27th SCORUS Conference
Session 4: Analysis and research

Statistical grids as tool for small area analysis

Ingrid Kaminger, Gernot Katzlberger and Norbert Rainer
Statistics Austria

11-13 August 2010, Jurmala, Latvia
Content

- Character of statistical grids
- Example: Austrian grid system
- Advantages of statistical grids
- Analytical power of grid systems
- Concluding remarks
Statistical grids

- Geo-referenced data: statistical data that are related to geographical coordinates, rather than just to give region, or administrative regional unit.

- In non-technical terms, grids represent a hierarchical system of square grid nets covering the whole territory of a country or even beyond, with a fixed origin.

- Grid sizes can vary from 100m by 100m up to 10km by 10km or more.
Austrian Grid Map on the Lambert Conformal Conic Projection

Austrian Grid based on the Meridian 13°20'
Lambert Conformal Conic Projection

13°20' East of Greenwich
47°30' North

Gridsize 10km
## Number of grid cells in Austria

<table>
<thead>
<tr>
<th>Grid size</th>
<th>No of grid cells in AT</th>
<th>No of grid cells with buildings</th>
<th>No of grid cells with population</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>total</td>
<td>%</td>
<td>total</td>
</tr>
<tr>
<td>125m</td>
<td>5.533.169</td>
<td>514.506</td>
<td>445.925</td>
</tr>
<tr>
<td>250m</td>
<td>1.374.615</td>
<td>267.345</td>
<td>233.240</td>
</tr>
<tr>
<td>500m</td>
<td>338.753</td>
<td>127.323</td>
<td>112.114</td>
</tr>
<tr>
<td>1000m</td>
<td>85.428</td>
<td>49.406</td>
<td>43.157</td>
</tr>
<tr>
<td>2500m</td>
<td>14.169</td>
<td>11.690</td>
<td>10.138</td>
</tr>
<tr>
<td>5000m</td>
<td>3.741</td>
<td>3.423</td>
<td>3.128</td>
</tr>
<tr>
<td>10000m</td>
<td>1.017</td>
<td>929</td>
<td>897</td>
</tr>
</tbody>
</table>
Properties of the Austrian grid system

- National grids based on the Lambert Conformal Projection
- Seven grid sizes: 125m x 125m up to 10km x 10km
- Data sets: Standard packages and tailor made
  - Population package
  - Building and dwelling package
  - Employment and local units package
  - Heating and energy package
- Confidentiality
- Pan-European grid based on the ETRS-LAEA projection
Comparison between MGI-Lambert and ETRS-LAEA grids
Advantages of statistical grids

- Grids are independent from administrative areas or boundaries
- Grids are evenly distributed over the territory
- Grids are easy to generate from point-based data
- Grids can be manipulated by standard GIS tools
- Grids do not change over time
- Grids are flexible for aggregating data to administrative or functional areas
- Grids are a tool for harmonizing geo-referenced data
- Grid sizes can be chosen that allows protecting confidentiality
... and administrative areas ....

- change constantly
- their size differ within a country and between countries
- they are usually large enough to comprise different kinds of areas inside them, and
- their comparability is weak from region to region and country to country, and over time

(Statistics Finland, 2010)
Analytical power of grid nets / grid datasets

- Uneven distribution of phenomena over the territory
- Density calculations
- Small area analysis/planning
- Cross border analysis
- Integration of different data sources/layers
- Structuring functional areas
Uneven distribution of phenomena over the territory (1)

Example: Population density in alpine areas

- Number of habitants - grid size 500m:
  - 10 - 100
  - 101 - 200
  - > 200

- Population density per 2.5km² grid:
  - 100 - 500
  - > 500

- Population density per km² by Municipalities:
  - 100 - 500
  - > 500
Uneven distribution of phenomena over the territory (2)

Example: Population density in Austria by municipalities

Population density by Municipalities

Population per km² by municipalities:

- < 50
- 50 - < 250
- 250 - < 500
- 500 - < 1,000
- ≥1,000
Uneven distribution of phenomena over the territory (3)

Example: Population density in Austria by 2.5km grid
Small area analysis (planning)

Example: Zoning Classification and Population (125km grid)

Population* 125m grid
- 1 - 50
- 51 - 100
- 101 - 277

*including inhabitants with secondary residence

zoning classification
- building area
- grassland
- allotments
- flood drainage area

Source: zoning plan - city of Klosterneburg
Cross border analysis

Example: Population density in neighbouring areas (Austria – Slovenia)
Integration or different data sources / layers

Example: Inhabitants near a railway track
Structuring functional regions

Example: Delineation of Urban Regions

a) Settlement Units as basis for establishing the core zone 1991

b) Population and workplace density per 500m grid cells for establishing the core zone 2001
Concluding remarks

Advantages of grid systems in comparison with administrative regional units

Possibility for official statistics to disseminate grids data

Analytical power of statistical grids
Thank you for your attention!