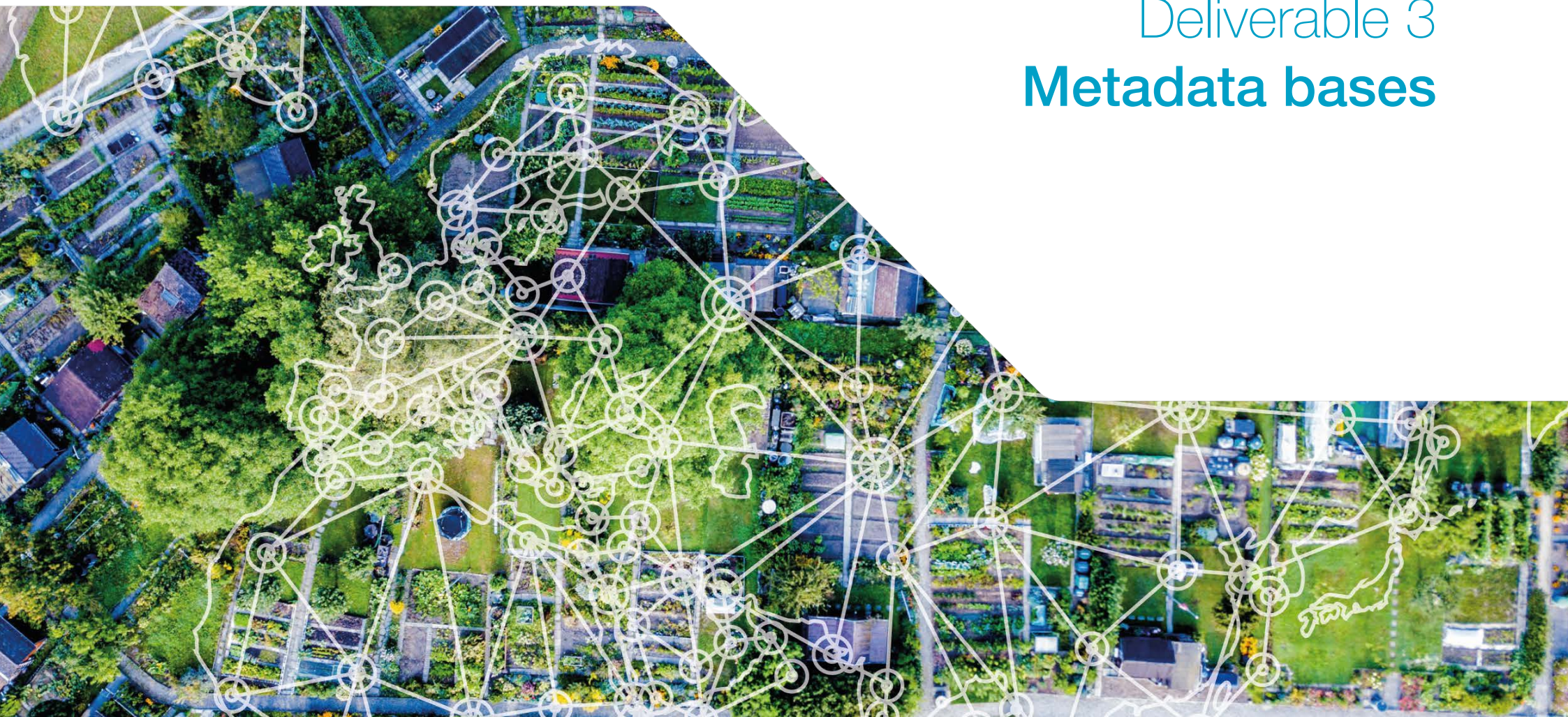




URBANGAIA

Deliverable 3 **Metadata bases**



Financed by the European Union under the BiodivERsA3 Program

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Index

Introduction.....	4
European Global Datasets.....	4
Urban areas	5
Catchment areas, rivers and related data.....	8
Population data	10
Digital elevation models	11
Land use and land cover related data	12
Soil related data	16
Weather related data	21
Local Datasets	22
References	27

Introduction

The content of this deliverable derives from the work developed for **Task 1.1: Data collection**, led by the Málaga University (UM), under **Work Package 1 - Ecological analysis of case studies**, led by the team of the Mykolas Romeris University (MRU).

This tasks involved the description of land use patterns, ecological quality and connectivity from available global and local maps, as well as remote sensing data, using quickbird / ikonos images (from

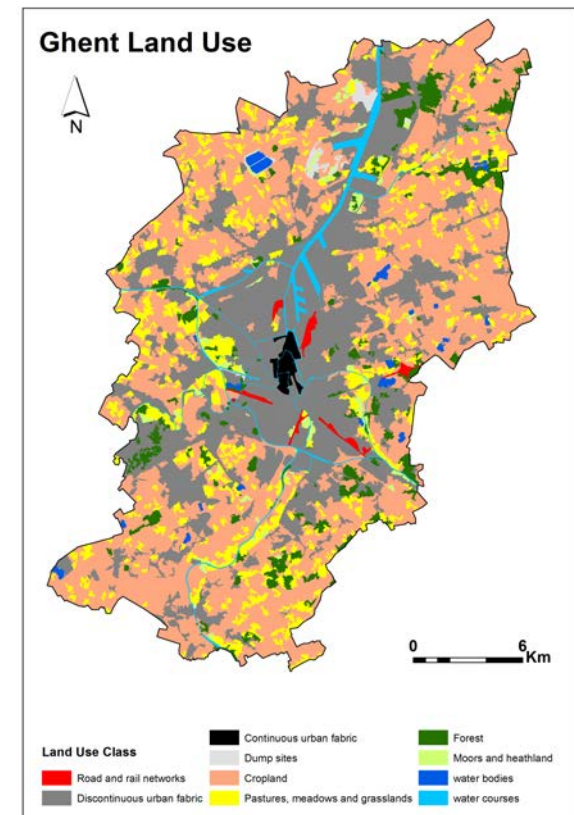
google earth) and locally available data sources.

During the collection of data for task 1.1, the team identified several datasets available, which could be relevant for the analysis undertaken, as well as for other tasks which should be developed during the project. These datasets are available at different scales, both at European or pan-europeans global datasets, as well as local data sets.

European Global Datasets


The global datasets comprise a total of 42 entries. They are organized according to seven themes: (1) urban areas, (2) Catchment areas, rivers and related data,

(3) Population data, (4) Digital elevation models, (5) Land use and land cover related data, (6) Soil related data, and (7) Weather related data.




Urban areas


1 Urban Atlas 2012

	<p>The European Urban Atlas provides reliable, inter-comparable, high-resolution land use maps for over 300 Large Urban Zones and their surroundings (more than 100.000 inhabitants as defined by the Urban Audit) for the 2006 reference year in EU member states and for over 800 Functional Urban Area (FUA) and their surroundings (more than 50.000 inhabitants) for the 2012 reference year in EEA39. Two additional layers were produced for the 2012 reference year: 1) Street Tree Layer within selected FUAs (depending on availability and suitability of satellite imagery) and 2) Building Heights for core urban areas of selected cities. Change layers were produced in 2012 and only for all FUAs covered both in 2006 and 2012 reference years.</p>	Temporal extent:	2012
		Resolution:	Minimum mapping unit: 500 m ² Minimum mapping width: 10 m
		Type:	Vector
		Source:	Copernicus Land Monitoring System /EEA
		Links:	https://land.copernicus.eu/local/urban-atlas/urban-atlas-2012/view


2 Urban Atlas 2006

	<p>The Urban Atlas is mainly based on the combination of (statistical) image classification and visual interpretation of Very High Resolution (VHR) satellite imagery. Multispectral SPOT 5 & 6 and Formosat-2 pan-sharpened imagery with a 2 to 2.5m spatial resolution is used as input data. The built-up classes are combined with density information on the level of sealed soil derived from the High Resolution Layer imperviousness to provide more detail in the density of the urban fabric. Finally, the Urban Atlas product is complemented and enriched with functional information (road network, services, utilities etc...) using ancillary data sources such as local city maps or online map services.</p>	Temporal extent:	2006
		Resolution:	Minimum Mapping Unit: Class 1: 0.25 ha Class 2 - 5: 1.00 ha Minimum Mapping Width: 10 m
		Type:	Vector
		Source:	Copernicus Land Monitoring System / EEA
		Links:	https://land.copernicus.eu/local/urban-atlas/urban-atlas-2006/view

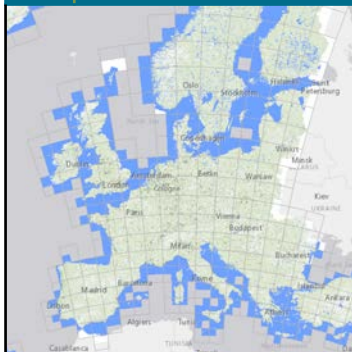
3 Street Tree Layer 2012

	<p>The Street Tree Layer (STL) is a separate layer from the Urban Atlas 2012 LC/LU layer produced within the Urban Atlas 2012 LC/LU urban mask for each FUA. The production of the Street Tree Layers was performed on the basis of SPOT 5 Supermode data used for the Urban Atlas 2012 production acquired between March and November months with a preference for spring and late summer imagery. An interactive automated classification approach was applied to identify contiguous rows or patches of trees covering 500 m² or more and with a minimum width of 10 m. A post-processing routine was applied to provide the results in vector format.</p>	Temporal extent:	2011-2013
		Resolution:	Minimum mapping unit: 500 m ² Minimum mapping width: 10 m
		Type:	Vector
		Source:	Copernicus Land Monitoring System / EEA
		Links:	https://land.copernicus.eu/local/urban-atlas/street-tree-layer-stl/view

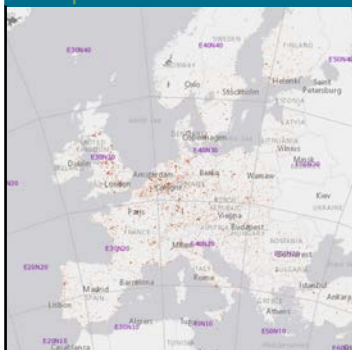
4 Building Heights 2012

	<p>Estimates of the residential population at the vector polygon level are tabular data that can be joined to the Urban Atlas 2012 datasets in a GIS environment. The estimation was done by downscaling, or disaggregating, census population reported at country-specific geometries ('source geometry') to the Urban Atlas land use/land cover polygons ('target geometry'). The downscaling method combined land use/land cover information from Urban Atlas, building densities from the European Settlement Map and census data. These complementary datasets to the Copernicus Urban Atlas product have been produced by the JRC and DG REGIO.</p>	Temporal extent:	2011-2013
		Resolution:	Minimum mapping unit: 500 m ² Minimum mapping width: 10 m
		Type:	Vector
		Source:	Copernicus Land Monitoring System / EEA
		Links:	https://land.copernicus.eu/local/urban-atlas/street-tree-layer-stl/view


5 European Settlement Map (ESM) 2016

	<p>The European Settlement Map 2017 (ESM2p5m) is the latest release of the European Settlement Map (ESM) produced in the frame of the URBA project (WPK 1193). The ESM products have been financed by the Directorate-General for Regional and Urban Policy (DG REGIO) and exploit the Copernicus core 003 dataset made of satellite images SPOT5 and SPOT6 ranging from 2010 to 2013.</p>	Temporal extent:	2010-2013
		Resolution:	2.5 m
		Type:	Raster
		Source:	Copernicus Land Monitoring System / EEA
		Links:	https://land.copernicus.eu/pan-european/GHSL/european-settlement-map/esm-2012-release-2017-urban-green/view


6 Imperviousness density

	<p>The high resolution imperviousness products capture the percentage and change of soil sealing. Built-up areas are characterized by the substitution of the original natural land cover or water surface with an artificial, often impervious cover. These artificial surfaces are usually maintained over long periods of time. A series of high resolution imperviousness datasets (for the 2006, 2009, 2012 and 2015 reference years) with all artificially sealed areas was produced using automatic derivation based on calibrated Normalized Difference Vegetation Index (NDVI). This series of layers constitutes the main status layers. They are per-pixel estimates of impermeable cover of soil, mapped as the degree of imperviousness (0-100%).</p> <p>Mapped properties: Imperviousness density for 2006, 2009, 2012 and 2015.</p>	Temporal extent:	2006, 2009, 2012 and 2015
		Resolution:	20 m
		Type:	Raster
		Source:	Copernicus Land Monitoring System / EEA
		Links:	https://land.copernicus.eu/pan-european/high-resolution-layers/imperviousness/status-maps/view

7 Street and Road Network

	<p>This server has data extracts from the OpenStreetMap project which are normally updated every day. Organized by continent and countries. This open data download service is offered free of charge by Geofabrik GmbH. The referenced data is related to the street network.</p>	Temporal extent:	2018
		Resolution:	1:10,000
		Type:	Vector
		Source:	Geofabrik GmbH
		Links:	http://download.geofabrik.de/europe.html

8 Buildings

	<p>This server has data extracts from the OpenStreetMap project which are normally updated every day. Organized by continent and countries. This open data download service is offered free of charge by Geofabrik GmbH. The referenced data is related to the buildings information.</p>	Temporal extent:	2018
		Resolution:	1:10,000
		Type:	Vector
		Source:	Geofabrik GmbH
		Links:	http://download.geofabrik.de/europe.html

Catchment areas, rivers and related data

9 European catchments and Rivers network system (Ecrins)



Ecrins is acronym for European catchments and Rivers network system. It is a geographical information system of the European hydrographical systems with a full topological information. Ecrins is a composite system made from the CCM developed by the JRC, Corine land Cover, WFD reporting elements, etc. It is organised from a layer of 181,071 "functional elementary catchments (FECs)" which average size is ~62 km², fully connected with explicit identifier (ID) relationships and upstream area. Catchments are grouped as sub-basins, river basin districts (actual and functional to meet hydrographical continuity).

Mapped properties:

Aggregation catchments, Rivers, Lakes and Functional elementary catchments (FECs)

Temporal extent:	1990-2006
Resolution:	Scale of dataset: 1:250,000
Type:	Vector
Source:	EEA
Links:	https://www.eea.europa.eu/data-and-maps/data/european-catchments-and-rivers-network#tab-gis-data

10 Large Rivers and Lakes



Large rivers are rivers that have a catchment area large than 50,000 km² or other rivers and tributaries that have a catchment area larger than 5,000 km²

Large lakes are lakes that have a surface area larger than 500 km². The definitions are from the WISE GIS guidance document. The main purpose of the data sets is to provide a cartographic background. To have a visually uninterrupted hydrographic network the feature layers should be used in combination with Transitional waters. For more information about European waters, please visit the WISE portal. Change compared to version 1.0: In version 1.1 one erroneous feature was deleted in the Large lakes dataset.

Temporal extent:	2009
Resolution:	Geographic accuracy: 5 km Scale of dataset: 1:1,000,000
Type:	Vector
Source:	WISE / EEA
Links:	https://www.eea.europa.eu/data-and-maps/data/wise-large-rivers-and-large-lakes

11 EU-Hydro River Network Public Beta




EU-Hydro is a dataset for all EEA39 countries providing photo-interpreted river network, consistent of surface interpretation of water bodies (lakes and wide rivers), and a drainage model (also called Drainage Network), derived from EU-DEM, with catchments and drainage lines and nodes.


EU-Hydro river network is divided into 35 basins (covering all EEA39 countries) available in geodatabase format with geometries and attributes (including HYDRO Feature Dataset with 12 Feature Classes in turn): Oder, Elbe, Rhine, Seine, Vistula, Skjern, Loire, Garonne, Rhone, Duero, Ebro, Tajo, Jucar, Guadalquivir, Shannon, Thames, Tweed, Iceland, French Guiana, French Islands, Hondo, Mesima, Tevere, Po, Tirso, Pinios/Bulgaria, Nemunas, Danube, Gota, Angerman, Neva, Kemi, Tana, Vorma, Turkey.

Temporal extent:	2006-2012
Resolution:	1:50.000 Derived from 20 m resolution imagery Feature data from VHRI 2.5 m resolution
Type:	Raster
Source:	Copernicus Land Monitoring System / EEA
Links:	https://land.copernicus.eu/pan-european/satellite-derived-products/eu-hydro/eu-hydro-public-beta/eu-hydro-river-network/view

12 Riparian Zones 2012


	<p>The Riparian Zones products support the objectives of several European legal acts and policy initiatives, such as the EU Biodiversity Strategy to 2020, the Habitats and Birds Directives and the Water Framework Directive.</p> <p>The delineation of Riparian Zones is based on a complex spatial modelling approach, making use of the Riparian Zones' LC/LU classification, large-scale earth observation data and a range of additional geo-data sources, as well as derived spatially explicit indicators. Inputs are regionally parameterised and weighted according to relative importance in a fuzzy modelling approach. The zones provide a majority of riparian functions with a focus on ecosystem services.</p> <p>The production of the Riparian Zones products was coordinated by the European Environment Agency in the frame of the EU Copernicus programme.</p>	Temporal extent:	2011-2013
		Resolution:	Minimum mapping unit: 0.5 ha Minimum mapping width: 10 m
		Type:	Vector
		Source:	Copernicus Land Monitoring System / EEA
		Links:	https://land.copernicus.eu/local/riparian-zones/riparian-zones-delineation/view

13 European Past Floods

	<p>Dataset contains information on past floods in Europe since 1980, based on the reporting of EU Member States for the EU Floods Directive (2007/60/EC) and combined with information provided by relevant national authorities and global databases on natural hazards. Reported data have been assessed and processed by the ETC-ICM and the EEA. The data is presented as number of floods per 10 000 km². Values in the newly created field are classified in 5 classes.</p>	Temporal extent:	1980-2015
		Resolution:	n.a.
		Type:	Database
		Source:	EEA
		Links:	http://www.eea.europa.eu/data-and-maps/data/european-past-floods

Population data

14 Population density disaggregated with Corine land cover 2000

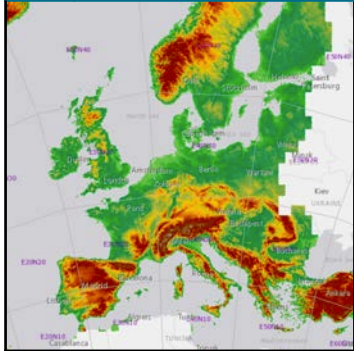
	<p>Raster data on population density using Corine Land Cover 2000 inventory. Values correspond to density in inhabitants/km2.</p> <p>Reference: Gallego, F.J., 2010</p>	Temporal extent:	2000
		Resolution:	100 m
		Type:	Raster
		Source:	EEA
		Links:	http://www.eea.europa.eu/data-and-maps/data/population-density-disaggregated-with-corine-land-cover-2000-2

15 Population estimates by Urban Atlas polygon

Look-up table	<p>Estimates of the residential population at the vector polygon level are tabular data that can be joined to the Urban Atlas 2012 datasets in a GIS environment. The estimation was done by downscaling, or disaggregating, census population reported at country-specific geometries ('source geometry') to the Urban Atlas land use/land cover polygons ('target geometry'). The downscaling method combined land use/land cover information from Urban Atlas, building densities from the European Settlement Map and census data. These complementary datasets to the Copernicus Urban Atlas product have been produced by the JRC and DG REGIO.</p>	Temporal extent:	2006-2012
		Resolution:	Minimum mapping unit: 500m ² Minimum mapping width: 10m (based on Urban Atlas 2012)
		Type:	Look-up table
		Source:	Copernicus Land Monitoring System / EEA
		Links:	https://land.copernicus.eu/local/urban-atlas/street-tree-layer-stl/view

Digital elevation models

16 European Digital Elevation Model (EU-DEM) v1.1



The EU-DEM v1.1 is a resulting dataset of the EU-DEM v1.0 upgrade which enhances the correction of geo-positioning issues, reducing the number of artefacts, improving the vertical accuracy of EU-DEM using ICESat as reference and ensuring consistency with EU-Hydro public beta.

EU-DEM v1.1 is available in Geotiff 32 bits format. It is a contiguous dataset divided into 100x100 km tiles, resulting in a total of 1992 tiles of 4000x4000 pixel at 25m resolution with vertical accuracy: +/- 7 meters RMSE.

Temporal extent:	2011
Resolution:	25 m Vertical accuracy: ± 7 m
Type:	Raster
Source:	Copernicus Land Monitoring System / EEA
Links:	https://land.copernicus.eu/pan-european/satellite-derived-products/eu-dem/eu-dem-v1.1/view

Land use and land cover related data

17 Corine Land Cover (CLC) 2012



The layer of CORINE Land Cover Changes (CLCC) is produced since the second CLC inventory (CLC2000). CLCC is derived from satellite imagery by direct mapping of changes taken place between two consecutive inventories, based on image-to-image comparison. Change mapping applies a 5 ha MMU to pick up more details in CLCC layer than in CLC status layer. Integration of national CLC and CLCC data includes some harmonization along national borders. Two European validation studies have shown that the achieved thematic accuracy is above the specified minimum (85 %). Primary CLC and CLCC data are in vector format with polygon topology.

Temporal extent:	2011-2012
Resolution:	≤ 25 m
Type:	Vector
Source:	Copernicus Land Monitoring System / EEA
Links:	http://land.copernicus.eu/pan-european/corine-land-cover/clc-2012/view

18 Corine Land Cover (CLC) 2006



CORINE Land Cover (CLC) was specified to standardize data collection on land in Europe to support environmental policy development. The reference year of first CLC inventory was 1990 (CLC1990), and the first update created in 2000. Later the update cycle has become 6 years. In-situ data (topographic maps, ortho-photos and ground survey data) are essential ancillary information. The project is coordinated by the EEA in the frame of the EU Copernicus programme and implemented by national teams under the management and quality control (QC) of the EEA. The basic technical parameters of CLC (i.e. 44 classes in nomenclature, 25 hectares minimum mapping unit (MMU) and 100 meters minimum mapping width) have not changed since the beginning, therefore the results of the different inventories are comparable.

Temporal extent:	2005-2007
Resolution:	Minimum mapping unit: 25 ha Minimum mapping width: 100 m
Type:	Vector
Source:	Copernicus Land Monitoring System / EEA
Links:	https://land.copernicus.eu/pan-european/corine-land-cover/clc-2006/view

19 Corine Land Cover (CLC) 2000



CORINE Land Cover (CLC) was specified to standardize data collection on land in Europe to support environmental policy development. The reference year of first CLC inventory was 1990 (CLC1990), and the first update created in 2000. Later the update cycle has become 6 years. In-situ data (topographic maps, ortho-photos and ground survey data) are essential ancillary information. The project is coordinated by the EEA in the frame of the EU Copernicus programme and implemented by national teams under the management and quality control (QC) of the EEA. The basic technical parameters of CLC (i.e. 44 classes in nomenclature, 25 hectares minimum mapping unit (MMU) and 100 meters minimum mapping width) have not changed since the beginning, therefore the results of the different inventories are comparable.

Temporal extent:	1999-2001
Resolution:	Minimum mapping unit: 25 ha Minimum mapping width: 100 m
Type:	Vector
Source:	Copernicus Land Monitoring System / EEA
Links:	https://land.copernicus.eu/pan-european/corine-land-cover/clc-2000?tab=mapview

20 Corine Land Cover (CLC) 1990

CORINE Land Cover (CLC) was specified to standardize data collection on land in Europe to support environmental policy development. The reference year of first CLC inventory was 1990 (CLC1990), and the first update created in 2000. Later the update cycle has become 6 years. In-situ data (topographic maps, ortho-photos and ground survey data) are essential ancillary information. The project is coordinated by the EEA in the frame of the EU Copernicus programme and implemented by national teams under the management and quality control (QC) of the EEA. The basic technical parameters of CLC (i.e. 44 classes in nomenclature, 25 hectares minimum mapping unit (MMU) and 100 meters minimum mapping width) have not changed since the beginning, therefore the results of the different inventories are comparable.

Temporal extent:	1986-1998
Resolution:	Minimum mapping unit: 25 ha Minimum mapping width: 100 m
Type:	Vector
Source:	Copernicus Land Monitoring System / EEA
Links:	https://land.copernicus.eu/pan-european/corine-land-cover/clc-1990/view

21 Forests

The HRL Forests consists of 3 types of (status) products, and additional change products. The status products are available for 2012 and 2015 reference years, covering (1) he level of tree cover density in a range from 0-100%, (2) the Dominant leaf type, either broadleaved or coniferous majority, and (3) the forest type.

Mapped properties:
Forest type,
Tree cover density,
Dominant leaf type.

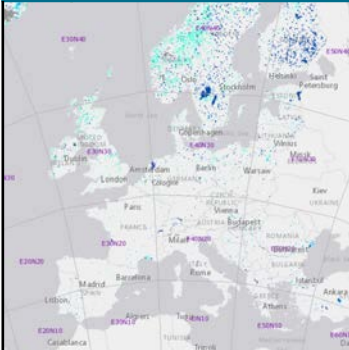
Temporal extent:	2012 and 2015
Resolution:	20 m Minimum mapping unit: 0.5 ha
Type:	Raster
Source:	Copernicus Land Monitoring System / EEA
Links:	https://land.copernicus.eu/pan-european/high-resolution-layers/forests

22 Grassland

The 2015 reference year grassland product is a new baseline product, which fully replaces all previous 2012 reference year products.A new approach is based on a longer time series of imagery from a number of different sensors, allowing for the detection of ploughing events in the years leading up to the reference year. In addition, we combined radar (SAR) data and optical data for the first time to improve the classification accuracy.

Mapped properties:
Grassland,
Grassland vegetation probability index,
Ploughing indicator. .

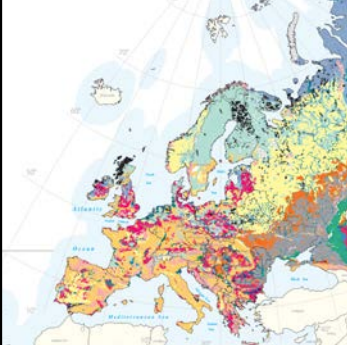
Temporal extent:	2015
Resolution:	20 m
Type:	Raster
Source:	Copernicus Land Monitoring System / EEA
Links:	https://land.copernicus.eu/pan-european/high-resolution-layers/grassland

23 Water & Wetness				
	<p>This layer is based on multi-temporal and multi-seasonal optical high-resolution satellite imagery. In addition, this layer is also based on radar information (Sentinel-1 data) with a geometric resolution of 10m on a pan-European basis. A multitude of optical and SAR imagery is used, covering a prolonged time series of 7 years, aiming at capturing the intra-annual dynamics as much as possible within a given area and lead to one image composite per season and year during the observation period. The products are assessed independently of the actual vegetation cover and are thus not limited to a specific land cover class and their relative frequencies.</p> <p>Mapped properties: Water and Wetness (WAW), Water and Wetness Probability Index (WWPI).</p>	Temporal extent:	2009-2015	
		Resolution:	10 m	
		Type:	Raster	
		Source:	Copernicus Land Monitoring System / EEA	
		Links:	https://land.copernicus.eu/pan-european/high-resolution-layers/water-wetness/view	
24 Carbon storage				
Look-up table	<p>Combined with land use data, in Mg C/ha</p> <p>Reference: Larondelle, N. and Haase, D. 2013</p>	Temporal extent:	2012	
		Resolution:	n.a.	
		Type:	Look-up table	
		Source:	?	
		Links:		
25 f-evapotranspiration				
Look-up table	<p>evapotranspiration values per land use, relative value</p> <p>Reference: Larondelle, N. and Haase, D. 2013</p>	Temporal extent:	2013	
		Resolution:	n.a.	
		Type:	Look-up table	
		Source:	?	
		Links:	European Soil Data Center	

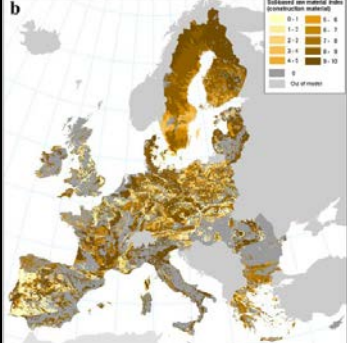
26 Food Supply			
Look-up table	Regression models for land cover and soil type, in GJ/ha Reference: Kroll <i>et al.</i> , 2012	Temporal extent:	2012
		Resolution:	n.a.
		Type:	Look-up table
		Source:	?
		Links:	

Soil related data

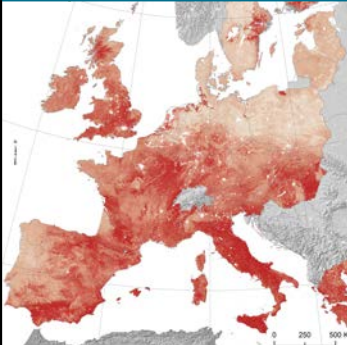
27 European Soil Database v2.0


	<p>This database (2004) is the only harmonized soil database for Europe, extending also to Eurasia. It contains a soil geographical database SGDBE (polygons) to which a number of essential soil attributes are attached, and an associate database PTRDB, with attributes which values have been derived through pedotransfer rules. Also part of the database is the Soil Profile Analytical Database, that contains measured and estimated soil profiles for Europe.</p> <p>References: Panos, 2006 European Commission and the European Soil Bureau Network, 2004.</p>	Temporal extent:	2001
		Resolution:	1:1,000,000 Raster: 10km x10km & 1km x 1km
		Type:	Vector & Raster
		Source:	European Soil Data Center
		Links:	https://esdac.jrc.ec.europa.eu/content/european-soil-database-v20-vector-and-attribute-data


28 Raw Material from soils in the European Union


	<p>This dataset (maps) indicates the availability of Raw Material (organic soil material and soil material for constructions) from soils in the European Union, and corresponds to the figures 7a and 7b from the publication "Continental-scale assessment of provisioning soil functions in Europe",. (link to online document)</p> <p>Reference: Tóth <i>et al.</i> 2013</p>	Temporal extent:	2016
		Resolution:	1:1,000,000
		Type:	Vector
		Source:	European Soil Data Center
		Links:	https://esdac.jrc.ec.europa.eu/content/map-indicating-availability-raw-material-soils-european-union-organic-soil-material-b-soil

29 Topsoil physical properties for Europe (based on LUCAS topsoil data)


	<p>This dataset (GIS maps) contains 7 soil property maps that have been derived using soil point data from the LUCAS 2009 soil survey (around 20,000 points) for EU-25, using hybrid approaches like regression kriging.</p> <p>Mapped properties: clay; silt and salt content; coarse fragments; bulk density; USDA soil textural class; available water capacity.</p> <p>Reference: Ballabio <i>et al.</i> 2016</p>	Temporal extent:	2015
		Resolution:	500 m
		Type:	Raster
		Source:	European Soil Data Center
		Links:	http://esdac.jrc.ec.europa.eu/content/topsoil-physical-properties-europe-based-lucas-topsoil-data

30 Soil Biomass Productivity maps of grasslands and pasture, of croplands and of forest areas in the European Union			
	<p>This dataset consists of 3 GIS maps that indicate the soil biomass productivity of grasslands and pasture, of croplands and of forest areas in the European Union (EU27) and that corresponds to the figures 4, 5 and 6 from the publication "Continental-scale assessment of provisioning soil functions in Europe"</p> <p>Mapped properties: Grassland, Cropland, Forest.</p> <p>Reference: Tóth <i>et al.</i> 2013</p>	Temporal extent:	2016
		Resolution:	1 km Based on the European Soil Database (1:1,000,000)
		Type:	Raster
		Source:	European Soil Data Center
		Links:	http://esdac.jrc.ec.europa.eu/content/soil-biomass-productivity-maps-grasslands-and-pasture-croplands-and-forest-areas-european

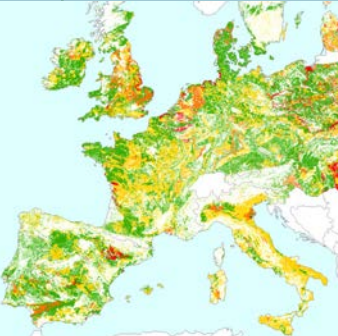
31 Soil Organic Carbon - Saturation Capacity in Europe			
	<p>This dataset (map) shows the Soil Organic Carbon (SOC) saturation capacity, expressed as the ratio between the actual and the potential SOC stock in each pixel. Values close to 0 indicate a great potential of soil to store more carbon. The actual SOC stock was derived from the Pan-European simulation using the biogeochemical CENTURY model (a detailed explanation can be found in the references below). The potential SOC stock was obtained simulating a grassland land use without nitrogen limitation. The scenario set-up was analogous to that described in Lugato <i>et al.</i> (2014b, for the grassland land use, namely 'AR_GR_LUC'. The simulation involved only the agricultural soils.</p> <p>References: Lugato <i>et al.</i> 2014a Lugato <i>et al.</i> 2014b</p>	Temporal extent:	2016
		Resolution:	250 m
		Type:	Raster
		Source:	European Soil Data Center
		Links:	http://esdac.jrc.ec.europa.eu/content/soil-organic-carbon-saturation-capacity

32 Global Soil Biodiversity maps (soil biodiversity and threats)			
	<p>T The Soil Biodiversity map shows a simple index describing the potential level of diversity living in soils on our planet. Based on two sets of data: (1) distribution of microbial soil carbon and (2) distribution of the main groups of soil macrofauna. The Soil Biodiversity threats map shows the potential rather than the actual level of threat to soil organisms. For the development of this map, the following threats and corresponding proxies were chosen: loss of aboveground biodiversity: map of plant species loss, pollution and nutrient overloading, agricultural use, overgrazing, fire risk, soil erosion, land degradation and climate change.</p> <p>References: Serna-Chavez <i>et al.</i> 2013; Ellis, E.C., <i>et al.</i>, 2012; Fritz, S., <i>et al.</i>, 2015; Potter, P., <i>et al.</i>, 2011; Robinson, T.P., <i>et al.</i>, 2014; USDA Natural Resources Conservation Service. World Soil Resources Map Index, 2015; Zomer, R.J., <i>et al.</i>, 2008.</p>	Temporal extent:	2016
		Resolution:	n.a.
		Type:	Raster
		Source:	European Soil Data Center
		Links:	https://esdac.jrc.ec.europa.eu/content/global-soil-biodiversity-maps-0

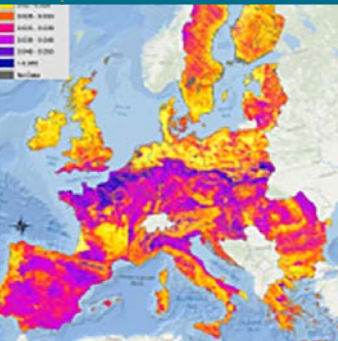
33 European map of soil suitability to provide a platform for most human activities

	<p>This dataset (map) presents the suitability of soil as a platform for most human activities. Suitability of a given soil is calculated on the basis of its structural stability. The strength of the soil is considered in terms of resistance against compaction and shearing stress. An expert classification was developed to express the Human Activities Soil Quality Index. The classification includes: (1) selection of soils which have no sensitivity to compaction or shearing; (2) Selection of soils which are susceptible to compaction or horizontal shearing; (3) Classification of Histosols, Cryolols and Vertisols to less-suitable for human activity. The evaluation scheme was extended with some other criteria (pedological, hydrological and topographic).</p> <p>References: Tóth G. and Hermann T. 2015.</p>	Temporal extent:	2016
		Resolution:	1 km
		Type:	Raster
		Source:	Copernicus Land Monitoring System / EEA
		Links:	http://esdac.jrc.ec.europa.eu/content/european-map-soil-suitability-provide-platform-most-human-activities-eu28

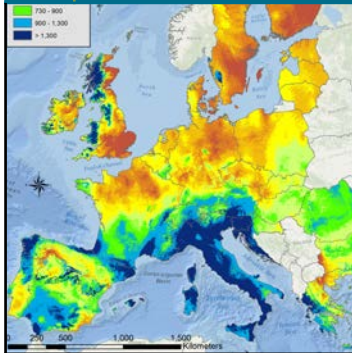
34 Natural susceptibility to soil compaction in Europe

	<p>This map shows the natural susceptibility of agricultural soils to compaction if they were to be exposed to compaction. The evaluation of the soil's natural susceptibility is based on the creation of logical connections between relevant parameters (pedotransfer rules). The input parameters for these pedotransfer rules are taken from the attributes of the European soil database, e.g. soil properties: type, texture and water regime, depth to textural change and the limitation of the soil for agricultural use. Besides the main parameters auxiliary parameters have been used as impermeable layer, depth of an obstacle to roots, water management system, dominant and secondary land use. It was assumed that every soil, as a porous medium, could be compacted.</p> <p>References: Houkova, B. and Van Liedekerke, M.. 2008</p>	Temporal extent:	2008
		Resolution:	1 km
		Type:	Vector
		Source:	European Soil Data Center
		Links:	http://esdac.jrc.ec.europa.eu/content/natural-susceptibility-soil-compaction-europe

35 Soil Erodibility (K- Factor)

	<p>The soil erodibility dataset overcomes the problems of limited data availability for K-factor assessment and presents a high quality resource for modellers who aim at soil erosion estimation on local/regional, national or European scale. Soil erodibility was calculated for the LUCAS survey points using the nomograph of Wischmeier and Smith (1978). A Cubist regression model was applied to correlate spatial data such as latitude, longitude, remotely sensed and terrain features in order to develop a high-resolution soil erodibility map. The mean K-factor for Europe was estimated at 0.032 t ha h ha-1 MJ-1 mm-1 with a standard deviation of 0.009 t ha h ha-1 MJ-1 mm-1.</p> <p>References: Panagos,et al. 2014</p>	Temporal extent:	2014
		Resolution:	500 m
		Type:	Raster
		Source:	European Soil Data Center
		Links:	http://esdac.jrc.ec.europa.eu/content/soil-erodibility-k-factor-high-resolution-dataset-europe

36 Rainfall Erosivity in the EU and Switzerland

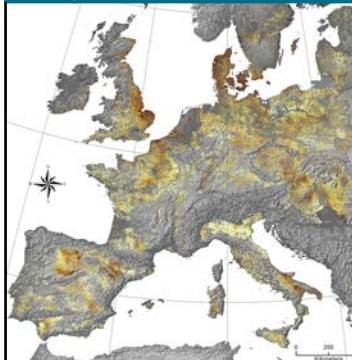


The purpose of this study is to assess rainfall erosivity in Europe in the form of the RUSLE R-factor, based on the best available datasets in Europe. The R-factor values calculated from precipitation data of different temporal resolutions were normalised to R-factor values with temporal resolutions of 30 minutes using linear regression functions. The average time series per precipitation station is around 17.1 years. Gaussian Process Regression (GPR) has been used to interpolate the R-factor station values to a European rainfall erosivity map at 1 km resolution. The covariates used for the R-factor interpolation were climatic data (total precipitation, seasonal precipitation, precipitation of driest/wettest months, average temperature), elevation and latitude/longitude.

References:
Panagos, *et al.* 2015

Temporal extent:	2000-2010
Resolution:	500 m
Type:	Raster
Source:	European Soil Data Center
Links:	http://esdac.jrc.ec.europa.eu/content/rainfall-erosivity-european-union-and-switzerland

37 Soil Erosion by wind



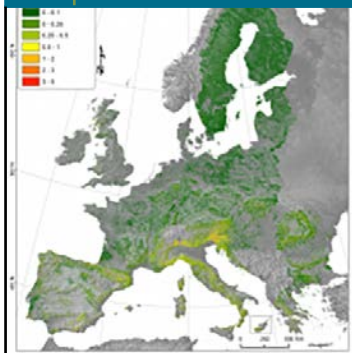
GIS-RWEQ is a simplified GIS-based application of the RWEQ model (ARS-USDA). It follows a spatially distributed approach based on a grid structure, running in R and Python scripts. The model scheme is designed to describe the daily soil loss potential at regional or larger scale.

Mapped properties:
Soil loss by wind erosion in European agricultural soils (2016); 1km resolution,
Land susceptibility to wind erosion (2014), 500m resolution,
Wind erosion susceptibility of European soils (2014); 500m resolution,
Agriculture Field Parameters data.

References:
Borrelli, P. 2017

Temporal extent:	2014 and 2016
Resolution:	500 m and 1 km
Type:	Raster & Vector
Source:	European Soil Data Center
Links:	http://esdac.jrc.ec.europa.eu/content/Soil_erosion_by_wind

38 Soil erosion in forestland in Europe (using RUSLE2015)

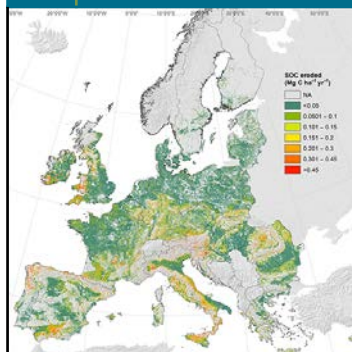


This study provides a first pan-European analysis that delineates the spatial patterns of forest cover changes in 36 countries. The first dynamic assessment of the soil loss potential in the EU-28 forests is reported. The recently published High-resolution Global Forest Cover Loss map (2000–2012) was reprocessed and validated. Results show that the map is a powerful tool to spatiotemporally indicate the forest sectors that are exposed to cover change risks. The accuracy assessment performed by using a confusion matrix based on 2300 reference forest disturbances distributed across Europe shows values of 55.1% (producer accuracy) for the algorithm-derived forest cover change areas with a Kappa Index of Agreement (KIA) of 0.672.

Reference:
Borrelli, P., *et al.* 2016

Temporal extent:	2010
Resolution:	100 m
Type:	Raster
Source:	European Soil Data Center
Links:	http://esdac.jrc.ec.europa.eu/content/soil-erosion-forestland-europe-using-rusle2015

39 Pan-European SOC stock of agricultural soils



A comprehensive model platform was established at a pan-European scale using the agro-ecosystem SOC model CENTURY. The model was implemented with the main management practices derived from official statistics. Results were tested against inventories from the EIONET and approximately 20,000 soil samples from the 2009 LUCAS survey.

Mapped properties:

Pan-European SOC stock (vector), Potential carbon sequestration (vector), Average Eroded SOC (raster)

References:

Lugato, E. *et al.* 2014.

Temporal extent: 2010

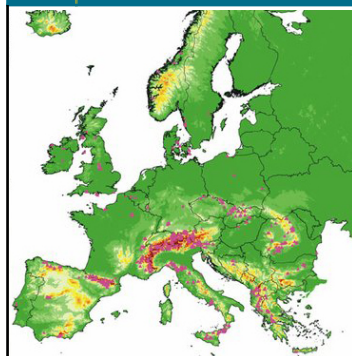
Resolution: 1 km (raster)

Type: Vector and Raster

Source: European Soil Data Center

Links: <http://esdac.jrc.ec.europa.eu/content/pan-european-soc-stock-agricultural-soils>

40 European Landslide Susceptibility Map



ELSUS v2 shows levels of spatial probability of generic landslide occurrence at continental scale. The map has been produced by regionalizing the study area based on elevation and climatic conditions, followed by spatial multi-criteria evaluation modelling.

Mapped properties:

European Landslide Susceptibility, Land Cover, Soil Parent Material map for European Landslide Susceptibility Assessment, Climate-Physiographic Regions, Slope Gradient

References:

Günther, A. *et al.*, 2014
Wilde, M. *et al.*, 2018

Temporal extent: 2018

Resolution: 200 m
(visualization scale 1:200,000)

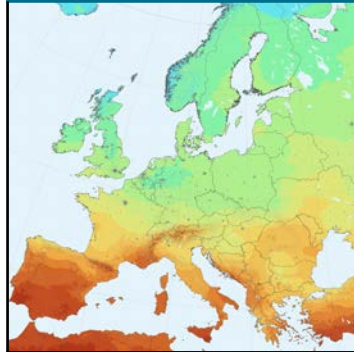
Type: Raster and Vector

Source: European Soil Data Center

Links: <http://esdac.jrc.ec.europa.eu/content/european-landslide-susceptibility-map-elsus1000-v1>

Weather related data

41 Solar Radiation



The solar radiation data made available here have been calculated from the National Solar Radiation Database (NSRDB), developed by the National Renewable Energy Laboratory. The data are only long-term averages, calculated from hourly global and diffuse irradiance values over the period 2005-2015. Solar radiation in W/m².

Mapped properties:

Average global irradiance on a horizontal surface (monthly & yearly) (W/m²)
 Average global irradiance on an optimally inclined surface (monthly & yearly) (W/m²)
 Average global irradiance on a two-axis sun-tracking surface (monthly & yearly)
 Optimal inclination angle for an equator-facing plane (degrees)

Reference:

Šúri, M. *et al.*, 2007.

Temporal extent:	2005-2015
Resolution:	0.04°
Type:	Raster
Source:	NREL, EU
Links:	http://re.jrc.ec.europa.eu/pvg_download/solar_radiation_nsrdp_download.html

42 Temperature



Trends in annual temperature across Europe between 1960 and 2017

Temporal extent:	1960-2017
Resolution:	Cellsize: 2° x 2°
Type:	Raster
Source:	Met Office United Kingdom & Royal Netherlands Meteorological Institute (KNMI)
Links:	http://re.jrc.ec.europa.eu/pvgis/download/download.htm

Local Datasets

The local datasets include information collected locally by each partner, mainly related to demographics (population by districts, employment, age, income,

household size, housing area, and education level), as well as to tourism (arrivals, accommodation establishments).

1. Urban districts			
		Temporal extent:	-
		Resolution:	Based on Land Use cover LAU 2
		Type:	Vector + Look-up table
		Source:	Local Authorities / Statistics Office
		Links:	-
2. Population in urban districts			
		Temporal extent:	-
		Resolution:	Based on Land Use cover LAU 2
		Type:	Vector + Look-up table
		Source:	Local Authorities / Statistics Office
		Links:	-
3. Employment			
		Temporal extent:	-
		Resolution:	Based on Land Use cover LAU 2
		Type:	Vector + Look-up table
		Source:	Local Authorities / Statistics Office
		Links:	-

4. Age			
		Temporal extent:	-
		Resolution:	Based on Land Use cover LAU 2
		Type:	Vector + Look-up table
		Source:	Local Authorities / Statistics Office
		Links:	-
5. Income			
		Temporal extent:	-
		Resolution:	Based on Land Use cover LAU 2
		Type:	Vector + Look-up table
		Source:	Local Authorities / Statistics Office
		Links:	-
6. Household size			
		Temporal extent:	-
		Resolution:	Based on Land Use cover LAU 2
		Type:	Vector + Look-up table
		Source:	Local Authorities / Statistics Office
		Links:	-

7. Housing area			
	m2/person	Temporal extent:	-
		Resolution:	Based on Land Use cover LAU 2
		Type:	Vector + Look-up table
		Source:	Local Authorities / Statistics Office
		Links:	-
8. Education level			
		Temporal extent:	-
		Resolution:	Based on Land Use cover LAU 2
		Type:	Vector + Look-up table
		Source:	Local Authorities / Statistics Office
		Links:	-
9. Overnight stays			
		Temporal extent:	-
		Resolution:	Based on Land Use cover LAU 2
		Type:	Vector + Look-up table
		Source:	Local Authorities / Tourism offices
		Links:	-

10. Arrivals			
		Temporal extent:	-
		Resolution:	Based on Land Use cover LAU 2
		Type:	Vector + Look-up table
		Source:	Local Authorities / Tourism offices
		Links:	-

11. Accommodation establishments			
		Temporal extent:	-
		Resolution:	Based on Land Use cover LAU 2
		Type:	Vector + Look-up table
		Source:	Local Authorities
		Links:	-

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