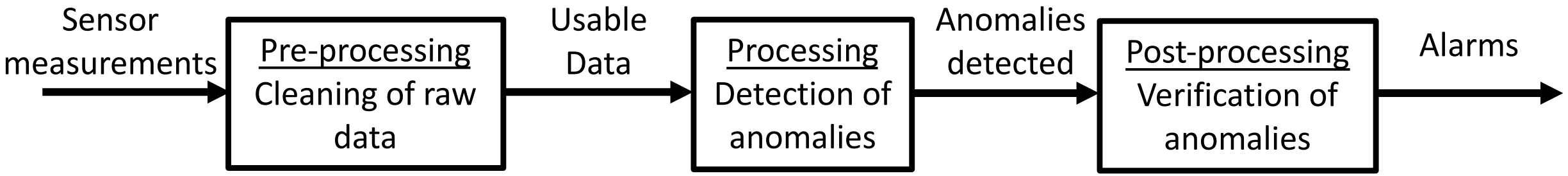
In this context, a sound strategy for Data management is needed.

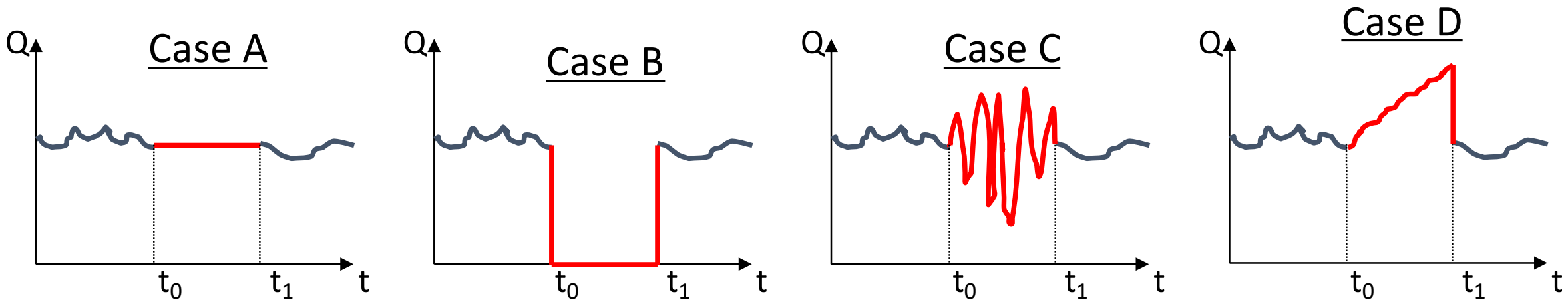
Without proper Data there is no benefits but many risks.

Collecting Data without a clear purpose and objectives
of action depending on its value is a non-sense.

Each Data concur to the representation of a situation. The concomitance of certain information might completely change its overall meaning.

Example of step-by-step data use in Smart Water Management





- t_1 is the intervention date when the sensor has been repaired.
- t_0 is the presumed date of apparition of the default.

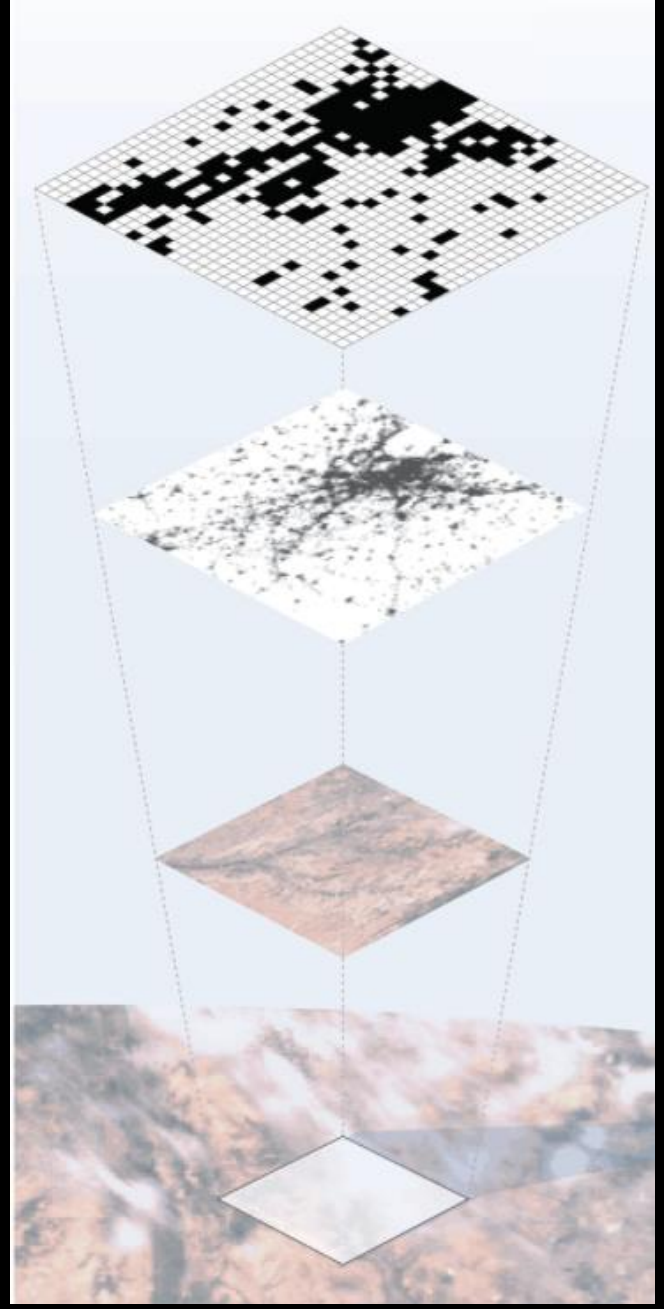
Socio-economic Analysis in Urban Water Management

What is possible to do using satellite images and global data?

Change in built-up area is an important factor for urban water managers to develop a sustainable supply/demand plan.

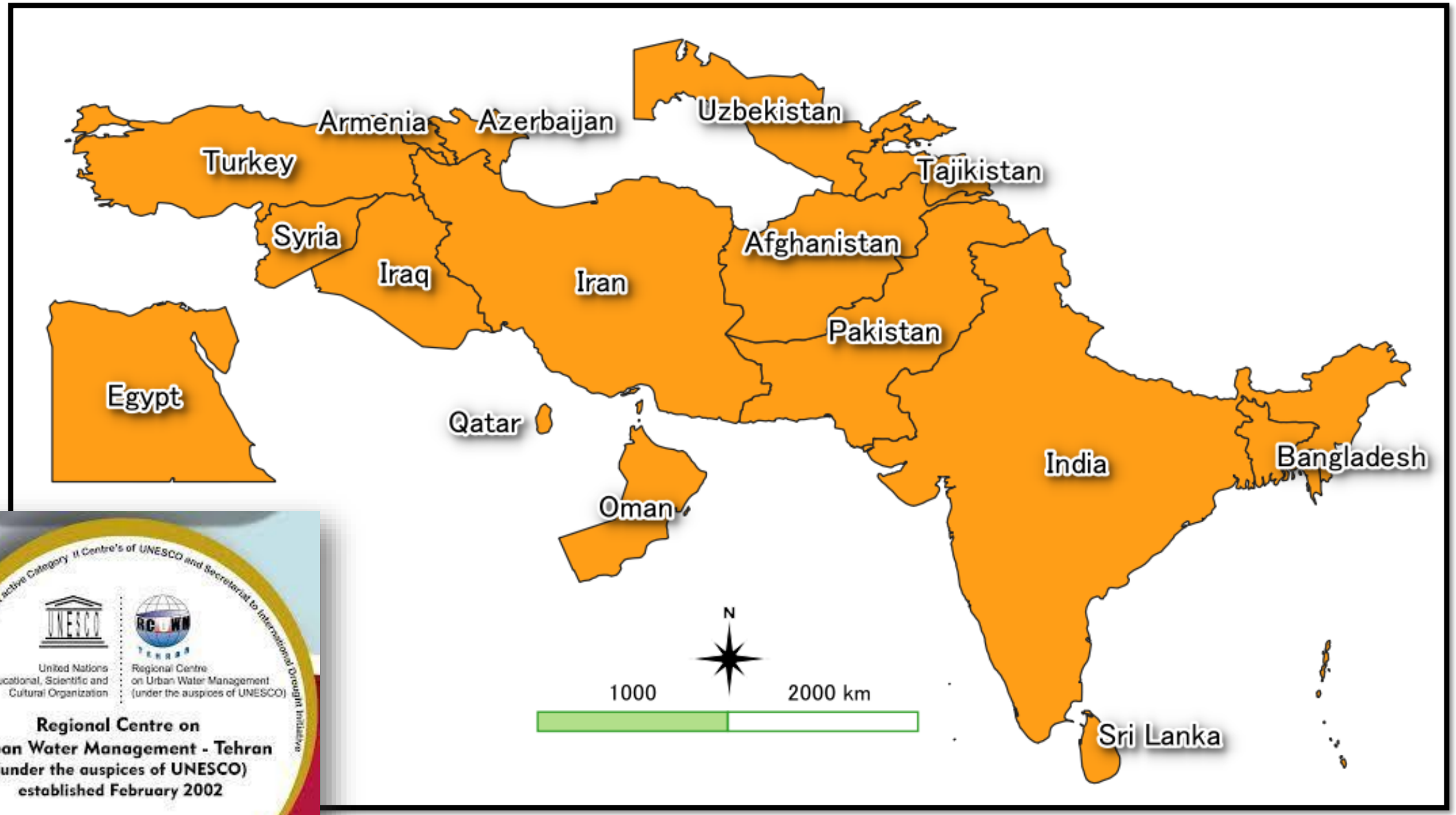
Change in population is also important for urban water managers

Satellite images could provide an insight for the above two items at regional and local scales.



Source: Global Human Settlement Layer (European Commission)

Member States of the Regional Centre on Urban Water Management

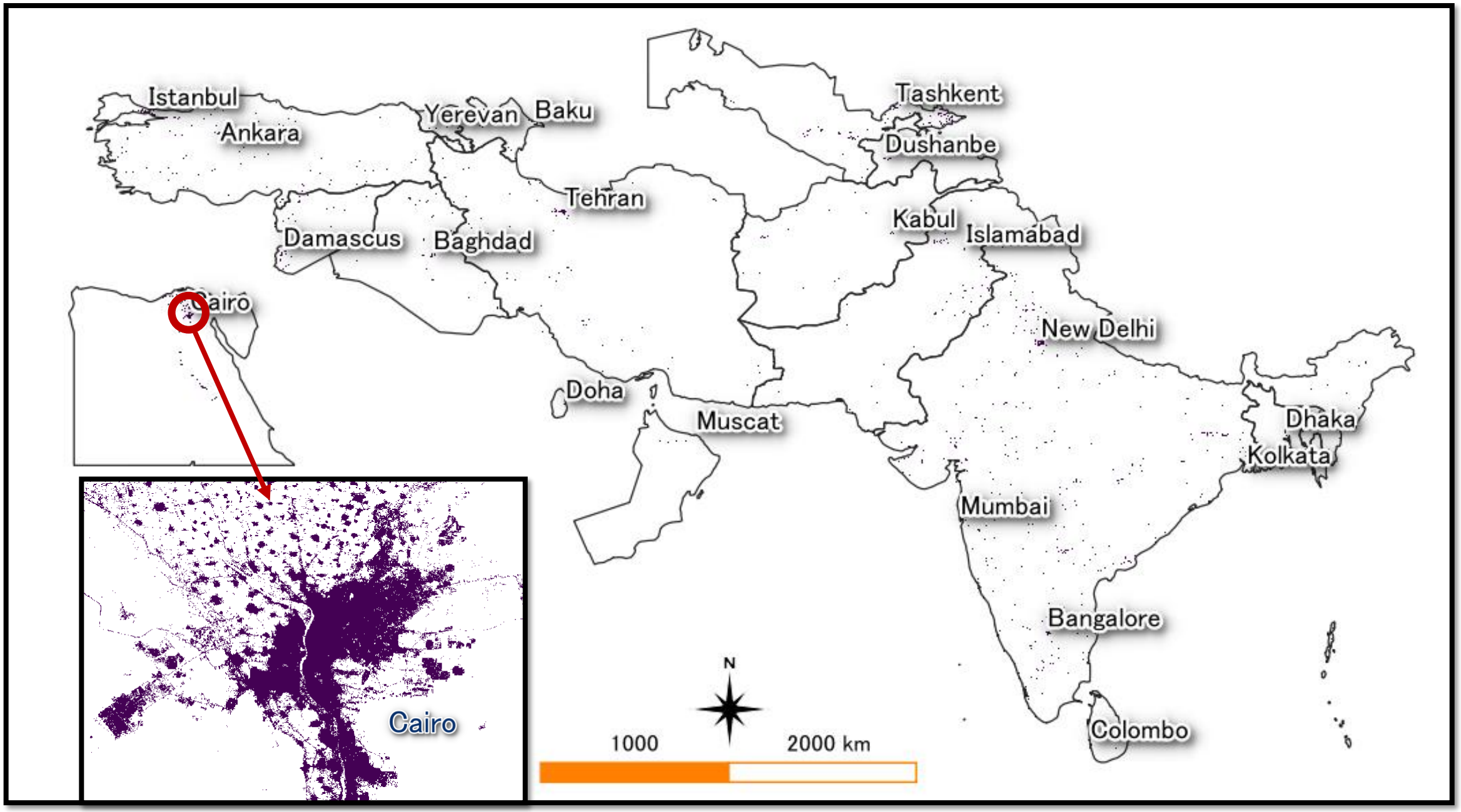


United Nations Educational, Scientific and Cultural Organization

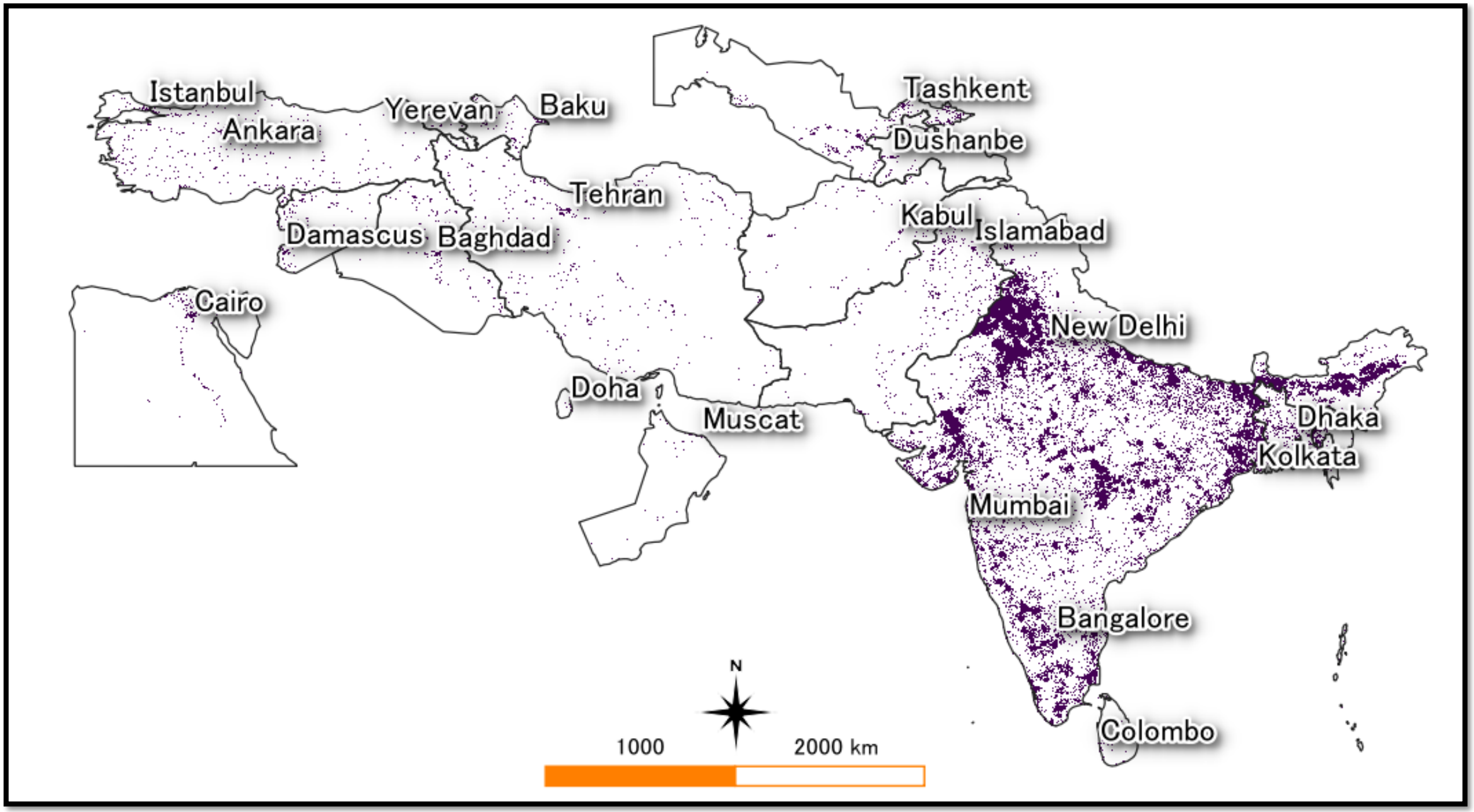
Regional Centre on Urban Water Management (under the auspices of UNESCO)

Regional Centre on Urban Water Management - Tehran (under the auspices of UNESCO) established February 2002

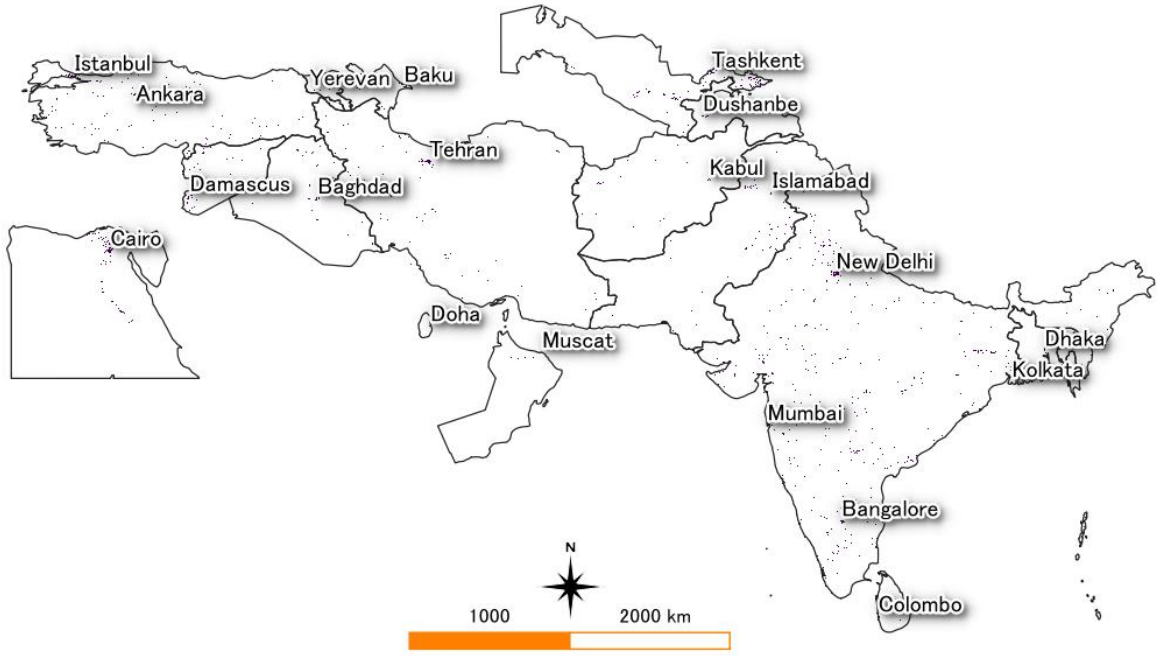
Built-up and Settlement Expansion in **2000** (30m Grids)



Built-up and Settlement Expansion in 2020 (30m Grids)



Comparison of changes in built-up areas from 2000 to 2020



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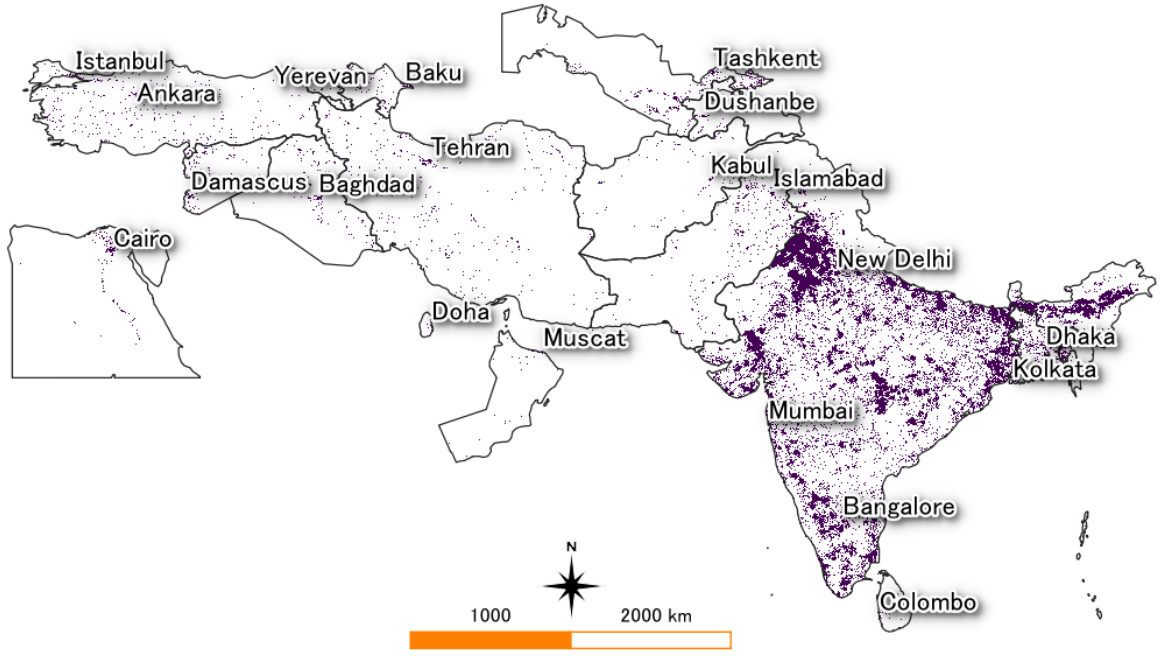

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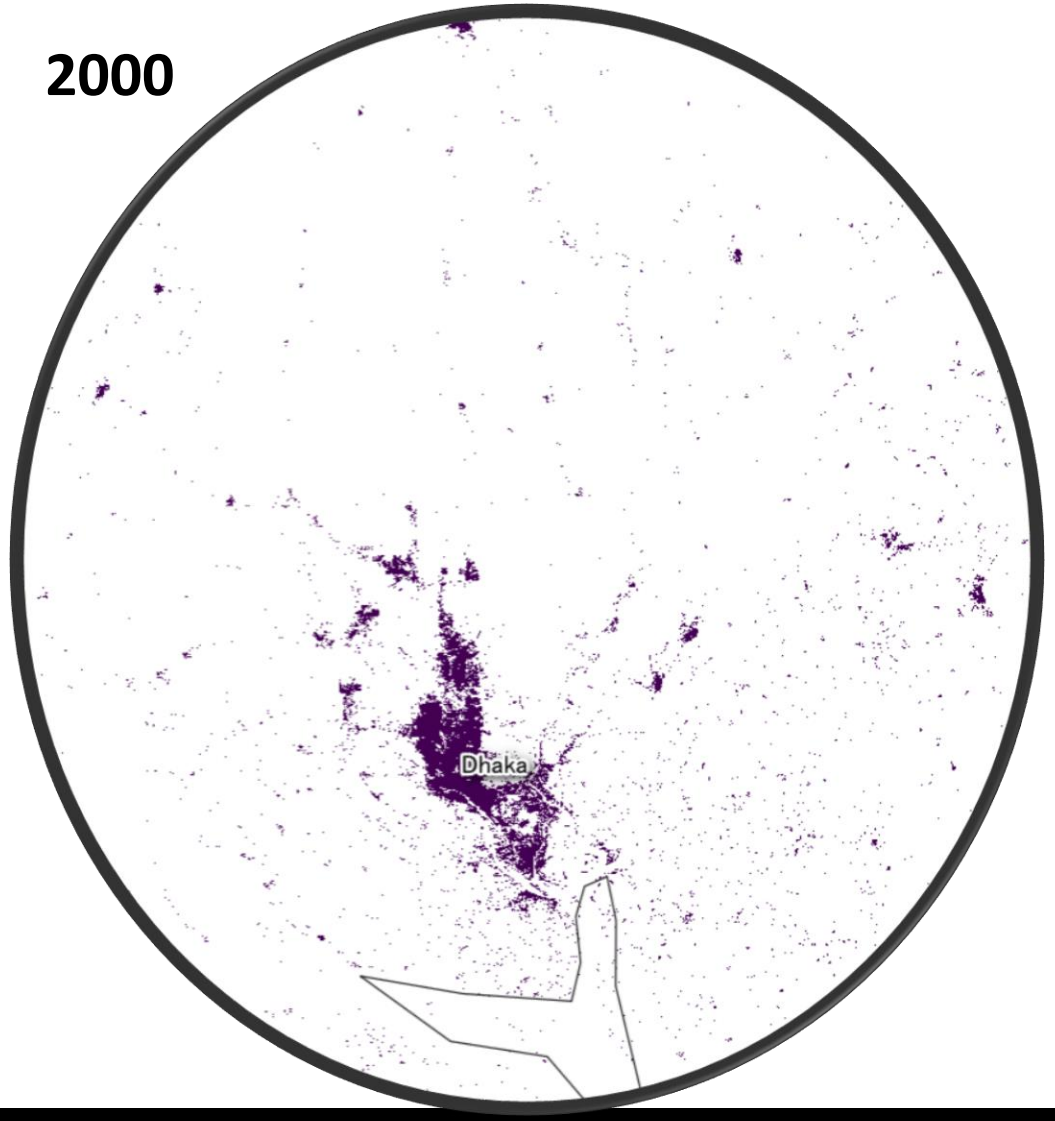

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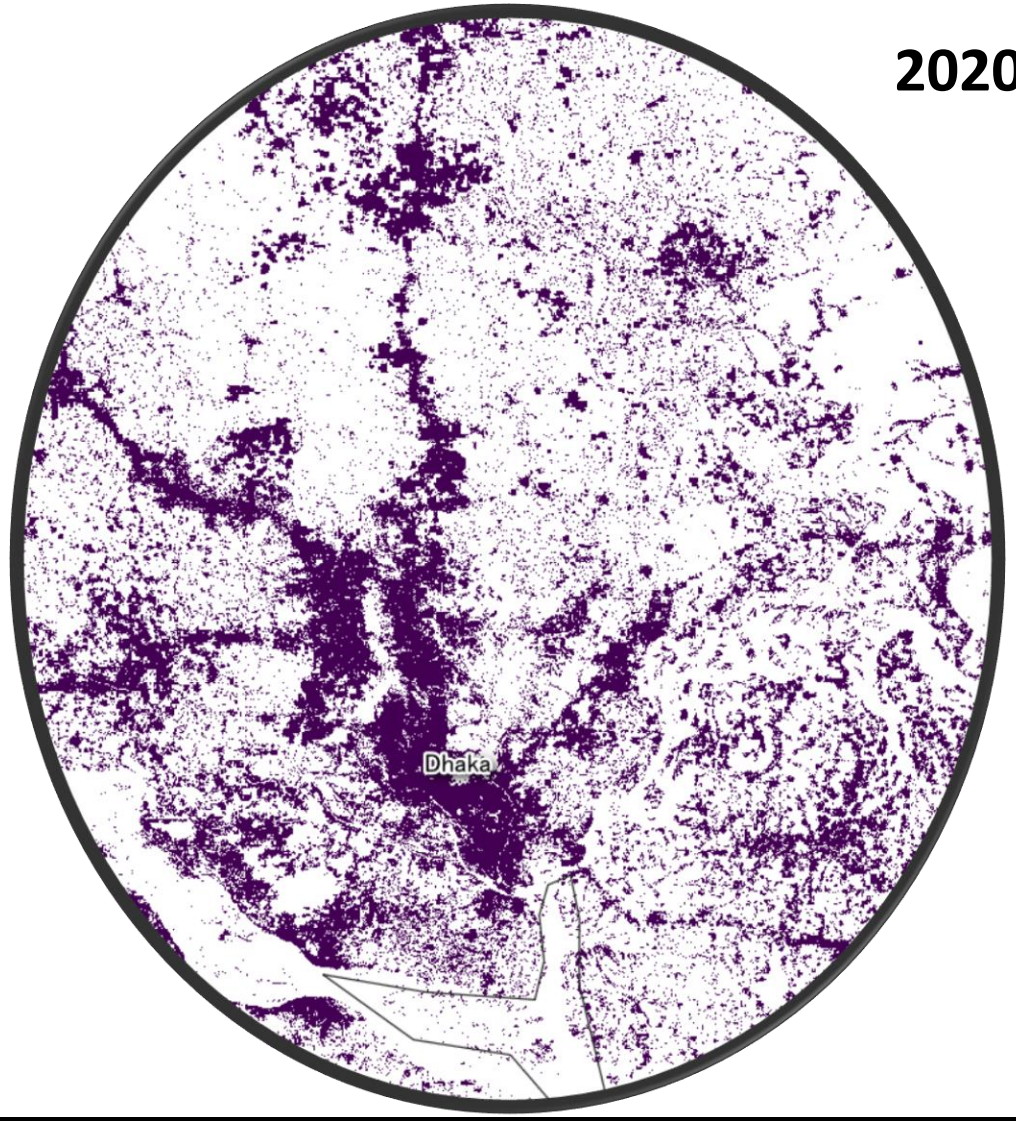

A closer look at the urbanization from 2000 to 2020

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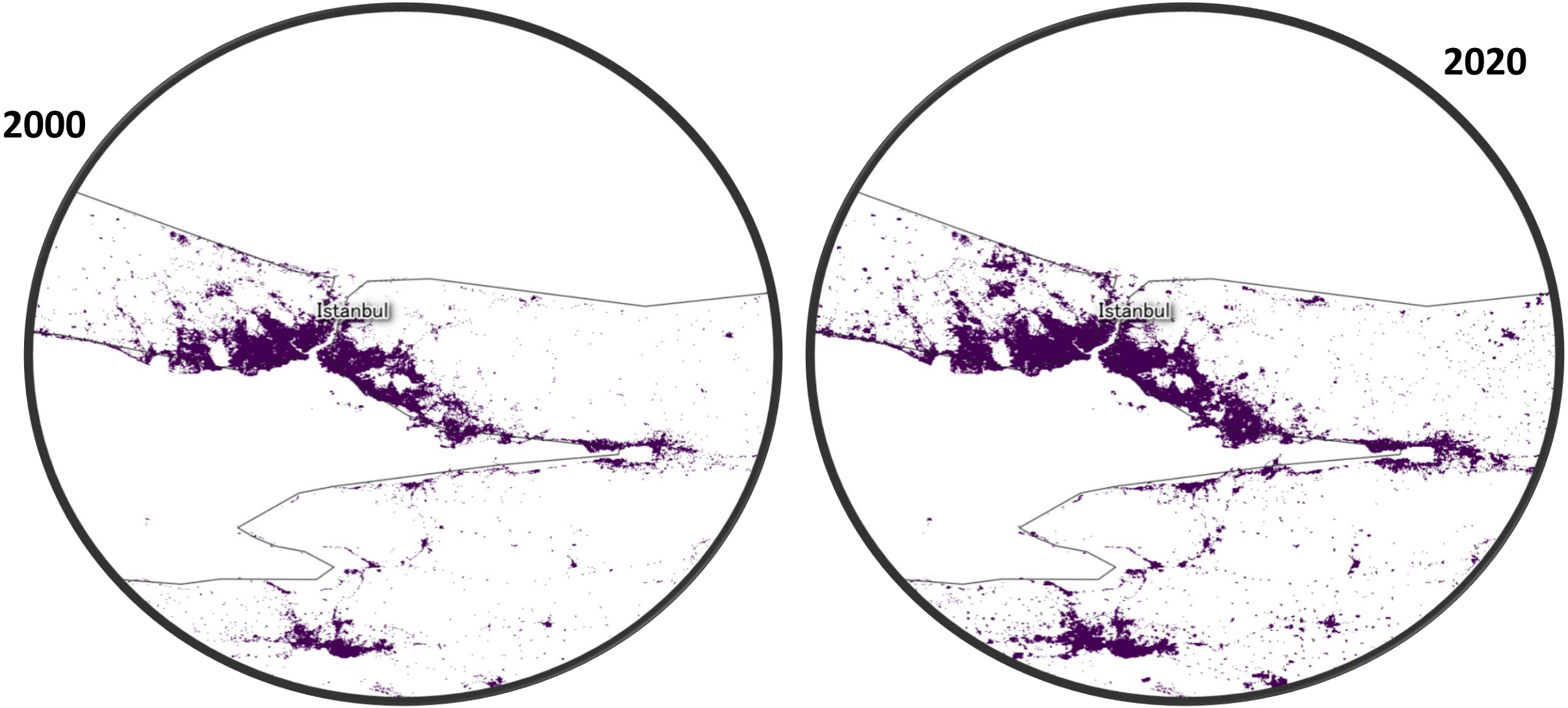

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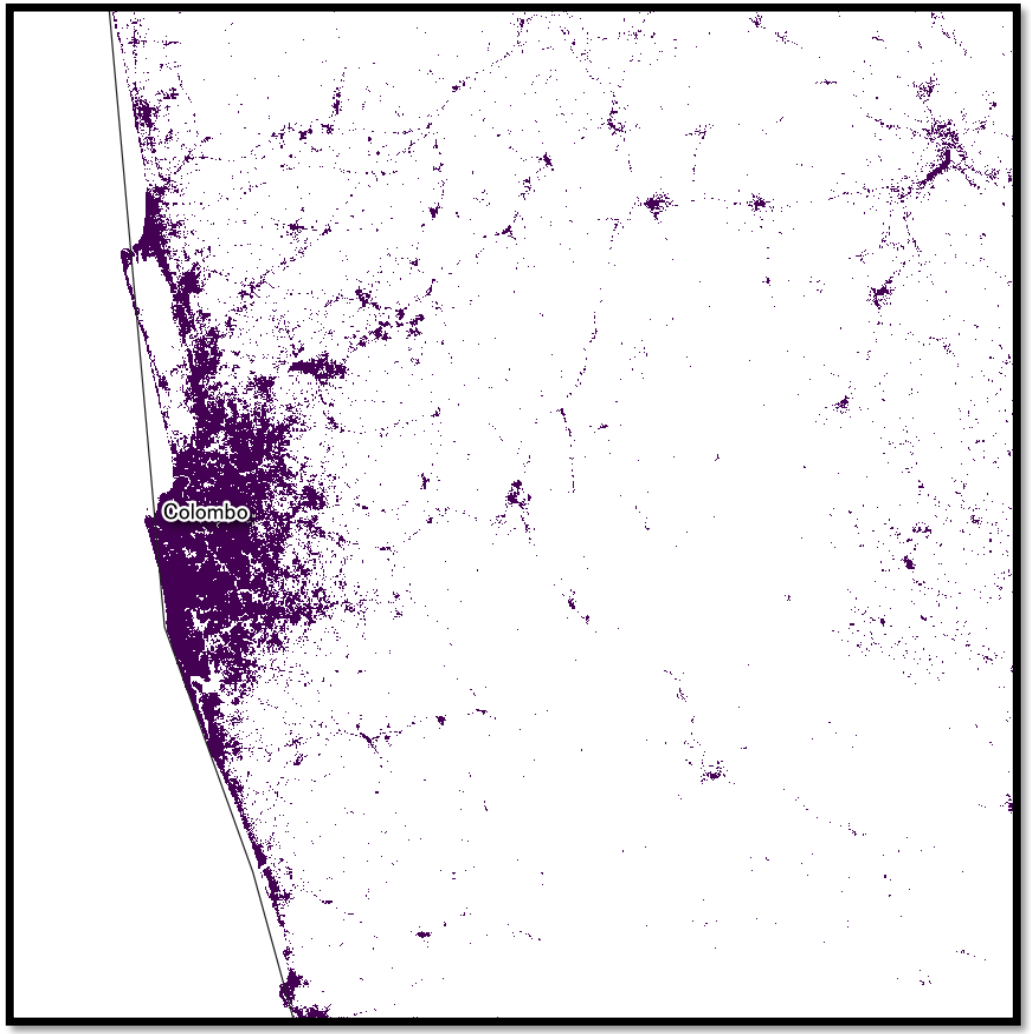

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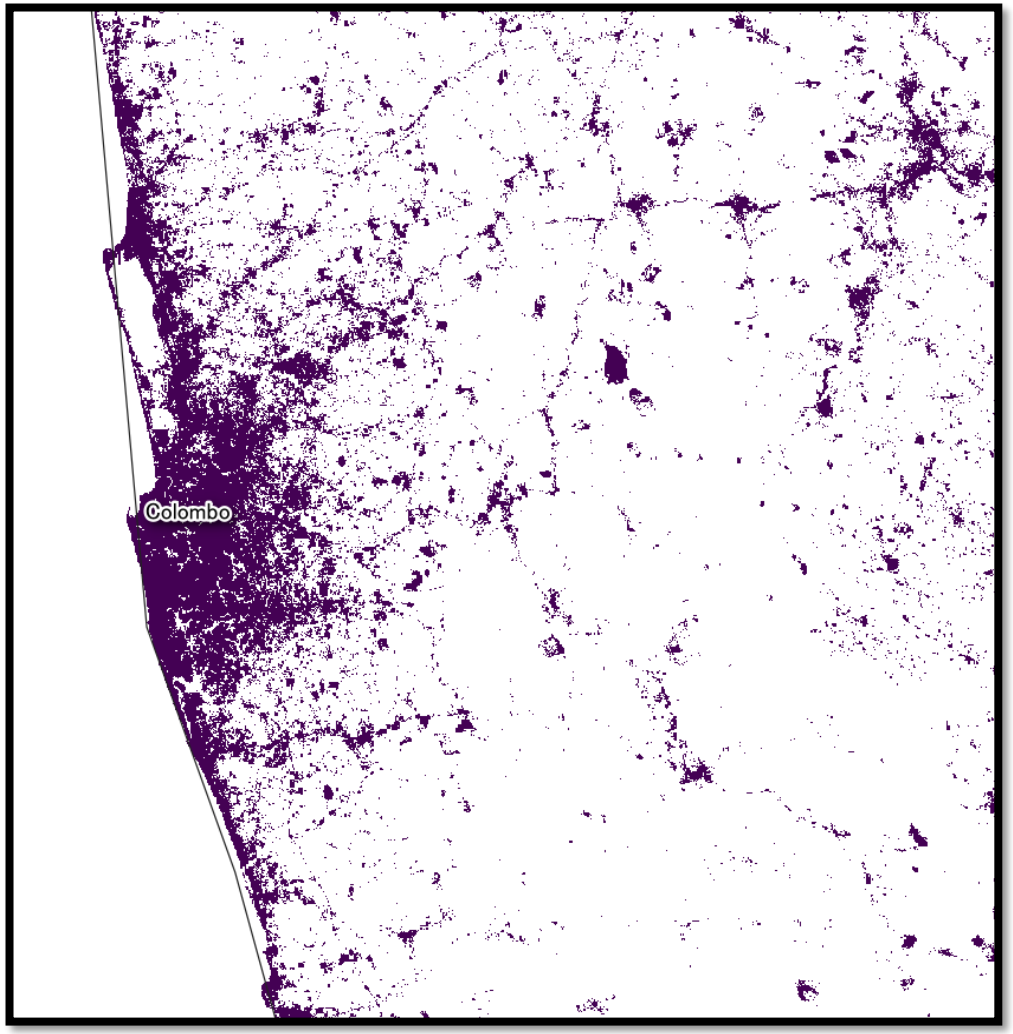

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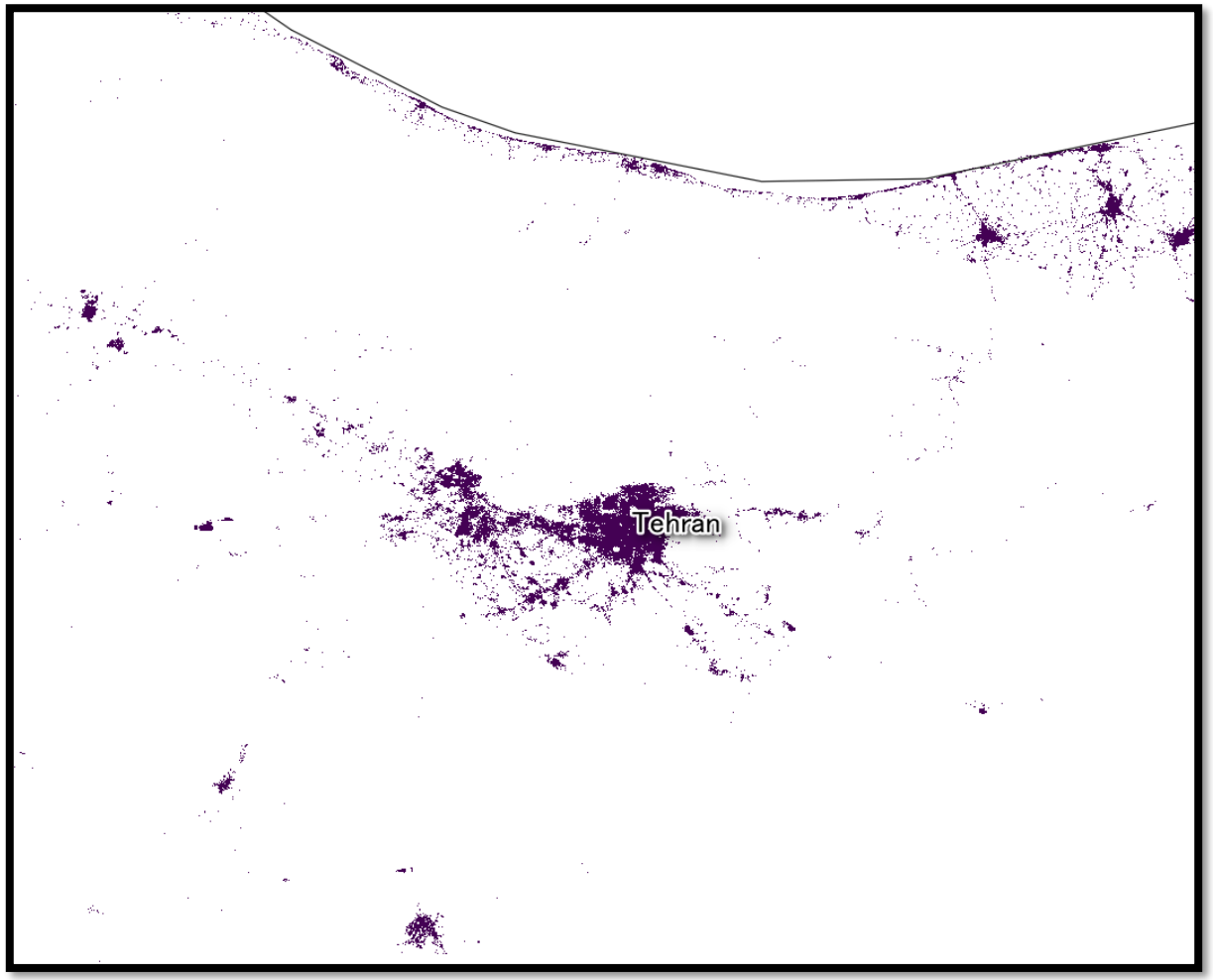

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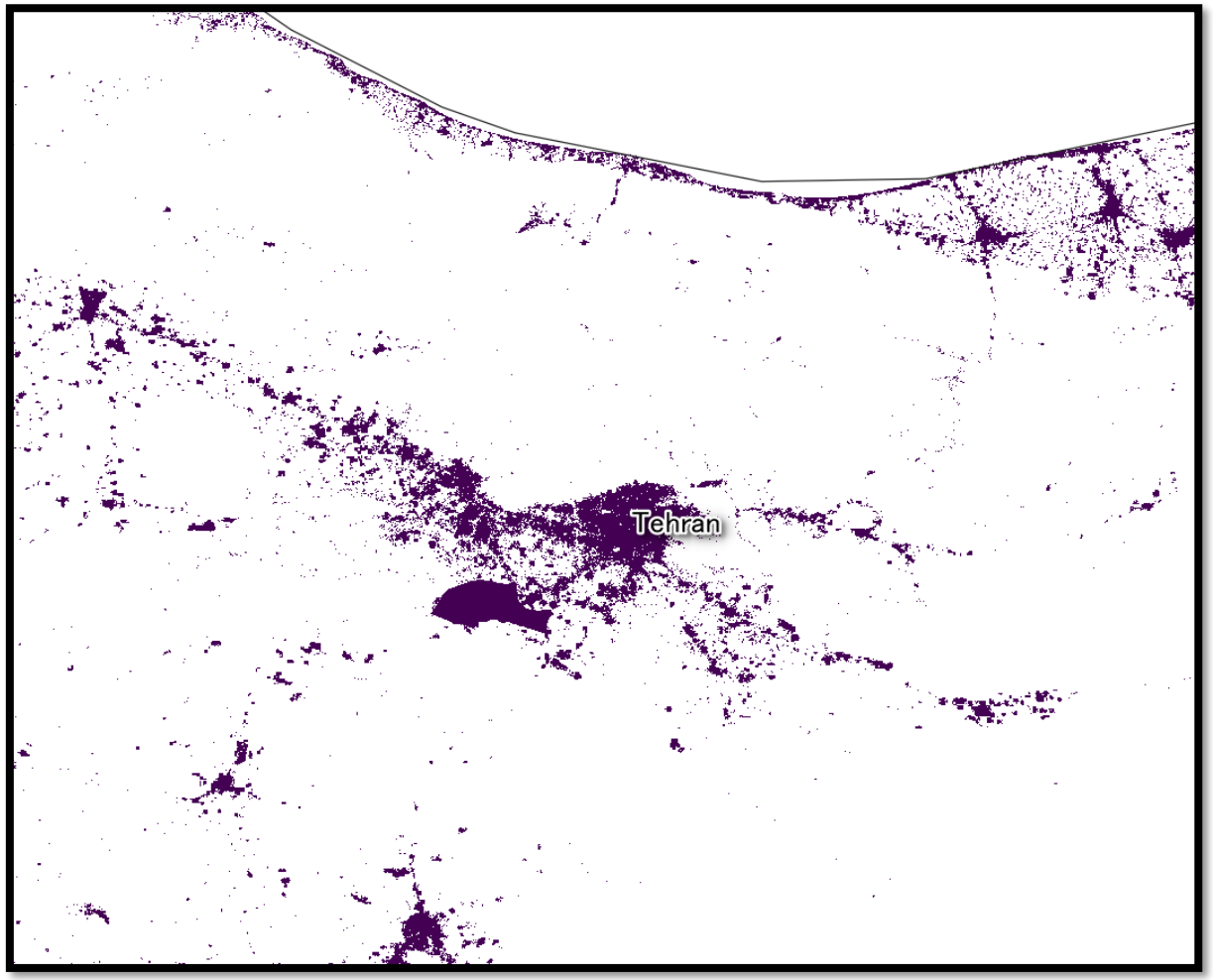
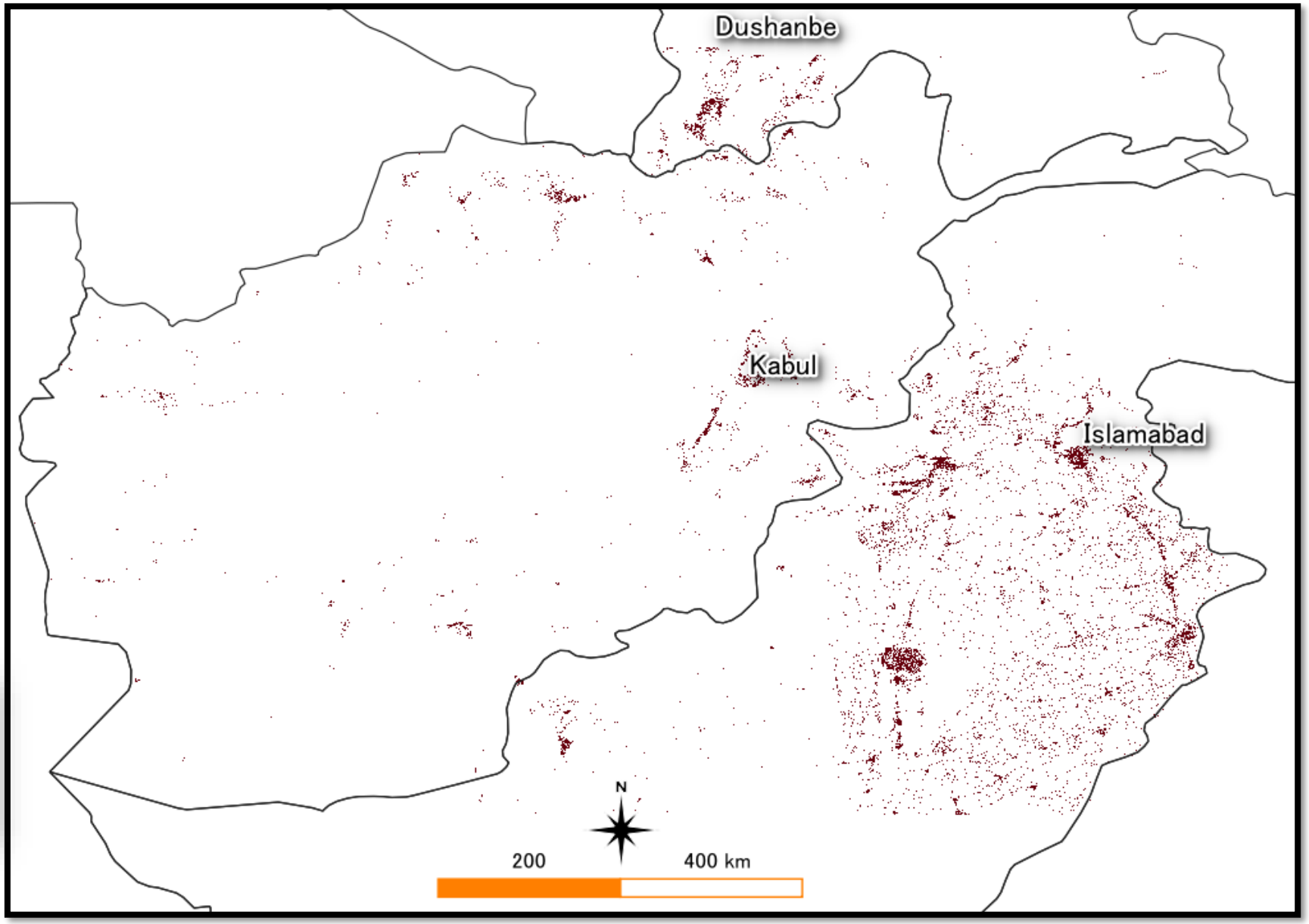
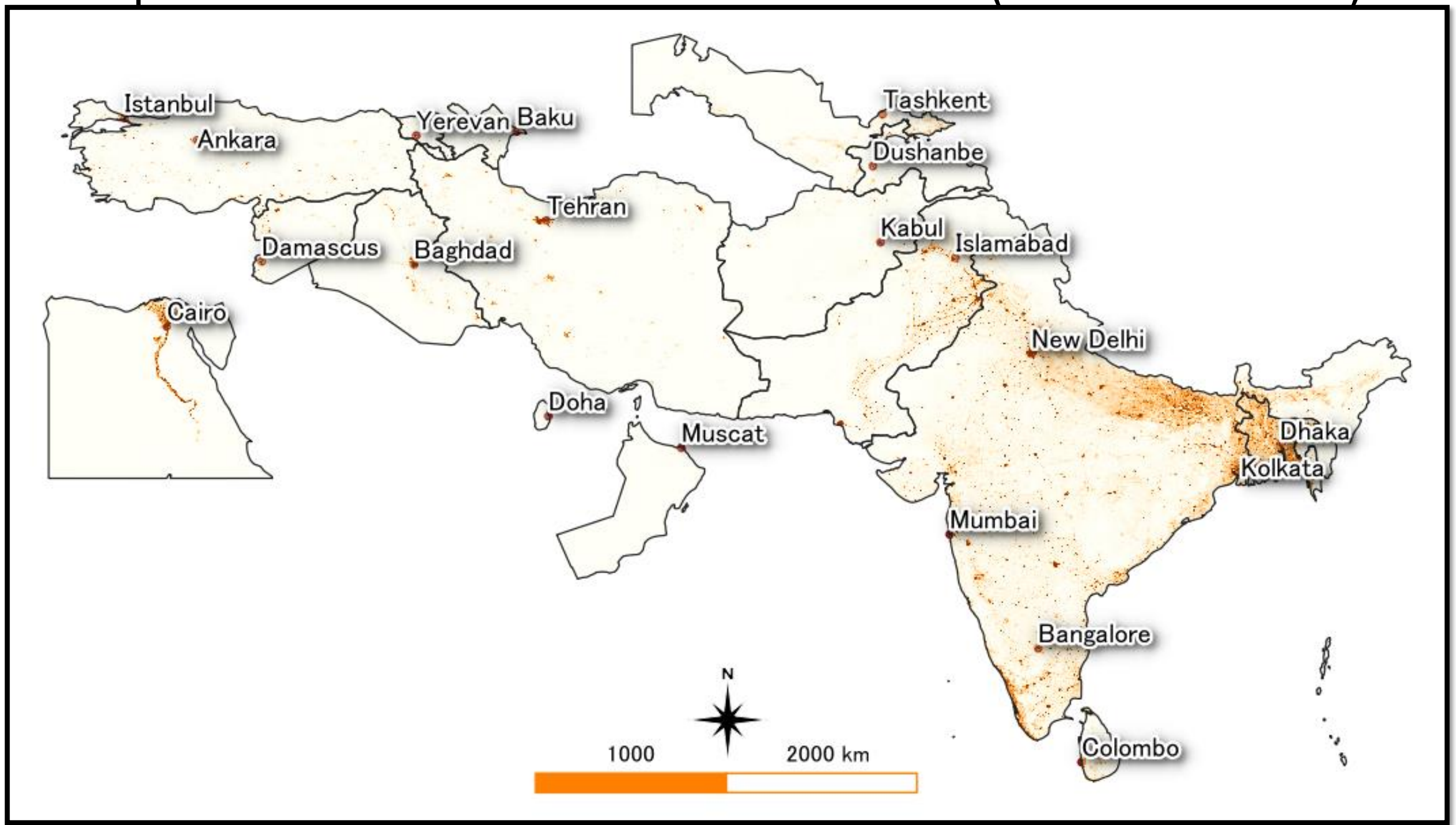


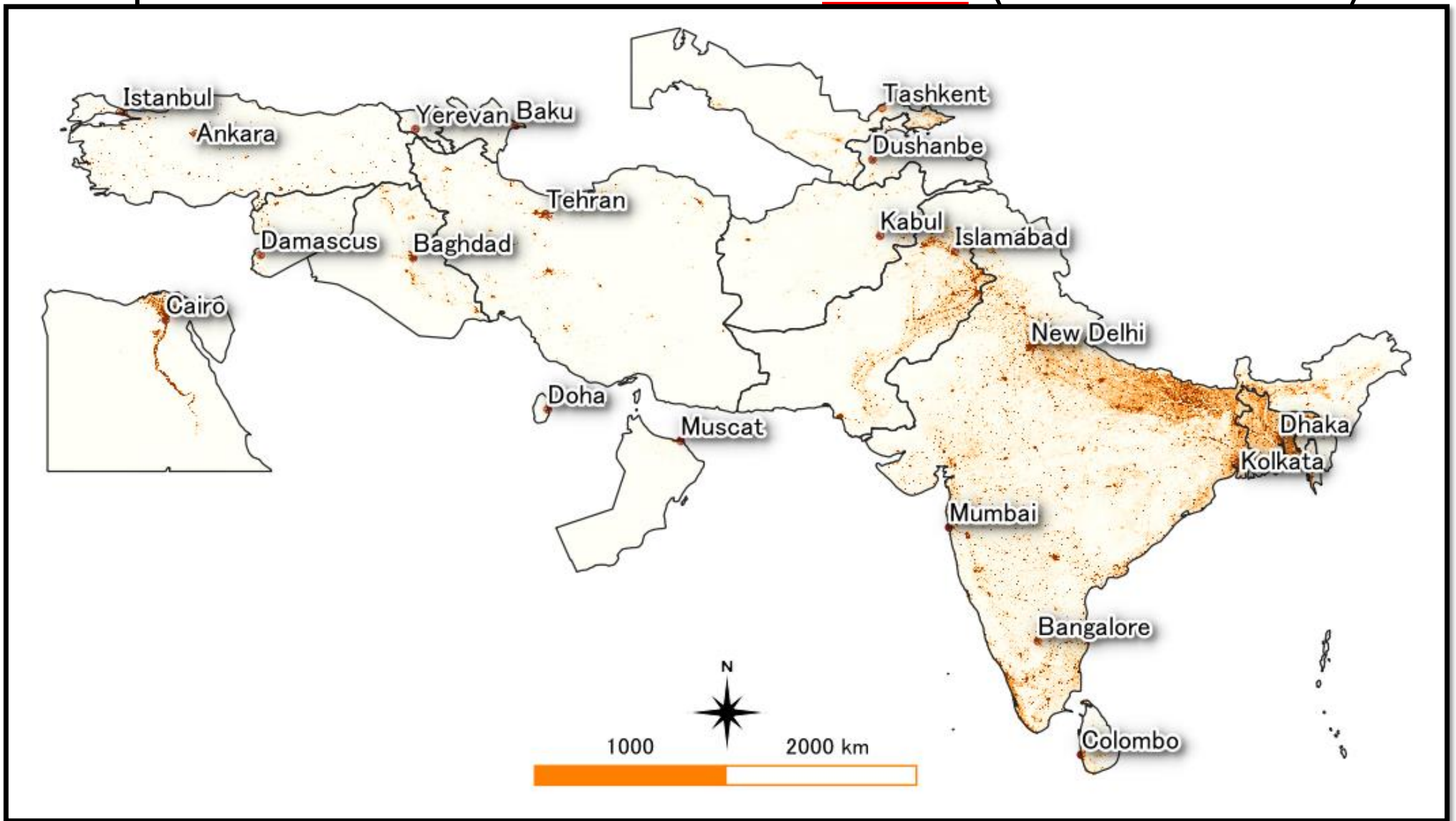
Percentage of changes in built-up areas from 2000 to 2020



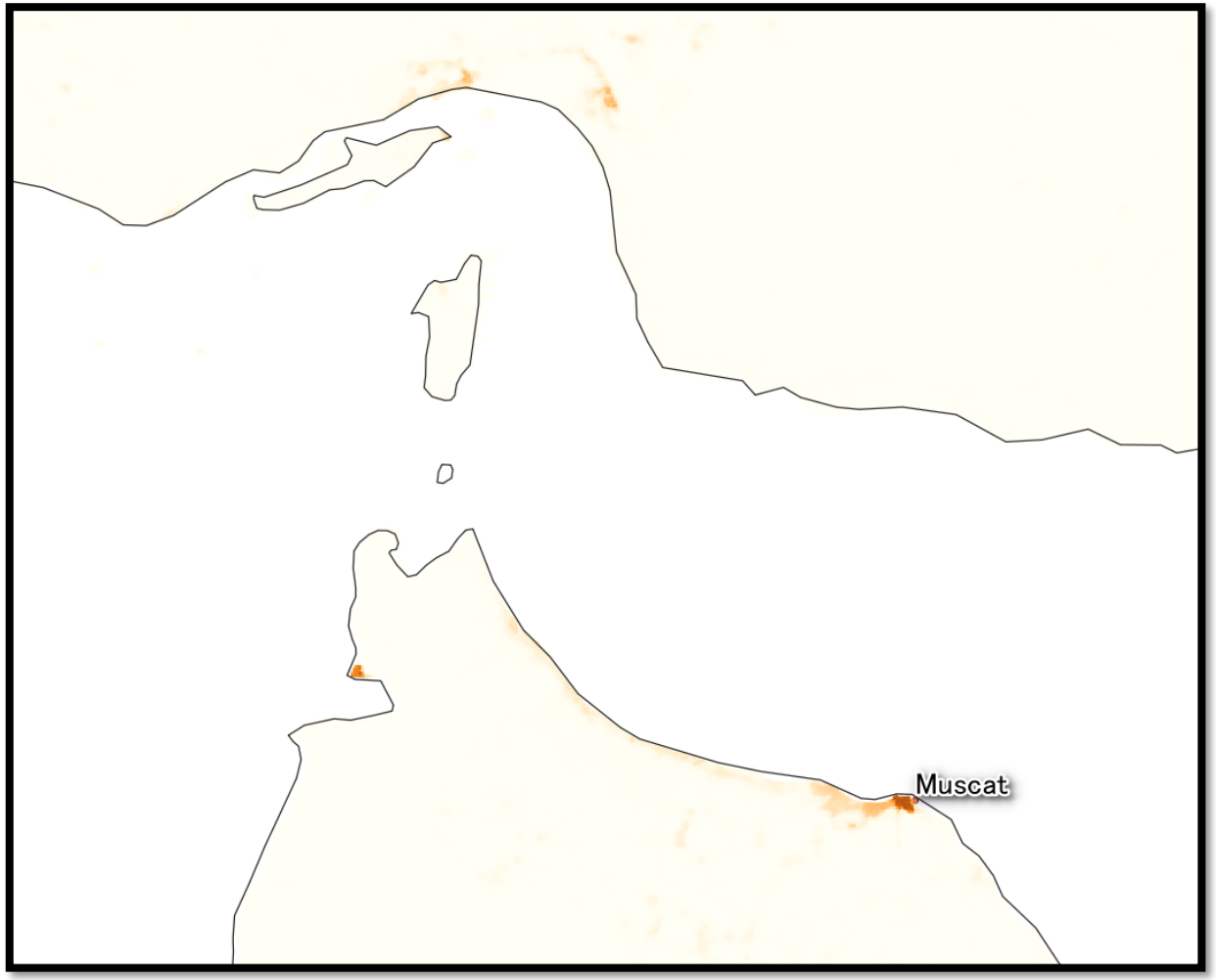
Population Distribution in **2000** (100m Grids)



Population Distribution in 2020 (100m Grids)



A closer look at the population change from 2000 to 2020



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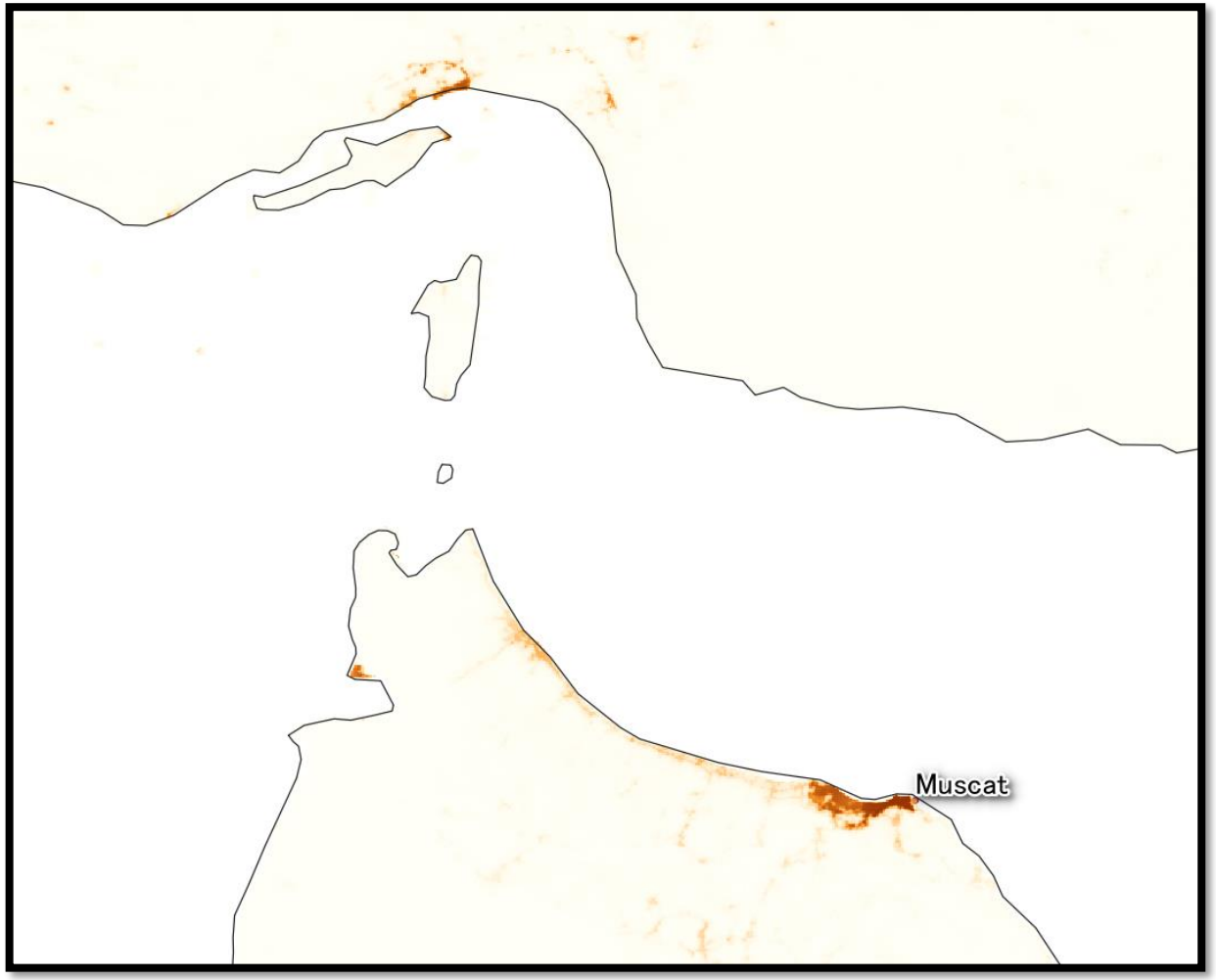

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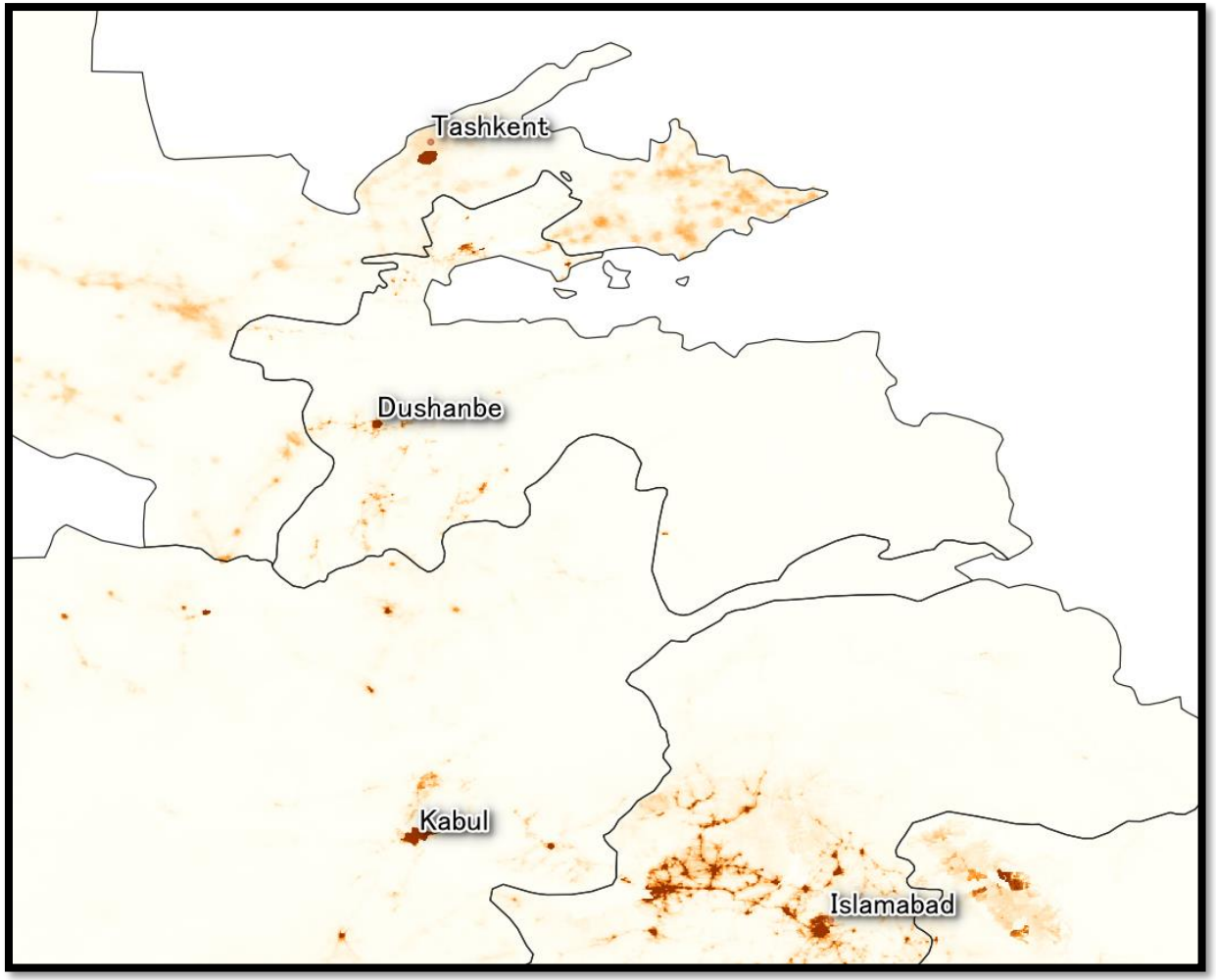

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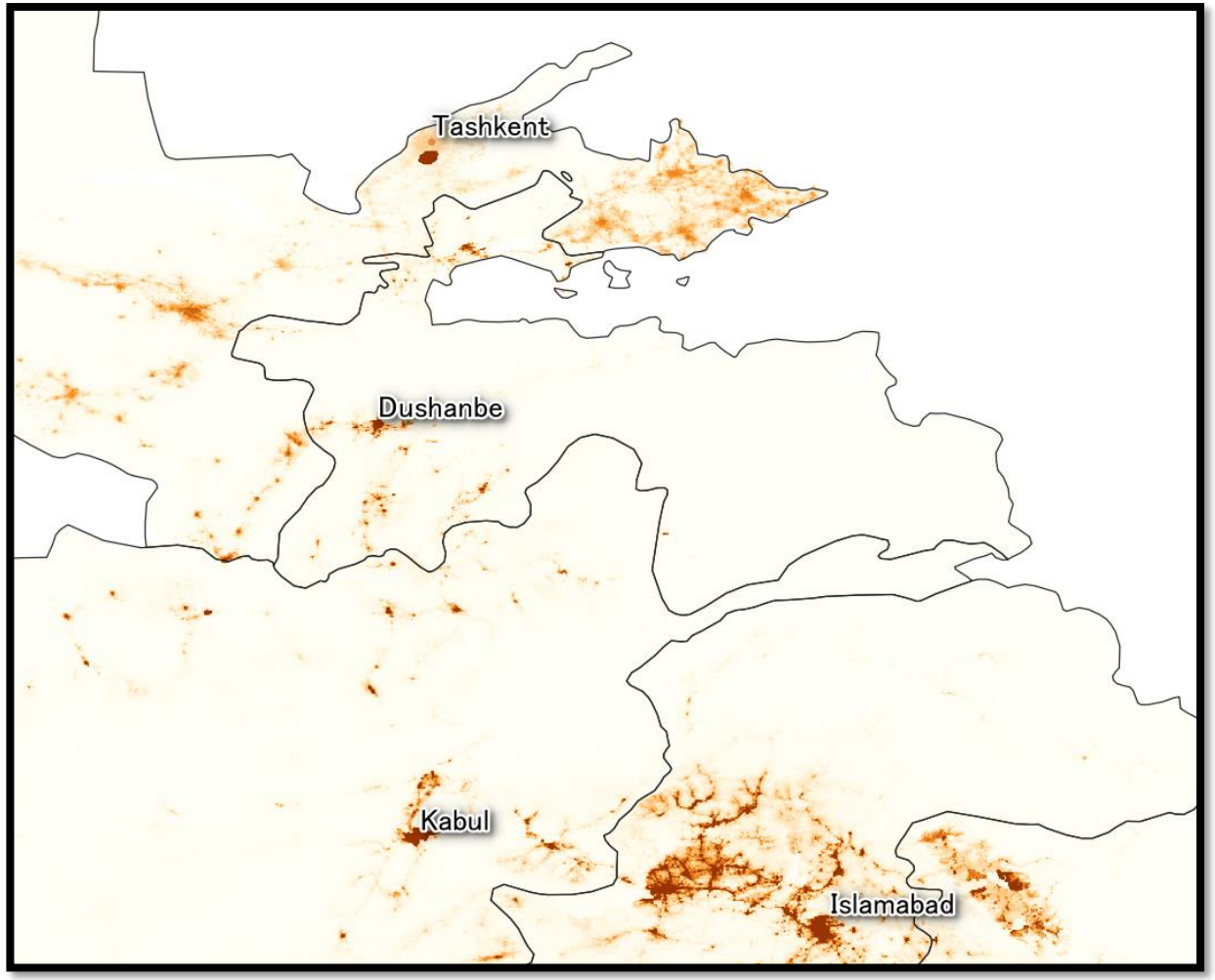

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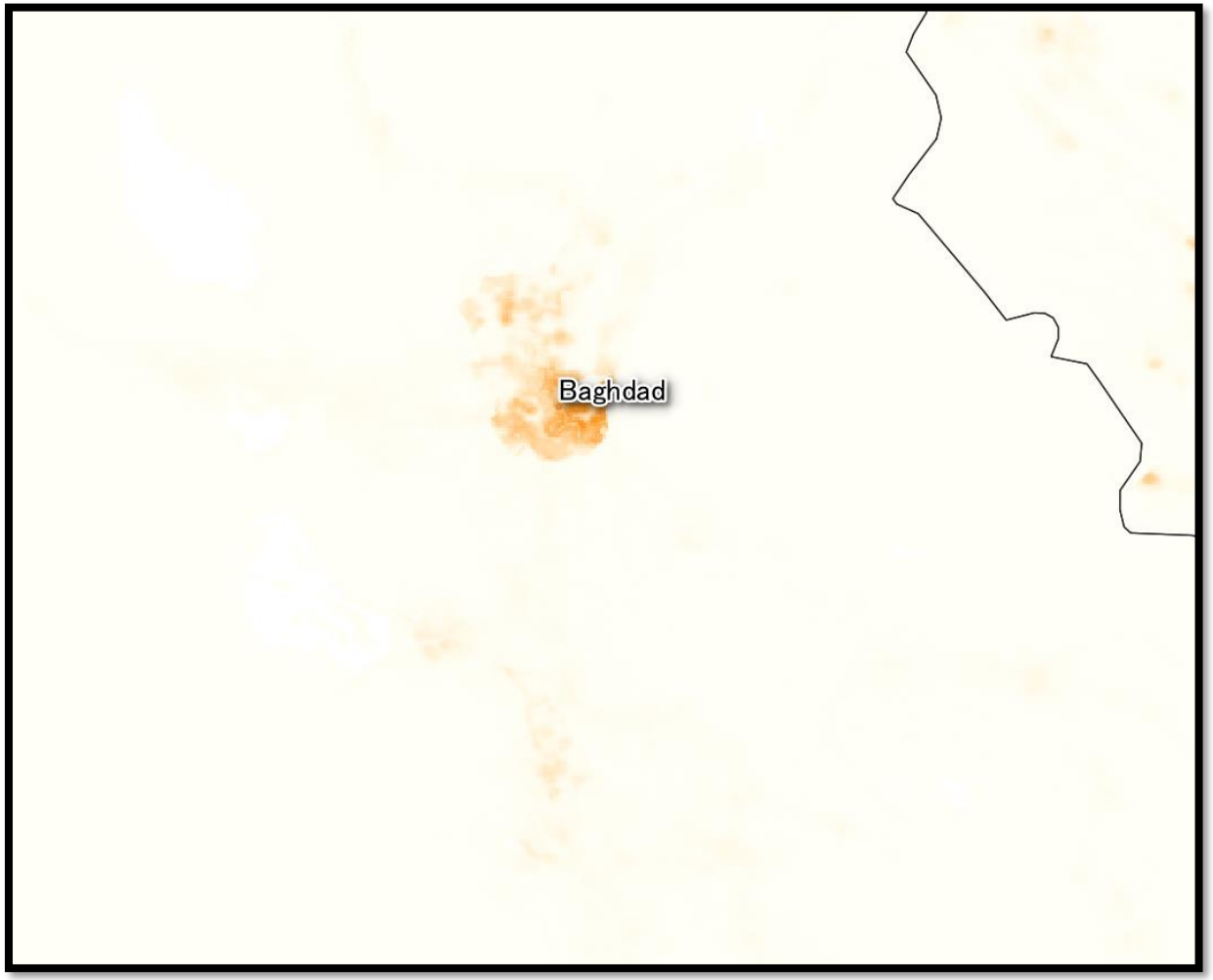

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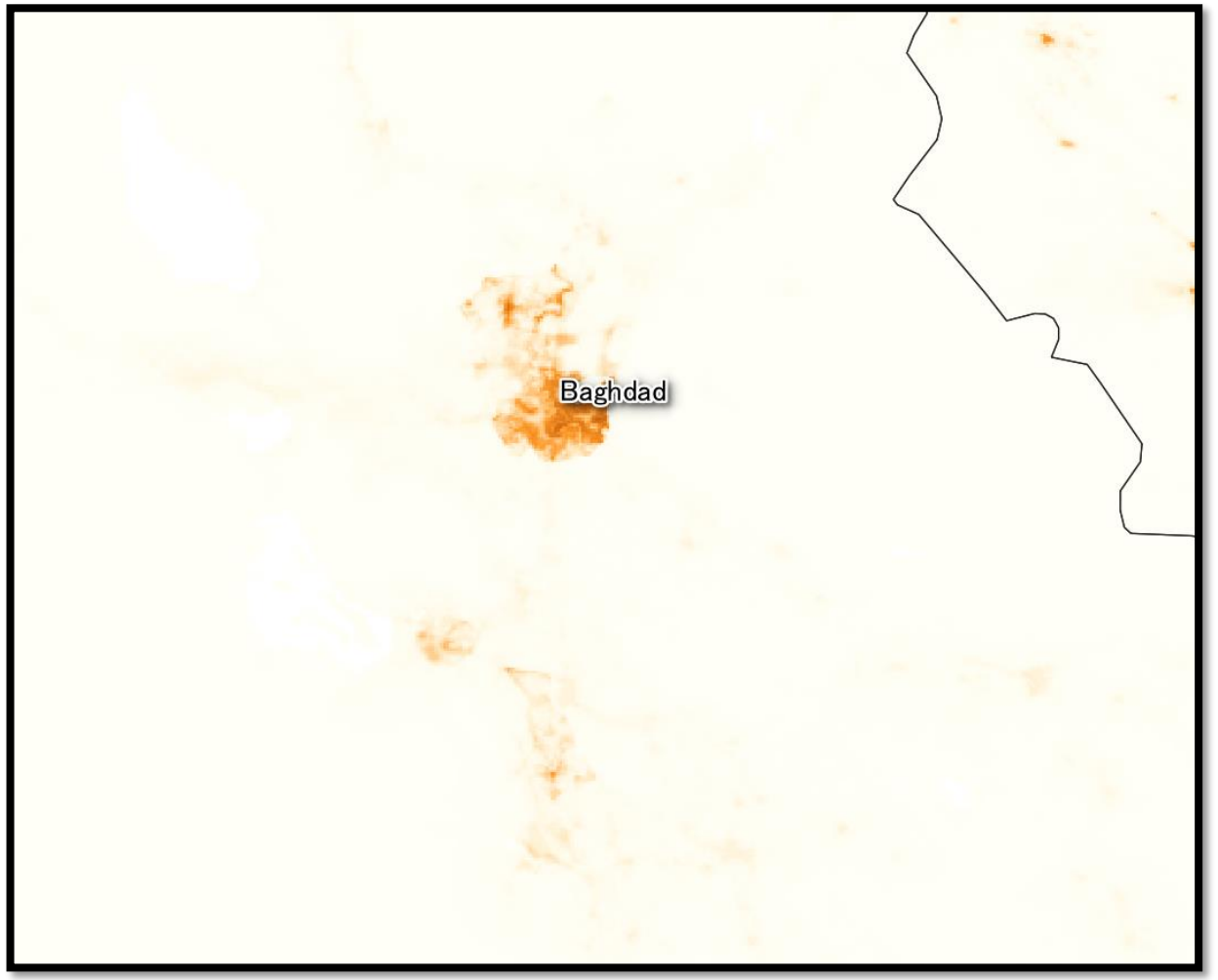

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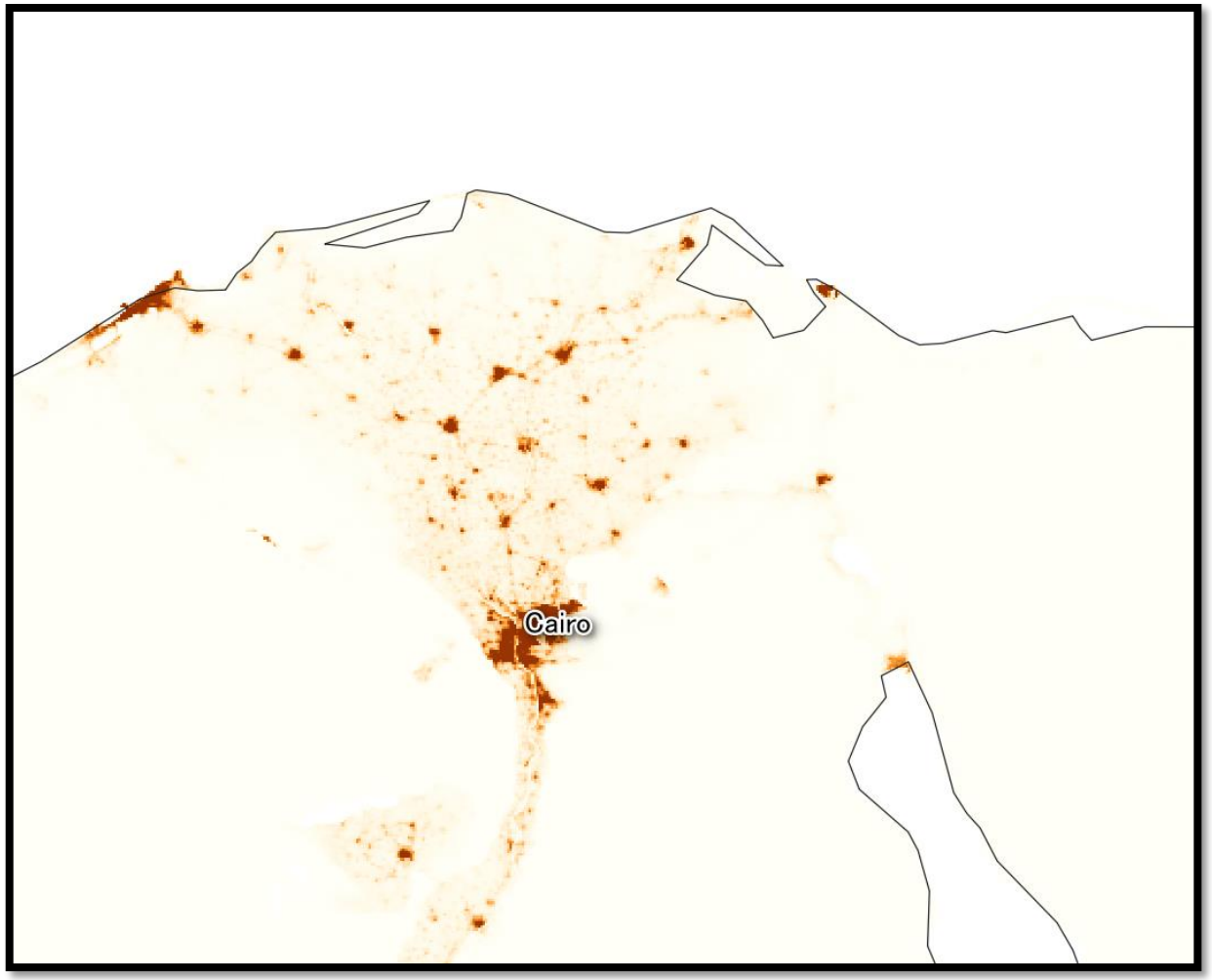

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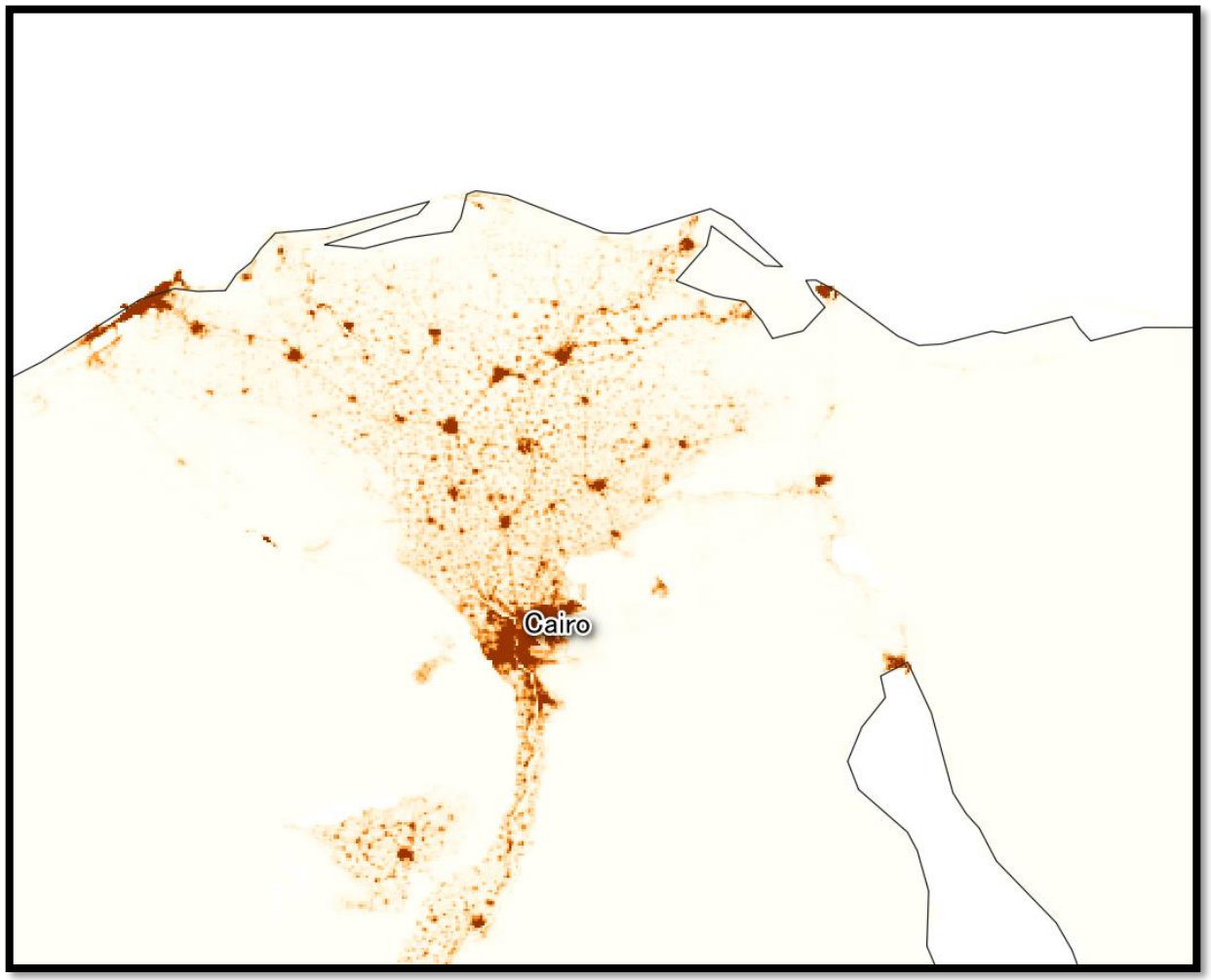


2020

Conclusion:

1. Importance of quality-assured local data and observation

2. Synergy among local and global data

Methodology

Governments are conducting national census (population, etc.) periodically.

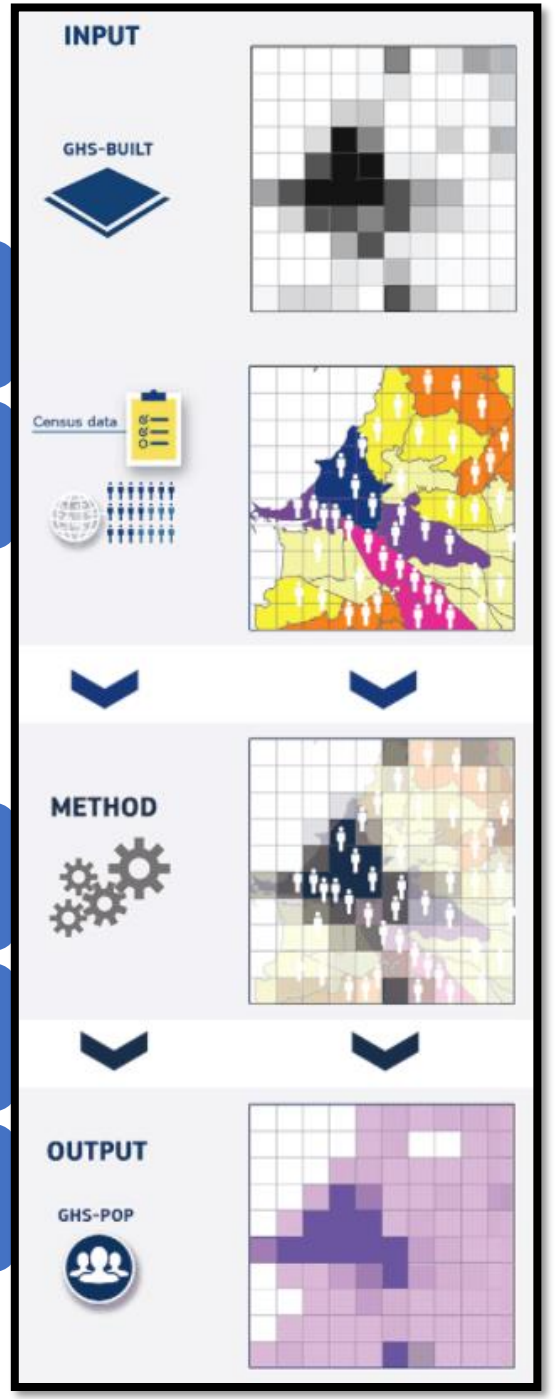
These census data are at different local levels:

- Admin Level 0: National population
- Admin Kevel 1: Prefectures, Provinces, Districts
- Admin Level 2: Cities, Towns, Zones
- Admin Level 3: City Wards, Smaller Zones
- Admin Level 4: Village, Local Areas

The census result are shared. (e,g. with UN)

These census data at different admin levels will be added to the built-up areas detected from satellite images.

The result is population distribution map at a fine resolution of about 100m.



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THANK YOU
FOR YOUR ATTENTION