Territorial typologies manual - mountain regions

Statistics Explained

This article forms part of Eurostat 's *methodology manual on territorial typologies* .

The mountain typology is applied at the level of NUTS level 3 regions: it identifies mountain regions in the European Union (EU) as NUTS level 3 regions where more than half of the surface is covered by mountain areas, or in which more than half of the population lives in mountain areas.

Classes for the typology and their conditions

Details of the typology

The mountain typology is a classification based on the following two categories:

- mountain regions;
- non-mountain regions (those regions that are not defined as mountain regions).

Mountain regions may be divided into three different categories, defined as NUTS level 3 regions:

- where more than 50 % of the surface is covered by topographic mountain areas;
- in which more than 50 % of the regional population lives in topographic mountain areas;
- where more than 50 % of the surface is covered by topographic mountain areas and where more than 50 % of the regional population lives in these mountain areas.

Methodology for the typology

The first step for classifying mountain regions concerns the delineation of mountain areas. This was carried out using a digital elevation model (DEM), a 3-D approximation of the surface of a terrain produced from elevation data. The model provides a raster (grid) dataset with information captured every 30 arc-seconds (approximately, every 1 km^2).

Within a European context, topographic mountain areas are defined using the following criteria:

- areas with elevation $\geq$ 2 500 m — all areas are considered mountainous (included within the mountain areas delimitation);
- areas with elevation 1 500 m - < 2 500 m — areas within a 3 km radius of a DEM point that have a slope > 2 degrees are considered mountainous;
- areas with elevation 1 000 m - < 1 500 m — at this altitude areas have to meet at least one of two criteria:
  - areas within a 3 km radius of a DEM point that have a slope > 5 degrees are considered mountainous;

  - areas that are less steep may still be considered mountainous if the elevations encountered within a 7 km radius of a DEM point vary by at least 300 m;

- areas with elevation 300 m - <1 000 m — are considered mountainous if the elevations encountered within a 7 km radius of a DEM point vary by at least 300 m;
- areas with elevation < 300 m — for each point of the DEM, the standard deviation for the elevations of eight cardinal points surrounding it (north, north-east, east, south-east, south, south-west, west and north-west) is calculated; if the standard deviation is greater than 50 m, then the landscape is considered sufficiently undulating to be mountainous (despite its low elevation).

The objective of the final criterion (for areas with elevation < 300 m) was to identify mountain areas with relatively large local contrasts in topography, such as Scottish or Norwegian fjords, or Mediterranean coastal mountain areas (for example, in Greece).

Once the delineation of mountain areas has been finalised, it may be used to identify NUTS level 3 regions where more than 50 % of the surface is covered by mountain areas.

The second stage concerns accessing grid-based population data for 1 km^2 grid cells (for more information, see the introductory chapter). In conjunction with the delineation of mountain areas, these population grid statistics may be used to identify NUTS level 3 regions where more than 50 % of the population lives in mountain areas; note that the population grid statistics and the delineation of mountain areas both refer to observations that occur each kilometre; this makes it convenient to combine these two distinct sources of information. The approach provides a distinction between regions with a predominantly mountainous surface and a predominantly mountainous population: for an analysis of the impact on land use or similar environmental issues, it would be more appropriate to use the indicator for regions with a majority of mountainous surface, whereas for an analysis of the impact on people, it would be more appropriate to use the indicator for regions with a majority of their population living in a mountain area.

Note the mountain typology is not defined/recognised within the NUTS Regulation , although the NUTS level 3 regions themselves are defined therein.

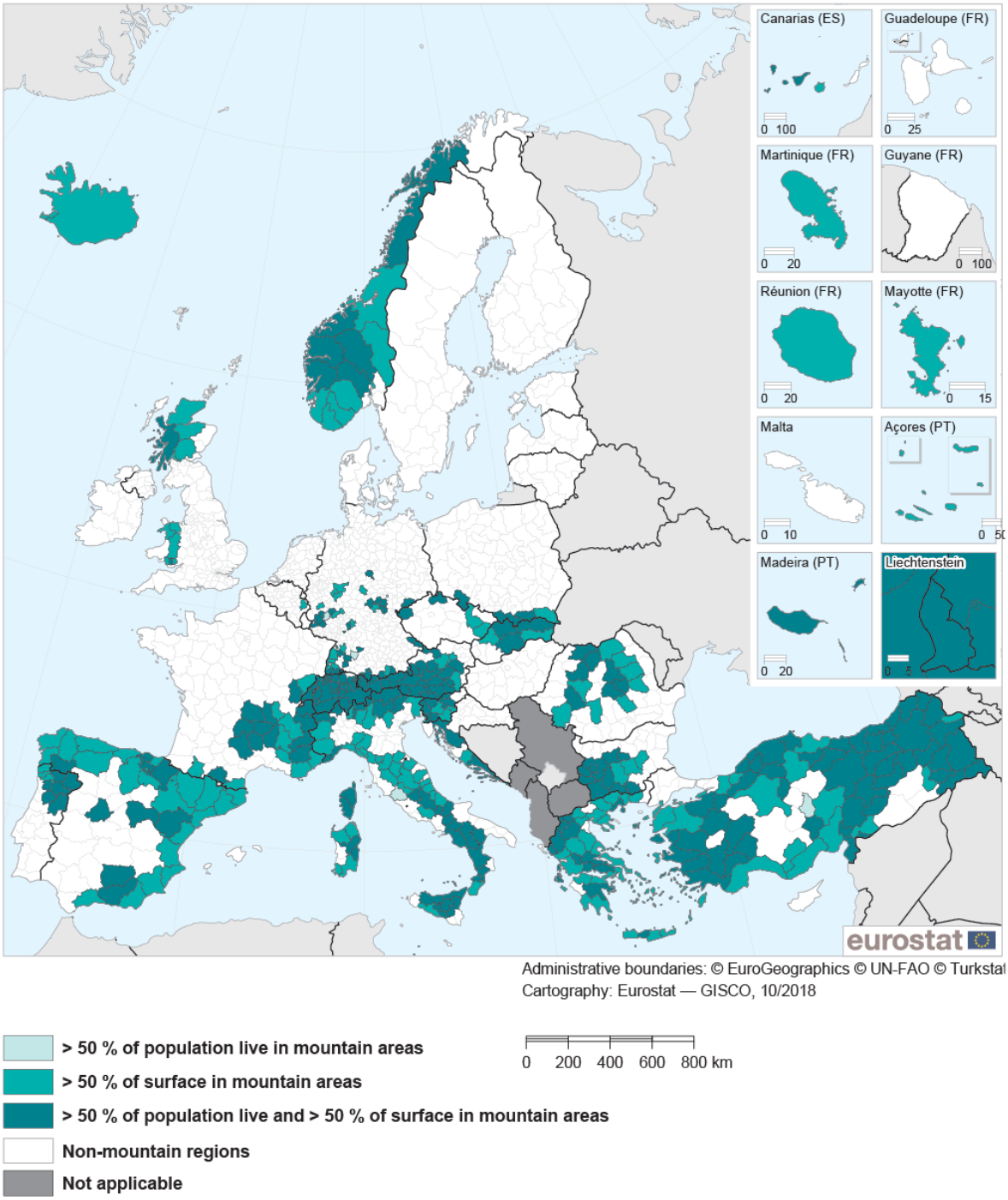
Links to other spatial concepts/typologies

There are links between the degree of urbanisation (see Chapter 2) or the urban-rural typology (see Chapter 5) and the typology for mountain regions, insofar as rural areas and predominantly rural regions overlap, to some degree, with mountain regions. On the other hand, there are three capital regions which are classified as mountain regions: Ljubljana (in Slovenia), Oslo (in Norway) and Bern (in Switzerland).

Results

Based on the above definitions, of the 1 348 NUTS 2016 level 3 regions, there are 323 mountainous regions in the EU-28 and 1 025 non-mountainous regions. The EU's mountainous regions may be broken down into the following classes: 170 NUTS level 3 regions have more than half their population living in mountain areas and more than half of their surface covered by mountain areas; 148 NUTS level 2 regions have more than half of their surface covered by mountain areas (with a lower population share); only four NUTS level 2 regions have more than half their population living in mountain areas (with a lower surface share).

Map 1 provides an overview of the final classification for the mountain typology showing each of the different classes described above.



Note: based on Mountain areas 2004, GEOSTAT population grid from 2011, Columbia University, Center for International Earth Science Information Network - CIESIN (2015): GHS population grid, and NUTS 2016.

Source: Eurostat, JRC and European Commission, Directorate-General Regional and Urban Policy

Map 1: Mountain typology Source: Eurostat, JRC and European Commission, Directorate-General Regional and Urban Policy

Changes to the typology over time

The mountain typology was developed by Nordregio through a project that was financed by the European Commission . Initially, the typology was based on information for local administrative units (LAUs) , with mountain

units defined as those with more than half of their surface covered by topographic mountain areas.

For a Green Paper on Territorial Cohesion (COM(2008) 616 final) , an alternative approach was adopted, based on the use of annual socioeconomic datasets for NUTS level 3 regions (as these provided the only recent source of information). The Green Paper defined NUTS level 3 regions as mountain regions if the majority of their population lived in mountain grid cells.

Thereafter, the most recent definition of mountain regions (as described above) was developed by the Directorate-General for Regional and Urban Policy in association with Eurostat.

Changes over time that impact on the classification

The mountain regions classification should be updated to reflect any changes to the underlying sources of information that are used in its compilation. As such, the classification may be updated to reflect: changes to population distributions for 1 km^2 grid cells, changes in the NUTS classification, or changes relating to the global digital elevation model. The frequency of such updates varies according to the source of information.

The NUTS Regulation specifies that the classification of regions should remain stable for a period of at least three years; the most recent updates were for NUTS 2010, NUTS 2013 and NUTS 2016. After each revision of the NUTS classification, population grid statistics should be re-assessed in order to (re-)compute the share of each NUTS level 3 region living within mountain areas. Changes to the mountain regions classification resulting from a revision of population distributions for 1 km^2 grid cells are less common and these may be expected every 10 years. The next major update of the population grid is foreseen to take place for the 2021 reference year. At the time of writing there is no change foreseen in relation to the use of information derived from the global digital elevation model, although new technologies may result in more detailed elevation models being made available over time.

Future developments

The next update of the NUTS classification is foreseen to take place in 2019.

At the time of writing, a 2021 population and housing census implementing regulation is in the process of being adopted by the European Commission. It includes an article for 1 km^2 population grid statistics. As well as information for annual counts of populations, it also foresees more detailed analyses: population by sex, population by age, number of employed persons, population by place of birth, population by usual place of residence one year prior to the census.

Eurostat are also discussing post-2021 census developments with national statistical authorities. It is hoped that the European statistical system (ESS) will agree to produce — from the mid-2020s onwards — annual counts of populations (based on usual place of residence) for a 1 km^2 grid, with data to be made available within 12 months of the reference period.

Further information

Glossary entry:

Mountain region

Detailed methodology:

Mountain areas in Europe: analysis of mountain areas in EU Member States, acceding and other European countries

Geodata for mountain areas:

Geodata for mountain areas ; note, these files can only be read when using geographical information system (GIS) software.

Published indicators

A variety of different statistical surveys collect data for NUTS level 3 regions and this information may be used to calculate data for mountain and non-mountain regions. This process involves aggregating the data for NUTS level 3 regions to compute a total or an average for all mountain (and non-mountain) regions within a territory (for example a Member State, or the EU as a whole).

Visualisation tools:

Eurostat publishes data for the mountain typology through Regions and cities illustrated .

Database:

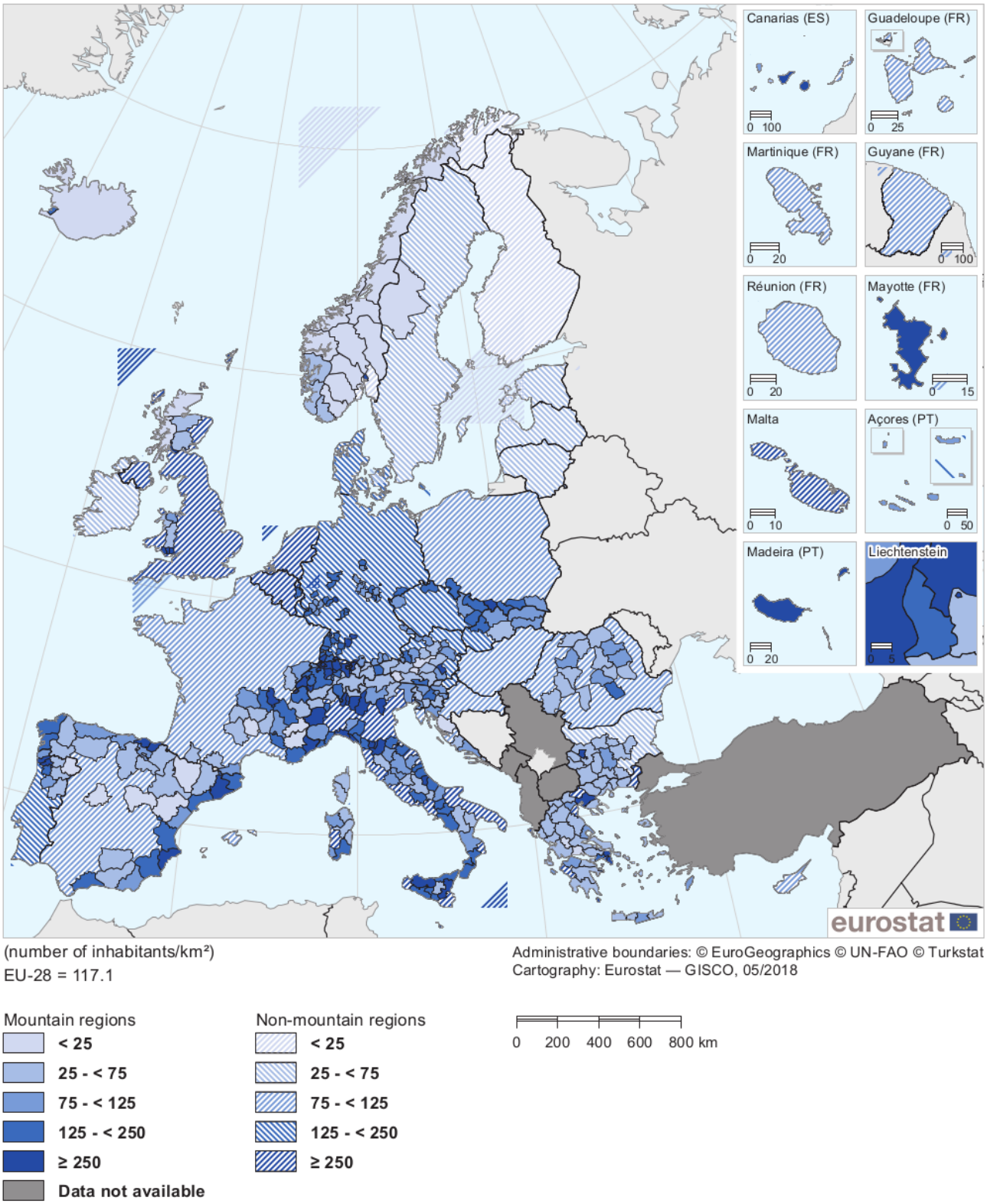
Eurostat's website provides information for a wide variety of indicators for the mountain typology. These statistics are available for the following statistical domains: demography, population projections, the labour market, crimes recorded by the police, economic accounts, business demography, intellectual property rights and transport. They are available here .

Geographical information for elevations:

Background information concerning digital elevation models (including link to full report).

Example

Population density, by mountain and aggregates of non-mountain regions, 2015
(number of inhabitants/km²)



Note: EU-28, Portugal and the United Kingdom, estimates. France: provisional.
Source: Eurostat (online data codes: urt_d3dens, reg_area3 and demo_r_pjangrp3)

Map 2: Population density, by mountain and aggregates of non-mountain regions, 2015 (number of inhabitants) Source: Eurostat (urt_d3dens), (reg_area3) and (demo_r_pjangrp3)

Database

- Rural development

Dedicated section

- Regions and cities - overview

Publications

- Publications on rural development

Methodology

- Mountain areas in Europe
- - Gisco - geodata (reference data-elevation)

Visualisations

- Regions and cities illustrated - Mountain areas