

URBAN ENVIRONMENT

2.13



Spain is characterised by having undergone a belated process of urban development. Moreover, metropolisation of Spain's major cities has only really occurred in the last three decades and has involved disproportionate human occupation of land. Not only has this given rise to imbalances in land use, but it has also generated major social and environmental problems arising from the low-density model applied in the majority of urban development.

Spain's urban system currently suffers from lack of balance and hierarchy, and exhibits three differentiated environments:

- Large Urban Areas > 50,000 inhabitants.
- Small Urban Areas: 50,000- 5,000 inhabitants.⁽¹⁾
- Non-Urban Areas < 5,000 inhabitants.

Large Urban Areas cover 9.4% of Spain's national territory and are home to 67.8% of its total population.

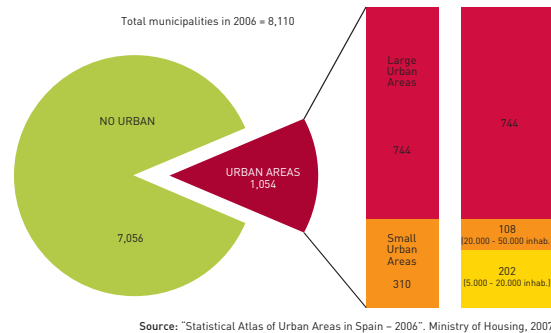
Small Urban Areas cover 10.8% of total national territory and account for 12.9% of the total population.

(1) This group includes some smaller municipalities, according to their rate of growth and other characteristics (<http://atlas.vivienda.es>)



| INDICATOR | GOAL | TREND |
|-------------------------------------------------------------------------------------------------|-----------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Urban pressure on land | Achieve a sustainable balance in land use | Urban pressure continues to grow, increasing at levels above the national growth rate in eight Autonomous Communities |
| Air quality in the urban environment | Maintain within established limits | Confirmed increase in the number of hours when NO ₂ exceeds 200 µg/m ³ as a consequence of growing use of diesel in vehicles |
| Environmental noise | Maintain within established limits | Noise maps for major transport infrastructure have been completed. Implementation of action plans will help abate the effects of noise pollution on exposed populations |
| Architectural heritage of Spain's cities | Ensure heritage sites are comprehensively protected | Number of protected Sites of Cultural Interest (BIC – Bienes de Interés Cultural) continues to grow |
| Local mobility and passenger transport | Promote less pollutant modes of transport | Increase in the number of journeys by public transport (net figure) in all metropolitan areas. Dependence on private transport is also growing |
| Sustainable Local Development (SLD): towns and cities registered with the 'Network of Networks' | Undertake local sustainability commitments | The Network of Networks for Local Sustainable Development (<i>Red de Redes de Desarrollo Local Sostenible</i>) has expanded with the adhesion of Cantabrian municipalities |

BREAK-DOWN OF MUNICIPALITIES BY TYPE OF URBAN AREA. 2006



Finally, Non-Urban Areas are home to 19.3% of Spain's population and account for 79.8% of its surface area.

Cities must necessarily be areas where inhabitants are able to meet their basic living and social needs, and this gives rise to a number of challenges. These must be addressed from the point of view of sustainability, as it is in cities where the struggle for sustainability principally has to take place on both a local and global scale.

At present, urban planning is faced with major problems to solve, such as "urban explosion" driven by progressive abandonment of the city for new residential developments in metropolitan suburbs; journeys by private vehicle (giving rise to intense traffic which generates high numbers of accidents, pollution, resource consumption to create infrastructure, etc.); recovery of degraded neighbourhoods; and improvement of the urban environment.

Ultimately, the issue is not growth itself, but the model of such growth: it is more a question of how than of how much. Long-term sustainable growth that is compatible with improving citizens' quality of life and respecting the environment and natural resources is what is required.

In 2006, the European Union approved the "Thematic Strategy on the Urban Environment" [COM (2005) 718 final, of 11 January 2005] with the aim of working towards urban sustainability and dealing with the environmental challenges facing European towns and cities in terms of their inhabitants' health and quality of life while also addressing economic performance and social cohesion. Following the guidelines of the

(2) The provisional document was drawn up by an Interministerial Committee involving the Ministry of Public Works (MF - *Ministerio de Fomento*), represented by the Spanish Centre for Public Works Studies and Experimentation (CEDEX - *Centro de Estudios y Experimentación de Obras Públicas*); the Ministry of Housing (MH - *Ministerio de la Vivienda*); the Spanish Institute for Energy Saving and Diversification (IDAE - *Instituto para la Diversificación y Ahorro de la Energía*); and the Ministry of Public Administration (MAP - *Ministerio de las Administraciones Públicas*). It is currently pending approval.

paper mentioned above, a provisional document on the "Spanish Urban Environmental Strategy" ("*Estrategia española de medio ambiente urbano*") has been drafted. The document has been promoted by the Spanish Ministry of the Environment (MMA - *Ministerio de Medio Ambiente*) in collaboration with other Agencies⁽²⁾.

This document addresses the challenges facing today's society in the four areas set out in the European strategy: land-use planning, transport, construction and urban management. It also adds a section on the relationship between the rural and urban environments in order to establish guidelines to lead Spain's villages, towns and cities towards a more sustainable future.

In this area in 2007, two initiatives by the Ministry of Housing should be highlighted:

1) The Land Act 8/07 (*Ley de Suelo 8/07*), of 28 May, in effect since 1 July 2007, is intended to achieve the following aims:

- Increase transparency in the sector and encourage public involvement.
- Establish urban policies on the basis of sustainable urban development.
- Guarantee greater effective provision of land for social housing.
- Increase the efficiency of the land market, curbing property speculation, as required by the Spanish Constitution.

Pursuant to the Act's Second Final Provision, a draft of the Consolidated Text has been prepared for the Government to process and approve. Furthermore, the Act authorises the Government, within the framework of its powers, to proceed with its legislative implementation.

2) The Spanish Building Code (*Código Técnico de la Edificación*) was approved by Royal Decree 314/2006 (*Real Decreto 314/2006*) and has been in effect since March 2006 (with two interim periods). Its requirements cover energy saving, user safety and fire prevention (approved in March 2006); building structure safety and health and hygiene (approved in March 2007); and noise protection (approved in October 2007).

The Code is based on three key criteria:

- Building functionality.
- Building structure safety, both in usage and in event of fire.
- Habitability, in every respect: hygiene, health, noise protection, environmental protection, energy saving and heat insulation.

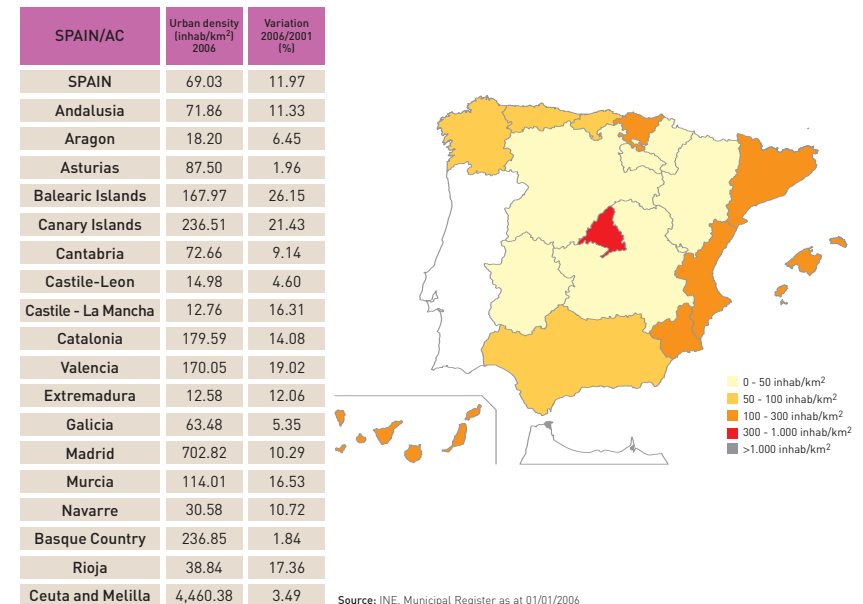
Addressing this area in greater depth, this chapter presents indicators that show the changes over time in the urban environment. Firstly, it reveals that demographic growth continues, with the population increasing in towns and cities with over 10,000 inhabitants. After that, it provides the latest figures available regarding air quality, confirming the increase in the number of hours that NO_2 concentrations are above $200 \mu\text{g}/\text{m}^3$; it assesses protection of Sites of Cultural Interest; it provides figures from the Spanish Urban Transport Authorities as regards mobility; and includes data showing authorities' and public commitment to Sustainable Local Development. Furthermore, it presents several strategic noise maps drawn up for areas close to main roads. In this edition, data for three single-province Autonomous Communities have been chosen: Asturias, Cantabria and Murcia.

Urban pressure on land

Population centres with over 10,000 inhabitants in relation to size of Autonomous Community

Pressure exerted by demographic growth in towns and cities of more than 10,000 inhabitants rose by 12% between 2001 and 2006

URBAN DENSITY BY AUTONOMOUS COMMUNITY, 2006 (inhab/km²)

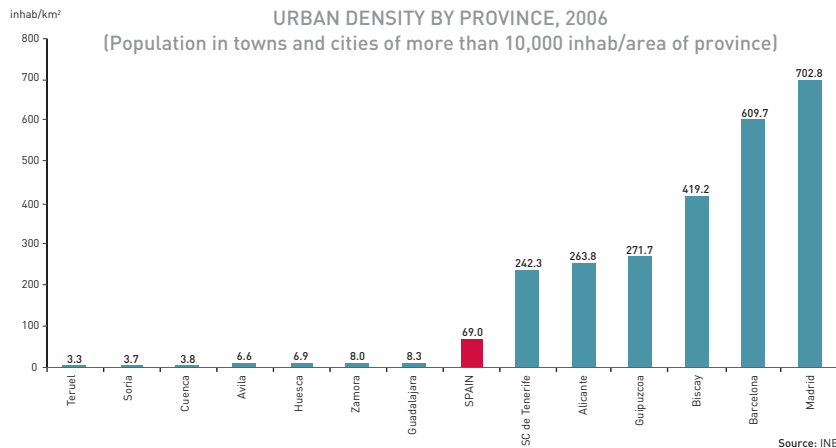


This indicator measures the pressure exerted by population centres with more than 10,000 inhabitants on the surface area of their respective Autonomous Community. As shown by the indicator's variation over the period 2001-2006, the urban growth trend of recent decades continues. The highest urban density is to be found in the Autonomous Cities of Ceuta and Melilla ($4,460.38 \text{ inhab}/\text{km}^2$) owing to their exceptionally small surface area, followed by Madrid (702.82), the Basque Country (236.85) and the Canary Islands (236.51). Catalonia, Valencia, the Balearic Islands and Murcia are also above the national average (69.03).

The variation between 2006 and 2001 is particularly significant (11.97%) and the highest figures have been produced by the most dynamic Autonomous Communities.

This is explained by tourism, mostly on the Mediterranean coastline and the archipelagos, which see an increase in the immigrant population drawn to employment in the construction and service sectors. Rioja and Castile-La Mancha also stand out, the latter as a result of demographic growth in Guadalajara, a province that has become one of the Spanish capital's areas of expansion. Those that registered least pressure in the 2001-2006 period are as follows: the Basque Country, Asturias, Castile-Leon, Ceuta and Melilla, and Galicia. In the case of the two autonomous cities, the already extremely high population density explains their low rate of change.

Teruel, Soria, Cuenca, Avila, Huesca, Zamora and Guadalajara are the provinces that exert least pressure on their land and show no significant variations in comparison with 2001. Meanwhile, Madrid, Barcelona, Biscay, Guipuzcoa, Alicante and Santa Cruz de Tenerife are at the opposite end of the scale.



These figures highlight the dichotomy found in demographic distribution across Spain's national territory, which shows a significant contrast between coastal and inland areas, with the exception of the Autonomous Community of Madrid. Another persistent contrast is the low demographic density at national level (89.3 inhab/km²) and the high level of concentration in half a dozen cities with over 500,000 inhabitants.

The countries of the current EU-27 have experienced population growth from 478.1 million inhabitants in 1997 to 495.1 million in 2007, an increase of 3.56%. In the same period, Spain's population expanded from 39.5 million inhabitants to 45.2 million, a rise of 12.5%. Population distribution in some of Spain's neighbouring countries can be seen in the table

below. Belgium, Germany and Spain have the highest percentages of urban concentration. France shows a more balanced distribution across the three density-zone groupings.

POPULATION DISTRIBUTION IN SELECTED EUROPEAN COUNTRIES. 2005
[% of homes per density zone]

| | Spain | Portugal | France | Germany | Italy | Belgium |
|--------|-------|----------|--------|---------|-------|---------|
| Zone A | 52% | 45% | 24% | 52% | 45% | 57% |
| Zone B | 22% | 31% | 49% | 31% | 39% | 39% |
| Zone C | 27% | 25% | 27% | 17% | 15% | 5% |

Source: Eurostat. Labour Force Survey
Zone A: over 500 inhabitants/km²
Zone B: between 100 and 499 inhabitants/km²
Zone C: under 100 inhabitants/km²

NOTES

- From a demographic point of view, towns/cities are taken to be any population centre with over 10,000 inhabitants, provided population density is high, collective high-rise buildings predominate and the inhabitants are employed mostly in the secondary and tertiary sectors. Population density of the country or town/city should also be taken into account, as it could mean that this term applies to smaller towns. The European Statistics Conference held in Prague considered "town/city" to mean an agglomeration of over 2,000 inhabitants, provided the population employed in agriculture does not exceed 25% of the total.
- The population living in towns and cities of less than 10,000 inhabitants is not taken into consideration in this chapter, although the boundaries between the urban and rural environments are increasingly blurred as a result of low-density residential development (urban sprawl), which is increasingly affecting the rural environment.
- This indicator was calculated using the Census of Population and Housing (*Censo de población y vivienda*) figures for 2001, together with those included in the Municipal Register as at 1 January 2006, (Royal Decree 1627/2006, of 29 December - *Real Decreto 1627/2006*). The difference in figures is very significant due to the influx of immigrant population.
- The EU-27 shows a density of 115 inhabitants per km² (2007), with Malta at the top of the ranking (1,278 inhab/km²), followed by the Netherlands (473.7), Belgium (345.5), the United Kingdom (243) and Italy (198.6). Europe's population is found in high densities on the coast and in the main metropolitan areas (10% of the population). Up to 1980, growth was driven by natural population growth. Since 1960, this indicator has dropped progressively but has been offset by the growth in immigration, which has now become the driving force behind demographic growth. Spain follows this demographic trend.
- The EU-27 is subdivided into 268 regions (NUTS 2) according to the "Eurostat Regional Yearbook 2007", which analyses the behaviour of regions as regards the main demographic indicators in the 2000-2005 period, and which does not always match the behaviour presented by the country as a whole. The countries with the largest number of regions are Germany (41), the United Kingdom (37), France (26), Italy (21) and Spain (19).

SOURCES

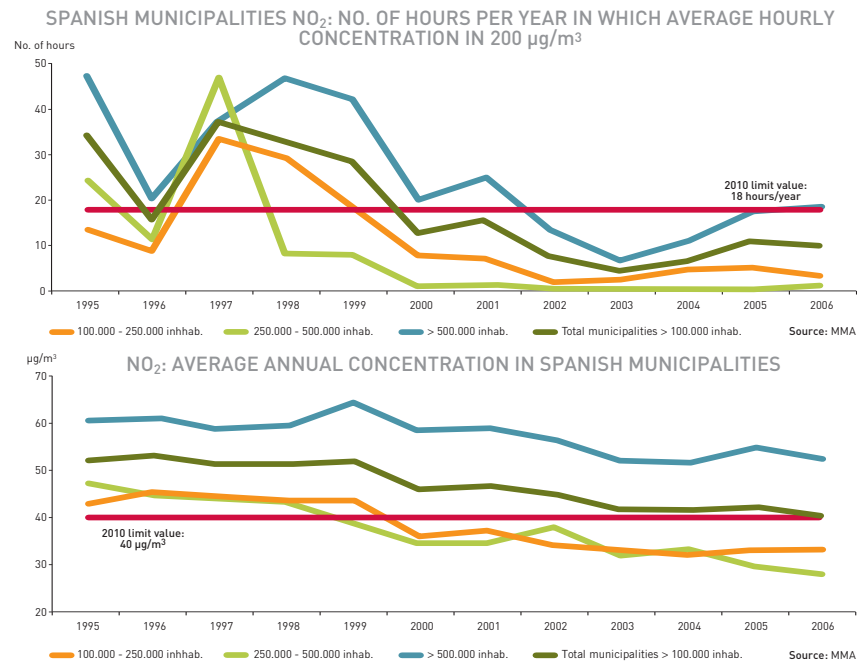
- Spanish National Institute of Statistics (INE - *Instituto Nacional de Estadística*). Census of Population and Housing. 2001.
- Spanish National Institute of Statistics (INE). Municipal Register as at 1 January 2006.
- Geographic area: INEbase figures.

FURTHER INFORMATION

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

Air quality in the urban environment

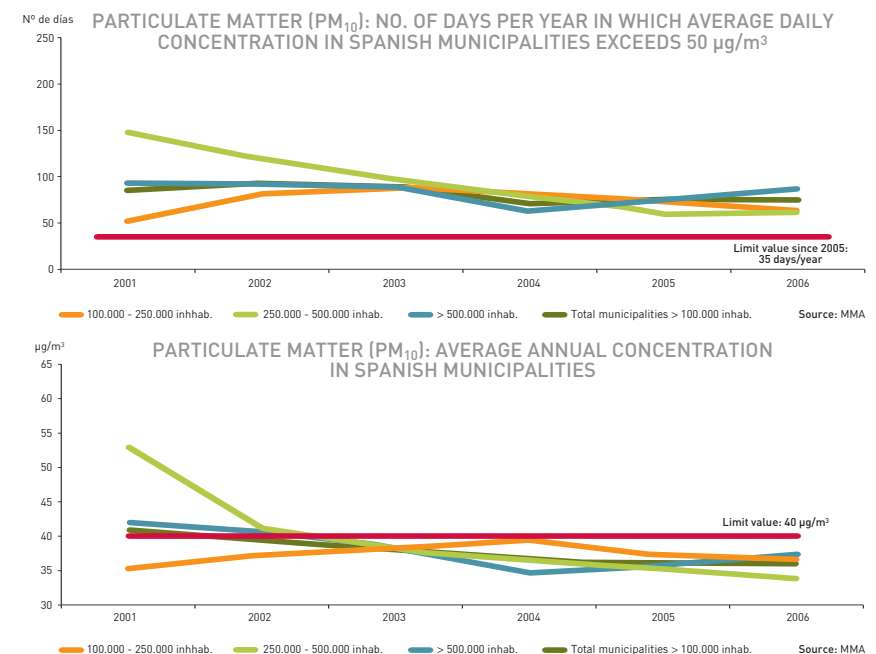
Analysis of population-weighted changes in the main pollutants affecting Spanish towns and cities shows that PM₁₀ and NO₂ exceed the regulatory limits and O₃ shows a worrying trend



2003 brought an end to the downward trend of previous years and revealed a slight increase in the average hourly concentration exceedance of NO₂. In 2006, only towns and cities with over 500,000 inhabitants recorded average values in excess of the limit value set for 2010, while among other groups of municipalities, and overall, average values were below the 2010 limit. This increase in the number of exceedance days is a general trend all over Europe and seems to stem mostly from the increase in diesel-powered vehicles.

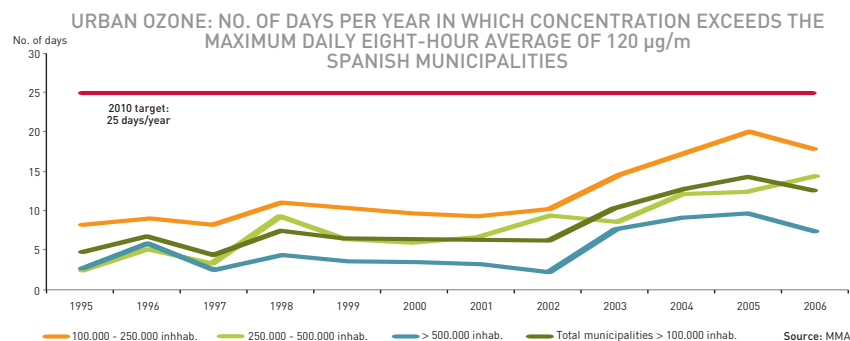
The average for cities with over 500,000 inhabitants exceeds the limit value for average annual NO₂ concentration set for 2010. However, the average value for all cities with over 100,000 inhabitants showed a drop in average annual concentration, as it did in the other municipality groups, nearing in 2006 the limit set for 2010.

For PM₁₀, there has been a downward trend in the number of days above the established limit value (50 µg/m³ per day), although this limit is still exceeded for the average of the three municipality size ranges and for the average of the total. The incidence of African dust particles is especially significant in the values for particulate matter as they constitute a natural contributor to this type of pollution. Since 2003, average annual concentration of PM₁₀ has registered lower average values than the 2005 limit, showing a clear downward trend. It should be noted that this analysis refers to average values weighted with the exposed population (see notes section) to represent an average situation that may not coincide with occasional situations in specific municipalities. In the year 2001, it became mandatory to evaluate PM₁₀ and since then information has been available from a satisfactory number of stations.

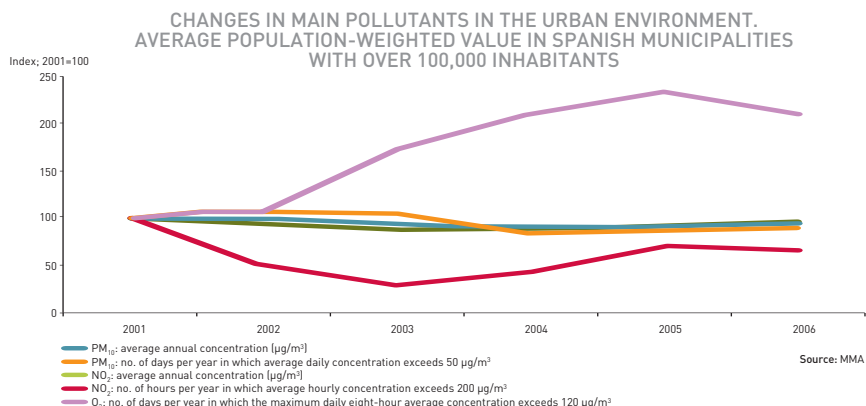


Although ozone pollution is a characteristic of areas a long way from precursor emission sources, and therefore from cities, there has been a significant increase in the number of days per year that exceed the maximum daily eight-hour average concentration of 120 µg/m³. This increase (which can be seen in all population size bands) took place in the years 2003, 2004 and 2005 as a consequence of adverse meteorological conditions in the

years used to calculate the annual average. Improvement in these conditions in recent years will affect the indicator's future value.



Finally, if the changes over time of these five indicators' average value are presented as an index (showing how levels of the three pollutants have altered) for all municipalities with over 100,000 inhabitants, an overall representation of the average situation in these municipalities as a whole is obtained. It may be seen that ozone is the only pollutant whose concentration has increased, especially from 2003 onwards. This is explained by the poor meteorological conditions that year, which led to precursor emissions giving rise to high concentrations of tropospheric ozone. The effects of this remained for the subsequent two years. This trend was reversed in 2006 due to that year being meteorologically propitious for ozone.



The concentration data given for NO₂ and PM₁₀ show a slight drop in values that have remained highly stable.

NOTES

- Indicator calculation method: to describe the quality of the air breathed in Spanish towns and cities as a whole using a representative average value, the EU methodology has been employed and the average value for each pollutant recorded at every station in each city has been calculated. Multiplying the sum of these average values by the respective municipality's population and dividing by the total population provides a weighted average. This weighted average is presented for the three municipality size ranges, and for the total of municipalities with over 100,000 inhabitants. In the case of ozone, the indicator is based on the triennial average, as laid down by regulation.
- All stations with sufficient data were taken into account and not only evaluation stations. Even so, it is worth highlighting that the average value obtained is a representation of the average situation as regards that pollutant, and there may be considerable differences between this value and occasional situations that may arise in towns and cities.
- Location and type of station (urban, traffic, industrial, etc.), maintenance and calibration of the analysers, and number of stations taken to produce average values are just some of the aspects which affect calculation of the variables for specific stations, located at sites which are representative of the intended monitoring process, and which provide sufficient valid data. Under these circumstances, monitoring of a trend would be highly reliable. This would provide an image of air quality at a specific point, information which bears no relation to an estimate of general air quality throughout the country, which is this indicator's aim.
- The indicator monitors the variables covered by the European Common Indicators (ECI) Project, and shows changes over time in excess values for NO₂, PM₁₀, and Ozone, together with average annual concentration levels for the first two, comparing them with the target and limit values set for 2005 and 2010 under current legislation: Royal Decree 1073/2002 (Real Decreto 1073/2002) on nitrogen dioxide (NO₂) and particulate matter smaller than 10µm (PM₁₀), and Royal Decree 1796/2003 (Real Decreto 1796/2003) on ozone.
- It is important to highlight that modification of monitoring stations' location, in accordance with the legislative recommendations to make them increasingly representative, has a notable impact on the indicator and the trends it finally shows. The total number of stations considered in the indicators' calculation varied throughout the period. This aspect had a significant effect on the final result. The table below summarises the percentage of stations considered in the period.

BREAK-DOWN BY TYPE OF AIR-QUALITY MEASURING STATIONS USED IN DRAWING UP THE INDICATORS (%)

| YEAR | INDUSTRY | TRAFFIC | BACKGROUND |
|------|----------|---------|------------|
| 1995 | 16.7 | 78.8 | 4.5 |
| 2000 | 17.8 | 72.6 | 9.6 |
| 2005 | 20.2 | 57.7 | 22.0 |
| 2006 | 20.0 | 55.3 | 24.7 |

- It should be noted that the analysis has not taken into account changes in SO₂ concentrations (which were covered by previous editions), essentially as a result of the apparent absence of problems involving these substances. Use of low-sulphur fuels and replacement of coal-burning boilers with natural gas units, among other measures, have led to an improvement in air quality in terms of SO₂ concentration and it has been some years since the limit values set for 2005 have been exceeded.
- Furthermore, since 1999, there has been a drop in the number of exceedance values (no. of days per year in which concentration exceeds the 10 mg/m³ daily maximum measured as an eight-hour average) in Spanish municipalities. The CO limit value set for 2005 has not been surpassed since 2002.
- As regards the origin of tropospheric ozone, it is known that urban areas generate primary pollutants (mainly caused by traffic) which are responsible, following a series of chemical processes dependent on high temperatures and solar radiation, for producing ozone. These precursors or primary pollutants, having been transported out of cities by the wind, produce an increase in ozone concentration, with pollution becoming evident as a problem in suburban and rural areas, where the highest levels of the pollutant are to be found.

SOURCES

- Air Quality Database (Base de Datos de Calidad del Aire). Sub-directorate General for Air Quality and Risk Prevention (Subdirección General de Calidad del Aire y Prevención de Riesgos). Directorate General for Environmental Assessment and Quality (Dirección General de Calidad y Evaluación Ambiental). Spanish Ministry of the Environment (MMA).

FURTHER INFORMATION

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

Environmental noise

Strategic noise maps drawn up for state-managed roads in Asturias, Cantabria and Murcia highlight that a total of 212,000 people are exposed to Lden >55 (dB)

STRATEGIC NOISE MAPS: OVERALL RESULTS IN ASTURIAS, CANTABRIA AND MURCIA

| AC | High-capacity state-managed roads (km) | High-capacity roads with noise maps (km) | Exposed area (km ²) | Exposed population Lden >55 (inhab.) | Exposed population Lden >65 (inhab.) | Exposed population Ln >55 (inhab.) | No. of hospitals exposed | No. of schools exposed |
|-----------|----------------------------------------|------------------------------------------|---------------------------------|--------------------------------------|--------------------------------------|------------------------------------|--------------------------|------------------------|
| Asturias | 287 | 126 | 114 | 76,600 | 14,700 | 22,780 | 1 | 36 |
| Cantabria | 214 | 135 | 93 | 73,600 | 9,000 | 10,400 | 2 | 42 |
| Murcia | 297 | 195 | 267 | 62,000 | 7,600 | 12,700 | 4 | 52 |

Source: Spanish Ministry of Public Works (MF). Strategic Noise Maps on State-Managed Roads. 2007

The indicator shows the population exposed to noise levels Lden >55 (daytime noise) and Ln >55 (night-time noise), and the number of hospitals and schools exposed in three Autonomous Communities. It also gives the length and surface area of the road sections included in the noise impact study in relation to the total length of state-managed high-speed roads. These figures sum up the overall figures from the maps already drawn up for the state highways network, which will provide an overview of the situation in Spain as regards noise.

The endeavour to address the problem of noise is based on citizens' right to enjoy a decent quality of life. The European Union, through Directive 2002/49/EC of 25 June 2002, relating to the assessment and management of environmental noise, set up a legislative framework to tackle noise pollution, including vibrations, laying down a common approach aimed at avoiding, preventing or abating the negative effects of exposure to environmental noise.

In Spain, this Directive was transposed by the Noise Act (*Ley de Ruido 37/2003*) of 17 November 2003, subsequently implemented by Royal Decree 1513/2005 (*Real Decreto 1513/2005*) of 16 December 2005, which specifies the concept of environmental noise and its effect on the population, laying down a series of measures and an action schedule. These regulations have recently been complemented with Royal Decree 1367/2007 (*Real Decreto 1367/2007*) of 19 October 2007, which implements the Noise Act as regards noise zoning, quality targets and noise emissions.

In its first stage, the Noise Act requires strategic noise maps to be drawn up for high-capacity roads with traffic in excess of six million vehicles per year. The second stage involves drawing up maps for roads with traffic in excess of three million vehicles per year.

In order to improve the available information on noise pollution and properly compile the necessary data regarding strategic noise maps and action plans, a Basic Noise Pollution Information System (SICA – *Sistema Básico de Información sobre la Contaminación Acústica*) has been set up by the Spanish Centre for Public Works Studies and Experimentation (CEDEX) under the Spanish Ministry of the Environment (MMA). The SICA consists of a data reception, analysis and processing centre and, among other functions, is responsible for contacting the competent authorities, providing information to the public and promoting noise pollution-related research (<http://sicaweb.cedex.es>).

STRATEGIC NOISE MAPS: ASTURIAS, CANTABRIA, MURCIA

Noise maps were produced in two stages: basic maps were drawn up in stage A (scale 1:25,000) and detailed noise maps (scale 1:5,000) were drawn up in stage B. The criteria for choosing the areas for detailed mapping included, among other things, volume of exposed population per km and the existence of residential housing exposed to Lden >75 dB. In the three Autonomous Communities as a whole, 22 noise maps were drawn up for an equivalent number of roads on the state highways network.

Principality of Asturias

The primary roads studied were the Autovía Ruta de la Plata (A-66) and a section of the Autovía del Cantábrico (A-8). As a whole, the roads studied cover a length of 126 km and comprise a surface area of approximately 114 km². The number of people exposed to Lden >55 amounts to 76,600, although the number exposed to Lden >65 falls to 14,700 (residents of the main population centres: Oviedo, Gijón, Aviles, Pola de Siero, Mieres del Camino, Ujo and Colloto, all in the central area of Asturias). A third of this population (22,780 inhab.) has to withstand night-time noise in excess of Ln >55. Proposals for action centre essentially on shielding 57 points on the road network.

Cantabria

In Cantabria, two traffic corridors crossing at Torrelavega were studied. This road network's main highways are the Autovía del Cantábrico (A-8) and the Autovía de la Meseta (A-67).

These highways have an impact on 28 municipalities. The highest volumes of noise pollution detected affect a total of almost 17 km.

The total population exposed to Lden >55 numbers 73,600 people, although the number exposed to Lden >65 is only 9,000. Population exposed to Ln >55 numbers 10,400 people. In total, 24,600 homes, 2 hospitals and 42 schools are exposed to noise. Corrective measures proposed, among others, include installing 3,800 m of noise barriers.

Murcia

The length of the sections studied totals 195 km and the exposed area reaches 267 km². The main highways are the Autovía del Mediterráneo and the Autovía de Murcia (A-30). The highest levels of noise pollution are found in four population centres: the city of Murcia, Alcantarilla, Librilla, Guadalupe and El Palmar. Overall, 18 km of road are affected, 12 km of which fall within the regional capital's boundary.

The population exposed to Lden >55 dB stands at approximately 62,000 inhabitants, 5% of the inhabitants on the census for Murcia. However, this population drops to 7,600 if Lden >65 dB is considered. The most significant impact occurs during the "night" time-band: 12,700 people are exposed to Ln >55 dB in areas of greatest exposure. As regards exposed homes, these are estimated to number around 25,700, of which three quarters are primary residences and the rest are empty houses or second homes. There are 52 schools and 4 hospitals exposed. Noise barriers constitute the main measure proposed to combat the problem.

NOTES

- Lden is an indicator of overall noise level during the day, evening and night. It is used to determine discomfort associated with exposure to noise; Ln is an indicator of noise level during the night and is used to determine sleep disturbance. The Lden and Ln indicators are used to draw up strategic noise maps.
- A strategic noise map is designed to provide an overall assessment of noise exposure in a specific area. It consists of:
 - **Noise level maps** (Lden, Ln, Ld and Le): obtained by mapping isophone references and colouring the areas occupied by noise ranges from 55-60 dB(A) up to over 75 dB(A) for day-time maps and from 50 dB(A) upwards on night-time maps.
 - **Exposure maps**: show the exposure values on the facades of houses and the number of people exposed.
 - **Affected area maps**: represent the area affected by noise levels in excess of 55 dB(A) and isophones of 55, 65 and 75 dB(A). A table is also provided with the affected surface area in km² for each noise range, the population and homes affected, and the number of hospitals and schools affected.
- Actions proposed to abate noise: noise barriers, road surfacing, industrial-type construction (where land is available) to act as a shield, remodelling the terrain to create ridges, other actions. These actions will be implemented according to criteria of priority.
- The table below provides a context for the noise maps of Asturias, Cantabria and Murcia:

| AC | Surface area (km ²) | Town/city (inhab.) | Population in municipalities > 50,000 inhab. | Population density (inhab/km ²) | State highways (km) |
|-----------|---------------------------------|--------------------|----------------------------------------------|---------------------------------------------|---------------------|
| Asturias | 10,604 | 1,074,862 | 53.4% | 101.36 | 803 |
| Cantabria | 5,321 | 572,824 | 41.4% | 107.65 | 626 |
| Murcia | 11,313 | 1,392,117 | 55.9% | 123.05 | 414 |

Source: INE. Figures drawn from the Municipal Register as at 1 January 2007. MF: 2006 figures.

SOURCES

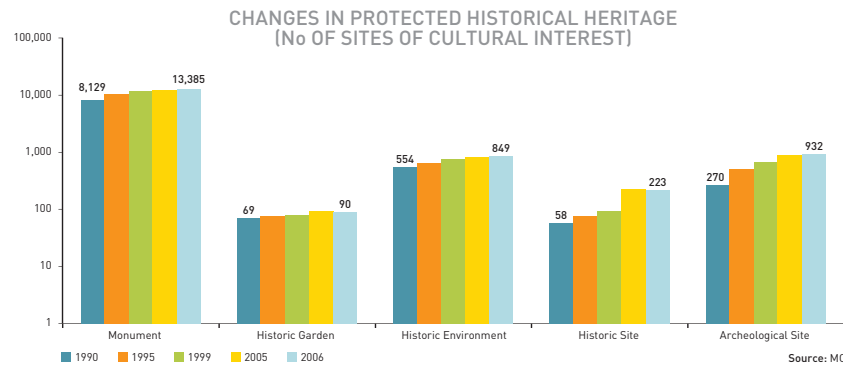
- Spanish Ministry of Public Works (MF). Directorate General for Highways (*Dirección General de Carreteras*). Strategic Noise Maps of the State Highways Network, [2007] Principality of Asturias, Summary Document; Autonomous Community of Cantabria, Summary Document; Murcia, Summary Document.
- Noise Act 37/2003, of 17 November. Official State Gazette (BOE) no. 276 of 18 November 2003.
- Royal Decree 1367/2007 of 19 October 2007, implementing the Noise Act as regards noise zoning, quality targets and noise emissions.

FURTHER INFORMATION

- <http://www.europa.eu.int/comm/environment/noise>
- <http://www.cedex.es/egra/entrada-egra.htm>
- <http://sicaweb.cedex.es>

Architectural heritage of Spain's cities

In 2006, legal protection for Spain's historical heritage covered 15,479 Sites of Cultural Interest (immovable assets)



The indicator shows the number of Sites of Cultural Interest in the immovable assets category. Given the cultural and geographical diversity of Spain's regions and the chronological extent of its history, the immovable assets classified as Spanish Historical Heritage (PHE)⁽³⁾ in the five categories shown in the graph can only ever represent a small part of the country's national heritage.

The European Parliament has noted that cultural and natural heritage are threatened with destruction, and it is increasingly common for them to disappear or for aggressive measures to be applied in detriment to their environment and the urban and natural context in which they exist. The causes of destruction of cultural and natural heritage include abusive human occupation of land; increased construction in historic town and city centres, green zones and free zones; together with loosely applied respect and protection criteria. It must be accepted that cultural and natural heritage are part of the environment and provide a familiar context for the population. As a result, protection and aid measures must be strengthened in public authorities' various fields of action.

The total figure (15,479) included in Spain's Property Register (*Registro de Bienes Inmuebles*), for which the Ministry of Culture (MC – *Ministerio de Cultura*) is responsible, cannot adequately portray the full importance of historical heritage, which is defined not in quantitative but aesthetic, educational and symbolic terms, and as a basic component of

cultural identity. A very high percentage of this heritage is located in major towns and cities nationwide. Environmental pollution, especially from traffic, may have serious effects upon it, and it is therefore important to include an indicator to monitor it among the environmental indicators.

The graph shows changes over the 1990-2006 period and their break-down within the five categories established. By Autonomous Community, in absolute figures, the Balearic Islands have the largest number of Sites of Cultural Interest registered (3,003), followed by Andalusia (2,773), Catalonia (2,190) and Castile-Leon (1,278).

Spain heads the world-wide list along with Italy in terms of largest number of UNESCO World Heritage Sites (40), the latest being the Teide National Park in 2007. The Tower of Hercules (Corunna) has also been submitted for acceptance. The UNESCO list includes four National Parks and the semi-natural landscape of Las Médulas, in addition to sites categorised as monuments.

As regards Cultural Heritage, the European Union has legislated on co-operation between Member States, specifically on the export of cultural assets and the return of cultural objects unlawfully removed from a Member State's territory. The EU's Culture Programme 2007-2013 is currently under way and is intended to help fund co-operation projects and promote and encourage creation of European cultural networks.

(3) In accordance with the Spanish Historical Heritage Act 16/1985 of 25 June 1985 (Ley 16/1985, del Patrimonio Histórico Español), Official State Gazette, 29 June 1985.

NOTES

- The graph showing Architectural Heritage uses a logarithmic scale due to the large difference between the number of Historic Gardens and Monuments.
- The Property Register includes the categories 'declared' (13,375) and 'nominated' (2,104).
- Act 16/1985 defines the concept of Spanish Historical Heritage, establishing that it comprises immovable and movable assets of artistic, historical, archaeological or ethnographic interest. It also includes documentary and bibliographical heritage, archaeological sites and areas, natural sites, gardens and parks with artistic or historical value.
- There are a number of European-level institutions focused on European Heritage such as Europa Nostra or the Council of Europe. The Council leads the European Heritage Network (HEREIN) project although, to date, it has provided little statistical information on each country. According to this source, and by way of example, in 1998 France had 40,467 protected immovable assets, 13,982 of which were monuments afforded maximum protection.
- **Some definitions:**
 - Immovable assets: essential elements of buildings that form a part of them or their environment.
 - Movable assets: elements that may be removed and, in general, any that may be taken from one place to another.
 - Monuments: immovable assets, consisting of architectural or engineered structures or large-scale works of sculpture, provided they are of historic, scientific or social interest.
 - Historic Garden: delimited space, the product of human arrangement of natural elements, occasionally supplemented by fabricated structures.
 - Historic Environment: group of immovable assets forming an established unit with a physical structure conditioned by and representative of a human community.
 - Historic Site: natural site or landscape with ties to past events, popular traditions, cultural creations or Nature.
 - Archaeological Site: natural site or landscape hosting movable or immovable assets suitable for study using archaeological methods.

SOURCES

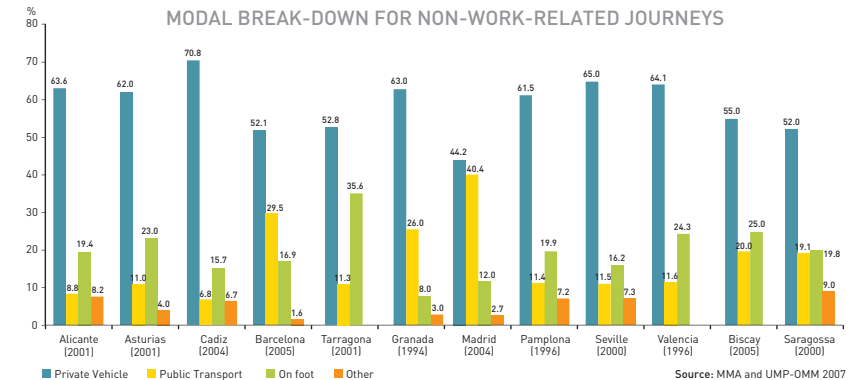
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- European Parliament. Environment, Public Health and Consumer Policy Committee. Draft Opinion on the Protection of the World Cultural and Natural Heritage in countries of the European Union. 8 November 2000.
- Decision No. 1855/2006/EC of the European Parliament and of the Council of 12 December 2006 establishing the Culture Programme 2007-2013.
- Spanish Historical Heritage Act 16/1985 of 25 June (Official State Gazette, 29 June 1985).

FURTHER INFORMATION

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

Local mobility and passenger transport

The number of journeys by public transport rose for all modes of transport, although dependence on cars remains strong, especially for work-related journeys



Below are a series of indicators for Spain's 14 metropolitan areas. The figures have been provided by the respective Public Transport Authorities (ATP – *Autoridades de Transporte Público*), co-ordinated by the Metropolitan Mobility Monitoring Centre (OMM – *Observatorio de la Movilidad Metropolitana*). The ATPs were set up to address current transport and mobility issues.

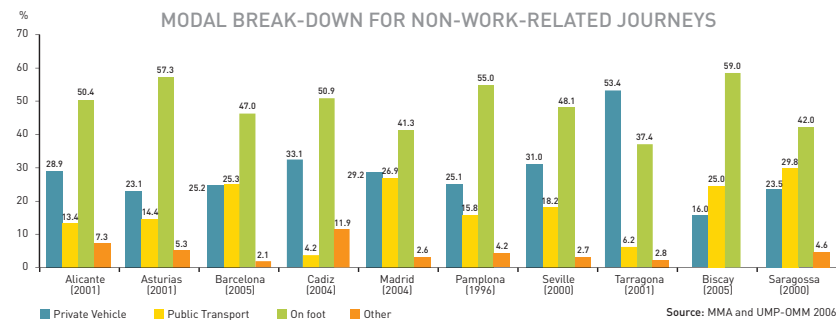
Modal break-down of work-related urban journeys

Work-related use of the various transport modes reveals that private vehicles are the most commonly used form of transport, although this is more widespread in medium- sized and small areas than in large ones.

The figures for Barcelona (52.1%), Saragossa (52.0%), Tarragona (52.8) and Biscay (55.0) show an even balance between public and private transport. However, automobile use exceeds 60% in the other metropolitan areas, with Cadiz standing out (70.8%) as having a clear public transport deficit. Exceptionally, in Tarragona, which is characterised by compact population centres, 35.6% of work-related journeys are made on foot.

Modal break-down for non-work-related journeys

As a result of greater available time and proximity to destination, non-work-related journeys are, to a large extent, made on foot in the case of activities that take place within urban centres. Biscay (59%) and Asturias (57.3%) stand out in this respect. These percentages decrease in Spain's large metropolitan areas, where means of transport become necessary due to the greater distances from leisure activities, shopping centres or, as the case may be, beaches. The Tarragona (53.4%) and Cadiz (33.1%) metropolitan areas have the highest percentages of private transport use for this purpose.



Modal break-down of journeys made within the main city

Analysis of journeys made within the metropolitan areas of the main cities highlights the fact that a large number are made on foot, especially in smaller cities where the distances are shorter. Granada (56%) and Asturias (50.8%) stand out in this respect. However, in the larger metropolitan areas (Madrid and Barcelona), although also in Tarragona and Saragossa, higher percentages of public transport use are seen in detriment to journeys made on foot.

The relationship between the main cities and the rest of the metropolitan area is characterised by greater journeys outside the population centres made exclusively by public and private transport. Madrid (46.4%) and Barcelona (52.9%) show the highest percentages of public transport use. This contrasts with the amount of private automobile use in Tarragona (87.7%) and Seville (77.8%).

These figures highlight the fact that population density is essential to making public transport cost-effective. This finding is in line with the proposals of the Urban Environment

Strategy when it stresses the need for sustainable mobility to “avoid the expansion of areas dependent on automobiles”.

Distances travelled daily and journey times (% of travellers)

It is essential to provide sufficient quantity and quality of public services to make their use attractive to the public and further use of public transport. However, there are other factors involved, such as journey time, service reliability, frequency, accessibility, ticket prices or place of work. Average distances travelled daily range between 1 km (Corunna) for journeys made on city buses, and 28.2 km for local rail services within the Barcelona Metropolitan Area.

AVERAGE DISTANCE TRAVELLED ON DIFFERENT MODES OF TRANSPORT

| Área metropolitana | Distance travelled by metropolitan bus (km) | Distance travelled by city bus (km) | Distance travelled by Metro (km) | Distance travelled by other rail modes (km) [1] |
|--------------------|---------------------------------------------|-------------------------------------|----------------------------------|-------------------------------------------------|
| Madrid | 15.8 km | 4.4 km | 7.0 | 19.4 |
| Barcelona | 7.7 km | 3.8 | 5.5 | 28.2 |
| Seville | 10.9 | 3.4 | - | 24.0 |
| Biscay | 9.4 | 3.0 | 6.2 | 15.9 |
| Tarragona | 15.7 | - | - | - |
| Granada | 12.6 | - | - | - |
| Alicante | 11.1 | 8.6 | - | 12.8 |
| Corunna | - | 1.0 | - | 12.8 |

Source: Metropolitan Mobility Monitoring Centre (OMM), 2007, Report 2005. [1] The figure indicating maximum distance has been used

Average journey times range between 10 minutes and over 1 hour. Furthermore, it should be noted that over half the population works, on average, within their municipality of residence, with Saragossa heading the list (79.6%), followed by Alicante and Malaga. This simplifies the journey and reduces the travelling time required.

AVERAGE JOURNEY TIMES (% OF TRAVELLERS)

| Size of area | Under 10' | 10'-20' | 20'-30' | 30'-60' | Over 60' |
|--------------|-----------|---------|---------|---------|----------|
| Large | 15.2% | 26.4% | 24.0% | 28.0% | 6.5% |
| Medium-sized | 19.3% | 36.2% | 26.6% | 15.8% | 2.2% |
| Small | 23.6% | 43.4% | 22.8% | 8.6% | 1.5% |

Source: Metropolitan Mobility Monitoring Centre (OMM), 2007, Report 2005.

Basic data for Metropolitan Areas (2005)

AVERAGE JOURNEY TIMES 2005 (% OF TRAVELLERS)

| Metropolitan area (MA) | No. of participating municipalities | Metropolitan surface area (km ²) | MA population (1/1/2005) | MA density (inhab/km ²) | Main city density (inhab/km ²) |
|------------------------|-------------------------------------|----------------------------------------------|--------------------------|-------------------------------------|--------------------------------------------|
| Corunna | 1 | 37 | 243,349 | 6,613 | 6,613 |
| Alicante | 5 | 355 | 427,217 | 1,203 | 1,589 |
| Asturias | 43 | 5,191 | 946,197 | 182 | 1,137 |
| Barcelona | 164 | 3,236 | 4,770,180 | 1,474 | 16,322 |
| Cadiz | 7 | 1,877 | 638,076 | 340 | 11,387 |
| Tarragona | 131 | 2,999 | 530,115 | 177 | 1,965 |
| Granada | 32 | 861 | 473,714 | 550 | 12,279 |
| Madrid | 179 | 8,030 | 5,964,143 | 743 | 5,203 |
| Malaga | 12 | 1,258 | 895,570 | 712 | 1,413 |
| Pamplona | 17 | 82 | 300,536 | 3,668 | 7,702 |
| Seville | 30 | 1,632 | 1,213,747 | 744 | 4,983 |
| Valencia | 60 | 1,415 | 1,700,608 | 1,202 | 5,281 |
| Biscay | 111 | 2,217 | 1,136,181 | 512 | 8,551 |
| Saragossa | 35 | 2,234 | 725,941 | 325 | 609 |

Source: Metropolitan Mobility Monitoring Centre, 2007. Report 2005.

The 14 Metropolitan Areas, with nearly 20 million inhabitants, comprise the population of 827 municipalities, cover a surface area of 31,424 km² and have an average density of 635 inhabitants/km².

The Metropolitan Areas' population grew in the 2001-2005 period by 7%, although, owing to the increase in surface area (the case of Biscay), density has fallen. This demographic increase has taken place on city outskirts, heightening the process of urban sprawl and increased mobility. There has also been an increase in the number of journeys by public transport, which seems to indicate that public transport is responding competitively to private vehicle use, although this is not reflected in the number of journeys per inhabitant. The offering in all the metropolitan areas includes city and inter-city buses, but only four (Madrid, Barcelona, Valencia and Biscay) have a Metro system. As regards rail transport, the Spanish National Rail Network (RENFE – *Red Nacional de los Ferrocarriles Españoles*) runs local trains in eight metropolitan areas, two of which also run regional trains (Barcelona and Biscay). Spanish National Narrow Gauge Railways (FEVE – *Ferrocarriles de Vía Estrecha*) provides rail services in the latter of these two, as well as in Asturias. Trams operate in Barcelona, Valencia, Biscay, Alicante and Corunna.

ANNUAL NUMBER OF JOURNEYS BY PUBLIC TRANSPORT PER INHABITANT IN METROPOLITAN AREAS

| Metropolitan area | No. of journeys/inhab | Metropolitan area | No. of journeys/inhab |
|-------------------|-----------------------|-------------------|-----------------------|
| Madrid | 255,3 | Seville | 89,8 |
| Barcelona | 176,6 | Alicante | 82,5 |
| Saragossa | 160,3 | Malaga | 55,8 |
| Biscay | 148,3 | Tarragona | 39,6 |
| Pamplona | 109,5 | Asturias | 28,9 |
| Valencia | 109,1 | Alicante | 82,4 |
| Granada | 95,3 | Cadiz | 13,5 |

Source: Metropolitan Mobility Monitoring Centre (OMM). 2000 & 2005 Reports. ATP figures from various years.

NOTES

- The Metropolitan Mobility Monitoring Centre (OMM) was created in 2003 as an initiative between the Reflection Group set up by the Public Transport Authorities (ATP) in Spain's metropolitan areas, the Ministry of the Environment (MMA) and the Ministry of Public Works (MF). The Spanish Federation of Municipalities and Provinces (FEMP – *Federación Española de Municipios y Provincias*), the Spanish Railways Foundation (FFE – *Fundación de Ferrocarriles Españoles*), the Association of Public Urban Transport Operators (ATUC – *Asociación de Transportes Urbanos Colectivos*), RENFE and the Institute for Energy Diversification and Saving (IDAE) also collaborate. The OMM's objective is to observe and assess general trends in mobility in the metropolitan areas it covers by analysing specific indicators such as key figures for these areas, transport offering, transport demand, funding and investment, and innovation in public transport. The OMM publishes an annual report.
- Spain has taken a number of state-level initiatives to achieve sustainable mobility. On the one hand, it has drawn up the Action Plan under the Spanish Energy Saving and Efficiency Strategy (*Estrategia de Ahorro y Eficiencia Energética Española*), under which all towns and cities of more than 100,000 inhabitants must produce urban mobility plans and plans for transport to centres of employment. On the other, it has produced the Spanish National Emission Rights Allocation Plan (*Plan Nacional de Asignación de Derechos de Emisión*), which covers actions intended to promote alternative modes of transport within urban environments. Furthermore, the Spanish Strategic Infrastructure and Transport Plan (PEIT – *Plan Estratégico de Infraestructuras y Transportes*), approved in 2005, proposes using sustainable mobility plans as a framework for co-ordinated action by the various local authorities.
- Mobility and accessibility:** it refers to citizens' ability to make journeys to reach their place of employment and the services and facilities offered by a city. Very much linked to this is the concept of accessibility, in other words, the proximity between homes and activities in urban areas.
- Metropolitan area:** in accordance with the criteria of the Metropolitan Mobility Monitoring Centre, a metropolitan area is defined as: "an urban geographical area with a high degree of interaction between its various urban centres in terms of journeys, day-to-day relationships, economic activity, etc."

SOURCES

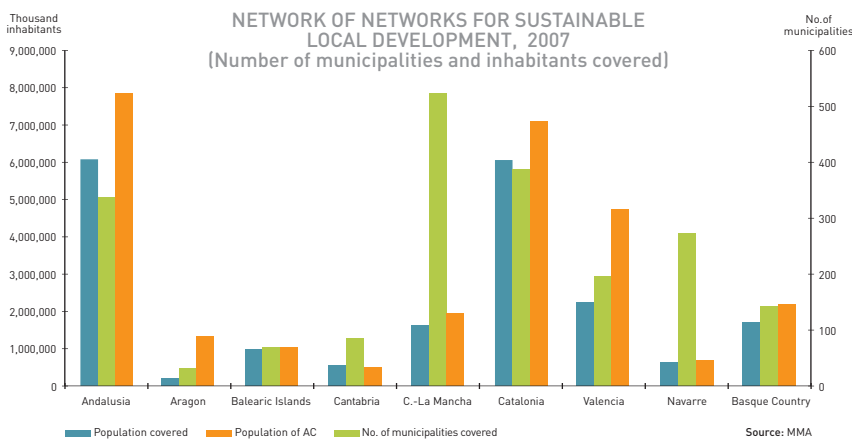
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- Spanish Ministry of Public Works (MF): Diagnosis of the Transport System: the Need for a Change of Direction (*Diagnóstico del sistema de transporte: necesidad de un cambio de rumbo*). Proposal document, December 2004.
- Spanish Ministry of the Environment (MMA), Spanish Ministry of Public Works (MF), 2007: Metropolitan Mobility Monitoring Centre (OMM). Report 2005 (4th report).
- Ministry of the Environment (MMA) and Centre for Transport Research. Polytechnic University of Madrid (UPM), 2007. Report on Transport and the Environment (*Informe sobre transporte y medio ambiente*): TRAMA 2006. Indicator System for Monitoring Integration between Transport and the Environment (*Sistema de indicadores para el seguimiento de la integración del transporte y el medio ambiente*).

FURTHER INFORMATION

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

Sustainable Local Development: towns and cities registered with the ‘Network of Networks’

44% of the population and 25% of Spain’s municipalities are covered by a ‘Network of Networks’ created to implement local sustainability policies



The Network of Networks for Sustainable Local Development is a forum, founded in December 2005, representing 1980 municipalities and a population of approximately 20 million inhabitants. Its members are made up of all of the municipal networks at a regional and provincial level which have worked on and have experience on the development and implementation of Local Agenda 21 processes. It also includes the Spanish Federation of Municipalities and Provinces (FEMP) and the Ministry of the Environment (MMA), which acts as the Network secretariat. Its aim is to work towards local sustainability, essentially through the exchange of experiences and exploitation of the potential offered by new technologies.

At a local level, the Network of Networks drew up the Urban Environment Strategy (*Estrategia de Medio Ambiente Urbano*) in 2006, to address the challenges facing today’s society in the four areas set out in the European Thematic Strategy: land-use planning, transport, construction and urban management. It also adds a section on the relationship between the rural and urban environments. It aims to establish guidelines to lead Spain’s

villages, towns and cities towards a more sustainable future, improving citizens’ quality of life and promoting a model based on compact, complex, efficient and socially cohesive population centres. The aim ultimately is to change the current trend based on resource consumption to another based on information and knowledge, creating both more countryside and more city.

The figures presented here were compiled within the context of the above-mentioned ‘Network of Networks’ and were provided by each of the constituent supra-municipal networks. According to this source, almost 2,000 municipalities or entities are registered, in other words, approximately a quarter of Spain’s municipalities. The population covered by the process amounts to around 20 million inhabitants, approximately 44% of Spain’s total population. Last year (2007), the Cantabrian Local Sustainability Network joined. Many of the municipalities that make up this network are also part of the Spanish Cities for Climate Network (*Red Ciudades por el Clima*), which is promoted by the Ministry of the Environment (MMA) and comprises 144 municipalities.

| Spain: Supra-municipal sustainability networks | No. of participating municipalities |
|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------|
| Castile-La Mancha Network of Sustainable Towns and Cities (Red de ciudades y pueblos sostenibles de Castilla-La Mancha) | 564 |
| Navarre Network of Local Authorities for Sustainability (Red Navarra de entidades locales hacia la sostenibilidad) | 165 |
| Network of Towns and Cities for Sustainability (Xarxa de ciutats i pobles cap a la sostenibilitat), Provincial Council of Barcelona (Diputació de Barcelona) | 208 |
| Network of Valencian Municipalities for Sustainability (Xàrcia de municipis valencians cap a la sostenibilitat) | 191 |
| Girona Council of Local Initiatives for the Environment (CILMA – Consell d’Iniciatives Locals per al Medi Ambiente de les comarques de Girona) | 176 |
| Basque Network of Municipalities for Sustainability (UDALSAREA 21 – Red Vasca de municipios hacia la sostenibilidad) | 170 |
| Andalusian Environmental Sustainability Programme (Ciudad 21 – Programa de sostenibilidad ambiental) | 111 |
| Huelva Provincial Network of Sustainable Towns and Cities (Red Provincial de Ciudades Sostenibles) | 79 |
| Cordoba Local Agenda 21 Network (Red de Agendas 21 Locales cordobesas) | 67 |
| Jaen Provincial Network of Sustainable Municipalities (Red de municipios sostenibles de la provincia de Jaén) | 76 |
| North Aragon Network of Local Authorities for Sustainability (RETE 21 – Red de Entidades Locales del alto Aragón por la sostenibilidad) Provincial Council of Huesca (Diputación Provincial de Huesca) | 26 |
| Cantabrian Local Sustainability Network (Red Local de Sostenibilidad de Cantabria) | 83 |
| TOTAL (excluding overlapping figures for Andalusia) | 1,980 |

Source: Spanish Ministry of the Environment (MMA), 2007

As regards sustainability processes’ level of implementation, only a minority have adopted an Action Plan. In assessing the effectiveness of initiatives related to local sustainability processes, a system or set of indicators would be required to monitor actions and to assess processes on three fronts: environmental, economic and social.

NOTES

- According to the Spanish Sustainability Monitoring Centre (IOSE – *Observatorio de la Sostenibilidad en España*), the number of entities with a Local Agenda 21 reached almost 1,500 in March 2006 . Other figures, provided by Regional Governments and Provincial Councils, raise this number to as high as 2,604, as there are around a thousand municipalities implementing actions relating to Local Agenda 21 without being part of a network. These include municipalities in Castile-Leon, Galicia and Extremadura. These figures would raise the percentage of Spanish municipalities implementing Local Agenda 21 processes to 32%. The highest level of participation is found in the Balearic Islands (84%) and the lowest in Castile-Leon. At the 2nd Conference of Local Agenda 21 Networks (*II Jornadas de Redes de la A21*) held in March 2006, 13 organisations took part.

SOURCES

- Barcelona Urban Ecology Agency (*Agencia de Ecología Urbana de Barcelona*).
- Urban Environment Department (*Área de Medio Ambiente Urbano*). Sub-directorate General for Air Quality and Risk Prevention (*Subdirección General de Calidad del Aire y Prevención de Riesgos*). Spanish Ministry of the Environment (MMA).

FURTHER INFORMATION

- <http://www.redciudadesclima.es>
- <http://www.ecourbano.es> (includes links to all the authorities belonging to the Network of Networks for Sustainable Local Development)

