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# URBAN DENSITIES AND SEALING DEGREES

The map sheets contain two major sections: the larger upper one shows the degree of soil sealing covering the Urban Morphological Zone of the EEA member states capitals (where available), the lower section gives the main urban indicators of the cities regarding population, population densities and sealing degrees. The paragraphs below give a description of the data sources.

## Spatial reference unit UMZ

The spatial reference unit of the map sheets data is the Urban Morphological Zone (UMZ) of each EEA member state capital. The UMZ is defined as a set of urban areas laying less than 200 m apart. Those urban areas are defined from CORINE land cover classes contributing to the urban tissue and function.

The Corine Land Cover core classes used to build the Urban Morphological Zone dataset are the following ones:

111 – Continuous urban fabric

112 – Discontinuous urban fabric

121 – Industrial or commercial units

141 – Green urban areas

Classes 123 (Port areas), 124 (Airports) and 142 (Sport and leisure facilities), are considered if they are neighbours to the core classes or to one of them touching the core classes. They are hence called “enlarged core classes”. Classes 122 (Road and rail networks) and 511 (Water courses) are included when the objects are neighbours to the enlarged core classes, cut by 300m buffer, forests & scrub (311,312,313,322,323,324) when they are completely within the core classes.

Intersecting the UMZ polygons with JRC’s 2001 Population density grid (more information at http://www.ec-gis.org/docs/F11116/RURAL%20URBAN%20%20POPDENS.PDF) we can obtain a population figure within every single UMZ. In the case of countries with missing population data (CY, BA, MK, AL), population data from http://www.citypopulation.de has been used for main cities (in general, above 5000 inhabitants).

More detailed information about the production of UMZ is available at http://www.eea.europa.eu/data-and-maps/figures/data/urban-morphological-zones-2000-umz2000-f1v0.

## Maps of soil sealing degrees

The maps of soil sealing degrees were extracted from the EEA data set "Fast Track Service Precursor (FTSP) on Land Monitoring - Degree of soil sealing" which contains a raster data set of built-up and non built-up areas including continuous degree of soil sealing ranging from 0 – 100 % in aggregated spatial resolution (100 x 100 m). The spatial reference zone is the UMZ of each EEA member state capital; the reference year of the soil sealing layer is 2006. More information together with a data delivery report is available at http://dataservice.eea.europa.eu/dataservice/metadetails.asp?id=1093.

For the preparation of the maps the selected UMZ were used as model to clip out the subsets of the raster built-up layer. For a better recognition value the administrative boundaries of the capitals as contained in the urban Audit data base have been superimposed on the maps.

The legend used is conform to the standard legend differentiating six classes: 0 %, 1 – 29 %, 30 – 49 %, 50 – 79 %, 80 – 99 % and 100 %.

As the UMZ have very different sizes, the maps are for a better visibility of the thematic content displayed in four different scales: 1:100 000, 1:250 000, 1:500 000 and 1:750 000.

## Urban indicators

| Average sealing degree [%] | Sealed surface/capita [m²/pop] | Population density [pop/km²] |
|---|---|---|
| 0 – 29 | 0 – 99 | <= 2999 |
| 30 – 49 | 100 - 149 | 3000 – 4999 |
| 50 – 79 | 150 – 199 | >= 5000 |
| 80 – 100 | >= 200 | |

## Data sources and indicator calculation

As already described above, two main basic data sources were used:

- EEA Fast Track Service Precursor on Land Monitoring - Degree of soil sealing (1 ha layer), reference year 2006
- Urban Morphological Zones 2000: boundaries (i.e. surface area) and population (2001)

The population density was calculated by dividing the population values from 2001 as contained in the UMZ data base by the area of the UMZ.

The derived indicators (average soil sealing and sealed surface per capita) were computed applying zonal statistics on the soil sealing raster data set:

- The average soil sealing describes the mean value of all pixel soil sealing values contained within the UMZ; the percentage values of each pixels were summed up and divided by the total number of pixels.
- The sealed surface per capita describes the surface area of sealed surface that is theoretically owned by one inhabitant of a city; the total sealed area of each 1 ha pixel was derived from the percentage value, summed up and divided by the number of inhabitants.

## Further remarks

While the EU27 capitals have a good data basis regarding UMZ 2000 and related population data, this is not the case for all further EEA member and associated countries. The list below gives the availability of data for these countries' capitals (in alphabetical order) and the related consequences for the map sheets.

| City | Available data | Map sheet |
|---|---|---|
| Ankara | No UMZ 2000 (geometry and population) and no CLC2000<br>Derivation of UMZ from soil sealing layer | Only average soil sealing degree |
| Belgrade | No UMZ 2000 (geometry and population)<br>Derivation of UMZ from CLC2000 | Only average soil sealing degree |
| Bern | No UMZ 2000 (geometry and population) and no CLC2000<br>Derivation of UMZ from soil sealing layer | Only average soil sealing degree |
| Oslo | No UMZ 2000 (geometry and population) and no CLC2000<br>Derivation of UMZ from soil sealing layer | Only average soil sealing degree |
| Podgorica | No UMZ 2000 (geometry and population)<br>Derivation of UMZ from CLC2000 | Only average soil sealing degree |
| Reykjavik | No UMZ 2000 (geometry and population)<br>Derivation of UMZ from CLC2000 | Only average soil sealing degree |
| Sarajevo | UMZ 2000 (geometry and population) | Full map sheet |
| Skopje | UMZ 2000 (geometry and population) | UMZ 2000 (geometry and population) |
| Tirana | UMZ 2000 (geometry and population) | Full map sheet |

| | | |
|---|---|---|
| Vaduz | UMZ 2000 (geometry and population) | Full map sheet |
| Zagreb | UMZ 2000 (geometry and population) | Full map sheet |

Hence, only for Sarajevo, Skopje, Tirana, Vaduz and Zagreb, the statistical parameters (average soil sealing, population density and sealing per capita) are comparable with the information from the EU27 capitals. For the other cities we have computed a UMZ, either based on CLC2000 (Belgrade, Podgorica, Reykjavik) or on the soil sealing layer (Ankara, Bern, Oslo).

This has two consequences:

- Because the UMZ were computed with a different methodology as the official UMZ 2000 layer, they can not be considered as being consistent with the official layer in terms of shape and size.
- The self-constructed UMZ do not contain population figures from 2001 as the official UMZ layer. Thus, population density and sealed area per capita could not be calculated (we did not want to integrate another data source, e.g. values form citypopulation.de since they are one the one hand based on administrative units, not UMZ, and on the other hand stem from more recent reference years).

Therefore, the map sheets of the EEA member and associated countries that are not EU27 are to a large extent (cf. table above) only of informative value, but not meant for detailed comparisons and further spatial or statistical analyses.