From *Urban Morphological Zones (UMZ)* to harmonised «urban objects » in Europe

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1. Toward a European urban database, stakes and approaches

A. General background: two main approaches

1. **Bottom-up** approach
   Compilation of national definitions, *harmonization* through interactions between national expertise / recommendations by European instances
   ➔ FUA (ESPON), LUZ (Urban Audit), City Core (Urban Audit)

2. **Top-down** approach
   Same criteria at a European scale, generally based on automatic processes (satellite images), need urban expertise to *validate* results
   ➔ GRUMP, Global Land cover, e-Geopolis, UMZ
1. Toward a European urban database, stakes and approaches

A. General background: two main approaches

**UMZ:**

Created in 2004 by the Environment European Agency

Defined from Corine Land Cover classes contributing to the “urban tissue and function”, minimal resolution 10ha (300x300m)

Continuous built-up area (i.e. laying less than 200 m. apart)

Population density grid laying on built-up zone

*Urban Morphological Zones 2000, Available on EEA website*
1. Toward a European urban database, stakes and approaches

B. Context and framework of our approach

1. Scale: urban agglomerations (>2000 inh.)
   Results not usable for local studies (real estates, urban fringes...)

2. Perspectives: International comparisons (between European countries)
   Comparing urban socio-economic indicators computed in two different countries raises the question of the city definitions (delineations) comparability
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B. Context and framework of our approach

Exemple of urbanisation level:
Denmark (urban areas > 2000 inh.) 62%
France (unités urbaines > 2000 inh.) 76%
1. Toward a European urban database, stakes and approaches

B. Context and framework of our approach

If we consider the UMZ database, urbanization level in Denmark raises to 65% and goes down to 71% in France. BUT…

- Are international criteria well adapted for so different settlement contexts?

- Are there some biases in the UMZ building processes (min. resolution, CLC classes interpretation process, population estimations by data grid etc.)?
2. Methodology: data base integration and urban expertise

A. Main steps of the spatial databases integration process

- Formalisation of the specifications of each database:
  - spatial and temporal resolution
  - definition of the urban space
  - links of aggregation

- Data matching:
  - geometric and semantic correspondances.

- Identification of correspondances

- Quantitative and qualitative evaluation of deviations
  - at macro level
  - term to term
  - equivalent and incoherences

(from Shereen, Mustilère & Zucker, 2004)
2. Methodology: data base integration and urban expertise

B. Schema integration & data fittings (Denmark)

<table>
<thead>
<tr>
<th>Building process specifications</th>
<th>Sources</th>
<th>Spatial resolution threshold</th>
<th>Population</th>
<th>Automatic process</th>
<th>Morphological criteria</th>
<th>Population threshold</th>
<th>Name</th>
</tr>
</thead>
<tbody>
<tr>
<td>UMZ</td>
<td>Corine LandCover 2000 (satellite imagery)</td>
<td>25ha</td>
<td>Population density disaggregated with Corine land cover 2000, pop 2001</td>
<td>yes</td>
<td>a set of urban areas laying less than 200 m apart. Those urban areas are defined from land cover classes contributing to the urban tissue and function.</td>
<td>no</td>
<td>no</td>
</tr>
<tr>
<td>Deviation level</td>
<td>High</td>
<td>Low</td>
<td>Medium</td>
<td>High</td>
<td>Low</td>
<td>Medium</td>
<td>Medium</td>
</tr>
<tr>
<td>Urban Areas (DK)</td>
<td>aerial photography + land register</td>
<td>&lt; 25ha</td>
<td>StatDK, pop 2007</td>
<td>no</td>
<td>the distance between the buildings is not more than 200 m, unless the interruption is due to public facilities, parks, cemeteries, etc. (UN definition of urban areas)</td>
<td>200 inhabitants in the census</td>
<td>yes</td>
</tr>
<tr>
<td>Solution</td>
<td>consider this deviation in the results</td>
<td>introduce a minimal threshold for Urban Areas</td>
<td>use the population density grid for Urban Areas</td>
<td>consider this deviation in the results</td>
<td>ok</td>
<td>introduce a minimal threshold for UMZ?</td>
<td>give a name to UMZ</td>
</tr>
</tbody>
</table>
2. Methodology: data base integration and urban expertise

C. Data matching for the term to term analysis

We have established a **1:1 relationship** between UMZ and Urban Areas on the criterion of the maximum overlaid population:

- An UMZ is linked to the Urban Area (*only one*) that holds the maximum of its population.
- If two UMZ are linked to the same Urban Area only the biggest is considered in the comparison.
3. Results

Aims:
- Estimation of quantitative differences
- Looking for possible systematic biases
- Visual interpretation of the main differences

A. Global analysis

B. Term to term analysis
3. Results

A. Global analysis

- High convergence of the measures

For France:
- Number of agglos. differences between National/UMZ databases = +/- 10%
- Population differences between National/UMZ databases = +/- 5%

For Denmark:
- Number of agglos. differences between National/UMZ databases = +/- 10%
- Population differences between National/UMZ databases = +/- 5%

- No systematic under/overestimation of urbanisation by UMZ from one country to another
B. Term to term analysis

3. Results

1. Integration quality: rather good (proportion of mismatches)
   Denmark: 15% of UMZ couldn’t match (mainly less than 5,000 inh.)
   France: 18% of UMZ (6 of them = large cities like Aix, Lens…)

2. Average differences for matches
   => About +/- 6% in both countries

But in France, a much higher standard deviation, especially for some >100,000 inh.
Unités urbaines
3. Results

3. Typology of main differences (in French biggest Unités Urbaines)

- **Industrial conurbations** (Douai -73%, Valenciennes -42%)

- **Coastal conurbations** (Marseille -32%, Toulon -30%)

- **Monocentric cities** located in low density regions
  (Toulouse -14%, Bordeaux -15%)
Conclusion and discussion

- Better knowledge of UMZ and of the urban patterns displayed by UMZ

- Compatibility between UMZ/national databases?
  - quite high at a macro level,
  - depending on settlement patterns at the level of agglomerations

  Denmark: limits of UMZ and Urban areas fit very well, even if UMZ are in average slightly more expanded than Urban areas

  France: UMZ are less extensive and there are sometimes much larger differences between UMZ and Unités urbaines
Conclusion and discussion

- No systematic bias => **not relevant to bring systematic corrections to UMZ** (ex: buffers)

Need to:
- **complete our typology**
- apply this **comparison protocol** to other countries where morpho-statistic agglomerations are available (ex: Sweden)

• Following step:
make UMZ more operational in countries where there is no national agglomeration database
Thank you for your attention.