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# 2.3

# LAND



By land we refer to the upper layer of the Earth's crust, between the bedrock and the surface. It is made up of mineral particles, organic matter, water, air and living organisms and constitutes the interface between the Earth, air and water.

Land is one of the environments most sensitive and vulnerable to pollution and degradation. It may be considered a non-renewable resource, providing services vital for human activity and systems' survival. The main threats affecting land in Europe are erosion, organic matter loss, pollution, salinisation, compaction, loss of land-based biodiversity, soil sealing, landslides and flooding.

Expansion of urban areas and related infrastructure is the main cause of changes in land cover and the transformation of agricultural land, woodland, semi-natural and natural areas into artificial surfaces. Some of the consequences are a reduction in habitats, fragmentation of landscapes and a reduction in the land required by many species. In Spain this process is occurring around the major cities and, above all, on the coast, where artificial surfaces cover not only the shoreline, but also extend inland.

Human pressure affects the state of the land, increasing or encouraging erosion rates and generating pollution that is difficult and costly to remedy since it also contributes to



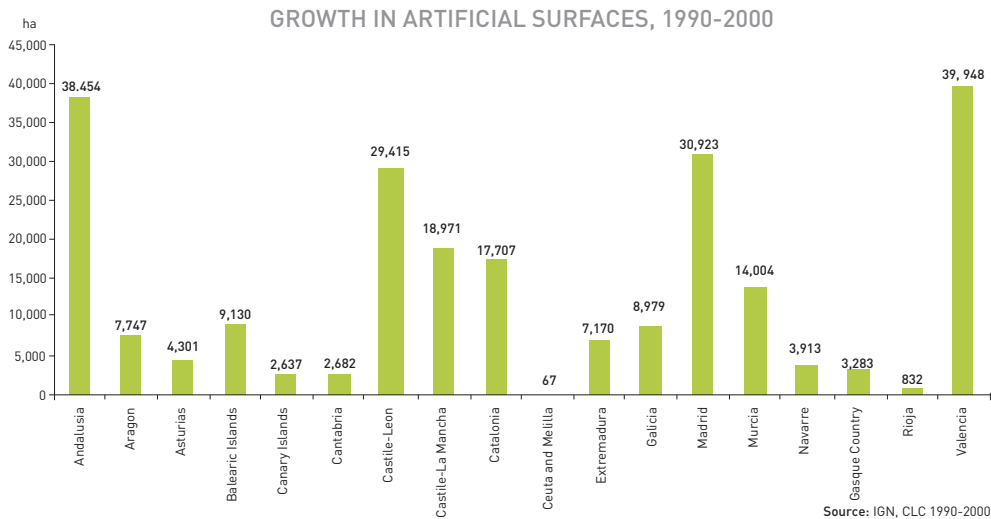
land salinisation, increased risk of landslides, etc. In fact, environmental damage to land can become irreversible, or at least last for several generations.

Approval of Royal Decree 9/2005 (*Real Decreto 9/2005*), of 14 January, altered the methodology previously employed in producing inventories of contaminated land. The contaminated land remediation indicator is not included in this edition of the Environmental Profile and will not be used until such time as the application of the new regulation provides the data required for calculation.

INDICATOR	GOAL	TREND
<b>Changes in land cover</b>	Achieve sustainable land use	Increase in artificial surfaces
<b>Area developed on the coast</b>	Reduce anthropic pressure on coastal areas	Almost one third of artificial surfaces are concentrated along the coast
<b>Area affected by erosion</b>	Reduce soil loss due to erosion	46% of Spain's land area is subject to intermediate or high erosion rates
<b>Area at risk from desertification</b>	Reduce area at risk from desertification	Around 30% of Spain's land area is subject to serious risk of desertification

## Changes in land cover

30% of artificial surfaces in existence today have been created in the last 14 years



Soil sealing due to construction, building and other infrastructure projects, leads to compaction, leaving the soil airless and waterless, and hence devoid of biological activity. As has happened elsewhere in Europe, most population centres and infrastructure projects have been built in fertile valleys and around estuaries, in other words those areas which are most productive for agriculture or natural vegetation.

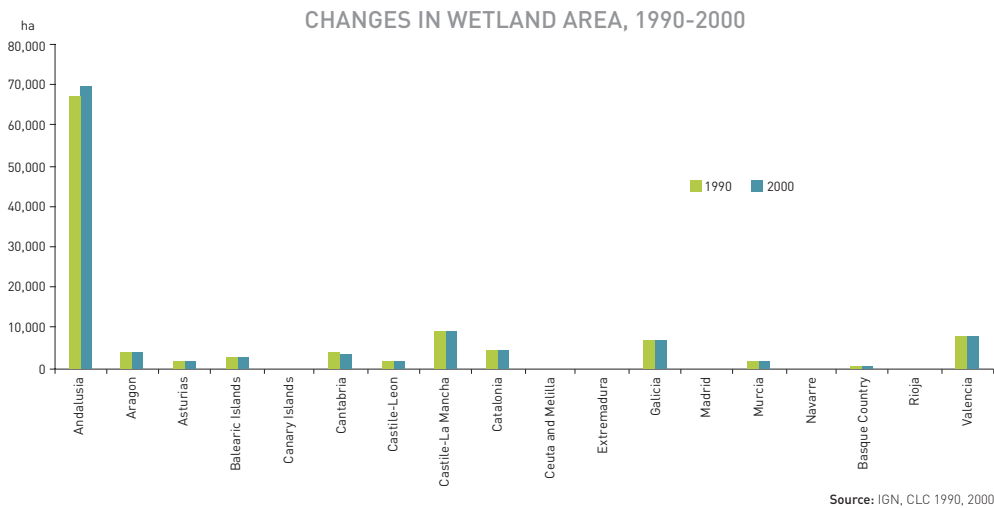
In Spain, as in the rest of Europe, soil sealing as a result of urban and infrastructure development is increasing faster than population growth, producing a development model that is unsustainable in the long term.

The information provided by the satellite images of the Corine Land Cover project revealed in 1990 that artificial surfaces accounted for 814,135 hectares out of a total area of 50,644,013. The 2000 edition of the same project revealed that artificial surfaces had expanded to cover 1,054,300 ha. In other words, there had been an increase of 240,166 ha over the course of just over a decade (fourteen years, since in Spain the CLC 1990 studies began in 1986). Over this period, the total artificial surface area built throughout Spain's entire history increased by 29.5%.

Spain's wetlands constitute one of the country's great natural resources and are home to various ecosystems and a large number of aquatic species. The importance of some of these wetlands (Doñana being the most emblematic) goes beyond the local region, as they

serve as staging posts for migratory birds on their annual flights from Europe to Africa. Comparison of the two Corine Land Cover databases shows that wetlands grew by 1,567 hectares between 1990 and 2000.

It should be remembered that the minimum surface area identifiable by the Corine project is 25 ha, meaning that the study does not include wetland areas smaller than this figure. For this reason, and on account of the various types of land groupings established, there may be differences between the Corine Land Cover databases and figures provided by other sources.



**NOTES**

- The indicators chosen reveal the different types of land cover found in Spain, based on the European Corine Land Cover (CLC) projects, which have used images from the Landsat 5 and Landsat 7 satellites to map the surface of Spain on two occasions, in CLC 1990 and CLC 2000 (the first CLC study was conducted in Spain in 1986, making for a 14-year comparison period). The next CLC is now underway and will be carried out in 2007 using images from 2006. These projects do not cover linear elements with a width of less than 100m, such as roads and railways, despite their undeniable environmental impact.

**SOURCES**

- Spanish National Geographic Institute [*Instituto Geográfico Nacional*]. Corine Land Cover 1990 and Corine Land Cover 2000.

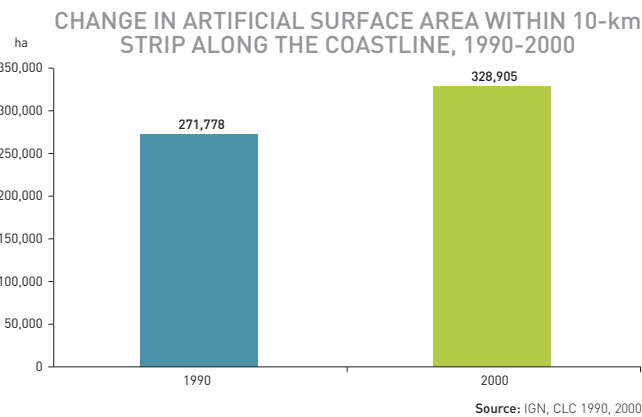
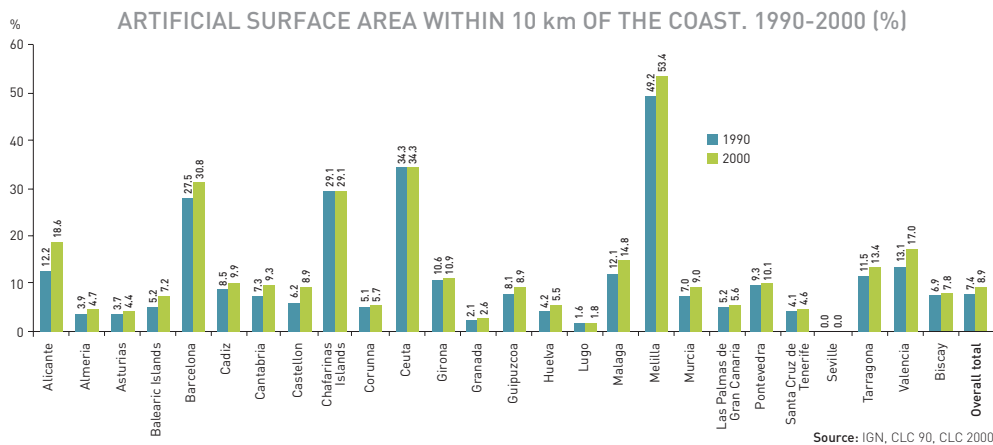
**FURTHER INFORMATION**

- [www.mma.es](http://www.mma.es)
- [www.ign.es](http://www.ign.es)

## Area developed on the coast

### A third of artificial surfaces in Spain are concentrated within a 10-kms-wide strip along the coast

The increase in artificial surface along the coast directly affects the shoreline, and particularly fragile marine ecosystems. This analysis takes into consideration data for the artificial surface area within this 10-km strip of coastline taken from the two European Corine Land Cover projects (1990 and 2000). There has been an increase in artificial surface area in almost all coastal provinces, leading to changes which will be difficult to reverse.

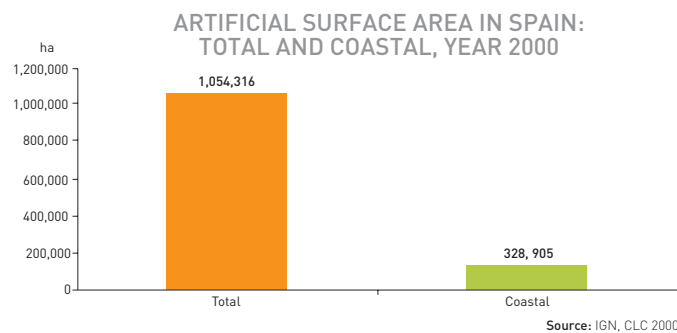


Changes to land directly along the coast affect the balance of coastal ecosystems, threatening or actually destroying certain biological communities.

The striking nature of construction projects on the coastline itself, in some cases within the Protected Areas or areas of influence established in the 1988 Spanish Shores Act (*Ley de*

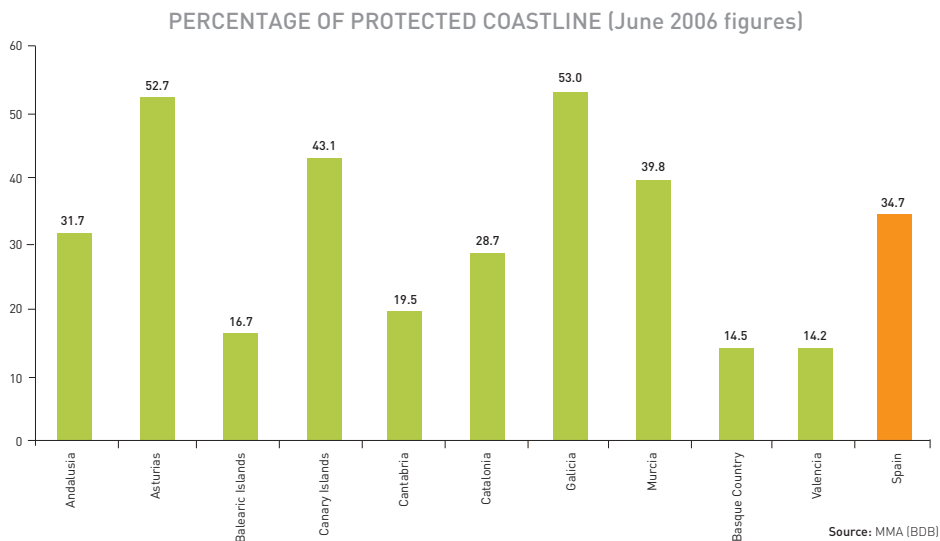
*Costas*), tends to mask the changes seen a little further inland, which also have a considerable impact.

It is particularly revealing to compare the artificial surface area within the 10-km-wide coastal strip with the situation throughout the peninsula as a whole. According to the Corine Land Cover 2000 data, Spain's total artificial surface area stood at 1,054,316 ha, in other words 2.1% of the country's land area. However, artificial surfaces within the 10-km-wide coastal strip accounted for 328,905 ha, 8.9% of the total area (3,679,302 ha) within this band.



31.19% of artificial surfaces in Spain in 2000 (including all of the country's urban areas, both large and small) were located on the coast, within 10 kilometres of the shoreline.

It is also worth highlighting that 2,852.83 km of Spanish coastline fall within the Protected Areas established by Act 4/1989. The graph below shows the breakdown of these areas by Autonomous Community.



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Around 6,066 km (77% of the Spanish coast) is now subject to boundary demarcation. In 2006, the Spanish Ministry of the Environment (*Ministerio de Medio Ambiente*) demarcated 563 kilometres of coastline.

### NOTES

- The 1988 Spanish Shores Act established 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 established an area of influence extending 500 metres inland from the shoreline, within which local authorities must keep tight control over tourist development.

### SOURCES

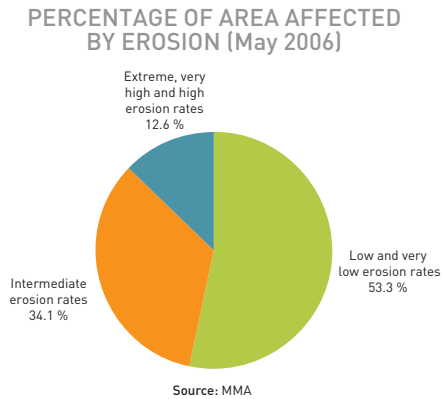
- Spanish National Geographic Institute, Spanish Ministry of Public Works (*Ministerio de Fomento*). Corine Land Cover 1990 and 2000.
- Directorate General for Coasts (*Dirección General de Costas*), Spanish Ministry of the Environment.

### FURTHER INFORMATION

- [www.mma.es](http://www.mma.es)

## Area affected by erosion

12% of Spain's geography is subject to high erosion rates

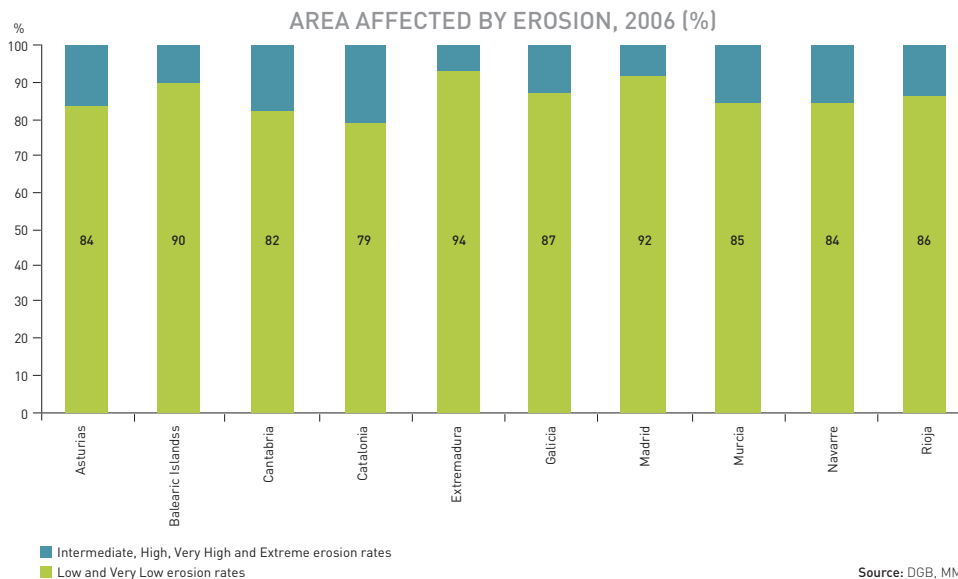


This indicator shows changes in the percentage of land, in comparison to national or regional totals, affected by varying levels of erosion. Erosion is defined as the removal of material from the land, on the surface or at shallow depths, through the action of water or wind. In addition to soil erosion at a geological level, a natural phenomenon involved in shaping the landscape, we must also consider anthropic erosion caused by humans' improper use of natural resources, which has clear negative consequences in environmental, economic and social terms. Water erosion, which is closely tied to the hydrological cycle, may be divided into surface erosion (sheet, rill and gully erosion), linear erosion (along river courses and torrent channels) and deep erosion.

Erosion leads to the leaching of nutrients which causes the eutrophication of rivers and lakes. Long periods of drought leave the land vulnerable to erosion as subsequent storms can carry off large quantities of soil matter. The expansion of artificial areas around towns and cities leads in some cases to building on steep slopes, which are highly vulnerable to erosion once vegetation has been removed.

The National Soil Erosion Inventory (*Inventario Nacional de Erosión de Suelos*), produced by the Spanish Ministry of the Environment, is updated every ten years. The Inventory is produced in stages and the current update is planned for completion in 2012. The graph shows the soil loss situation in the ten Autonomous Communities for which data has already been updated. This data on area affected by erosion has been compiled from studies carried out between 2002 and 2005. A new analysis of the area of Spain's geography affected by erosion is currently being carried out.





#### NOTES

- The following rates of soil loss have been established, measured in tonnes per hectare per year:

- Very low: 0 - 5 t/ha/yr
- Low: 5 - 10 t/ha/yr
- Intermediate: 10 - 50 t/ha/yr
- High: 50 - 100 t/ha/yr
- Very high: 100 - 200 t/ha/yr
- Extreme: → 200 t/ha/yr

- The FAO-UNEP-UNESCO methodology, based on the universal soil loss equation, has been used to calculate sheet, rill and gully erosion. The unit of measurement for the indicator is the percentage of total land affected by varying levels of erosion.

- The National Soil Erosion Inventory is updated every ten years, with the current version planned for completion in 2012. Updated soil loss figures are therefore not available for all Autonomous Communities. The soil loss graph updated to 2006, for those Autonomous Communities where data is available, in fact includes studies begun in 2002 and continuing up to 2006.

#### SOURCES

- National Soil Erosion Inventory, 2002-2012 (*Inventario Nacional de Erosión de Suelos, 2002-2012*). Secretariat General for the Environment and Land Use Planning (*Secretaría General de Medio Ambiente y Ordenación del Territorio*), Directorate General for Biodiversity (*Dirección General de Biodiversidad*). Spanish Ministry of the Environment.
- 3rd Report on the Spanish National Action Programme to Combat Desertification (*Programa de Acción Nacional contra la Desertificación*). Spanish Ministry of the Environment, May 2006.

#### FURTHER INFORMATION

- [www.mma.es](http://www.mma.es)

## Area at risk from desertification

### Over 31% of Spain's geography is at serious risk from desertification

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

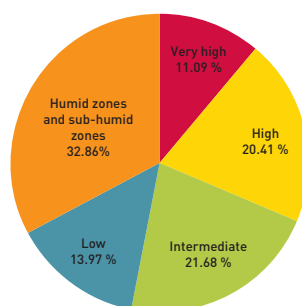
The term “desertification” is not applied exclusively to hyper-arid (desert) regions. Rather it is used to refer to a process resulting from anthropic and natural factors, such as over-exploitation of land, overgrazing, mechanised farming, inappropriate irrigation practices, illegal and excessive tree-felling, burning of forests and shrubs and deforestation. In addition to these human activities, there is also a whole range of climatic factors which influence the process of land degradation (arid conditions throughout the year, high variability in rainfall, repeated droughts, etc.). Given the large number of causes, the fight against desertification involves a broad raft of measures and also contributes to the fight against poverty, to structural reforms and sustainable development.

Over two thirds of Spain's geography falls into the arid, semi-arid and dry sub-humid categories. According to the results of the model applied under the Spanish National Action Programme to Combat Desertification, the problem of desertification may be considered serious (very high and high levels) across 31.5% of the country.

Risk of desertification (2003)	Nº of sub-basins	Area (km <sup>2</sup> )	Proportion (%)
<b>Arid, semi-arid and dry sub-humid zones</b>	<b>234</b>	<b>339,776</b>	<b>67.14</b>
Very high	42	56,053	11.09
High	74	103,284	20.41
Intermediate	72	109,712	21.68
Low	46	70,728	13.97
<b>Humid and sub-humid zones</b>	<b>106</b>	<b>166,284</b>	<b>32.84</b>
<b>National total</b>	<b>340</b>	<b>506,061</b>	<b>100</b>

Source: DGB, MMA

### AREA AT RISK FROM DESERTIFICATION, 2003



Source: DGB. MMA

#### NOTES

- The model applied is based on the classification of river sub-basins according to the intensity of certain factors and desertification processes. The unit of measurement used is the land area at risk from desertification, per category, expressed as a percentage of total land area.

#### SOURCES

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

#### FURTHER INFORMATION

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