

Analysis of urban sprawl phenomenon

Detection of city growth based on spatiotemporal analysis and landscape metrics.

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Knowledge for Tomorrow



Presentanion Outline

1. Introduction:
 - Urban sprawl definition
 - The need of mapping cities
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3. Materials and methods
4. Project target
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 - Urban footprint
6. Sprawl measured by landscape metrics
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7. Discussion



Introduction – sprawl definition



Image source: maps.google.com



Introduction – the need of mapping cities

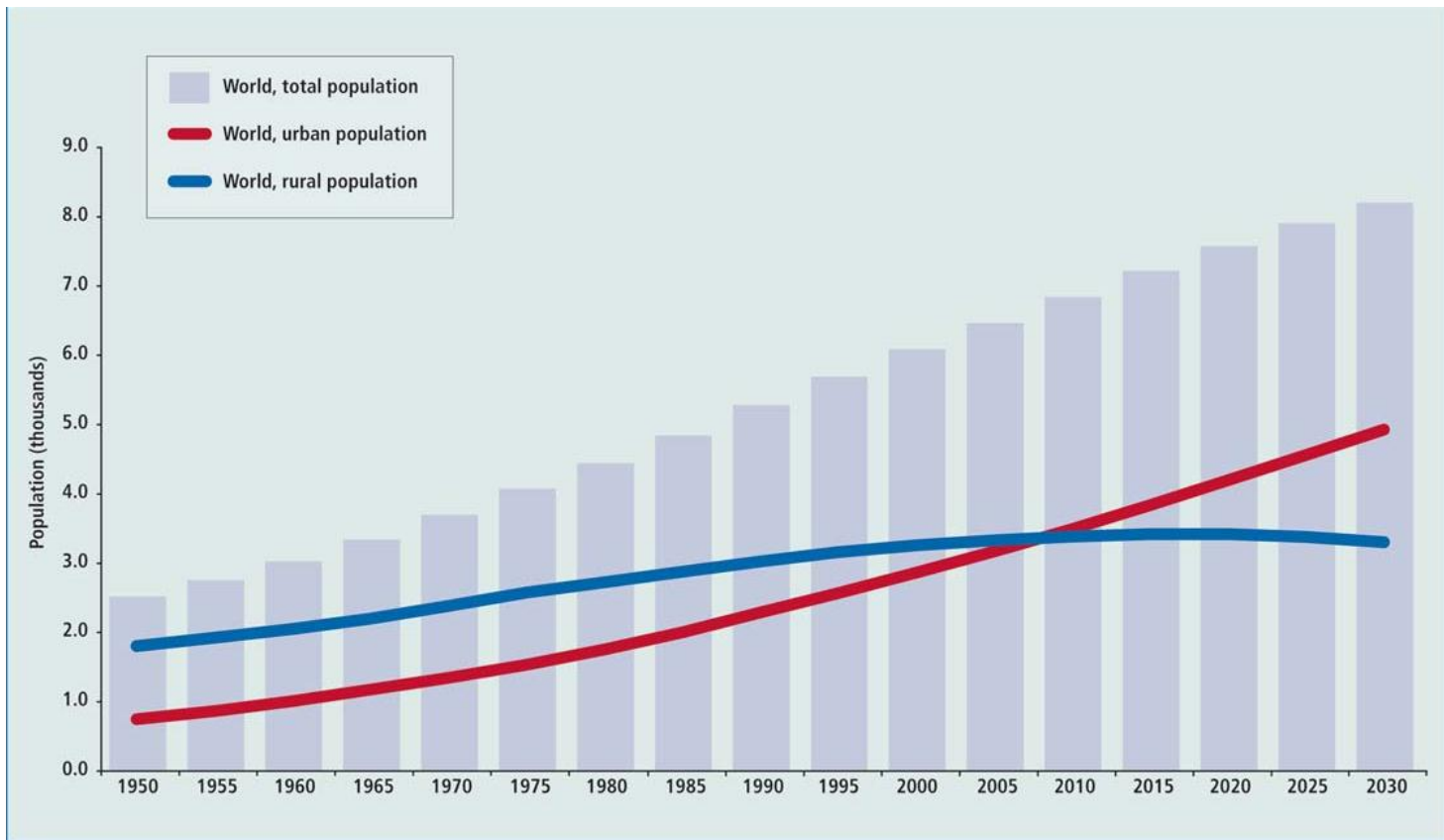


Fig. 1. Urban and rural population of the world, 1950-2030, Data source: UN Population division.



Introduction – the need of mapping cities

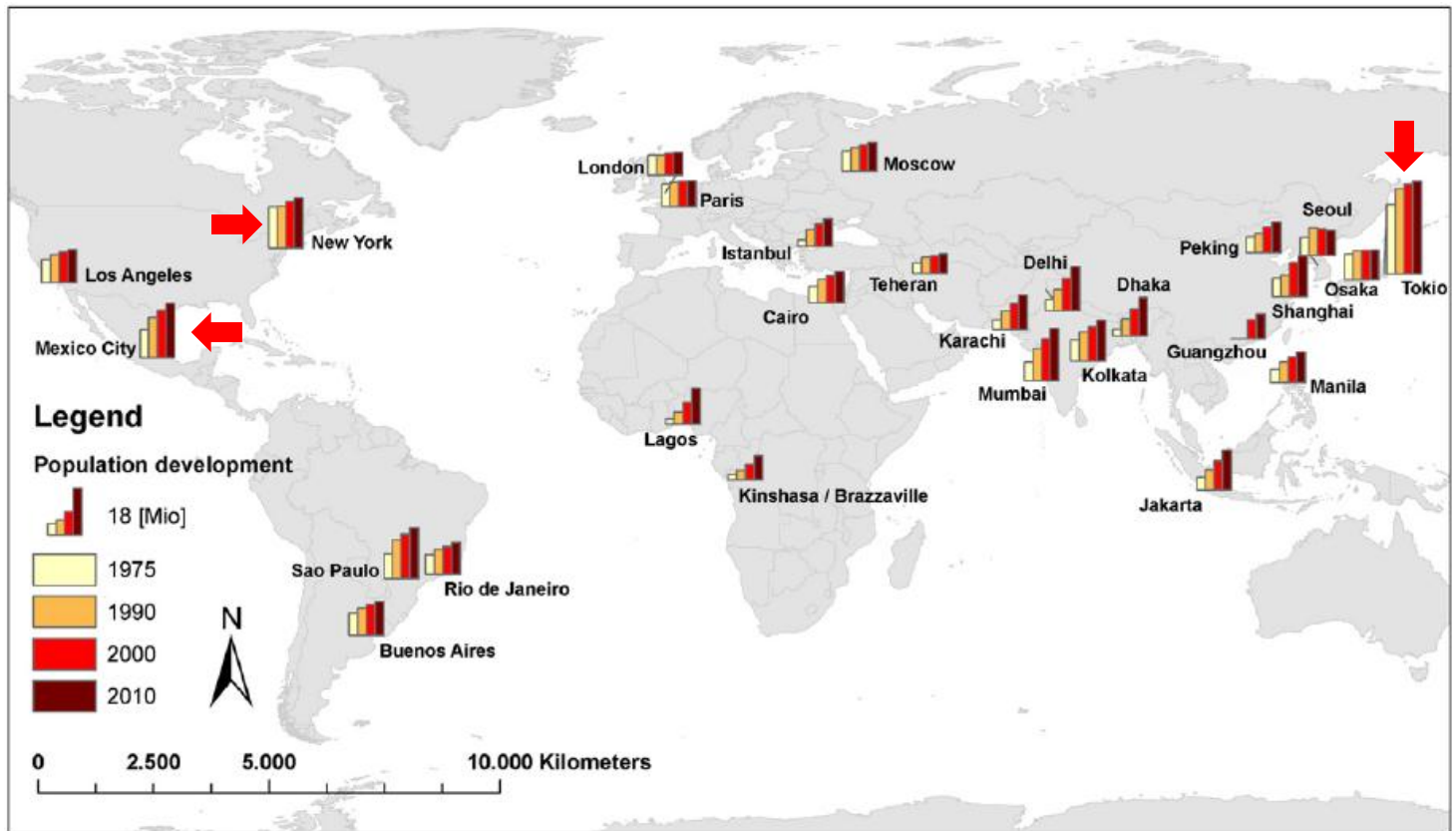


Fig. 2. Spatial distribution of the current mega cities of the world and their population development since 1975. [8], Data source: UN (2007).



How urban sprawl can be measured ???

- **Landscape metrics**

- From many applied only certain part of them is eligible for description of this phenomenon
- According to (Ritters et al.) 26 out of 55 are good to describe landscape pattern

- **Time series analysis**

- To show direction of growth



Project target

- Find out if cities are sprawling or not.
- Derive urban footprints of cities under consideration
 - OOC (Object oriented classification)
- Applied landscape metrics as suitable measure to detect sprawl
 - (e.g.: Shannon's Entropy, Fractal dimension, Patch per Unit)



Materials and methods

Materials:

Landsat data: 1-5 MSS, 4-5 TM, 7 ETM+

Methods:

Object oriented classification

Applying landscape metrics by means of:

- R scripting language
- Different kind of landscape analysis software like:
 - Fragstat, fragstat tool for ArcGis



Sprawl measured by time series analysis

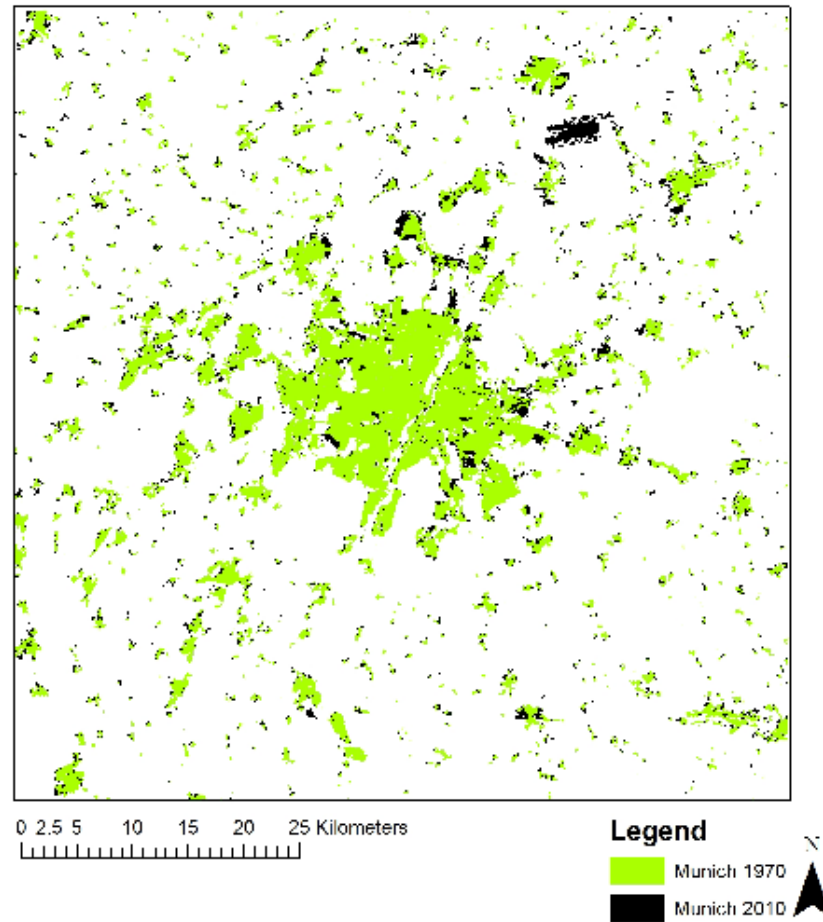


Fig. 3. Urban footprint of Munich city, 1970/2010



Discussion

- Advantages:
 - Open source = flexibility
 - Adjustment results to our needs
 - All calculations located in one script, thus it is not necessary to switch among the software
 - Save of time
- Disadvantages:
 - Long time to learn OOC classification methods



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Thank you for your kind attention !



Any questions? Now or never ;)

Image source: NASA

