Deriving INSPIRE Compliant Land-use Maps from Open Public Sector Information

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Overview

- Approaches to land-use mapping
- Open Public Sector Information
- The register based method
- Examples
- Pros and Cons
- Conclusion
Land-use versus land cover

- Land Cover describes the surface of the earth by its (bio-)physical characteristics
- Land Use defines the use and functions of a territory in terms of its socio-economic and ecological purpose
INSPIRE Data Specifications for Land-use

- Land-use belongs to INSPIRE Annex 3
- Land-use data can be represented in vector as well as raster format
- The Existing *Land Use* application schema enables the provision of information on land uses inside one land use object
Existing versus planned land-use

- **The Existing Land Use** which objectively depicts the use and functions of a territory as it has been and effectively still is in real life.

- **The Planned Land Use** which corresponds to spatial plans, defined by spatial planning authorities, depicting the possible utilization of the land in the future.
HILUCS

- The technical guidelines describe a so-called Hierarchical INSPIRE Land-Use Classification System (HILUCS)

- This is a new, multi-level, classification system

- It is general enough for the member states to map their specific classification system to the appropriate level in HILUCS
Existing methods for land-use data acquisition

Remote sensing
- Traditionally used method for land cover mapping
- Very appropriate if land-use can be seen from above – like forestry and agriculture
- Not possible to distinguish different land-uses within urban areas – e.g. between a shop and a public administration building

EuroStat LUCAS
- Land-use often requires in situ observations making creation and update time-consuming and costly
- Thus the LUCAS system by Eurostat has a three-year update frequency and requires a lot of manpower about 27000 points distributed among the 28 EU Member States
- The EU area is 4,325,000 km² !!!
Aim of the current project

• The aim of the current project has been to develop a method to create INSPIRE compliant land-use data from existing open public sector information.

• The emphasis has been on current and previous land-use applying the gridded land-use option.

• The examples shown are agricultural land-use, urban land-use, and land-use for energy production.
New approach

- Public authorities are collecting huge amounts of information in their daily administration.
- Several surveys have shown that about 90% of this information has a spatial reference and therefore providing information about locations.
- This information comprises buildings, infrastructure, agriculture, forests, businesses, plans, nature protection areas, etc.
- ….. and this can also tell us about the use of land 😊
The Basic Data Concept
## Land-use categories and data sources

<table>
<thead>
<tr>
<th>HILUCS</th>
<th>Name</th>
<th>Datasource</th>
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<tbody>
<tr>
<td>1-1</td>
<td>Agriculture</td>
<td>Field maps</td>
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<td>1-2</td>
<td>Forestry</td>
<td>CORINE LC</td>
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<td>2-1 – 2-3</td>
<td>Industry</td>
<td>BBR &amp; Business Register</td>
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<tr>
<td>2-4</td>
<td>Energy</td>
<td>Field maps, emission point sources, wind turbine register</td>
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<td>BBR</td>
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<td>4</td>
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<td>Topographic maps</td>
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<tr>
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<td>Residential areas</td>
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</tr>
<tr>
<td>6</td>
<td>Nature and other areas</td>
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</table>
Land-use for agricultural production

Main data sources:

• National field map
  – Contains more than hundred different use of land
  – Represented by polygons

• Central Register for Domestic Animals
  – Contains information about each livestock regarding type, size, and location

• Managed by the Danish AgriFish Agency
Urban land-use

- Urban areas have a wide range of economic activities and accordingly land-uses
- Often of small geographical extent
- Mixed land-use classes within the same building is common
- Requires on-site surveys
- ..... or detailed maps or registers
BBR

Diagram of residential buildings with the following key points:

- Property number
- Roof materials
- Year of construction
- Address
- Wall materials
- Kitchen facilities
- Dwelling area
- Heating installation
- No. of floors
- No. of bathrooms
- Use
- Business area
- Ground floor area
- Building number
### Urban land-uses

- **Industry** 220
- **Commercial services** 320
- **Community services** 160, 420, 430, 440, 490
- **Cultural services** 410, 530
- **Other services** 390, 490
- **Detached / semi-detached houses** 120, 130, 160
- **Blocks of flats** 140, 150
- **Residential mixed with others** ???
- **Summer cottages** 510
- **Allotments** 540
Land-use for energy production

- Energy is produced from different sources where the most important ones are fossil based power plants, wind energy, and bio-energy, which is split up into the production of bio-energy crops and the bio-energy power plants.
- The Danish National Energy Agency maintains detailed registers over all wind turbines, fossil based wind turbines, and bio-energy power plants.
- The Danish AgriFish field block maps contains information about energy crops.
Fossil based energy production

CollectER database

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</table>

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Land for bio-fuel production

Field map database
Pro and Con

Pro

• Very detailed information
• Easy to update
• Cheap solution
• Can be combined with other solution like remote sensing for nature and forest areas

Con

• Requires reliable registers with input from citizens
• Not easy to convert point observation to an area
• Not available in all countries
Conclusions and outlooks

• The method described is an innovative solution to provide detailed land-use mapping
  – At low cost
  – with frequent update

• Possible to derive land-use maps 20 years back
THANK YOU FOR YOUR ATTENTION!

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