

2.3 LAND



Land is a natural resource that plays a key role in the environment. It sustains biological activity and production, it regulates the flow of water and solutes, and it filters and absorbs organic and inorganic matter. It is fundamental not only to the survival of ecosystems, but also to human activity. The main threats affecting soil are erosion, organic matter loss, pollution, salinisation, compaction, loss of land-based biodiversity, soil sealing, landslides and flooding. Human intervention may accelerate and even determine these processes.

Land cover deriving from agriculture, infrastructure and, in particular, urban sprawl has serious and often irreversible consequences for the environment. The creation of artificial surfaces leads to a decline in habitats, fragmentation of landscapes and a reduction in the space vital to many species. In Spain, these artificial surfaces have become particularly widespread around large cities and along the coast. This indicator analyses the type and development of these artificial surfaces, comparing their growth between 1990 and 2000 in towns and cities with over 100,000 inhabitants and along a 10-km-wide strip of coastline.

The National Soil Erosion Inventory (*Inventario Nacional de Erosión de Suelos*) continues to study the situation in Spain's various Autonomous Communities. Although more provinces have now been analysed, the data for just one additional Autonomous Community have been aggregated to those presented in the previous edition. The working paper for the Spanish National Action



Programme to Combat Desertification (*Programa de Acción Nacional contra la Desertificación, December 2007*), provides an overview of the proportion of surface area in danger of desertification throughout Spain's Autonomous Communities.

Human activity is responsible for most cases of land pollution. In Spain, Royal Decree 9/2005 (*Real Decreto 9/2005*), of 14 January, regulates the criteria and standards for classifying land as contaminated. The only land considered contaminated will be that declared as such by express administrative ruling. Since Spain's Autonomous Communities are still in the process of declaring land as contaminated, it is not currently possible to establish a reliable number of contaminated sites in Spain. However, there is a National Database of Contaminated Land (*Base de Datos Nacional de Suelos Contaminados*) that will use the data supplied by the Autonomous Communities to record the number of sites declared as contaminated and provide other relevant information (specific pollutants, etc.).

INDICATOR	GOAL	TREND
Changes in land cover: artificial surfaces	Achieve sustainable land use	The growth of artificial surfaces tends towards a pattern of urban sprawl
Area developed on the coast	Reduce pressure on coastal ecosystems	Urban growth on the coast differs from that of inland areas
Area affected by erosion	Hydrological and forest restoration	Of the Autonomous Communities studied so far, Catalonia has the highest percentage of land affected by erosion
Area at risk from desertification	Recovery of areas at risk	The problem of desertification can be considered serious (high and very high) in 18% of Spanish territory

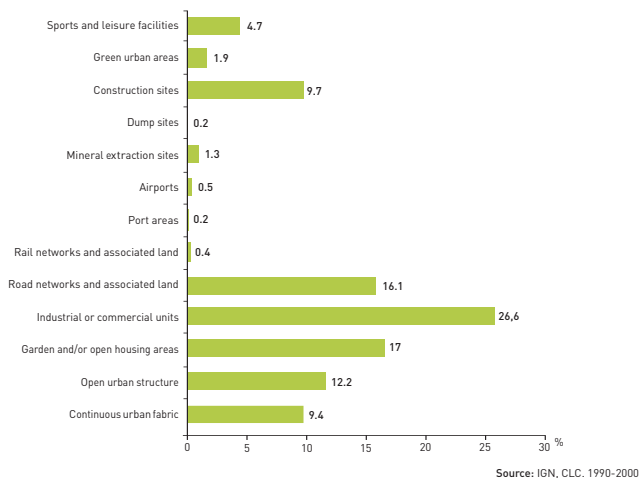
Changes in land cover: artificial surfaces

Artificial surfaces are primarily attributable to by commercial units, garden housing areas and road networks

The Corine Land Cover (CLC) 1990 and 2000 projects used satellite images to examine the surface of Spain and other European countries. On comparing the two studies, it was found that artificial surfaces in Spain had increased by 240,166 ha between 1990 and 2000.

This edition analyses the composition of these artificial surfaces in towns and cities with more than 100,000 inhabitants. Artificial surfaces in these urban areas have increased by 40,063.1 ha, a figure that is broken down in the graph below to show the sectors responsible for this growth.

BREAK-DOWN OF GROWTH IN ARTIFICIAL SURFACES IN TOWNS AND CITIES WITH MORE THAN 100,000 INHABITANTS (1990-2000)



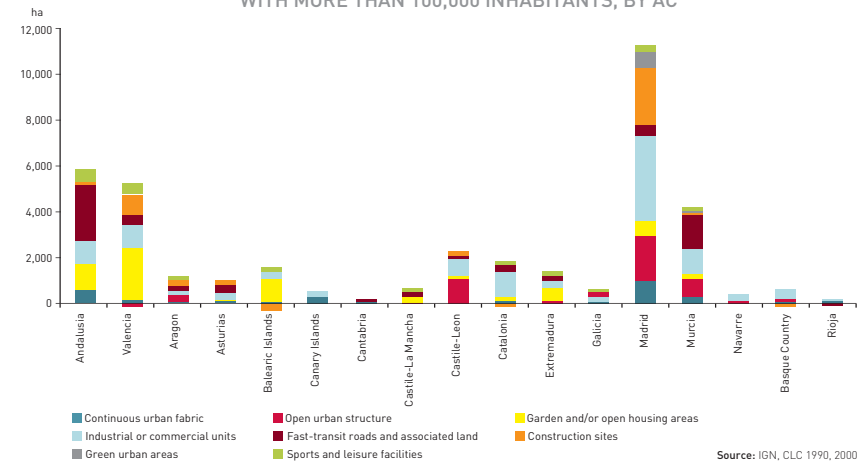
The urban growth model applied in Spain during the 1990s is characterised by significant growth in the surface area covered by “industrial or commercial units” (10,064 ha or 26.6%), followed by “garden and/or open housing areas” 6,790 ha or 17%. The area covered by road networks and associated land represents 6,448 ha or

16.1%. This is followed by artificial surfaces covered by “open urban structure”, which is defined as buildings with or without associated green areas, such as tree-lined streets or small parks and/or gardens. These are urban structures adjacent to the more compact town or city centre and represent 4,868 ha or 12.2% of artificial surfaces.

Continuous urban fabric represents 3,755.3 ha or 9.4%. This category refers to surfaces where buildings, roads, infrastructure, transport networks and artificial surfaces cover more than 80% of total surface area.

Finally, analysis reveals that there has been an increase in artificial surfaces covered by “sports and leisure facilities”, which comprise sports grounds, theme parks, golf-courses, race-courses, etc. These areas also include traditional parks not surrounded by urban areas and represent 1,882 ha or 4.7% of the growth analysed.

BREAK-DOWN OF GROWTH IN ARTIFICIAL SURFACES IN TOWNS AND CITIES WITH MORE THAN 100,000 INHABITANTS, BY AC



Distribution of these surfaces varies greatly from one Autonomous Community to another. For example, in Andalusia the area covered by road networks and associated land is even greater than the categories “garden and/or open housing areas” and “industrial or commercial units” together. In the Valencia region, less area is covered by “open urban structure”, but there is a significant increase in “garden and/or open housing areas”. Meanwhile, in Catalonia the highest growth is in “industrial or commercial units”. In the Madrid region, growth of artificial surfaces (in towns and

cities with more than 100,000 inhabitants) now stands at 11,282.6 ha. This is primarily due to an increase in “industrial and commercial units”, “open urban structure”, “continuous urban fabric” and “construction sites”.

NOTES

- The CLC projects do not cover some linear elements with a width of less than 100 m, such as roads and railways, despite their undeniable environmental impact.

SOURCES

- Corine Land Cover 1990; Corine Land Cover 2000.

FURTHER INFORMATION

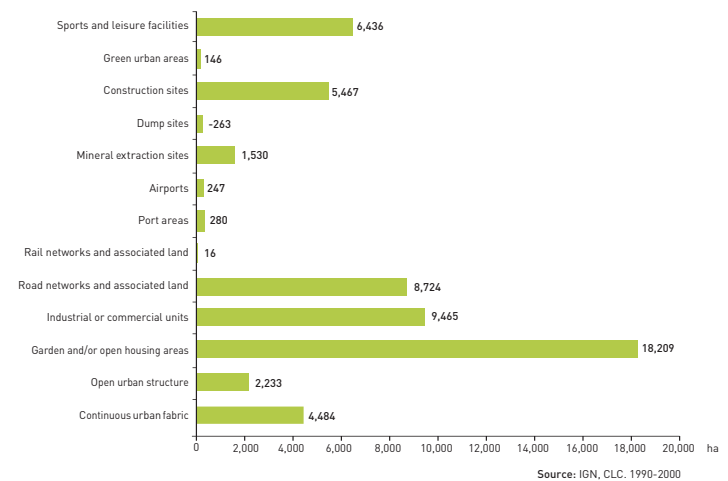
- <http://www.ign.es>
- <http://eea.europa.eu>

Area developed on the coast

The urban model on the 10-km-wide strip along the coast is different to its inland counterpart

According to Corine Land Cover 2000 data, the 10-km-wide strip along Spain’s coastline accounts for a surface area of 3,679,301.91 ha, of which a total of 328,905.32 ha is classified within the “artificial surfaces” category. This contrasts significantly with the 271,778.29 ha recorded by Corine Land Cover 1990. Growth of artificial surfaces in this coastal zone represents 31.19% of total artificial surfaces created in Spain. The indicator in this edition breaks down distribution of this growth in artificial surfaces in coastal zones during the decade between CLC 1990 and CLC 2000.

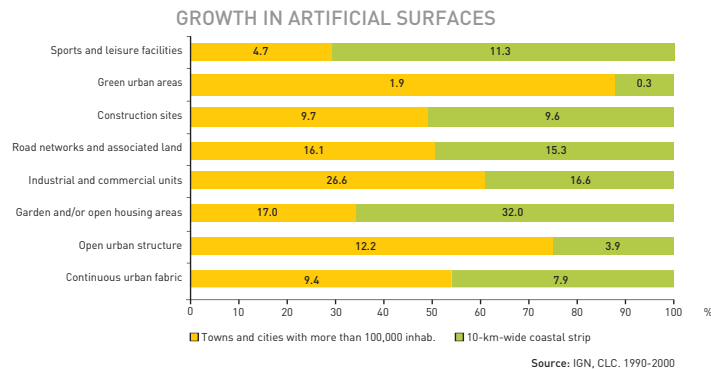
BREAK-DOWN OF GROWTH IN ARTIFICIAL SURFACES IN THE 10-KM-WIDE STRIP ALONG THE COAST



The change in the different categories in the coastal strip does not coincide with the data presented in the previous indicator for towns and cities with more than 100,000 inhabitants. The difference is particularly pronounced in the “garden and/or open housing areas” category, which represents 17% of growth in artificial surfaces in towns and cities and stands at 32% in the 10-km-wide strip along the coast. There is also a similar difference in “sports and leisure facilities”, growth of which represents

4.7% of the change in artificial surfaces in towns and cities with more than 100,000 inhabitants but stands at 11.3% in the coastal strip.

However, in towns and cities with more than 100,000 inhabitants, the “continuous urban fabric” and, in particular, “open urban structure” categories have increased more inland than along the coast.



NOTES

- The 1988 Spanish Shores Act (*Ley de Costas*) establishes a protected strip extending 100 metres inland from the shoreline, within which development for residential or accommodation purposes, among others, is prohibited. This Act also establishes an Area of influence extending 500 metres inland from the shoreline, within which local authorities must keep tight control over tourist development.

SOURCES

- Corine Land Cover 1990; Corine Land Cover 2000.

FURTHER INFORMATION

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

Area affected by erosion

Human intervention and certain land uses are increasing the rate of erosion

In principle, land erosion is a natural process, but it can cause serious environmental, economic and social problems when its natural rate is significantly accelerated by human activity. Erosion is defined as the removal of material from the land, on the surface or at shallow depths, through the action of water or wind. The indicator shows the percentage of land, in comparison to national or regional totals, affected by varying levels of erosion.

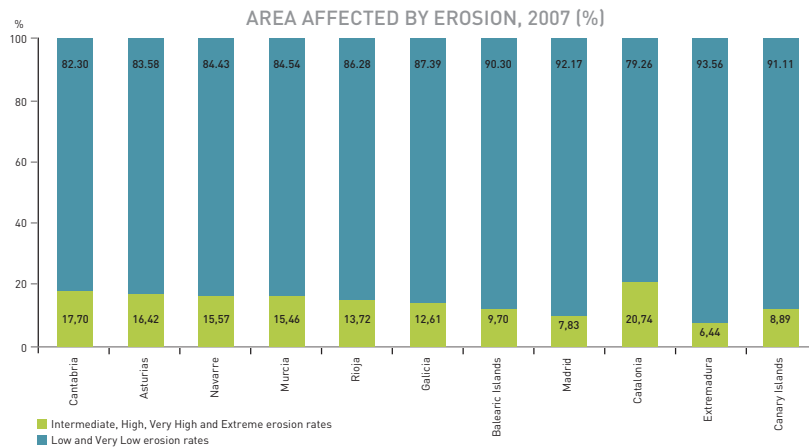
The erosion rate is highly sensitive to climate, topography and land use, as well as to certain land use and conservation practices. Erosion leads to nutrient leaching and eutrophication of rivers and lakes. The Mediterranean region, which includes a large part of Spain, is especially prone to erosion, as it experiences long periods of drought followed by heavy rains, which erode steep slopes on fragile ground. In contrast, in Northern Europe there is less soil erosion, as it rains more regularly throughout the year and the land tends to slope more gently.

Improved waste-water treatment reduces nutrient emissions by this means. However, expansion of artificial surfaces around towns and cities leads in some cases to building on steep slopes, which are highly vulnerable to erosion once vegetation has been removed.

This edition provides updated information for the eleven Autonomous Communities in which studies have been carried out as part of the National Soil Erosion Inventory, which is being drawn up by the Spanish Ministry of the Environment (*Ministerio de Medio Ambiente*). The Inventory is being produced in stages and is due for completion in 2012. Data on the area affected by erosion in these eleven Autonomous Communities were produced by studies conducted between 2002 and 2007.

Autonomous Community	“Low or Very Low” erosion rates	“Intermediate, High, Very High and Extreme” erosion rates
Cantabria	82.30%	17.70%
Asturias	83.58%	16.42%
Navarre	84.43%	15.57%
Murcia	84.54%	15.46%
Rioja	86.28%	13.72%
Galicia	87.39%	12.61%
Balearic Islands	90.30%	9.70%
Madrid	92.17%	7.83%
Catalonia	79.26%	20.74%
Extremadura	93.56%	6.44%
Canary Islands	91.11%	8.89%

Source: Spanish Ministry of the Environment



Source: Directorate General for Biodiversity (Dirección General de Biodiversidad). Spanish Ministry of the Environment.

NOTAS

- The following rates of soil loss have been established, measured in tonnes per hectare per year prior to 2002:
 - Very low: 0-5 t/ha/yr
 - Low: 5-12 t/ha/yr
 - Intermediate: 12-50 t/ha/yr
 - High: 50-100 t/ha/yr
 - Very high: 100-200 t/ha/yr
 - Extreme: > 200 t/ha/yr
- After 2002, the "Low" soil loss rate is set at 5-10 t/ha/yr, and "Intermediate" at 10-50 t/ha/yr.
- The National Soil Erosion Inventory is updated every 10 years, with the current version due for completion in 2012. The soil loss data updated to 2007 for Spain's Autonomous Communities correspond to studies under way since 2002.

SOURCES

- National Summary of the 2002 Erosion Map (*Resumen Nacional del Mapa de Estados Erosivos, 2002*). Scale 1:1,000,000.
- National Soil Erosion Inventory, 2002-2012. Secretariat General for the Environment and Land Use Planning (*Secretaría General de Medio Ambiente y Ordenación del Territorio*), Directorate General for Biodiversity. Spanish Ministry of the Environment.

FURTHER INFORMATION

- <http://www.mma.es>

Area at risk from desertification

Around 18% of Spain's land area is subject to high or very high risk of desertification

The United Nations Convention to Combat Desertification (UNCCD) defines risk of desertification as the degradation of arid, semi-arid and dry sub-wetland regions as a result of factors such as climate change and human activity. Desertification has its origins in complex interactions between physical, biological, political, social, cultural and economic factors.

In Spain, the Ministry of the Environment has included an initial demarcation of areas at risk from desertification in the Working Paper on the Spanish National Action Programme to Combat Desertification (PAND - *Programa de Acción Nacional contra la Desertificación*). By identifying these areas, it will be possible to define the physical and socio-economic units in which policies need to be developed to combat desertification. Analysis of the situation in Spain takes qualitative aspects into consideration and provides an initial indication of how desertification is distributed in Spain.

Only physical and biological indicators currently available at national level have been used in the aforementioned study, and the model applied is based on land-area classification according to the intensity of certain factors and desertification processes. The following indicators have been used:

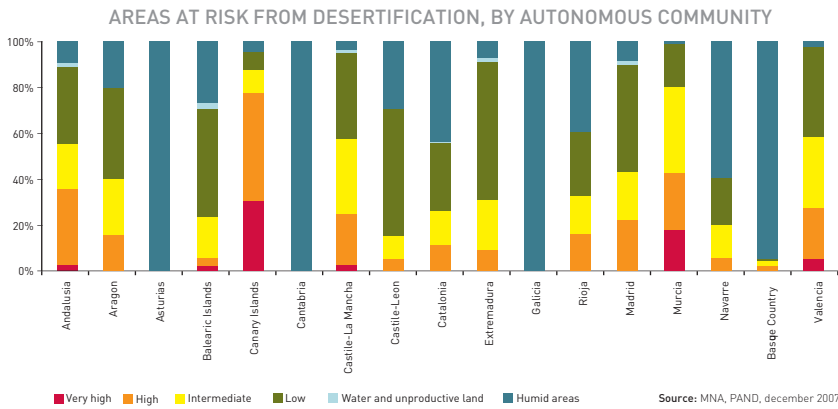
- Aridity index.
- Erosion: soil loss.
- Fires: percentage of accumulated land area affected by fire over 10 years.
- Aquifer over-exploitation: existence of over-abstraction.

A simple method has been used to obtain a map showing the risk of desertification, classified according to the level of risk defined by the model applied.

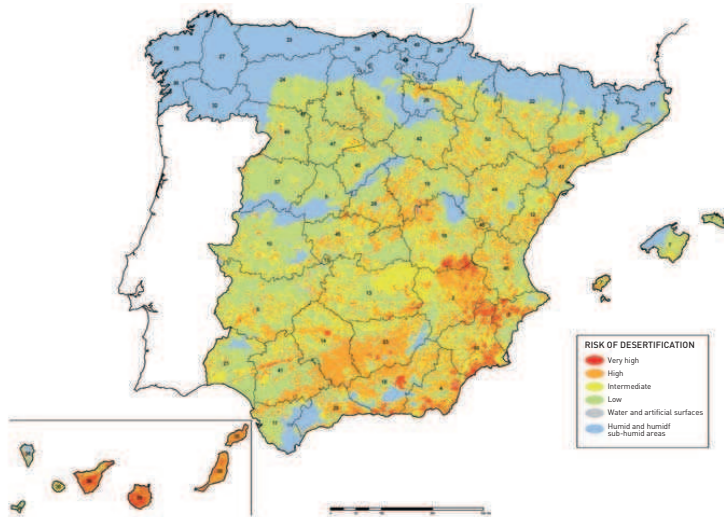
Risk of desertification	Area (ha)	Proportion
Very high	1,029,517	2.03%
High	8,007,906	15.82%
Intermediate	9,718,040	19.20%
Low	18,721,141	36.99%
Total arid, semi-arid and dry sub-humid areas	37,476,605	74.05%
Humid and humid sub-humid areas water	12,773,820	25.24%
Water and artificial surfaces	356,937	0.71%
National total	50,607,361	100.00%

Source: DGB, MMA

The break-down of areas at risk, classified by category and Autonomous Community, is as follows:



MAP SHOWING RISK OF DESERTIFICATION



SOURCES

- Spanish National Action Programme to Combat Desertification. Directorate General for Biodiversity, Spanish Ministry of the Environment.

FURTHER INFORMATION

- <http://www.mma.es>

