

# LAND 2.3



According to the Corine Land Cover (CLC) survey in 2006, Spain is one of the countries of Europe with the lowest percentage of artificial surfaces over total land area. However, it is also the country in which the greatest change occurred in this respect in the period 2000 to 2006, with an increase of 15%.

The CORINE Land Cover (CLC) survey is a European Environment Agency Project developed with the aim of producing a European land cover database. It forms part of the CORINE Programme (Coordination of Information of the Environment, of the European Union). It is also integrated in the Land Core Monitoring System of GMES (Global Monitoring for Environment and Security), an EU initiative aimed at Earth observation in Europe.

With regard to landscape fragmentation, the latest studies carried out by the European Environment Agency reveal that Spain has an average level of fragmentation compared to the rest of European countries, but with high levels in many built-up coastal areas. Landscape fragmentation is a factor to be considered when managing land, as it has an impact on reduction of fauna populations, dividing them and isolating them, as well as on the quality of the countryside.



The National Soil Erosion Inventory was again updated in 2011. This year's survey has added data on areas at risk from erosion in the province of Avila, and in 2012 those of Palencia, Segovia, Burgos and Salamanca are due to be completed.

In 2011 transposition of the Waste Framework Directive into our domestic law was completed, through Law 22/2011 of 28 July, on waste and contaminated soil, which repeals Law 10/1998 of 21 April, on waste. Annex XI of this law cites the autonomous communities' obligations regarding information in the area of contaminated soil, which will result in the availability of complete, updated information on this issue. The priority axes in the field of contaminated soils will be the prevention of pollution and the implementation of corrective action.

### KEY MESSAGES

Spain is one of the countries of Europe with the lowest percentage of artificial surfaces. However, it is one of the countries where this kind of surface increased the most over the period 2000-2006.

There has been a medium level of landscape fragmentation in Spain in relation to the rest of Europe, although it is increasing in coastal regions.

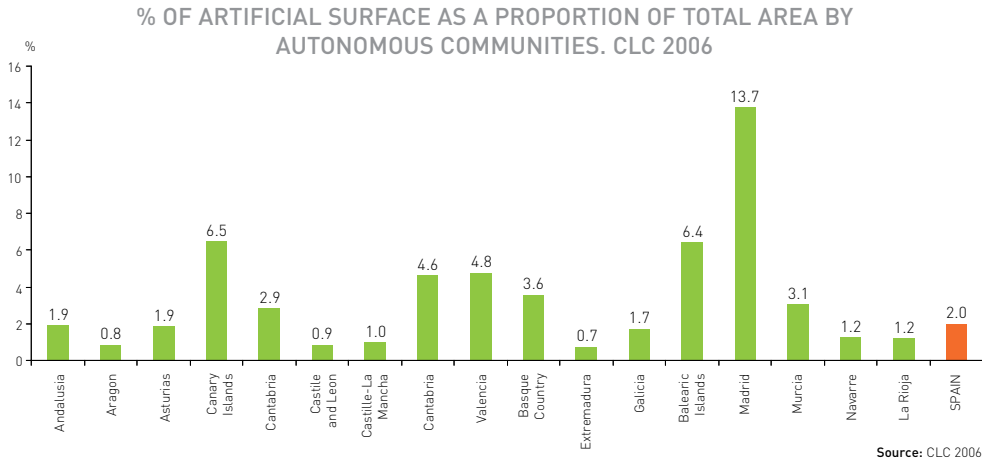
The National Inventory of Soil Erosion is still undergoing preparation. Its methodology is innovative within Europe and provides a highly detailed picture of the state of erosion in Spain.

### INDICATORS

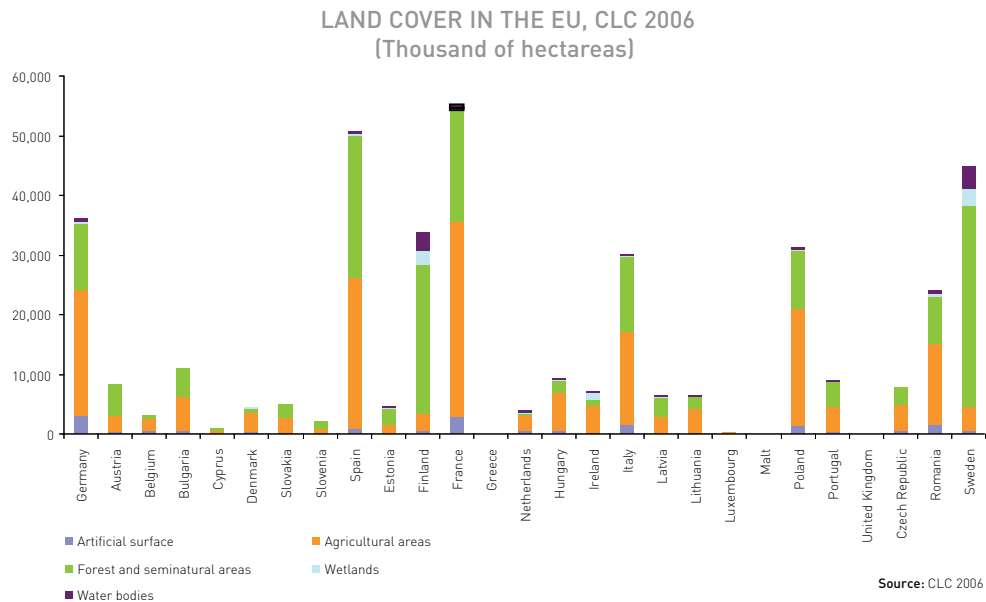
- Changes in land cover: artificial surfaces
- Landscape fragmentation
- Area affected by erosion

# Changes in land cover: artificial surfaces

Between the CLC 2000 and the CLC 2006 surveys, the area of Spain covered by artificial surfaces increased by 15%



In Spain artificial surfaces account for 2% of the total according to the Corine Land Cover 2006 project. The Autonomous Community of Madrid has the highest amount of artificial surfaces, followed by the Canary Islands and the Balearic Islands, and finally Aragon and Extremadura.



According to Corine Land Cover 2006 (CLC 2006), the percentage of artificial surfaces in Spain is 2% of the total land area, making it one of the countries of Europe with the lowest percentage of artificial surfaces. Only Finland and Sweden, with 1.4% and Latvia, with 1.3%, have lower rates. This situation was also the case in the Corine Land Cover 2000 (CLC 2000). In this survey, Spain had an artificial surface percentage of 1.76%, followed by Finland, Sweden and Latvia (1.43%, 1.40% and 1.33% respectively). However, Spain is the country where the highest increase has taken place, as this rise was of 15%, as compared to 2.3%, 2.8% and 1.1% respectively in the other countries.

In Europe, the CLC 2006 data indicate that 4.3% of the land area is artificial. According to the CLC 2000 survey, artificial surface in Europe stood at 4.18%.

With regard to other types of surfaces, the figures are very different. In Spain forest area and semi-natural areas account for a percentage of 47% according to the CLC 2006 survey, behind Sweden (75%), Finland (74%), Slovenia (62%), Austria (62%), Estonia (56%), Latvia (50%) and Portugal (48%).

#### NOTES

The CLC surveys identify linear elements with a minimum width of 100m. The minimum mappable unit in the CLC surveys is 25 ha. Updates included in the CLC 2006 survey have enabled creation of the CLC 2000-2006 changes database as an independent product (minimum images unit: 5 ha). In Spain, the base year for most of the data is 2005. However, in the particular case of Navarre, images from 2006 have been used.

In CLC 2006, artificial surfaces comprise the following categories:

- 1.1 urban fabric
  - continuous urban fabric
  - discontinuous urban fabric
- 1.2. industrial, commercial and transport units
  - industrial or commercial units
  - road and rail network and associated land
  - port areas
  - airports
- 1.3. mine, dump and construction sites
  - mineral extraction sites
  - dump sites
  - construction sites
- 1.4. artificial non-agricultural vegetated areas
  - green urban areas
  - sport and leisure facilities

#### SOURCE

- National Geographic institute (IGN). Ministry of Public Works (MF): Corine Land Cover 2006. (CLC 2006).
- National Geographic institute (IGN). Ministry of Public Works (MF): Corine Land Cover 2000. (CLC 2000).
- European Environment agency, Land accounts data viewer 2000-2006.

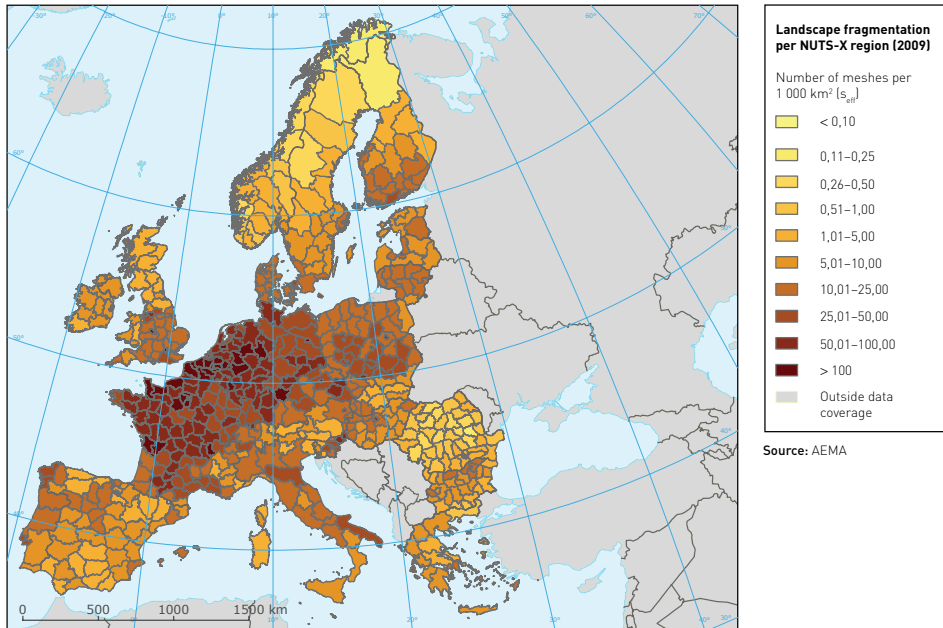
#### FURTHER INFORMATION

- <http://www.fomento.es>
- <http://www.magrama.es>
- <http://www.eea.europa.eu/data-and-maps/data/data-viewers/land-accounts>

# Landscape fragmentation

Landscape fragmentation in Spain is medium, in relation to the rest of Europe

LANDSCAPE FRAGMENTATION IN EUROPE BY REGIONS, 2009



This indicator quantifies the extent to which the movement of wild fauna is interrupted by transport infrastructure and built-up areas. The higher mesh density values indicate greater fragmentation of the landscape (see notes at the end of the indicator).

Of all the European countries, those in the Iberian and Scandinavian peninsulas, together with Romania, are the least-fragmented regions.

The most fragmented areas are in Belgium, the Netherlands, Luxembourg, France, Germany, Denmark, the Czech Republic, Poland, United Kingdom and Slovenia, with values of more than 50 meshes per square kilometre.

Spain, like other Mediterranean countries such as Greece and Italy, has a medium level of landscape fragmentation, with greater fragmentation in many of the built-up coastal areas. Moreover, in the Mediterranean countries, the more mountainous regions are often the most fragmented.

Within Spain, the provinces with the highest fragmentation levels are Coruña and Pontevedra, with 42.90 and 30.46 meshes per 1000 km<sup>2</sup> respectively. Afterwards come the Balearic Islands (19.64), Madrid (18.60), Valladolid (18.02), Alicante (16.56), Segovia (14.80), Bizkaia (14.55), Lugo (13.49), Santa Cruz de Tenerife (13.30), Barcelona (12.93), Zamora (11.98), Palencia (11.93) and Burgos (10.62), in a range of between 10 and 25 meshes per 1000 km<sup>2</sup>.

Thirdly, with densities between 5 and 10 meshes, we find Salamanca (9.59), Alava (8.76), Guadalajara (8.58), Soria (8.23), Las Palmas (8.18), Murcia (7.47), Valencia (7.47), Avila (7.36), Albacete (7.27), Cuenca (7.12), Toledo (6.93), Badajoz (6.70), Tarragona (6.47), Guipuzcoa (6.47), Malaga (6.08), Seville (5.94), Teruel (5.64), Cáceres (5.53), Orense (5.34), Castellon (5.23), Girona (5.14) and Navarre (5.07).

Finally, the provinces of Zaragoza (4.91), Leon (4.64), Huelva (4.51), Almeria (4.39), Granada (4.36), Cantabria (4.34), Huesca (4.24), Cordoba (4.04), La Rioja (3.95), Cadiz (3.88), Lleida (3.53), Ciudad Real (2.92), Asturias (2.67) and Jaen (1.5) have a density between 1 and 5 meshes per 1000 km<sup>2</sup>.

#### NOTES

- The effective mesh density (seff) is a measure of landscape fragmentation, i.e. the degree to which movement between different parts of the landscape is interrupted by barriers. It gives the effective number of meshes per 1 000 km<sup>2</sup> or the density of the meshes, i.e. how many times the effective mesh size fits into an area of 1 000 km<sup>2</sup>. Thus, the more barriers fragmenting the landscape, the higher the effective mesh density.
- The effective mesh size (meff) serves to measure landscape connectivity, i.e. the degree to which movement between different parts of the landscape is possible. It expresses the probability that any two points chosen randomly in a region are connected; that is, not separated by barriers such as transport routes or built-up areas. The more barriers fragmenting the landscape, the lower the probability that the two points are connected, and the lower the effective mesh size. The effective mesh size is measured in km<sup>2</sup>.
- This indicator uses FG-B2 geometry, which measures the fragmentation of non-mountainous land areas, which are all areas excluding lakes, major rivers and high mountains. Therefore the fragmentation of the remaining area is measured. This is the most appropriate geometry for comparing different regions.

#### SOURCES

- EEA, 2011. "Landscape fragmentation in Europe". Joint EEA-FOEN report. EEA Report No 2/2011. European Environment Agency (EEA). Federal Office for the Environment (FOEN).

#### FURTHER INFORMATION

- <http://www.eea.europa.eu/>

## Area affected by erosion

The National Soil Erosion Inventory allows authorities to identify priority action areas to combat erosion

AREA AFFECTED BY EROSION (%)

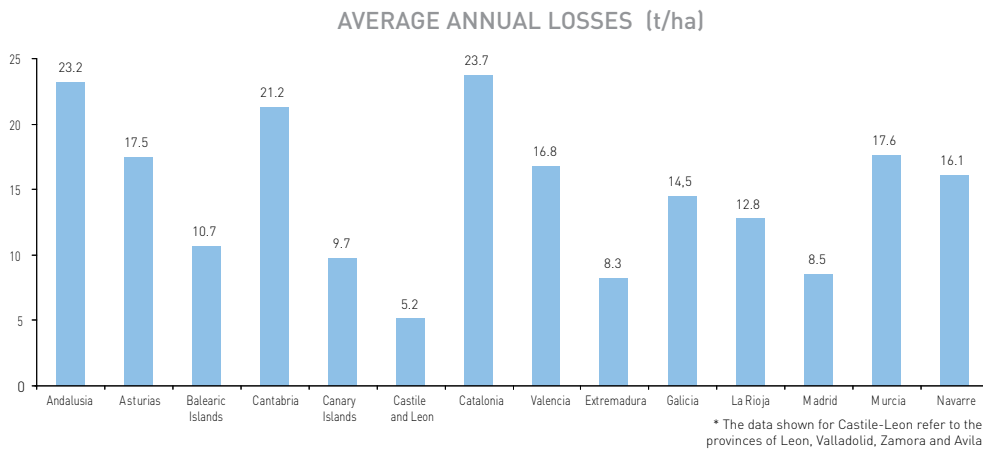
AC	Moderate rate of erosion (%)	Intermediate rate of erosion (%)	High rate of erosion (%)
Cantabria	59.91	22.39	17.70
Asturias	61.92	21.67	16.42
Navarre	65.64	18.79	15.57
Murcia	66.41	18.13	15.46
Rioja	65.84	20.43	13.72
Galicia	74.34	13.06	12.61
Balearic Islands	76.62	13.69	9.70
Madrid	81.28	10.89	7.83
Catalonia	54.41	24.86	20.74
Extremadura	83.75	9.81	6.44
Canary Islands	69.25	21.86	8.89
Andalusia	57.61	19.76	22.63
Comunidad Valenciana	70.12	16.04	13.83
Castile-Leon (*)	87.81	9.25	2.93

\*The data for Castile-Leon refer to the provinces of Leon, Valladolid, Zamora and Avila.

Source: MAGRAMA

In 2011, data for the province of Avila in the autonomous community of Castile-Leon were added to the National Soil Erosion Inventory (INES). The figures correspond to the percentage of land area affected by varying degrees of erosion in relation to the autonomous community's total area subject to erosion. Data for Castile-Leon only refers to the four studied provinces (Leon, Valladolid, Zamora and Avila), and not the total area for the autonomous community. The data presented in this indicator on land affected by sheet, rill and gully were collected in studies carried out between 2002 and 2011.

To date the autonomous communities with the largest annual loss figures are Catalonia and Andalusia, followed by Cantabria, with values that are considered average, as they are between 10 and 25 t/ha/year, although in all three cases they are above 21 t/ha/year.



One of the main objectives of the INES is to locate, quantify and analyse changes in erosive phenomena in order to delineate areas requiring priority action in the fight against erosion, as well as to define and evaluate the actions carried out.

The National Soil Erosion Inventory, which uses a 1:50,000 scale, involves both field work, that improves application of the RUSLE model, and study of other types of erosion (riverbank, gully, deep and wind erosion). Thus, unlike similar projects in which sheet and rill erosion are studied in other European countries, the INES adopts an innovative approach and provides a highly detailed picture of the state of the erosion in Spain. As such, the Inventory constitutes a methodological model for studies of this type throughout Europe.

#### NOTES

- In the indicator "Moderate" soil loss is defined as 0-10 t/ha/year, "Intermediate" as 10-25 t/ha/year and "High" as over 25 t/ha/year.
- The inventory is divided into five sections according to the various types of erosion:
  - Sheet, rill and gully erosion (quantitative estimate of soil loss, performed by applying RUSLE model - Soil Universal Revised Equation Loss).
  - Gully erosion (identification and demarcation of affected areas).
  - Deep erosion (mass movements) (identification of areas potentially at risk and qualitative classification).
  - Bank erosion (qualitative classification of hydrological units according to their susceptibility to torrential phenomena in their drainage basins).
  - Wind erosion (identification and classification of areas potentially at risk).

#### SOURCES

- National Soil Erosion Inventory, 2002-2012. Secretariat-General for the Natural Environment and Forestry Policy. Secretariat-General for Agriculture and Food. Ministry of Agriculture, Food and Environment.

#### FURTHER INFORMATION

- <http://www.magrama.gob.es/es/biodiversity/topics/inventarios-nacionales/inventario-nacional-de-erosion-de-suelos/default.aspx>