

# 2.14 NATURAL AND TECHNOLOGICAL DISASTERS



In recent years, there has been an increase in the frequency and intensity of certain extreme climatic phenomena, causing a number of significant natural disasters. Natural disasters can destabilise regions' social and economic balance and their impact can hamper achievement of countries' development goals, particularly in those most vulnerable.

The second Wednesday of October is the day established by the United Nations as International Day for Natural Disaster Reduction (Resolution 56/195 of 21 December 2001). Its objective is to promote a global culture of natural disaster reduction, including disaster prevention, mitigation and preparedness through knowledge of potentially harmful processes and their possible effects. The World Disaster Reduction Campaign 2006-2007 focused on promoting education on disaster risk and school safety.

The United Nations International Strategy for Disaster Reduction (ISDR) considers Disaster Risk Reduction (DRR) to be its main scope of action. Accordingly, it has set up National Platforms as a co-ordination mechanism to incorporate DRR into policies and planning. They are also the formal points of access to the ISDR System in each country. In January 2005, a 10-year plan known as the Hyogo Framework was adopted to make the world safer from natural hazards. It provides concrete



guidelines for reducing the risk of disaster over the next decade. Its main goal is to reduce disaster losses in terms of lives and communities' and countries' social, economic and environmental assets, offering a series of guiding principles, priorities for action and practical means for achieving disaster resilience to vulnerable communities.

INDICATOR	GOAL	TREND
Deaths due to natural disasters	Prevent disasters and industrial accidents and so reduce fatalities and the environmental impact arising from natural disasters, drought, forest fires and accidents involving dangerous substances by applying appropriate prevention, intervention and information measures.	2007 was one of the lowest years in terms of fatalities due to natural disasters.
Drought periods		Since 1941, the number of dry years has been very similar to the number of wet years, although 2005 was the driest of all.
Forest fires		In 2007, the number of forest fires and affected surface area were among the lowest in recent years
Road and rail accidents causing possible environmental damage		2006 witnessed the fewest number of accidents since 2002
Oil spills due to maritime accidents		More accidents occurred in 2006 than in 2005
Discharges of dangerous chemical substances due to industrial accidents		In 2006 and 2007, there was a total of 9 industrial accidents that fell within the scope of the Seveso Directive; in 2005 there were none

The ISDR uses the following definitions:

- **Disaster:** *a serious disruption of the functioning of a community or a society causing widespread human, material, economic or environmental losses which exceed the ability of the affected community or society to cope using its own resources. A disaster results from the combination of a hazard or threat, conditions of vulnerability and insufficient capacity or measures to reduce the potential negative consequences of the phenomenon in question. It should be noted that the ISDR does not use the adjective “natural” to describe disasters, as it considers them to be the result of a combination of natural hazards or threats and social and human vulnerability, and as such do not result solely from natural processes.*
- **Hazard or threat:** *a potentially damaging physical event, phenomenon or human activity that may cause loss of life or injury, property damage, social and economic disruption or environmental degradation. They can have a natural origin (geological, hydrometeorological or biological) or be induced by human processes (environmental degradation and technological hazards). Hazards can be single, sequential or combined in their origin and effects. Each hazard is characterised by its location, intensity or magnitude, frequency and probability.*

According to Münchener Rück, there was only one “major catastrophe” in 2006: the earthquake that occurred in Indonesia on 27 May and which claimed over 5,700 lives (a disaster becomes a “major catastrophe” when the affected regions cannot cope with the emergency situation without external aid). Furthermore, its list of the 50 most significant natural catastrophes that occurred in 2006 included 5 in the European environment. These were caused by cold spells, floods, hail storms, droughts, heat-waves and forest fires, and resulted in over 2,900 fatalities. Among them, the drought and heat-wave of mid-July caused the death of nearly 2,000 people, mostly in Belgium and the Netherlands (800 and 1,000 deaths, respectively). The worst human catastrophes of 2007 occurred, as is usually the case, in developing countries: storms, floods and landslides in a number of areas in Asia caused over 11,000 deaths.

For the 1950-2004 period, this same source gives a total figure of 268 major natural catastrophes around the world, with 40% corresponding to storms, 29% to earthquakes/tsunamis and volcanic eruptions, 25% to floods, and the remaining 6% to other causes (heat-waves, forest fires, etc.). Total fatalities amounted to 1.65 million people, the main causes being earthquakes (54%), followed by storms (38%) and floods (7%). The situation since 2000 is summarised in the table below:

NO. OF CATASTROPHES AND FATALITIES DUE TO NATURAL DISASTERS WORLD-WIDE

	2000	2001	2002	2003	2004	2005	2006	2007
Events	890	701	698	699	641	648	850	950
Fatalities	10,300	25,063	10,576	77,886	183,000	100,995	20,000	15,000

Source: Munich Reinsurance Company. \*Topics Geo Annual review: Natural catastrophes 2005\*, \*Topics Geo. Natural Catastrophes 2006\* and \*Natural Catastrophes 2007\*. Comparison with previous years. Press Release (from website: <http://www.munichre.com>).

In Spain, the scale of disasters is not comparable with those in other parts of the world. Nevertheless, every year a varying number of people are affected and killed. This chapter analyses fatalities due to natural disasters and events or phenomena of interest such as droughts, forest fires, accidents deriving from the transport of hazardous goods (by road and rail), maritime accidents involving oil spills and accidents occurring at industrial facilities.

## Deaths due to natural disasters

Almost 50% of deaths caused by natural disasters are due to floods and storms. This figure exceeds 70% if maritime storms are included

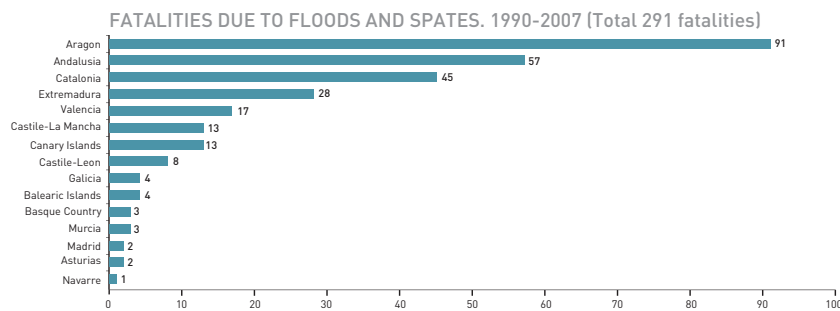
SPAIN: NUMBER OF FATALITIES DUE TO NATURAL DISASTERS 1995-2007

Type of natural disaster	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	Total
Floods	22	110	40	0	5	14	9	13	9	7	8	9	11	257
Storms	19	13	14	2	20	28	17	12	8	6	8	9	4	160
Forest fires	8	1	4	4	8	6	1	6	11	4	19	8	1	81
Landslides	7	8	2	0	0	0	1	1	2	0	0	5	2	28
Heat-waves	0	0	0	0	1	0	0	0	60	23	4	14	0	102
Avalanches	7	1	0	0	0	4	2	4	4	5	1	0	0	28
Snow and cold	0	2	5	1	0	2	4	0	0	3	3	0	0	20
Maritime storms	19	13	13	36	17	37	27	15	5	20	SD	SD	SD	202
ANNUAL TOTAL	82	148	78	43	51	91	61	51	99	68	43	45	18	878

Source: Directorate General for Civil Protection and Emergencies (Ministry of the Interior)

Most of the 878 fatalities in Spain in the 1995-2007 period (not including fatalities due to maritime storms since 2005) were caused by floods and storms. These two natural phenomena (together with maritime storms) are the most damaging, followed by heat-waves and forest fires.

Analysis of floods since 1990 reveals that the number of deaths from this cause amounts to 291, of which 110 occurred in 1996. By Autonomous Community, Aragon had the highest number of fatalities (31.3%), followed by Andalusia (19.6%) and Catalonia (15.5%). In the case of Aragon, the Biescas (Huesca) catastrophe in 1996 claimed the lives of 87 people.



Source: DGPCE. Spanish Ministry of the Interior

Floods are a cause of extensive material and human loss. For example, Central Europe experienced a series of floods in the spring of 1996 caused by heavy rainfall coinciding with a heat-wave in some areas. These phenomena brought about a rapid thaw and caused rivers to rise, flooding inhabited areas. Floods are increasingly frequent and are strongly influenced by phenomena related to climate change. The problem is exacerbated by inadequate river system management and by urban expansion and occupation of flood plains.

Directive 2007/60/EC of the European Parliament and the Council of 23 October 2007, on the assessment and management of flood risks, establishes a framework for assessing and managing flood risks and is intended to reduce the adverse consequences for human health, the environment, cultural heritage and economic activity.

It will enable flood risk areas to be identified (in river basins and coastal areas) and contribute towards mitigating the damage caused. In the event that potential risk areas are identified, maps will be drawn up to indicate flood risks, along with plans to manage these risks.

This Directive considers that floods can cause fatalities and displacement of people, damage the environment, severely compromise economic development and undermine the economic activities of the Community. Floods are natural phenomena which, occasionally, cannot be avoided; in other cases, they are caused by human activity and construction. Some human activities (such as the growth of urban development and economic operations on flood plains that reduce natural ground-water retention capacity) and climate change are contributing to increase both the likelihood that they occur and their adverse consequences.

**NOTES**

- When calculating the number of fatalities, the following types of natural disaster have been considered: floods and spates, storms and gales (including fatalities due to lightning and strong winds), forest fires, landslides, heat-waves, avalanches, snow and cold, and maritime storms. Deaths due to maritime storms are only included up to 2004 and from that year onwards no official figures are available. Deaths caused by landslides in Spain are closely linked to heavy rains, which also cause flooding and spates. The large majority of landslides have occurred at the same time as rain or a short time after heavy rainfall.
- Volcanic eruptions, droughts and earthquakes have been excluded from the analysis, since although these are hazards that can occur in Spain (drought recurrently and earthquakes frequently in specific areas), they have not caused any deaths in the period under consideration. The Canary Islands are the only part of Spain with active volcanoes, and are thus the only area where risk of volcanic eruption exists. The last eruptions were that of Chinero (a lateral volcano on the Pico del Teide) on Tenerife in 1909 and those of Nambroque in 1949 and Teneguía in 1971 on the island of La Palma.

**SOURCES**

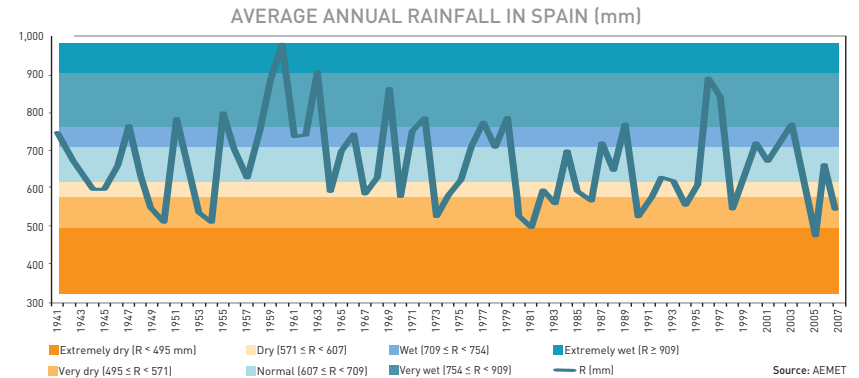
- Figures provided by the Sub-Directorate General for Planning, Operations and Emergencies (*Subdirección General de Planificación, Operaciones y Emergencias*). Directorate General for Civil Protection and Emergencies (*Dirección General de Protección Civil y Emergencias*). Spanish Ministry of the Interior (*MI - Ministerio del Interior*).

**FURTHER INFORMATION**

- <http://www.eea.europa.eu>
- <http://www.proteccioncivil.org/>
- <http://natural-hazards.jrc.it>
- Natural and Environmental Disasters Information Exchange System (NEDIES). <http://nedies.jrc.it/>
- European Flood Alert System (EFAS).
- <http://www.unisdr.org/eng/country-inform/spain-general.htm>
- <http://www.grid.unep.ch/activities/earlywarning/preview/data/index.php>
- OFDA/CRED International Disaster Database.
- EM-DAT: The OFDA/CRED International Disaster Database, <http://www.em-dat.net/> - Université Catholique de Louvain - Brussels - Belgium.
- Directorate General for Civil Protection and Emergencies, "Civil Protection Recommendations" (*Recomendaciones de Protección Civil*). Directorate General for Civil Protection and Emergencies. Spanish Ministry of the Interior.

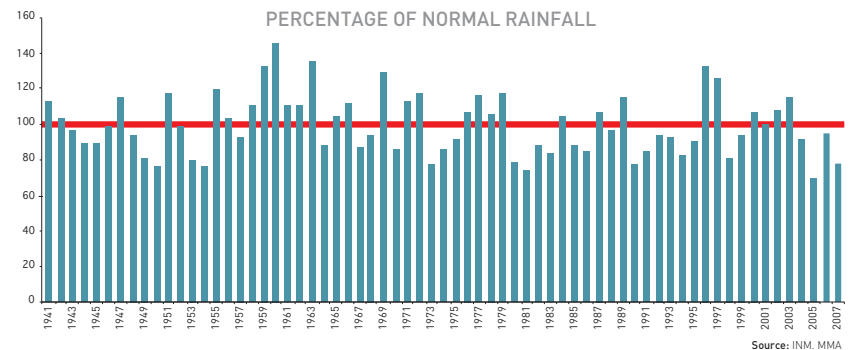
## Drought periods

Without reaching the level of 2005, 2007 was another dry year in most of Spain



Using the classification based on average annual rainfall (reference period 1961-1990), in the 67 years of the 1941-2007 period, 2 years were "Extremely dry", 13 were "Very dry", 9 were "Dry", 19 were "Normal", 10 were "Wet", 12 were "Very wet" and 2 were "Extremely wet". These data reveal that the percentage of dry years (including the "Dry", "Very dry" and "Extremely dry" categories) was practically the same as the percentage of wet years (including the "Wet", "Very wet" and "Extremely wet" categories), while 28.4% of years were "Normal".

Looking at the Percentage of Normal Rainfall over the period 1941-2007, 44.8% of the years (30 out of 67) recorded rainfall above the average figure for the period.



In 2007, rainfall was 20% lower than the average for the 1971-2000 period. Showing significant regional variations, its spatial distribution ranged from extremely dry in most of Galicia and a large part of Catalonia (Lerida and Tarragona), to extremely wet in Valencia, Majorca, Zamora and Saragossa. The northern third of Spain was predominantly dry. The central and southern peninsula was largely normal, with dry areas in Extremadura, central Andalusia and parts of Castile-La Mancha, while most of Castile-Leon and the Canary Islands were primarily wet.

Galicia stands out as suffering drought, which was particularly acute in places such as Vigo, where only 1,038 mm were recorded, the lowest rainfall registered since 1951 (average rainfall is 1,909 mm), and Santiago de Compostela, where 1,093 mm were recorded, making 2007 the third driest year since 1944 (average rainfall is 1,862 mm). In Girona, in which 427 mm of rainfall were recorded, 2007 was also the driest year since 1973. As regards temperature, 2007 was warm in general with respect to the 1971-2000 period. The average temperature for peninsular Spain and the Balearic Islands was 15.0°C, which is four tenths of a point above the average for this period, making it the sixteenth warmest year since 1970.

#### NOTES

- In calculating the indicator, a year or several years are classified as drought years when average annual rainfall is significantly below the average for the period. Under the Spanish Water Information System (Hispagua – Sistema Español de Información sobre el Agua), the Percentage of Normal Rainfall is one of the indicators used to study drought. It is calculated as the ratio between accumulated rainfall in a year and average annual rainfall for a particular region and period and is expressed as a percentage. Average annual rainfall is also referred to as normal rainfall and is obtained by averaging annual rainfall over a period of no less than 30 years.
- In this regard, the World Meteorological Organisation considers the period 1961-1990 (30 years) representative of the rainfall regime. Applying these criteria to Spain enables us to establish the following bands and create a generic classification within which to place each year in accordance with its average annual rainfall:
  - Extremely dry: rainfall does not exceed the minimum amount recorded in reference period 1961-1990 (495.1 mm).
  - Very dry: rainfall is less than or equal to the 20 percentile and is greater than the minimum amount recorded in the reference period (495 mm < R ≤ 571 mm).
  - Dry: rainfall is greater than the 20 percentile and less than or equal to the 40 percentile (571 mm < R ≤ 607 mm).
  - Normal: rainfall is greater than the 40 percentile and less than or equal to the 60 percentile (607 mm < R ≤ 709 mm), in other words, it is around the median.
  - Wet: rainfall is greater than the 60 percentile and less than or equal to the 80 percentile (709 mm < R ≤ 754 mm).
  - Very wet: rainfall is greater than the 80 percentile and less than the maximum amount recorded in the reference period (754 mm < R ≤ 899.1 mm).
  - Extremely wet: rainfall is equal to or greater than the maximum amount recorded in reference period 1961-1990 (899.1 mm).
- Drought is defined as an extreme scarcity of precipitation within a period of time in comparison to the area's normal rainfall. Scarcity of precipitation (meteorological drought) may cause a shortage of water resources (hydrological drought) needed to supply existing demand. Consequently, there is no universally accepted definition of drought, as it varies from place to place.
- Previous editions included abundant information on the consequences, definitions and types of drought. The EU differentiates clearly between "drought" as a temporary drop in water availability due to lack of precipitation and "water scarcity", which arises when demand for water exceeds the water resources exploitable under sustainable conditions.

#### SOURCES

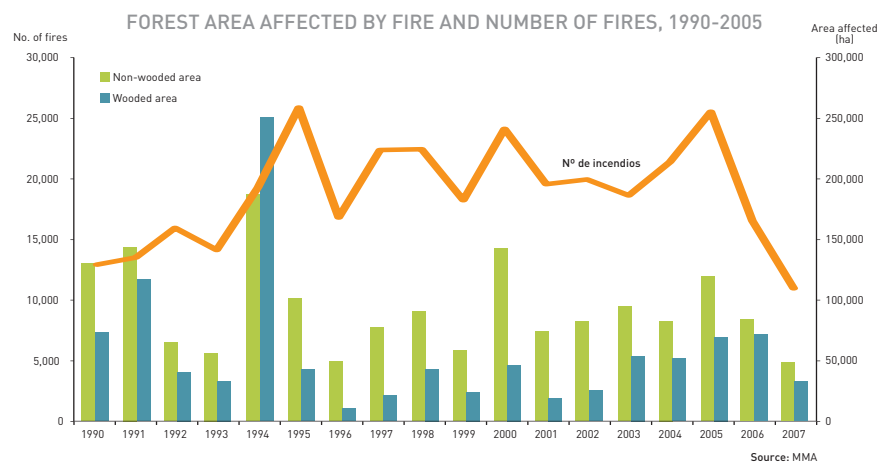
- Rainfall figures provided by the Sub-directorate General for Climatology and Applications (*Subdirección General de Climatología y Aplicaciones*), Spanish State Meteorology Agency (AEMAT – *Agencia Estatal de Meteorología*, formerly the Spanish National Institute of Meteorology – *Instituto Nacional de Meteorología*). Spanish Ministry of the Environment (MMA – *Ministerio de Medio Ambiente*).

#### FURTHER INFORMATION

- <http://www.aemet.es>
- <http://www.mma.es>
- <http://www.inm.es>
- <http://www.eea.europa.eu>
- <http://natural-hazards.jrc.it>
- [http://hispagua.cedex.es/documentacion/especiales/sequia/indicadores\\_sequia.htm](http://hispagua.cedex.es/documentacion/especiales/sequia/indicadores_sequia.htm)

## Forest fires

In 2007, the number of forest fires and affected area were among the lowest in recent years



The year 2007 was one of the lowest in terms of number of forest fires and area affected. In fact, both the number of forest fires and the area affected registered the lowest figures of recent years and much lower than average figures for the last decade. Only in 1996 were figures for affected area lower than those for the year 2007.

Moreover, it would be necessary to go as far back as 1988 to find a year with a lower number of forest fires. A contributing factor was that the month of August was rainier and cooler than in recent years (except in the regions of Andalusia and the Canary Islands), which led to the risk of forest fires being high but with individual situations only presenting moderate or even low risk.

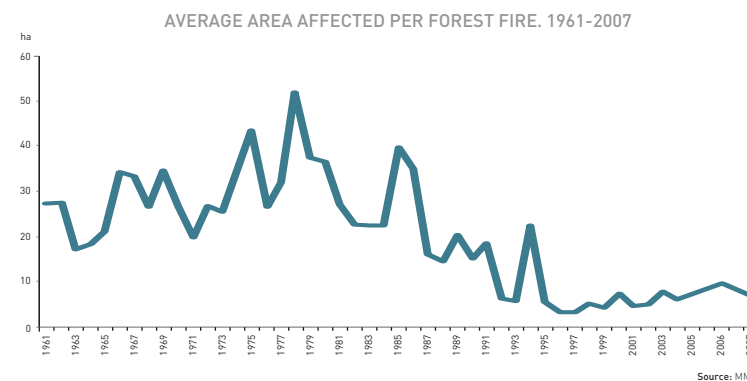
Nevertheless, despite being a favourable year, in the Autonomous Communities of the Canary Islands and Valencia, the results were worse than in previous years, exceeding the average area affected of the last decade for those same months. In these cases, two forest fires in each of the two Autonomous Communities were responsible for most of the area affected.

On the peninsula, the largest forest fires occurred in Torre de las Arcas (Teruel), which surpassed 1,000 ha and claimed the life of a fire-fighter employed by the Regional Government of Aragon (*Diputación General de Aragón*), and one in Les Useres (Castellón), where strong dry westerly winds contributed to over 5,000 ha being destroyed by fire. The

fires that occurred at the end of July in Gran Canaria and Tenerife were especially significant. Between them they affected over 14,000 ha and were the largest to have occurred in the Canary Islands since the forest fire database was created in 1968.

It is noteworthy that of the total area affected by fire, wooded area is always smaller than non-wooded (38% and 62% in the 1990-2007 period). Only in 1994 was more wooded area than non-wooded area affected.

Average area per fire dropped again in 2007 after a slight increase in 2006, falling back in line with the trend of recent years. In the period 1961-2007, average area affected per fire was 14.5 ha/fire, while in the period 1990-2007, this figure was 8.0 ha/fire. In 2007, this ratio dropped to 7.5 ha/fire. Improvements to fire-fighting equipment and techniques together with fast intervention and better co-ordination, co-operation and planning contributed to this trend.



As regards causes, the break-down for the decade 1996-2005 and the year 2006, both for affected forest area and number of fires, is as follows:

BREAK-DOWN OF FOREST FIRES BY CAUSE (%). DECADE 1996-2005

	Deliberate	Negligence and other causes	Lightning	Re-ignition	Unknown
By forest area affected	58.72	22.22	5.66	1.14	12.26
By number of forest fires	60.04	17.57	3.64	1.75	17.01

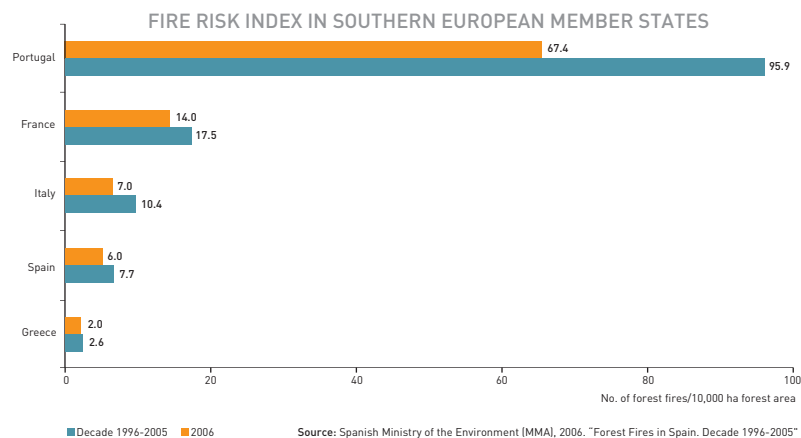
Source: MMA

BREAK-DOWN OF FOREST FIRES BY CAUSE (%), 2006

	Deliberate	Negligence and other causes	Lightning	Re-ignition	Unknown
By forest area affected	67.57	17.39	3.06	3.72	8.26
By number of forest fires	47.99	24.09	7.35	3.66	16.92

Source: MMA

In Member States of southern Europe with the highest rate of forest fires, the Fire Risk Indices (average number of forest fires per year per 10,000 hectares of forest area) for the decade 1996-2005 and for 2006 are shown in the graph below. As may be seen, Spain occupies the second most favourable position. There was also a significant drop in the index value in 2006 compared with the average value for the decade 1996-2005. This was due to a fall in the number of forest fires that occurred in 2006.



**NOTES**

- The category "other causes" includes burning of rubbish dumps, fires started by suspected property speculators, vandalism, etc.

**SOURCES**

- Spanish Ministry of the Environment (MMA), 2006. "Forest Fires in Spain. Decade 1996-2005" (*Los incendios forestales en España. Decenio 1996-2005*).
- Spanish Ministry of the Environment (MMA), 2006. "Forest Fires in Spain. Year 2006" (*Incendios forestales en España. Año 2006*).
- Spanish Ministry of the Environment (MMA), 2008. "Forest Fires from 1 January to 31 December 2007. Update for 2007" (*Incendios forestales del 1 de enero al 31 de diciembre de 2007. Avance informativo del 2007*). Provisional figures.

**FURTHER INFORMATION**

- <http://www.mma.es>
- <http://www.incendiosforestales.org>
- <http://www.eea.europa.eu>

## Road and rail accidents causing possible environmental damage

The number of accidents causing possible environmental damage in 2006 was the lowest in 5 years

NUMBER OF ACCIDENTS CAUSING POSSIBLE ENVIRONMENTAL DAMAGE DURING THE TRANSPORT OF DANGEROUS GOODS BY ROAD AND RAIL, 1997-2006

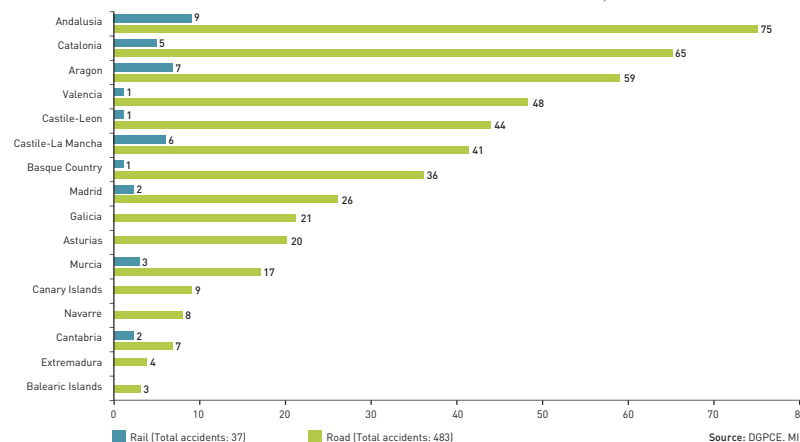
	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	Total
Road	29	50	34	53	44	47	55	64	61	46	483
Rail	10	8	n.d.	4	2	1	5	4	2	1	37
TOTAL	39	58	34	57	46	48	60	68	63	47	520

Source: Directorate General for Civil Protection and Emergencies. MI

In the decade 1997-2006, over 500 accidents caused possible environmental damage during the transport of dangerous goods by road and rail. However, in recent years, this number has decreased. In fact, comparing 2006 with 2005, the number of accidents fell by 24.4% and, as compared with 2004, the drop was even greater (30.9%).

The vast majority of these accidents occurred in road transport; the number of rail accidents is minimal. Rail transport's greater safety, along with its lower use in comparison with road transport, meant that in 2006 only one of the 47 accidents that took place occurred on this mode of transport.

NO. OF ACCIDENTS CAUSING POSSIBLE ENVIRONMENTAL DAMAGE DURING THE TRANSPORT OF DANGEROUS GOODS BY ROAD AND RAIL, 1997-2005



By Autonomous Community, Andalusia, with 84, was the region with the highest number of accidents (75 by road and 9 by rail), followed by Catalonia (70 in total). It is significant that in 2006 these two Autonomous Communities unloaded the largest amount of goods from inland road transport (over 385 and 323 million tonnes, respectively). The volume of transport, together with the size of their road networks and their geographical location (either bordering other countries or with a sea port, or on the way to either of these), are contributing factors that increase the traffic of goods and hence, the risk of accidents.

Once an accident has occurred, the possible environmental damage may affect the air, the water or the soil. It is not unusual for an accident to affect two or even all three environments. In general, the most affected environment is the soil, from where it easily spreads to the air and then into the atmosphere and the aquatic environment by infiltration or run-off into water channels. Out of total environmental impacts in the 1997-2006 period (which does not coincide with total accidents), 76.4% affected soil, 13% affected water and the remaining 10.6% affected air.

NO. OF ACCIDENTS CAUSING POSSIBLE ENVIRONMENTAL DAMAGE DURING THE TRANSPORT OF DANGEROUS GOODS, 1997-2006

	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	Total
Atmospheric pollution	5	3	2	4	3	0	8	8	17	13	63
Water pollution	7	11	6	9	5	5	4	14	9	7	77
Soil pollution	36	49	29	51	41	46	57	55	49	41	454

Source: Directorate General for Civil Protection and Emergencies. MI

NOTES

- When categorising road and rail accidents, dangerous goods are considered those substances that, in the case of an accident during transport, may represent a hazard to population, property and the environment. Possible environmental damage is considered to occur when the existence of a leak or spillage (on land, in water or into the atmosphere) with a potentially pollutant effect is reported.

SOURCES

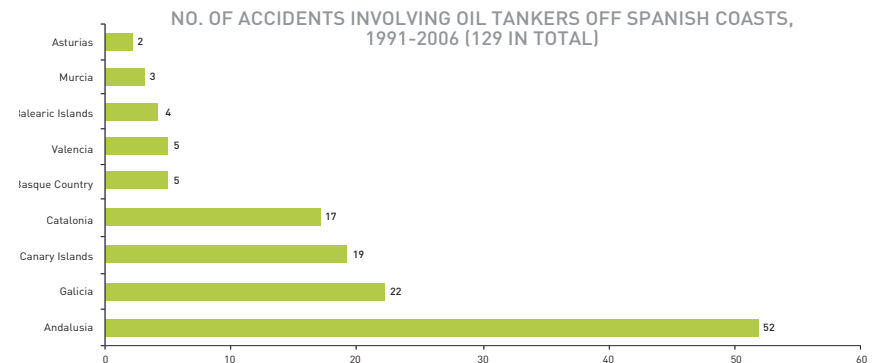
- Figures provided by the Directorate General for Civil Protection and Emergencies. Spanish Ministry of the Interior (MI).

FURTHER INFORMATION

- <http://www.proteccioncivil.org/>
- <http://mahbsrv.jrc.it/> (Major Accident Hazards Bureau – MAHB. European Commission).
- <http://www.eea.europa.eu>

## Oil spills due to maritime accidents

In 2006, four accidents involving oil tankers occurred off Spanish coasts, compared with two in 2005

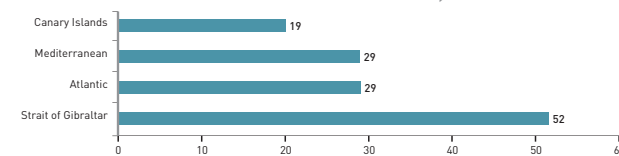


Source: Directorate General for Merchant Shipping. MF

Since the 1950s, there have been more than 30 accidents off Spanish coasts involving oil tankers. These have caused oil spills of differing extent and have occurred mainly off the coast of Galicia and in the Strait of Gibraltar. According to the International Tanker Owners Pollution Federation (ITOF), the majority of maritime accidents (84%) result in oil spills of less than 7 tonnes, with most of the total amount being spilled in a small number of accidents.

The coasts of Andalusia, Galicia, the Canary Islands and Catalonia registered the highest number of accidents of this kind during the 1991-2006 period. The break-down by maritime search and rescue zone shows that the Strait of Gibraltar is where the greatest number of accidents occurred.

ACCIDENTS INVOLVING OIL TANKERS IN MARITIME SEARCH AND RESCUE ZONES OFF SPANISH COASTS, 1991-2006



Source: Directorate General for Merchant Shipping. MF



The last major catastrophe to take place in Spain was the sinking of the Prestige (November 2002) off the coast of Galicia. It was the worst ecological disaster to date on Spanish coasts. It affected several Autonomous Communities and spread along 2,900 km of coastline, impregnating 450,000 m<sup>2</sup> of rocks with heavy crude oil and spilling 526 tonnes of fuel over the continental shelf.

Occasionally, the remains of oil spills not related to tanker accidents are also discovered. These are usually the result of leaks from coastal industrial plants, maintenance operations, unloading of vessels in ports, or vessels spilling oil whilst under way. It is also possible that oil spilled is fuel (mainly diesel) used by the ships themselves for propulsion and which, in the event of accident or sinkage, leaks from their fuel tanks. This occurred in January 2007 in Bay of Gibraltar after the refrigerator ship Sierra de Navas ran aground. It was also the case in the area around the Port of Ibiza when the merchant ship Don Pedro sank in summer 2007 leading to the temporary closure of a number of beaches.

The map below, based on data published on the website of the Centre of Documentation, Research and Experimentation on Accidental Water Pollution (CEDRE – *Centre de documentation de Recherche et d'expérimentation sur les pollutions accidentelles des eaux*), shows the approximate sites of the major maritime accidents that have occurred in Spanish waters.

LOCATION OF OIL TANKER ACCIDENTS OFF SPANISH COASTS RESULTING IN OIL SPILLS (> 7 TONNES)



#### NOTES

- Created in 1978, the Centre of Documentation, Research and Experimentation on Accidental Water Pollution (CEDRE) is responsible for documenting, researching and performing experiments on pollutant products, their effects and the methods and means required to treat and dispose of them. Its remit covers both marine and inland waters.

#### SOURCES

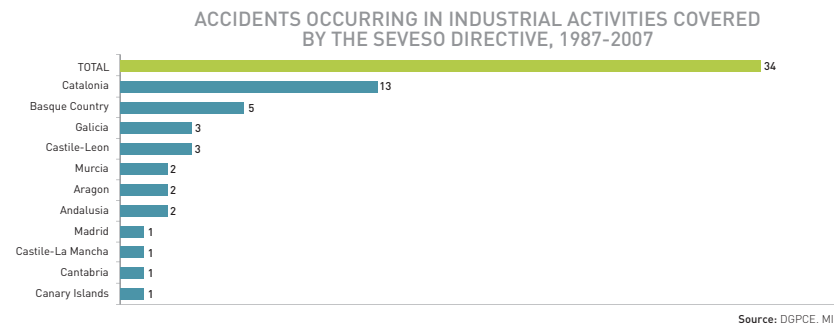
- Figures provided by the Maritime Pollution Department (Área de Contaminación Marítima). Sub-Directorate General for Maritime Traffic, Safety and Pollution (*Subdirección General de Tráfico, Seguridad y Contaminación Marítima*). Directorate General for Merchant Shipping (*Dirección General de la Marina Mercante*). Spanish Ministry of Public Works (MF – *Ministerio de Fomento*).

#### FURTHER INFORMATION

- <http://www.fomento.es>
- <http://www.eea.europa.eu>
- <http://www.itopf.com/>
- [http://www.le-cedre.fr/index\\_es.html](http://www.le-cedre.fr/index_es.html)

## Discharges of dangerous chemical substances due to industrial accidents

In 2006 and 2007, accidents again occurred in industrial activities covered by the Seveso Directive



In the last two years, there was a total of nine accidents covered by Seveso regulations (six in 2006 and three in 2007). Of these, four occurred in Catalonia, two apiece in Galicia and Castile-Leon, and one in Andalusia. Nevertheless, it was only necessary to notify the EU Commission in two cases (September 2006 in Galicia and September 2007 in Castile-Leon), as these were the only ones considered major accidents pursuant to Annex VI of Directive 96/82/EC of 9 December 1996 on the control of major-accident hazards involving dangerous substances (Seveso II).

As regards the whole period (1987-2007), there were 34 accidents overall, with those in 2006 and 2007 representing 26.5% of the total. One of the most serious took place on 14 August 2003 at the Repsol Refinery in Puertollano (Ciudad Real), which claimed the lives of 9 employees and poisoned over 100 people.

Seveso regulations require every industrial site to draw up a self-protection plan, called an Internal Emergency Plan, which defines and provides for the means and procedures necessary to prevent accidents of any kind and, as the case may be, contain their effects within the site.

Accordingly, the pertinent Regional Government agencies will draw up, in collaboration with industrial enterprises, an External Emergency Plan to prevent and, as the case may be, to mitigate the consequences of any possible accident previously analysed, classified and assessed. This will establish the most appropriate protection measures, the necessary material and human resources and the system for co-ordinating the authorities, agencies and services required to respond to the situation.

In Spain, there are over 600 sites affected by the Directive, located mostly in Catalonia, Valencia and Andalusia. The two main activities covered by the Directive are storage and distribution of gas, oil and oil products, and manufacture, handling and storage of chemical products.

Article 7 of the Civil Protection Guidelines for the Control and Planning of Major-Accident Hazards involving Dangerous Substances establishes that Regional Governments' emergency plans to deal with serious accidents on premises housing dangerous substances shall be called External Emergency Plans. These Plans lay down prevention and information measures, and establish procedures for action and co-ordination with the means and resources of the Public Administration and other public and private bodies. In this respect, 201 emergency civil protection plans for sites covered by the Seveso Directive were approved by Spain's National Civil Protection Committee (*Comisión Nacional de Protección Civil*) between 2003 and 2007.

### NOTES

- The accidents analysed are those covered by the Seveso Directive, i.e. accidents occurring in industry (chemical, pharmaceutical, energy industry, etc.), and include storage, distribution and sale of dangerous substances or products.
- Directive 96/82/EC on the control of major-accident hazards involving dangerous substances (Seveso II) is intended to prevent major accidents and reduce their consequences for human health and safety and the environment. It replaces Directive 82/501/EEC (Seveso I). The Seveso II Directive was transposed to Spanish Legislation by Royal Decree 1254/1999 (*Real Decreto 1254/99*) of 16 July, which approved measures to control major-accident hazards involving dangerous substances. This Royal Decree was amended by Royal Decree 119/2005 (*Real Decreto 119/2005*) of 4 February and by Royal Decree 948/2005 (*Real Decreto 948/2005*) of 29 July. This regulatory framework is complemented with Royal Decree 1196/2003 (*Real Decreto*) of 19 September, which approved the Civil Protection Guidelines for the Control and Planning of Major-Accident Hazards involving Dangerous Substances. (Spanish Official State Gazette No. 242 of 9 October 2003).
- **Major accident:** any incident, such as emissions in the form of leaks, spills, fires or major explosions, that is the consequence of an uncontrolled process during operation of any facility to which Royal Decree 1254/1999 is applicable and that represents a major-accident hazard, of either immediate or delayed effect, to the population, property or the environment, whether inside or outside the facility, and in which one or more dangerous substances are involved.
- Other types of accident not covered by the Seveso Directive, but just as serious for the environment, also exist. These include mining accidents, such as the one caused by failure of the Aznalcollar dam in April 1998.

### SOURCES

- Figures provided by the Sub-Directorate General for Planning, Operations and Emergencies. Directorate General for Civil Protection and Emergencies. Spanish Ministry of the Interior (MI).
- Spanish Ministry of the Interior (MI). Directorate General for Civil Protection and Emergencies, 2004: Study and Statistical Analysis of Accidents under the Seveso Directive, 1987-2004 (*Estudio y análisis estadístico sobre accidentes en el ámbito de la normativa Seveso 1987-2004*).

### FURTHER INFORMATION

- <http://www.proteccioncivil.org>
- <http://www.eea.europa.eu>
- Trade Union Institute of Work, Environment and Health (ISTAS - *Instituto Sindical de Trabajo, Ambiente y Salud*), 2006. "Impact and Application of the Seveso Regulations in Spain. July 2006" (*"Incidencia y Aplicación de la Normativa Seveso en España. Julio de 2006"*). ISTAS-CCOO [Trade Union Confederation of Workers' Commissions - *Comisiones Obreras*].