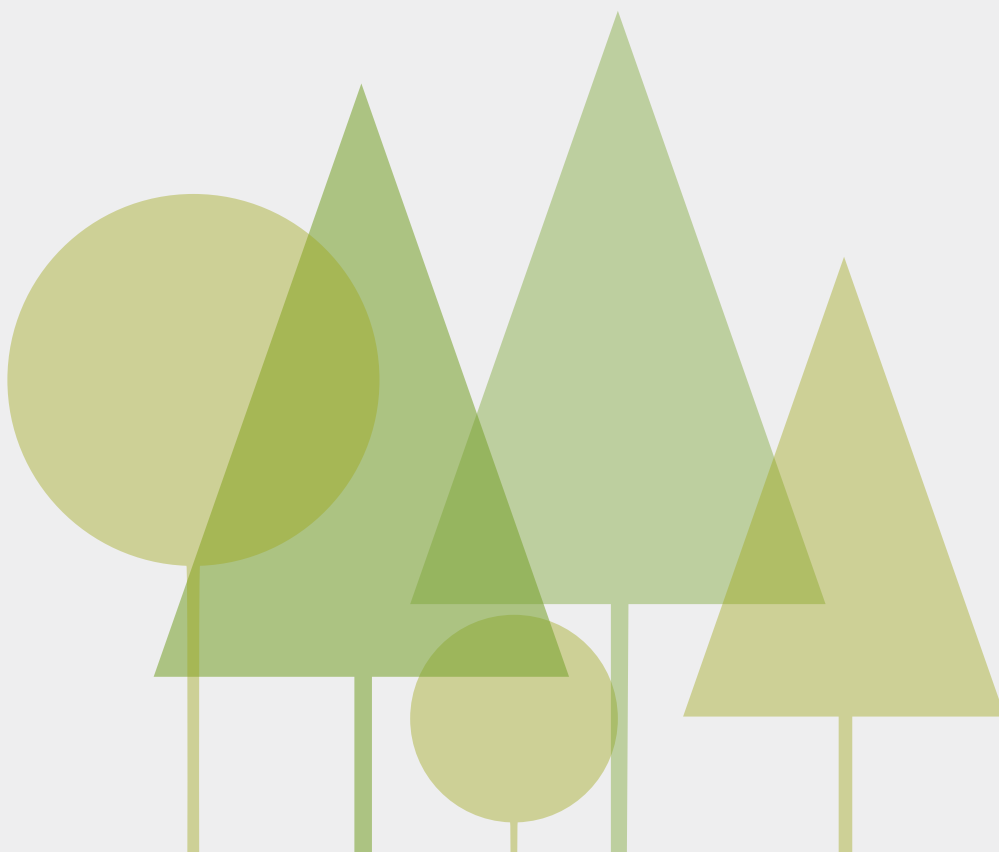


# Criteria and Indicators for sustainable forest management in Spanish forests

2012



MINISTERIO  
DE AGRICULTURA, ALIMENTACIÓN  
Y MEDIO AMBIENTE

# **Criteria and Indicators** **for sustainable forest management** **in Spanish forests**



MINISTERIO  
DE AGRICULTURA, ALIMENTACIÓN  
Y MEDIO AMBIENTE

**Madrid 2012**

**Coordinación:**

AGRESTA S.COOP/ [www.agresta.org](http://www.agresta.org)  
INCA Medio/[www.inamedio.com](http://www.inamedio.com)

**Fotografías:** Ministerio de Agricultura, Alimentación y Medio Ambiente,  
Tomás Sánchez Pellicer, Alberto González Ronda, Fondo AGRESPA, Fondo INCA

**MINISTERIO DE AGRICULTURA, ALIMENTACIÓN Y MEDIO AMBIENTE****Este libro ha sido publicado en inglés con el título:**

“Criteria and indicators for sustainable forest Management, in Spanish forests 2012”

**Edita:**

© Ministerio de Agricultura, Alimentación y Medio Ambiente  
Secretaría General Técnica  
Centro de Publicaciones

**Distribución y venta:**

Paseo de la Infanta Isabel, 1  
28014 Madrid  
Teléfono: 91 347 55 41  
Fax: 91 347 57 22

**Diseño y maquetación:**

Santiago Farizano.  
[www.farizano.es](http://www.farizano.es)

Plaza San Juan de la Cruz, s/n  
28003 Madrid  
Teléfono: 91 597 61 87  
Fax: 91 597 61 86

**Impresión y encuadernación:**

Talleres del Centro de Publicaciones del MAGRAMA  
NIPO: 280-12-230-1  
NIPO: 280-12-152-8 (línea)  
Depósito Legal: M-38950-2012

Tienda virtual: [www.magrama.es](http://www.magrama.es)  
e-mail: [centropublicaciones@magrama.es](mailto:centropublicaciones@magrama.es)

Catálogo de Publicaciones de la Administración General del Estado:

<http://publicacionesoficiales.boe.es/>

**Datos técnicos:** Formato: 21x29,7 cm. Caja de texto: 17,5x24 cm. Composición: una columna. Tipografía: Times New Roman a cuerpo 10. Encuadernación: fresado. Papel: interior en papel reciclado de 125 g. Cubierta en cartulina gráfica de 250 g. Tintas: 4/4.

Impreso en papel reciclado al 100%

# Index

<b>Criterion 1: Maintenance and appropriate enhancement of forest resources and contribution to global carbon cycles</b>	8
Forest Area	10
Growing Stock	12
Diameter distribution of forest	14
Carbon fixation	16
<b>Criterion 2: Maintenance of forest ecosystem health and vitality</b>	18
Defoliation	20
Forest Damage (1/2): Forest Fires	22
Forest Damage (2/2): Other forest damage	24
<b>Criterion 3: Maintenance and Improvement of the productive function of forests</b>	26
Increment and felling of wood and firewood	28
Production of wood and firewood	30
Non-wood products	32
Services	34
Forests under management plans	36
<b>Criterion 4: Maintenance, conservation and improvement of biodiversity in forest ecosystems</b>	38
Types of forest and composition according to species	40
Regeneration	42
Degree of naturalness	44
Species introduced	46
Genetic Resources	48
Endangered forest species	50
Protected forest area	52
<b>Criterion 5: Maintenance and improvement of the protective function of forests</b>	54
Protective forests	56
<b>Criterion 6: Maintenance of other socio-economic functions and conditions</b>	58
Forest ownership	60
Contribution of the forestry sector to GDP	62
Investment in the forestry sector	64
Employment in the forestry sector	66
Health and Safety at Work	68
Forestry Training	70
Forest Research	72
Trade in forestry products	74

# Prologue

The importance of forest systems in mitigating climate change, providing renewable products and energy and contributing to the development of a more sustainable economy forms the subject of increased technical, media and political attention. Furthermore, Spain's forest, one of Europe's largest and in constant growth for 30 years, plays an essential role in the conservation of biological diversity, the regulation of the hydrological cycle and the fight against desertification as well as providing space for leisure and enjoyment for society as a whole. These qualities of forest ecosystems, however, are increasingly threatened by fire, climate change and the abandonment and absence of management, among others.

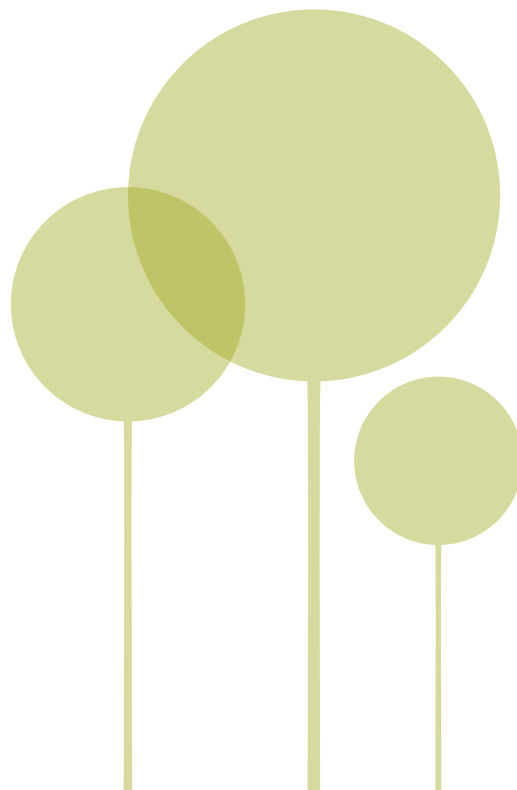
The set of indicators used for this study gathers those adopted in the Forest Europe process and adapts them to the reality and specific features of Spain's forestry policy and planning and to the environmental, social and economic conditions of our forests.

The aim of this publication is to provide a set of indicators which briefly and systematically allow experts in forestry science and other interested parties to gain an idea of the importance, evolution and trends in Spanish forests and thereby increase their knowledge of them. In addition, the reader will become aware of the challenges and opportunities faced by forests and dialogue will be promoted between politicians, the private sector and civil society within and beyond the forestry sector based on shared objective information for all the parties.

We trust therefore that this short publication will prove useful and will help to promote a new forestry culture as envisaged by the Spanish Forestry Plan, based on the balance between the three pillars of sustainable forestry management.

**Begoña Nieto Gilarte**

*Director-General of Rural Development and Forestry Policy*



# Introduction

Forest Europe, a process arising from the Ministerial Conferences on the Protection of Forests in Europe (MCPFE), is a high-level political initiative aimed at encouraging cooperation in the pan-European region and promoting sustainable forest management. Centred on the opportunities and concerns related to forests and forest science, MCPFE was launched in 1990 as a political platform for dialogue on the continent's forests.

The third Conference (Lisbon, 1998) established the basis for a common set of criteria on sustainable forest management for all the countries which form part of the process. Successive modifications and improvements have consolidated this system of indicators as a benchmark for the sector's characterisation and monitoring.

This publication is intended to present the current state and recent development of Spanish forest management through its 28 principal quantitative indicators. It contains explanatory data and graphics for both national and regional levels and thereby demonstrates the marked variability of forest in the country's different regions.

We have chosen to adopt an informative and synthetic approach to the different indicators and have gone for simplicity rather than wordy explanations. The publication's English version is directed at informing the international scientific and technical public of the state of forests in Spain and its autonomous regions in order to coincide with the Spanish Chairmanship of Forest Europe from 2011-2015.

Our gratitude goes to everyone who has provided information, those who have helped us to compare it and those who have revised the final product. We wish to save a special mention for the contribution of the Spanish Society of Forestry Sciences (SECF), whose report on the *State of Forests and the Forestry Sector in Spain 2011* provided the starting point for much of the data.





# **Criterion 1**

**Maintenance and appropriate enhancement of forest resources and contribution to global carbon cycles**



## Forest Area

Area of forests and other wooded land, classified by broadleaves and conifers, and by availability for wood supply, and share of forest and other wooded land in total land area

### Introduction

Forest area is indicative of the forest resources of a region and of a country. The size of forests and other wooded land areas and particularly their evolution over time provide objective criteria for evaluating the sustainability of forest management policies.

### Current Situation

Forest and other wooded land area in Spain is **27.67 million hectares**, which accounts for 55.6% of total national area.

**Forests cover 18.27 million hectares**, while other wooded land area occupies 9.40 million.

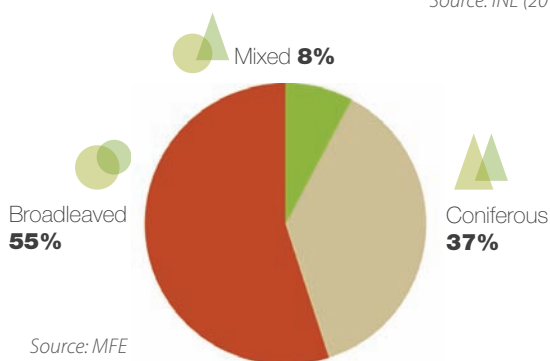
	Area (million ha)	% National Total
National Total	50,59	-
Total Forest (FOWL)	27,668	55 %
Forest	18,273	36 %
Other wooded land	9,395	19 %

Source: MFE (2010)

Forest area per capita is, therefore, **0.39 hectares**.

Population (habitantes)	Forest area (ha)	Forest areas per capita
47.021.031	18.273.218	0,39 hectares

Source: INE (2010), MFE (2010)



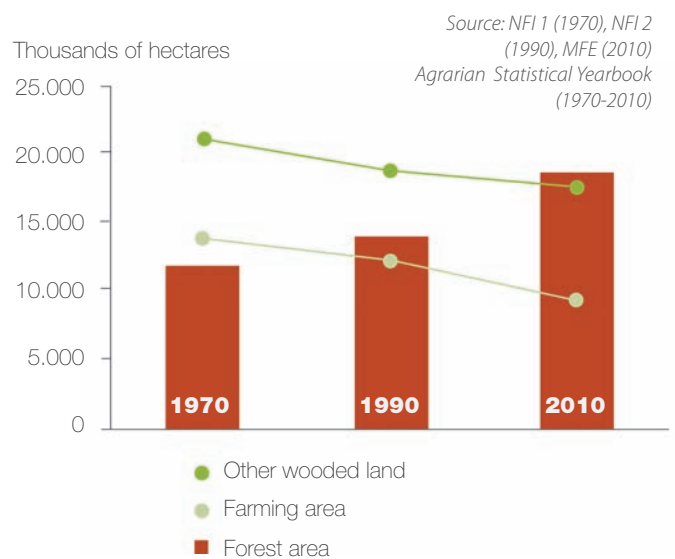
The area of forest available for the supply of wood and firewood – not included in protected areas – is 14.92 million hectares, equivalent to 82% of the forest area and 29% of the total national area<sup>1</sup>.

<sup>1</sup>In this publication the Spanish term “monte” has been translated into English as “forest and other wooded land (FOWL).”

In terms of the composition according to species, 55% of the forest area are broadleaved, 37% coniferous and 8% mixed mass<sup>1</sup>.

### Evolution

Between 1970 and 2010, the forest area in Spain increased by 6.48 million hectares. Between 1990 and 2010, growth of the forest area was 31%: 4.4 million hectares, an average increase of 210,000 hectares a year. Spain shows the biggest growth in Europe.



This evolution is based on natural regeneration of forest on abandoned agricultural areas since the rural exodus –from 1960– and campaigns promoting the afforestation of agricultural and non-wooded land from 1990.

Other wooded land (OWL), complementary to the growth in forest area, fell by 20% (2.33 million hectares) between 1990 and 2010.

Area (thousand ha)	1970	1990	2010	Difference 2010-1990	
Total Forest (FOWL)	25.623	25.984	27.668	1.684	6%
Forest area	11.792	13.905	18.273	4.368	31%
Other wooded land	13.831	12.079	9.574	-2.505	-21%
Farming	22.523	18.753	17.216	-1.537	-8%

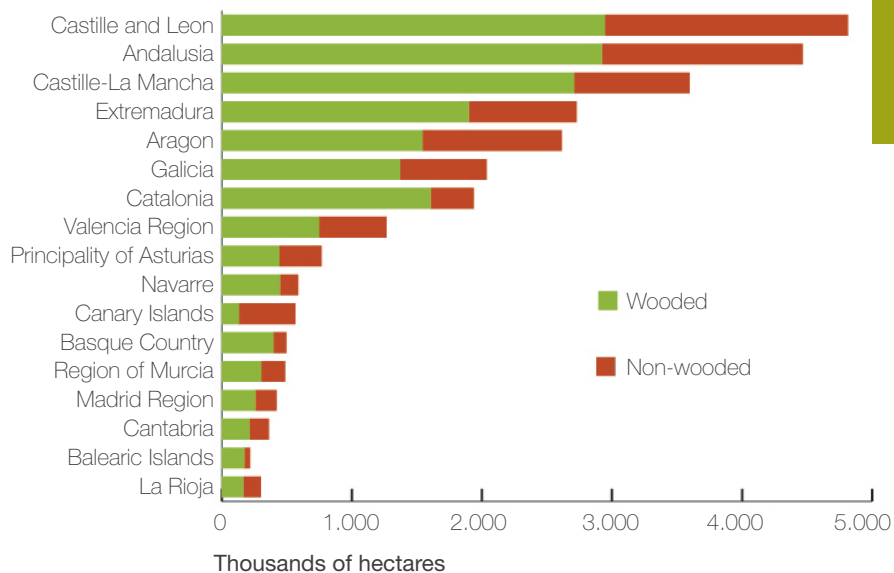
Source: NFI 1 (1970), NFI 2 (1990), MFE (2010) Agrarian Statistical Yearbook (1970-2010)

<sup>1</sup>A mass is considered to be coniferous or broadleaved when its occupation is greater or equal to 70%, both for one species or various. Otherwise, it is mixed.

## Autonomous Regions

The Autonomous Region with the largest forest area is **Castille and Leon**, both in terms of forest and other wooded land, followed by **Andalusia** and **Castille-La Mancha**. In relative terms, the **Basque Country** and **Catalonia** possess the greatest percentage of forest area. The **Canary Islands** and **Asturias** have the greatest percentage of total forest area, including other wooded land.

**Extremadura** has the most wooded area per capita, followed by **Castille-La Mancha**, **Aragon** and **Castille and León**, which all exceed one hectare of forest per inhabitant. At the other extreme are those Autonomous Regions with high population density (Madrid and the Canary Islands).



Regions	Population (thousands)	Total area (thousand ha)	Total forest area (FOWL) (thousand ha)				Forest Area per capita	
			Forest area	OWL	Total	% FOWL		% Forest
Andalusia	8.150	8.760	2.923	1.544	4.467	51%	33%	0,36
Aragon	1.314	4.772	1.543	1.072	2.615	55%	32%	1,17
Canary Islands	2.077	745	132	434	566	76%	18%	0,06
Cantabria	576	532	214	148	362	68%	40%	0,37
Castille-La Mancha	2.023	7.946	2.708	889	3.598	45%	34%	1,34
Castille and Leon	2.511	9.423	2.945	1.870	4.815	51%	31%	1,17
Catalonia	7.290	3.211	1.606	331	1.937	60%	50%	0,22
Madrid Region	6.295	803	258	163	421	52%	32%	0,04
Navarre	615	1.039	447	139	586	56%	43%	0,73
Valencia Region	4.992	2.326	748	519	1.267	54%	32%	0,15
Extremadura	1.080	4.164	1.898	830	2.728	66%	46%	1,76
Galicia	2.739	2.957	1.371	666	2.037	69%	46%	0,50
Balearic Islands	1.070	499	173	44	217	44%	35%	0,16
La Rioja	316	505	166	135	301	60%	33%	0,53
Basque Country	2.136	724	397	99	496	69%	55%	0,19
Principality of Asturias	1.059	1.060	442	324	766	72%	42%	0,42
Region of Murcia	1.443	1.131	302	186	487	43%	27%	0,21
<b>Total</b>	<b>47.021</b>	<b>50.597</b>	<b>18.273</b>	<b>9.395</b>	<b>27.668</b>	<b>55%</b>	<b>36%</b>	<b>0,39</b>

Source: MFE (2010)

Between 1990 y 2010, **Castille-La Mancha** and the **Balearic Islands** increased their forest area by more than 40%. In terms of total forest area, **Extremadura**, the **Canary Islands** and **Asturias** grew by over 15%.

Comunidad	1970	1990		2010		Difference 2010-1990			
	Forest area	Forest area	Other wooded land	Forest area	Other wooded land	Forest area	%	Other wooded land	%
Andalusia	1.822	2.106	4.325	2.923	4.467	817	39%	142	3%
Aragon	950	1.186	2.479	1.543	2.615	357	30%	136	5%
Canary Islands	97	105	486	132	566	27	26%	80	16%
Cantabria	173	166	323	214	362	48	29%	39	12%
Castille-La Mancha	1.440	1.851	3.474	2.708	3.598	857	46%	124	4%
Castille and Leon	1.886	2.119	4.516	2.945	4.815	826	39%	299	7%
Catalonia	1.164	1.394	1.856	1.606	1.937	212	15%	81	4%
Madrid Region	157	195	393	258	421	63	32%	28	7%
Navarre	304	372	529	447	586	75	20%	57	11%
Valencia Region	408	628	1.215	748	1.267	120	19%	52	4%
Extremadura	1.226	1.458	2.279	1.898	2.728	440	30%	449	20%
Galicia	1.129	1.045	1.968	1.371	2.037	326	31%	69	4%
Balearic Islands	107	122	204	173	217	51	42%	13	6%
La Rioja	93	129	294	166	301	37	29%	7	2%
Basque Country	353	390	469	397	496	7	2%	27	6%
Principality of Asturias	363	368	667	442	766	74	20%	99	15%
Region of Murcia	118	269	506	302	487	33	12%	-19	-4%
<b>Total</b>	<b>11.792</b>	<b>14.080</b>	<b>25.984</b>	<b>18.273</b>	<b>27.668</b>	<b>4.368</b>	<b>31%</b>	<b>1.684</b>	<b>6%</b>

Source: NFI 1 (1970), NFI 2 (1990), MFE (2010)

# Growing Stock

Growing stock of forest land, classified by broadleaves and conifers and by availability for wood supply

## Introduction

Estimation of the volume of growing stocks, classified according to type of forest mass and its availability for supplying forestry products, is a fundamental item of information for the application and evaluation of the techniques of sustainable forest management.

In addition, quantification of biomass stocks in the forest enables a more accurate estimation of the amount of carbon accumulated by forest systems.

Growing stocks are evaluated through the variable "volume of wood over bark" (VoB) in wooded areas.

## Current Situation

VoB of Spanish forest masses, according to the Third National Forest Inventory is **927,76 million m<sup>3</sup>**. Spain has the ninth highest total volume of wood in the EU-27.

Volume of wood over bark VoB 2005		
Coniferous	Million m <sup>3</sup>	531,54
Broadleaved	Million m <sup>3</sup>	396,22
Total	m <sup>3</sup> /ha	927,76
Total per wooded area	m <sup>3</sup> /ha	50,8
Total per habitant	m <sup>3</sup> /hab	19,7

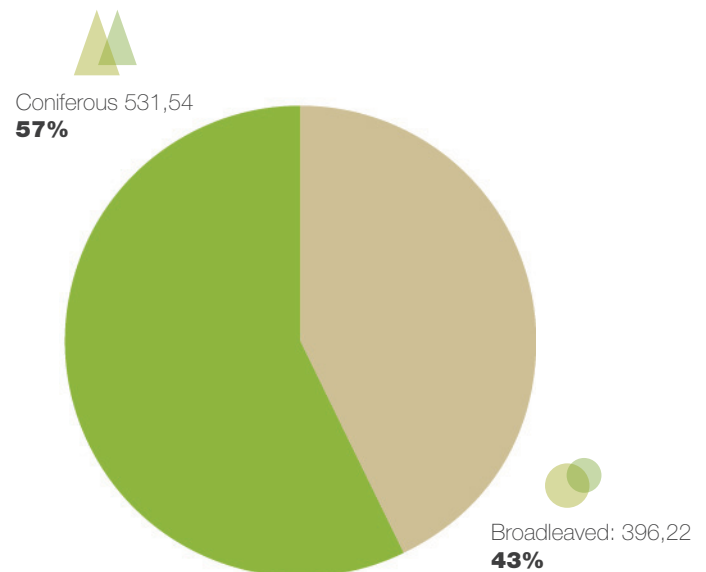
Source: NF13 1997-2007 (MARM). compiled by authors.

Growing-stock density is **50.8 m<sup>3</sup> of wood per hectare** of wooded forest area. With respect to the EU-27, Spain is, together with Greece, the country with the least growing stocks of wood per forest area.

The ratio of volume of wood to inhabitant is **19.7 m<sup>3</sup>**.

Distribution of volume of wood over bark according to forest type is as follows: **57%** is **coniferous** (531.54 Mm<sup>3</sup>) and **43%** **broadleaved trees** (396.22 Mm<sup>3</sup>).

Growing stock of the wooded forest area available for the supply of wood and firewood amounts to 783.9 million m<sup>3</sup>, which accounts for 85.7% of current stock.

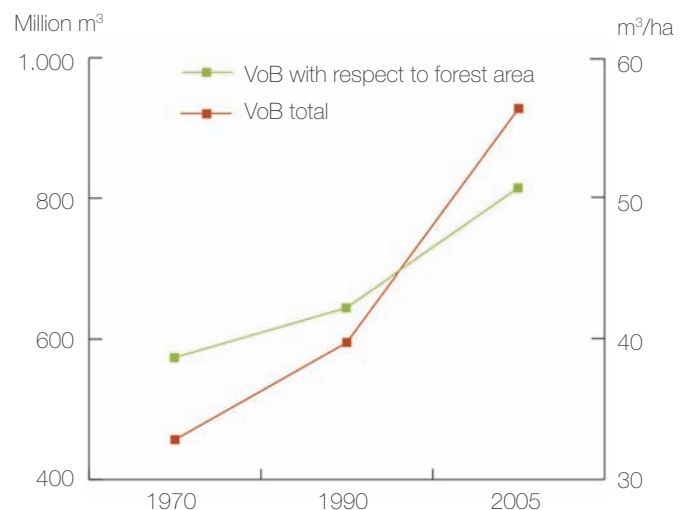


Source: NF13 1997-2007 (MARM). Prepared by the authors.

## Evolution

Between 1970 (NF11) and 2005 (NF13), the volume of wood over bark increased by 471.04 million m<sup>3</sup> (103.1%), a rate of annual increase of 23.55 million m<sup>3</sup>/year.

Likewise, the volume of wood per hectare of forest area rose from 38.7 m<sup>3</sup>/ha to 50.8 m<sup>3</sup>/ha.



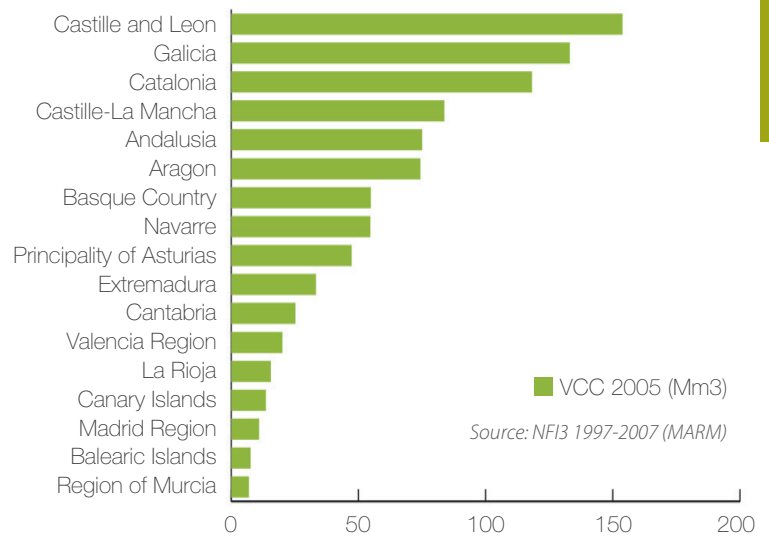
Source: NF11, 1966-1975 (MA), NF12, 1986-1996 (MAPA) e NF13 1997-2007 (MARM). Source

## Autonomous Regions

53% of wood stocks in Spain are currently concentrated in four Regions: **Castile and León** (153.77 Mm<sup>3</sup>; 16.6%), **Galicia** (133.09 Mm<sup>3</sup>; 14.3%), **Catalonia** (118.16 Mm<sup>3</sup>; 12.7%) and **Castile La Mancha** (88.73 Mm<sup>3</sup>; 9%).

In terms of wood density per forest area, the **Basque Country** (138 m<sup>3</sup>/ha), **Navarre** (122,2 m<sup>3</sup>/ha) and **Cantabria** (117,9 m<sup>3</sup>/ha) are at the forefront.

In terms of volume of wood per capita, **Navarre** (85.8 m<sup>3</sup>/inhabitant), **Castile and León** (60.1 m<sup>3</sup>/inhabitant) and **Aragon** (55.2 m<sup>3</sup>/inhabitant) have the highest proportion.



### Volume of wood over bark (VBW) 2005 (NF13)

Region	Total (Millones m3)	With respect to %	With respect forest area (m3/ha)	Per inhabitant (m3/hab.)
Andalusia	74,97	8,1%	25,7	9,0
Aragon	74,34	8,0%	48,2	55,2
Principality of Asturias	47,30	5,1%	107,0	43,6
Balearic Islands	7,53	0,8%	43,5	6,8
Canary Islands	13,54	1,5%	102,5	6,4
Cantabria	25,21	2,7%	117,9	42,6
Castille-La Mancha	83,73	9,0%	30,9	39,9
Castille and León	153,77	16,6%	52,2	60,1
Catalonia	118,16	12,7%	73,6	15,7
Valencia Region	20,07	2,2%	26,8	3,9
Extremadura	33,26	3,6%	17,5	30,0
Galicia	133,09	14,3%	97,1	47,6
La Rioja	15,52	1,7%	93,6	48,1
Madrid Region	10,90	1,2%	42,2	1,7
Region of Murcia	6,92	0,7%	22,9	4,7
Navarre	54,65	5,9%	122,2	85,8
Basque Country	54,82	5,9%	138,0	25,2
<b>Total</b>	<b>927,76</b>	<b>100,0%</b>	<b>50,8</b>	<b>19,8</b>

Source: NF13 1997-2007 (MARM). Compiled by authors

In terms of the evolution of VoB during the period 1970 (NF11) and 2005 (NF13), **Castile and León** (3.88 Mm<sup>3</sup>/year), **Catalonia** (3.27 Mm<sup>3</sup>/year) and **Galicia** (3.11 Mm<sup>3</sup>/year) were the Autonomous Regions with the highest annual rate of change. The **Region of Murcia** saw the highest rate of relative variation (243.2%).

### Evolution of volume of wood over bark 1975-2010

Region	1970	1990	2005	(Millones m3/year) Annual change rate 1970-2005	%
	Million m3				
Andalusia	30,25	40,79	74,97	1,28	147,8%
Aragon	32,55	44,58	74,34	1,19	128,4%
Principality of Asturias	27,28	32,58	47,30	0,57	73,4%
Balearic Islands	3,82	5,45	7,53	0,11	97,3%
Canary Islands	8,37	9,45	13,54	0,15	61,8%
Cantabria	13,43	19,31	25,21	0,34	87,7%
Castille-La Mancha	49,90	49,52	83,73	0,97	67,8%
Castille and León	76,12	86,60	153,77	2,22	102,0%
Catalonia	52,73	80,04	118,16	1,87	124,1%
Valencia Region	8,39	10,95	20,07	0,33	139,2%
Extremadura	12,60	19,06	33,26	0,59	163,9%
Galicia	70,80	90,40	133,09	1,78	88,0%
La Rioja	5,49	9,57	15,52	0,29	182,8%
Madrid Region	5,22	6,80	10,90	0,16	108,9%
Region of Murcia	2,02	3,14	6,92	0,14	243,2%
Navarre	29,06	45,35	54,65	0,73	88,0%
Basque Country	28,71	41,59	54,82	0,75	90,9%
<b>Total</b>	<b>456,72</b>	<b>595,18</b>	<b>927,76</b>	<b>13,46</b>	<b>103,1%</b>

Source: NF11, 1966-1975 (MA), NF12, 1986-1996 (MAPA) e NF13 1997-2007 (MARM). Compiled by the authors.

# Diameter distribution of forest

Structure of the forest mass according to diametric type

## Introduction

The structure of forest mass provides basic information on the state of maturity of the forest and the dynamics of its future development. It enables evaluation of the conditions of forest systems for hosting biodiversity and organising the extractions of products in the case of forest mass which supplies raw materials, among others.

This indicator is evaluated through the classification of *volume of wood with bark according to diametric type*.

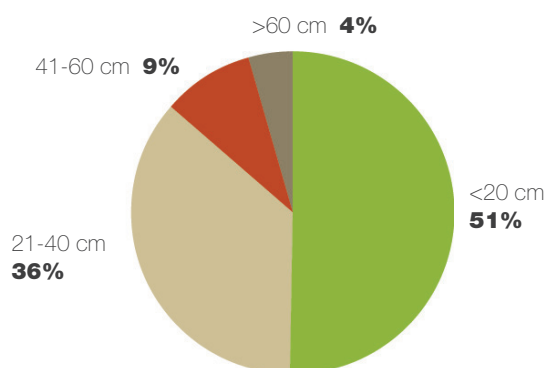
## Current Situation

**Over half** (50.6%) the volume of wood over bark is found in trees with a diametric type which is **less than 20 cm** (469.05 million m<sup>3</sup>).

If this is combined with the VoB corresponding to the 21 cm-40 cm diametric type, it may be seen that **86.6% of wood stocks** in Spain grow in trees of moderate size.

Volume of wood over bark (VoB) 2005		
Diametric type	Total (Million m <sup>3</sup> )	With respect to total (%)
<20 cm	469,05	50,6
21-40 cm	334,34	36,0
41-60 cm	85,86	9,3
>60 cm	38,53	4,2
<b>Total</b>	<b>927,78</b>	<b>100,0</b>

Fuente: NF13 1997-2007 (MARM). Elaboración propia.



Source: NF13 1997-2007 (MARM). Compiled by authors.

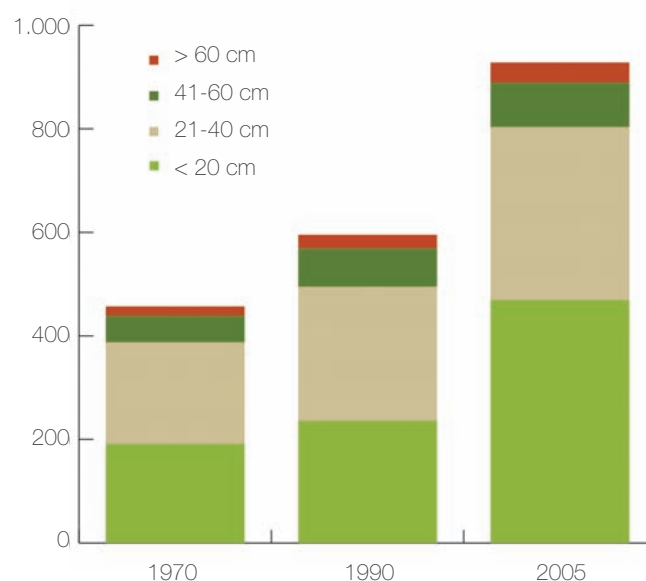
## Evolution

Between 1970 and 2005, distribution of growing wood stocks between diametric types changed. With regard to the lesser diametric type (< 20 cm), a significant increase was observed, rising from 42% for the growing stocks of this type in 1970 to 50.6% in 2005. Percentages which correspond to intermediate diametric types (21-40 cm and 41-60 cm) fell in both cases while the diametric type of greatest size (>60 cm) did not vary significantly.

In absolute terms, all diametric types showed increases in wood volume.

Diametric type	Evolution percentage distribution VoB		
	1970	1990	2005
<20 cm	41,8%	39,6%	50,6%
21-40 cm	43,0%	43,6%	36,0%
41-60 cm	11,2%	12,4%	9,3%
>60 cm	4,0%	4,4%	4,2%
<b>Total</b>	<b>100,0%</b>	<b>100,0%</b>	<b>100,0%</b>

Source: NF1, 1966-1975 (MA), NF2, 1986-1996 (MAPA) e NF13 1997-2007 (MARM). Compiled by authors.



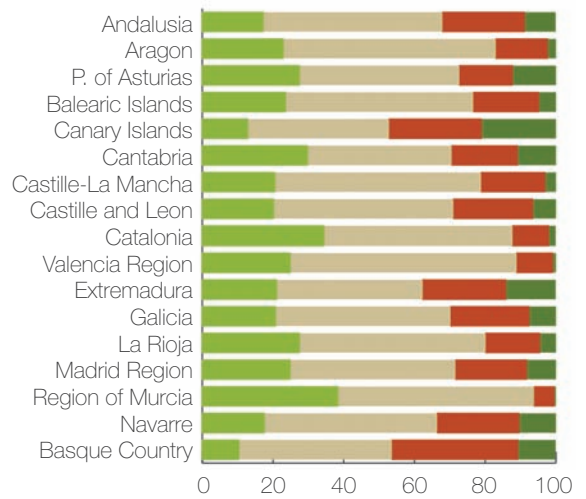
Source: NF1, 1966-1975 (MA), NF2, 1986-1996 (MAPA) and NF13 1997-2007 (MARM). Compiled by authors.

## Autonomous Regions

Almost 50% of the VoB stored in thin trees (CD < 20 cm) is found in **Catalonia** (19.7%), **Castile and Leon** (14.9%) and **Galicia** (13.3%). **Galicia** and **Castile and Leon** have the highest volume of wood corresponding to the thickest trees, with 16% and 15.9% of the national total in terms of diametric type > 60 cm.

**Region of Murcia** and **Catalonia** are the Autonomous Regions with the highest proportion of VoB in the lowest diametric type, with 38.8% and 34.4%, respectively, in contrast to the **Canary Islands** (12.8%) and the **Basque Country** (10.3%).

In terms of forest area, **Cantabria** y **Asturias** have the highest density of volume of wood in the lowest diametric type, with 35 m<sup>3</sup>/ha and 29.4 m<sup>3</sup>/ha, respectively, compared to **Extremadura** (3.7 m<sup>3</sup>/ha) and **Andalusia** (4.4 m<sup>3</sup>/ha).



Source: NF3 1997-2007 (MARM). Compiled by authors.

Region	Diametric distribution of the volume of wood with bark (VoB), total and according to forest area									
	(Million m3)					(m3/ha)				
	<20 cm	21-40 cm	41-60 cm	>60 cm	Total	<20 cm	21-40 cm	41-60 cm	>60 cm	Total
Andalusia	12,92	38,05	17,40	6,60	74,97	4,4	13,0	6,0	2,3	25,7
Aragon	17,00	44,68	10,89	1,78	74,35	11,0	28,9	7,1	1,2	48,2
Principality of Asturias	12,98	21,42	7,09	5,82	47,31	29,4	48,5	16,0	13,2	107,1
Balearic Islands	1,77	4,00	1,39	0,37	7,53	10,2	23,1	8,0	2,1	43,5
Canary Islands	1,73	5,41	3,54	2,86	13,54	13,1	40,9	26,8	21,6	102,5
Cantabria	7,48	10,29	4,69	2,75	25,21	35,0	48,1	21,9	12,9	118,0
Castille-La Mancha	17,20	48,78	15,18	2,57	83,73	6,4	18,0	5,6	0,9	30,9
Castille and Leon	30,93	78,30	34,40	10,14	153,77	10,5	26,6	11,7	3,4	52,2
Catalonia	40,70	62,95	12,11	2,40	118,16	25,3	39,2	7,5	1,5	73,6
Valencia Region	4,98	12,86	2,02	0,21	20,07	6,7	17,2	2,7	0,3	26,8
Extremadura	6,99	13,73	7,83	4,70	33,25	3,7	7,2	4,1	2,5	17,5
Galicia	27,51	65,88	29,52	10,18	133,09	20,1	48,0	21,5	7,4	97,1
La Rioja	4,25	8,18	2,38	0,71	15,52	25,6	49,3	14,4	4,3	93,6
Madrid Region	2,70	5,10	2,19	0,90	10,89	10,5	19,8	8,5	3,5	42,2
Region of Murcia	2,65	3,84	0,39	0,04	6,92	8,8	12,7	1,3	0,1	22,9
Navarre	9,58	26,72	12,68	5,68	54,66	21,4	59,7	28,0	12,7	122,2
Basque Country	5,67	23,75	19,50	5,89	54,81	14,3	59,8	49,1	14,8	138,0
<b>Total</b>	<b>207,04</b>	<b>473,94</b>	<b>183,20</b>	<b>63,60</b>	<b>927,78</b>	<b>11,3</b>	<b>25,9</b>	<b>10,0</b>	<b>3,5</b>	<b>50,8</b>

Source: NF3 1997-2007 (MARM). Compiled by authors.

Analysing evolution of the distribution of the density of wood according to extreme diametric types (<20 cm and >60 cm) during the period 1990 and 2005, the **Balearic Islands** registered the greatest increase in the highest diametric type (274%), while **Catalonia** presented a slight fall (-3,2%). In terms of lowest diametric type, the **Region of Murcia** and the **Basque Country** saw the largest increases, of over 100%.

Region	Diametric distribution of volume of wood over bark according to forest area (m3/ha)							
	1990			2005			Δ periodo 1990-2005 (%)	
	<20 cm	>60 cm	Total	<20 cm	>60 cm	Total	<20 cm	>60 cm
Andalusia	6,25	1,12	17,88	11,52	1,33	25,65	84,3%	19,0%
Aragon	16,28	0,51	37,60	27,85	0,63	48,17	71,0%	25,5%
Principality of Asturias	37,15	9,27	88,49	59,94	10,50	107,05	61,3%	13,3%
Balearic Islands	20,13	0,31	44,51	22,47	1,16	43,50	11,6%	274,2%
Canary Islands	20,14	14,60	90,10	32,77	14,91	102,47	62,7%	2,1%
Cantabria	49,56	8,86	116,64	65,09	8,70	117,96	31,3%	-1,8%
Castille-La Mancha	9,75	0,44	26,75	16,05	0,45	30,92	64,6%	1,4%
Castille and Leon	14,18	1,73	40,87	24,44	2,10	52,22	72,4%	21,6%
Catalonia	34,09	0,80	57,42	49,61	0,78	73,56	45,5%	-3,2%
Valencia Region	9,45	0,08	17,42	17,52	0,12	26,84	85,3%	58,5%
Extremadura	4,98	1,41	13,08	7,49	1,58	17,52	50,3%	11,8%
Galicia	30,80	3,64	86,47	45,07	4,57	97,06	46,3%	25,3%
La Rioja	37,35	2,36	74,23	54,64	2,41	93,60	46,3%	2,0%
Madrid Region	15,61	1,61	34,78	21,77	2,05	42,19	39,5%	27,6%
Region of Murcia	8,14	0,03	11,68	17,87	0,07	22,94	119,5%	119,0%
Navarre	44,77	7,64	121,75	51,81	8,16	122,18	15,7%	6,7%
Basque Country	19,74	4,82	106,64	41,05	6,04	137,95	108,0%	25,2%
<b>Average</b>	<b>16,72</b>	<b>1,88</b>	<b>42,27</b>	<b>25,67</b>	<b>2,11</b>	<b>50,77</b>	<b>53,49%</b>	<b>12,18%</b>

Source: NF2, 1986-1996 (MAPA) and NF3 1997-2007 (MARM). Compiled by authors.

# Carbon fixation

Carbon fixation in woody biomass and of soils on forest and other wooded land

## Introduction

During their growth, forest ecosystems fix carbon from CO<sub>2</sub> from the atmosphere, thereby contributing to the mitigation of climate change. Carbon fixed by a forest at a particular time is distributed between the fraction of above-ground and below-ground live biomass, the dead biomass fraction and the soil. Depending on the type of management applied, the carbon store may increase or decrease over time.

It is also important to highlight that forests can also contribute to the mitigation of greenhouse gas emissions through the replacement of the use of fossil fuels and of other more polluting building materials.

This indicator is evaluated through the carbon stored in the *fraction of live above-ground and below-ground biomass*.

## Current Situation

At present, Spanish forests fix **421.8 million tonnes of carbon**, 314.8 in the above-ground fraction (74,6%) and 107.0 in the below-ground fraction (25.4%). This represents the equivalent of **1,546.71 million tonnes** of carbon dioxide.

The ratio of the amount of carbon stored to the forest area is **23.08 tonnes a hectare**.

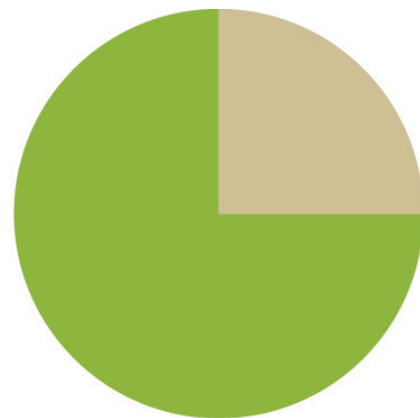
Live carbon biomass	Above-ground		314,80
	Below-ground	(Million t)	107,03
	Total		421,83
Live CO <sub>2</sub> biomass	Per forest area	(t/ha)	23,08
	Total	(Million t)	<b>84,64</b>

Source: State of Europe's Forests 2011 (Forest Europe). Compiled by authors.

Spain has the eighth largest carbon stock in the EU-27, after Germany (1.405 Mt), Sweden (1.275 Mt) and France (1.208 Mt), among others.

However, with respect to the density of carbon stored in forest area, Spain stands with Greece in the lowest places, with 23 t/ha and 20 t/ha, respectively.

ABOVE-GROUND CARBON FRACTION **75%**      BELOW-GROUND CARBON FRACTION **25%**



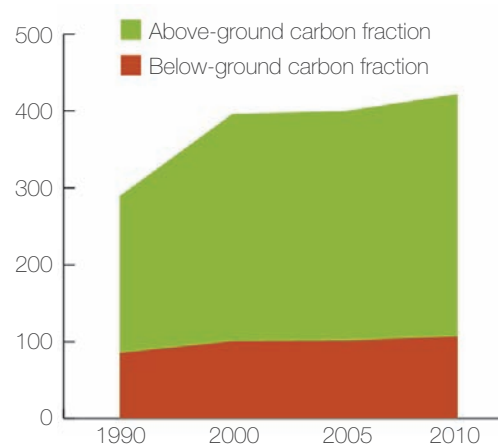
Source: State of Europe's Forests 2011 (Forest Europe).

## Evolution

During the period 1990 and 2010, carbon stored by forest area grew by **145.9%** (132.7 Mt), rising from **289.2 Mt in 1990 to 421.8 Mt in 2010**. The annual rate of increase corresponding to the period was **6.6 Mt/year**.

Year	Carbon in live biomass		Total
	Above-ground	Below-ground	
	Million t		
1990	204	85	289
2000	296	101	396
2005	298	101	400
2010	315	107	422

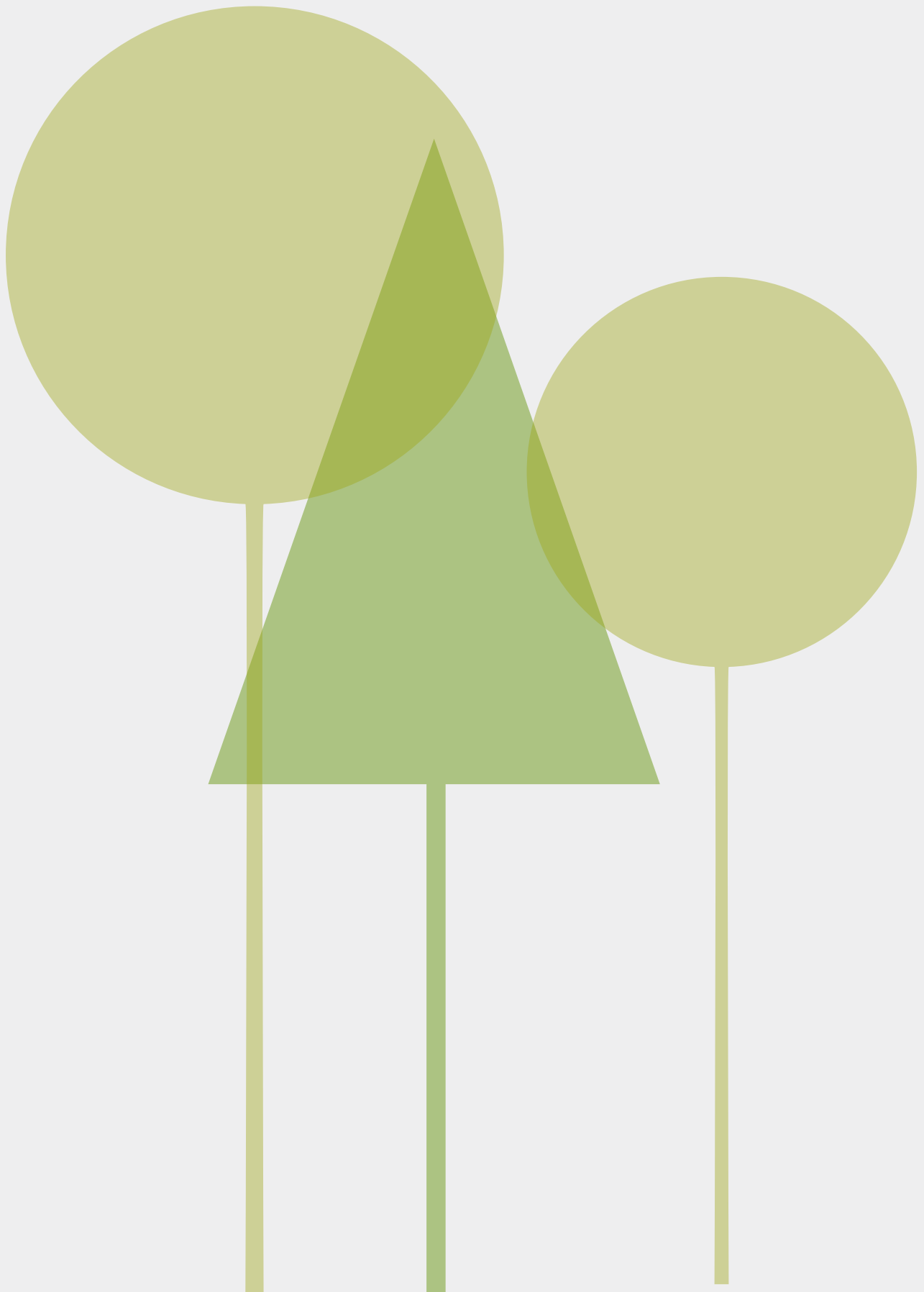
Source: State of Europe's Forests 2011 (Forest Europe).



Source: State of Europe's Forests 2011 (Forest Europe).







## **Criterion 2**

**Maintenance of forest ecosystem  
health and vitality**

# Defoliation

Defoliation of one or more main tree species on forests and other wooded land in each of the defoliation classes: none, slight, moderate, severe and dead

## Introduction

One way of establishing the state of health of forests in Europe is by monitoring the foliage of its trees. Defoliation indicates the health and vitality of trees and is related to very diverse factors, such as climatic conditions and extreme meteorological phenomena, together with atmospheric pollution and pests and diseases.

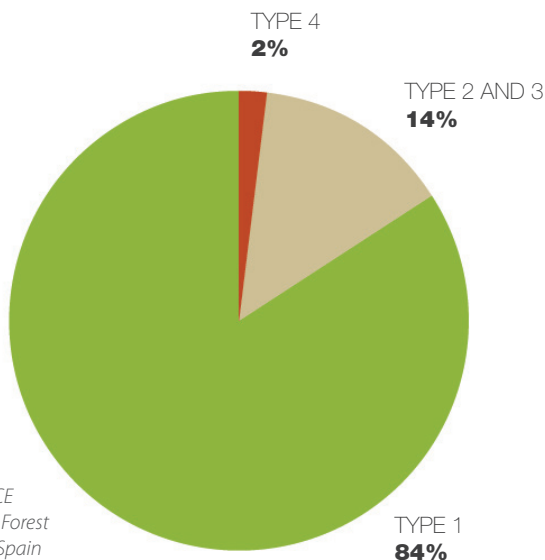
Defoliation is evaluated by numerical estimation of the state of defoliation of the sampling points belonging to Level I and II of the European Monitoring Network, and in accordance with the scale established by the ICP Forest ([www.icp-forest.net](http://www.icp-forest.net)).

## Current Situation

Trees in Spain corresponding to the three-year period 2008-2010 may be viewed as healthy, with 84% of the sample classified in Types 0 and 1 (see table). 14% showed a significant degree of disease (Types 2 and 3), while 1.9% were classified as dead (Type 4).

Degree of defoliation	State of annual average defoliation period 2008-2010 (%)		
	Coniferous	Broadleaved	Total
Type 0: From 0 to 10% of defoliated tree crown	24,2	17,1	20,6
Type 1: From 11 to 25% of defoliated tree crown	62,3	64,5	63,4
Type 2: From 26 to 60% of defoliated tree crown	10,7	15,1	12,8
Type 3: Over 60% of defoliated tree crown	1,0	1,4	1,2
Type 4: Dead	1,9	1,9	1,9

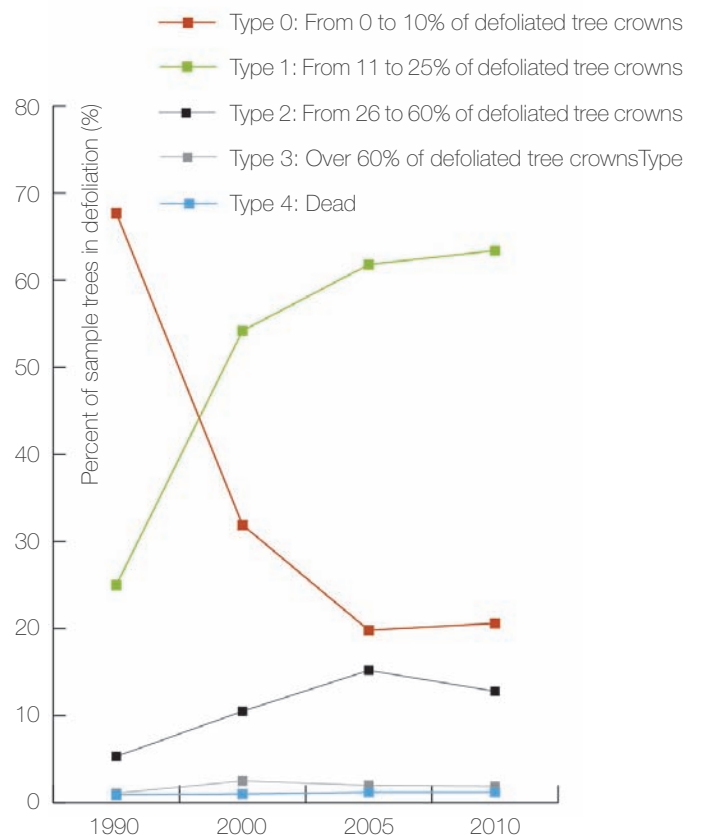
Source: EU-CE Inventory of Forest Damage in Spain 2010. Compiled by authors.



Source: EU-CE Inventory of Forest Damage in Spain 2010 (MARM). Compiled by authors.

Coniferous trees appear in slightly better shape, with 86.5% classified in Types 0 and 1, compared to 81.6% of broadleaved trees.

With respect to the EU-27, Spain's state of vitality is clearly higher than the European average, with 84% of healthy trees inventoried compared to 76.7% in the rest of the Union.



Source: EU-CE Inventory of Forest Damage in Spain 2010 (MARM). Compiled by authors.

## Evolution

Between 1990 and 2010 the health of trees experienced a slow but continuous decay, with significant weakening between the periods 1991-1995 and 2005-2006. For the whole period, the annual proportion of trees classified as Type 1 fell (from 78.3% to 24.3%), with a parallel increase in trees classified as Type 2 (from 17% to 61.1%).

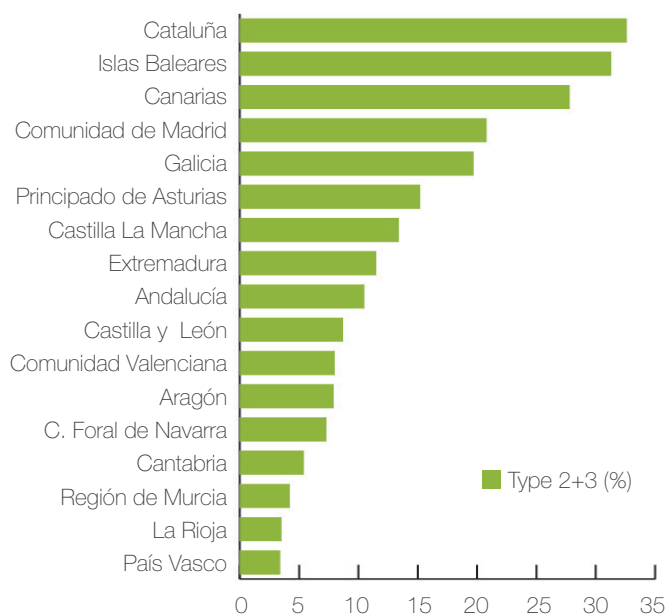
The percentage of trees in a healthy state (Types 0 and 1) fell from 95.3% to 85.4% over the same period. The percentages corresponding to Type 2 and 3 trees increased (from 3.1% to 11.1% and from 0.6% to 1.1%, respectively). However, there was a slight improvement in the most recent three-year period.

## Autonomous Regions

**Catalonia**, the **Balearic Islands** and the **Canary Islands** were the Autonomous Regions with the greatest symptoms of defoliation during the 2008-2010 period, with annual average percentages of the trees sampled belonging to Types 2 and 3, 32.6%, 31.3% and 27.8%, respectively.

The best figures on the state of health of forests came from the **Basque Country**, **La Rioja** and the **Region of Murcia**, which have an annual average of Type 0 and 1 trees exceeding 95%.

Source: EU-CE Inventory of Forest Damage in Spain 2010 (MARM). Compiled by authors..



Proportion of trees according to types of defoliation. Average from 2008-2010 period*		
Region	Type 0+1	Type 2+3
	%	
Andalusia	87,4	10,5
Aragon	92,0	7,9
Principality of Asturias	76,2	15,2
Balearic Islands	68,1	31,3
Canary Islands	71,6	27,8
Cantabria	90,3	5,4
Castille-La Mancha	84,7	13,4
Castille and Leon	90,8	8,7
Catalonia	65,9	32,6
Valencia Region	90,2	8,0
Extremadura	87,9	11,5
Galicia	74,9	19,7
La Rioja	96,5	3,5
Madrid Region	79,2	20,8
Region of Murcia	95,7	4,2
Navarre	91,7	7,3
Basque Country	95,8	3,4
<b>Total</b>	<b>84,5</b>	<b>14,9</b>

\* Excluding Type 4 (dead or disappeared)  
Source: EU-CE Inventory of Forest Damage in Spain 2010 (MARM). Compiled by authors..

# Forest Damage (1/2): Forest Fires

Forest and other wooded land damaged area classified according to primary agents (abiotic, biotic and of anthropic origin) and to types of forest

## Introduction

Fire is a natural element which plays an important role in the processes of regeneration, selection, adaptation and evolution of natural ecosystems. However, forest fires can have negative consequences on vegetation and fauna and contribute to desertification processes, loss of soil and water supply as well as producing loss of human life and material goods.

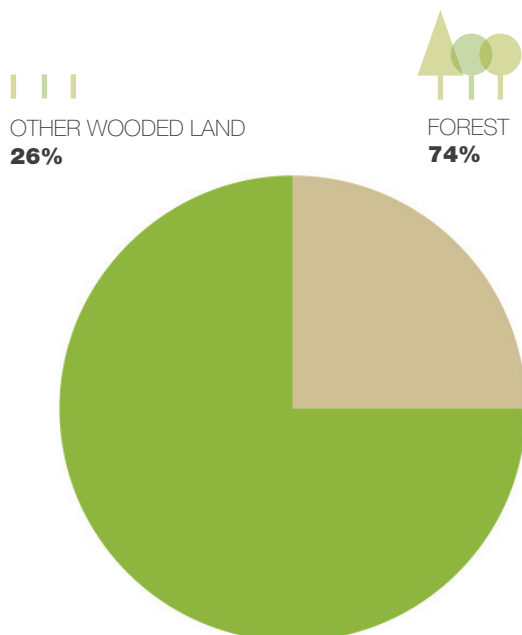
Damage produced by forest fires is evaluated through the *number of fires produced and the forest and other wooded land affected*.

## Current Situation

The annual average for forest fires over the most recent three-year period (2008-2010) was **13.01 thousand**.

The annual average forest area affected by fires in Spain over the same period was **74.99 thousand ha**. This represented an annual affected area equivalent to **0.3%** of national forest, without taking into account the possibility of fires recurring in the same zone.

**74%** of this affected area corresponded to **other wooded land** (55.32 mil ha), while the remaining **26%** was **forest area** (19.67 mil ha)



Source: Forest Fires in Spain 2010 (MARM). Compiled by authors.

Annual average number of fires (2008-2010)		(Thousand unit/year)	13,01
Annual average area of forest affected (2008-2010)	Forest	(Thousand ha/year)	19,67
	Other wooded land		55,32
	Total		74,99
	With respect to national forest area	(%)	0,3
	Per fire	(ha/ud)	5,55

Source: Forest Fires in Spain 2010 (MARM). Compiled by authors.

The average area affected by a fire was **5.77 hectares**.

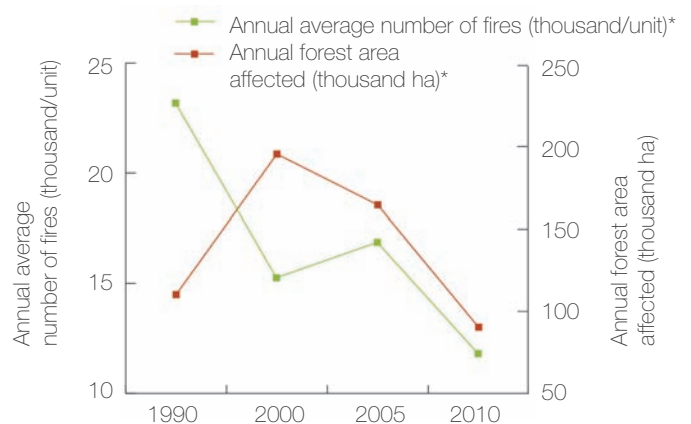
Spain only lies behind Portugal as the European country affected most by forest fires, both in the number produced and the area affected.

## Evolution

Between 1990 and 2010, the average annual number of fires increased during the 2000 five-yearly period (1998-2002), with an average of **20.86** thousand fires a year, only to fall to **12.92** thousand in the most recent three-year period (2008-2010).

There was a sharp fall in the forest area affected, from an annual average of **226.61** thousand ha in the 1988-1992 period (1990 five-yearly period) to **74.99** thousand ha in the 2008-2010 period.

In the current three-yearly period, fires affect an average area of **4.31** ha/fire, compared with an average figure of **15.39** ha/fire recorded 20 years earlier.



\*Five-yearly averages, with the exception of 2010 (2008-2010)

Source: State of Europe's Forests 2011 (Forest Europe). Forest Fires in Spain 2010 (MARM). Compiled by authors.

## Autonomous Regions

**Galicia** is the Autonomous Region with the greatest annual average of fires in the period 2008-2010 (3,456 unit/year), followed by **Castille and Leon** (1,989 unit/year) and the **Principality of Asturias** (1,893 unit/year). **Castille and Leon** (18,67 mil ha/año) has the highest annual average forest area affected. **Aragon** (5.11 mil ha/year) has the highest annual average forest area affected.

On observing the ratio of average forest area to regional forest area, **Cantabria** has the highest proportion in the current three-year period, with 2.1% of annual area. Fires affect **Aragon** most, with 20.46 ha hit by fire.



Region	Average forest area affected 2008-2010 period						Total per fire (ha/unit)
	Average no. fires 2008-2010 period (unit)	Forest (Thousand ha)	Other wooded land (Thousand ha)	Total (Thousand ha)	With respect to total area (%)	With respect to forest area (%)	
Andalusia	782	0,47	5,51	5,98	8,0%	0,1%	7,65
Aragon	379	5,11	2,65	7,76	10,3%	0,3%	20,46
Principality of Asturias	1.893	0,71	7,64	8,36	11,1%	1,1%	4,42
Balearic Islands	113	0,16	0,09	0,25	0,3%	0,1%	2,25
Canary Islands	122	1,10	0,31	1,41	1,9%	0,2%	11,58
Cantabria	668	0,52	6,95	7,48	10,0%	2,1%	11,19
Castille-La Mancha	691	1,75	1,85	3,60	4,8%	0,1%	5,20
Castille and Leon	1.989	3,96	14,71	18,67	24,9%	0,4%	9,39
Catalonia	548	0,71	0,84	1,55	2,1%	0,1%	2,83
Valenciana Region	360	1,22	1,88	3,10	4,1%	0,2%	8,61
Extremadura	793	1,02	2,54	3,56	4,7%	0,1%	4,49
Galicia	3.456	2,10	8,52	10,63	14,2%	0,5%	3,08
La Rioja	112	0,02	0,21	0,23	0,3%	0,1%	2,05
Madrid Region	243	0,01	0,25	0,26	0,3%	0,1%	1,05
Region of Murcia	124	0,19	0,15	0,35	0,5%	0,1%	2,79
Navarre	620	0,34	0,84	1,18	1,6%	0,2%	1,90
Basque Country	113	0,26	0,37	0,63	0,8%	0,1%	5,59
<b>Total</b>	<b>13.006</b>	<b>19,67</b>	<b>55,32</b>	<b>74,99</b>	<b>100,0%</b>	<b>0,3%</b>	<b>5,77</b>

Fuente: Incendios Forestales en España 2010 (MARM). Elaboración propia.

Average total forest area affected during the 1990-2010 period fell in the **Basque Country** (-5,91 thousand ha/year), **Galicia** (-52,09 thousand ha/year) and the **Valencia Region** (-17,37 thousand ha/year), with a reduction of over 80%. By contrast, **Aragon** recorded a significant increase in the area affected by fire (4.95 thousand ha/year; variation of 176.5%). The **Canary Islands** and **Cantabria** also showed increases in forest area affected, with 0.4 thousand ha/year and 1.13 thousand ha/year respectively.

Region	Annual average forest area affected by fires*				Annual rate of change period 1990-2010	
	1990 (1988-1992)	2000 (1998-2002)	2005 (2003-2007)	2010 (2008-2010)	(Thousand ha/year)	(%)
Andalusia	28,09	7,05	17,85	5,98	-22,11	-78,7%
Aragon	2,81	1,98	1,77	7,76	4,95	176,5%
Principality of Asturias	11,62	12,10	6,42	8,36	-3,26	-28,1%
Balearic Islands	1,13	0,63	0,20	0,25	-0,88	-77,6%
Canary Islands	1,01	1,76	8,05	1,41	0,40	39,5%
Cantabria	6,35	4,24	3,39	7,48	1,13	17,8%
Castille-La Mancha	7,05	6,14	9,19	3,60	-3,45	-49,0%
Castille and Leon	44,03	34,13	24,10	18,67	-25,36	-57,6%
Catalonia	2,57	7,14	4,29	1,55	-1,02	-39,6%
Valencia Region	20,47	4,17	3,88	3,10	-17,37	-84,8%
Extremadura	19,84	7,57	18,09	3,56	-16,28	-82,1%
Galicia	62,72	30,01	42,47	10,63	-52,09	-83,1%
La Rioja	0,55	0,21	0,09	0,23	-0,32	-58,3%
Madrid Region	1,29	1,45	1,44	0,26	-1,04	-80,3%
Region of Murcia	0,65	0,11	0,21	0,35	-0,30	-46,7%
Navarre	1,84	1,09	0,68	1,18	-0,66	-36,0%
Basque Country	6,54	1,11	0,38	0,63	-5,91	-90,4%
<b>Total</b>	<b>218,58</b>	<b>120,89</b>	<b>142,51</b>	<b>74,99</b>	<b>-143,59</b>	<b>-65,7%</b>

## Forest Damage (2/2): Other forest damage

Forest an other wooded land damaged area classified according to primary agents (abiotic, biotic and of anthropic origin) and to types of forest

### Introduction

Forests may be damaged by biotic, abiotic and human agents. Biotic and abiotic agents are usually (with the exception of invasive alien species) natural components of the ecological processes of these ecosystems. Their uncontrolled development may cause considerable damage in forest masses, threatening sustainable forest management.

Pests and diseases, wildlife and livestock, water deficits, snow and wind storms and fires, together with atmospheric pollution, are some of these factors, to which certain human behaviour may often be added.

Forest damage is evaluated through the classification of the cause of the damage identified in the sampling points belonging to Level I and II of the European Monitoring Network and in accordance with a specific identifying scale established by ICP Forest.

### Current Situation

The most frequent causes of damage detected during the most recent three-year period 2008-2010 were attributable to **insects** (30,9%), **abiotic agents** (30.20%) and to a lesser extent, **fungi** (13.8%).

Insects include the action of **defoliators** like *Thaumetopoea pityocampa*, *Gotniperus scutellatus*, *Rhynchaenus fagi*, *Diprion pini* and

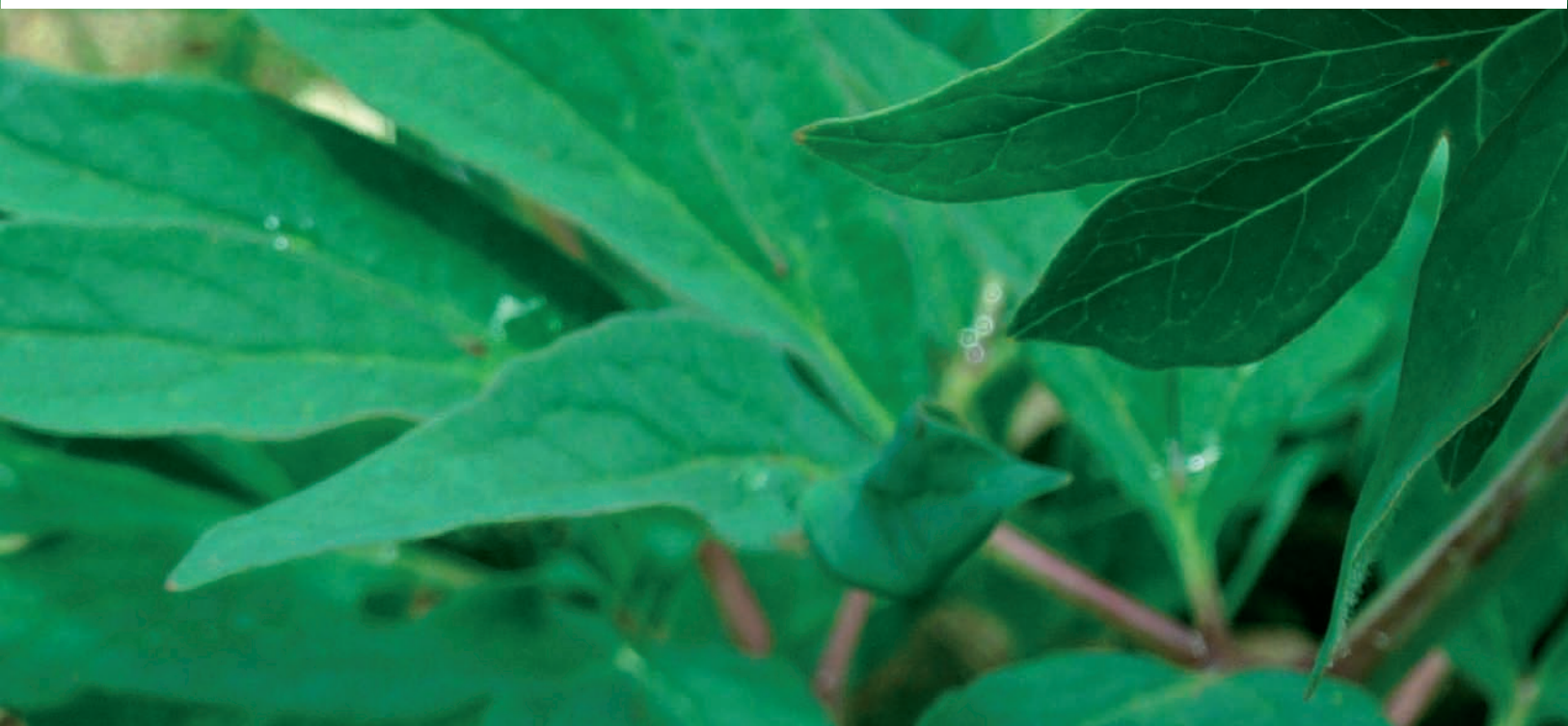
*Lymantria dispar*, together with **perforators**, mainly bark beetles, and long-horned beetles like *Coroebus florentinus* and *Cerambyx* sp., among others.

**Drought** is the principal abiotic agent identified, while **fungi** include needles (*Thyriopsis halepensis* y *Mycosphaerella pini*), those which rot (*Verticillium dahliae* y *Fomes* sp.) and those referred to as rust (*Sirococcus conigenus* and *Diplodia mutila*).

**Chancre** and **ink disease** of the chestnut, **oak branch dieback** of the holm oak, **Dutch elm disease**, and **mistletoe infestations** on pines and junipers are other agents which cause damage to forest ecosystems.

Causes of damage d trees (Defoliation > 25%)	2008-2010 three-year period (%)
T1. Hunting and grazing	0,3
T2. Insects	26,5
T3. Fungi	9,9
T4. Abiotic	34,0
T5. Human behaviour	6,3
T6. Fire	3,2
T8. Others	0,0
T9. Unidentified	8,3

Source: EU-CE Inventory of Forest Damage in Spain 2010 (MARM). Compiled by authors.









## **Criterion 3**

### **Maintenance and Improvement of the productive function of forests**

# Increment and felling of wood and firewood

Balance between net annual increment and annual felling of wood in forests available for wood supply

## Introduction

A basic rule of the forest science is never to extract from forest more than what is grown: this will guarantee that the forest will always grow and never diminish.

The balance between the annual net increment of forest masses and the extraction of wood and firewood undertaken in them is a **quantitative indicator of the sustainability** of production. It also expresses the degree of the sector's current development and the future potential of production in our forests.

## Current Situation

Net annual increment of Spanish forests is **46.56 million cubic metres** with bark. In the past five years in which figures are available (2005-2009), average annual felling of wood and firewood was **17.19 million cubic metres** over bark.

As a result, the extraction rate in our woodland (balance between felling and increment) was **36%**.

	Million m3	m3/ha
Net Annual Increment	46,56	2,55
Annual Fellings of Wood and Firewood	17,19	0,94
Extraction rate	37%	

Source: NFI 3 (2010), MFE (2010)

This figure highlights the capacity of the Spanish forests to increase felling of wood and firewood under sustainable management criteria.

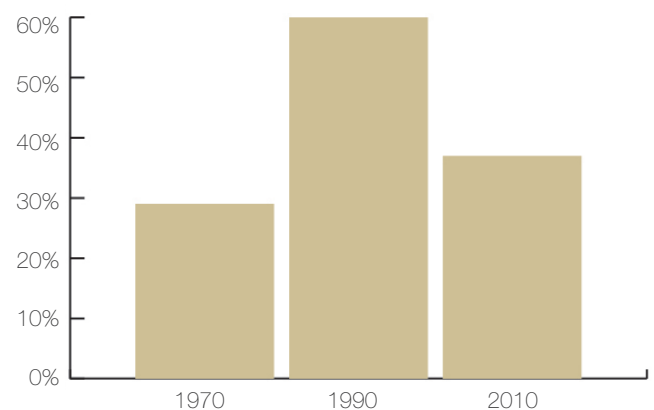
## Evolution

Taking into account the increment figures from the three National Forest Inventories and the annual average production of wood and firewood for the dates these inventories were conducted, we can obtain the evolution of the extraction rate between 1970 and the present.

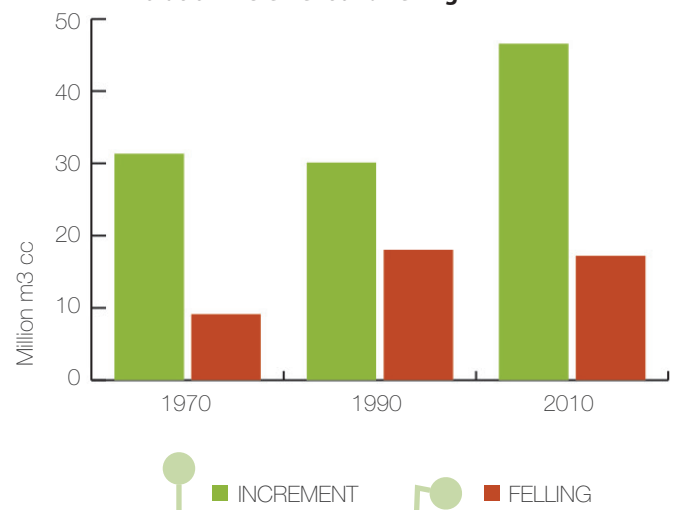
	1970	1990	2010
Net annual increment Million m3	31,34	30,09	46,56
Annual felling of Wood and Firewood Million m3	9,12	18,04	17,19
Extraction rate %	29%	60%	37%

Source: INF1 (1970), NFI2 (1990), NFI 3 (2010), Forest Statistical Yearbook (2005-2009), ICONA Reports (1972), Agrarian Statistical Yearbook (1990-1994)

### Evolution Extraction Rate



### Evolution Increment and Felling

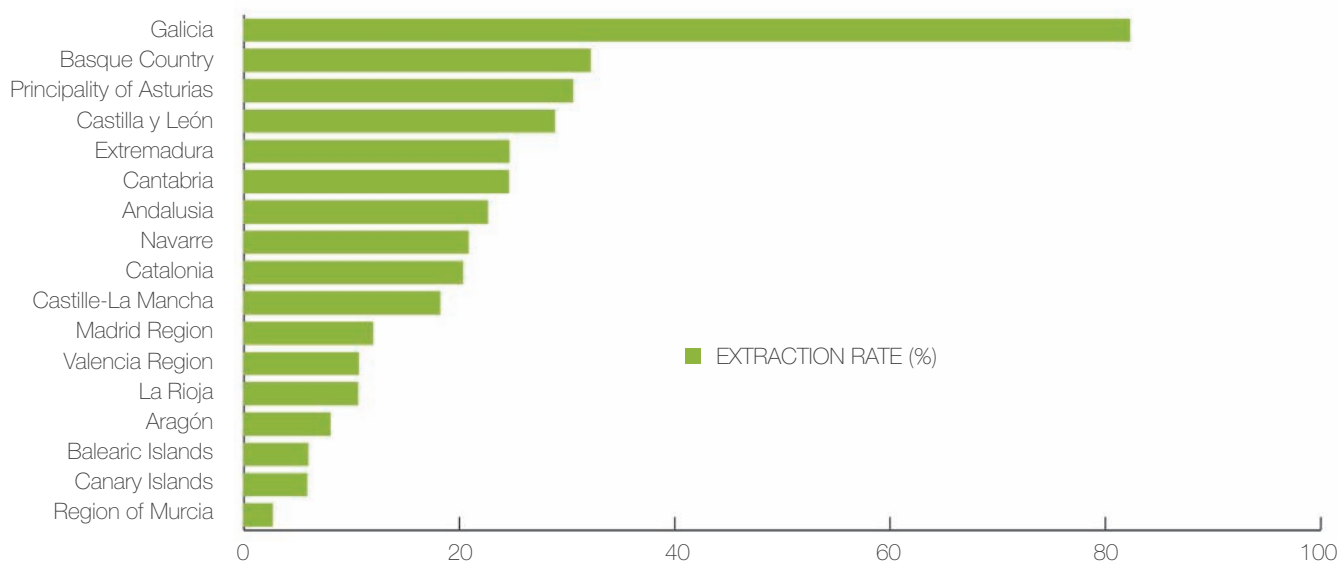


## Autonomous Regions

**Galicia** shows figures which differ clearly from the rest: its extraction rate is 79.2% and it contributes 53% of the total felling in Spain. In fact, if these figures were ignored, the Spanish extraction rate would drop to 17%.

Region	Forest area (Thousand ha)	Growing Stock (Million m3)	Net annual increment (Thousand m3)	Annual felling (Thousand m3)	% Cortas Total	Extraction rate (%)	Net increment per forest hectare	Felling per forest hectare
Andalusia	2.923	74,97	3.075	695	4,0%	22,59	1,1	0,26
Aragon	1.543	74,34	2.760	220	1,3%	7,97	1,8	0,14
Canary Islands	132	13,54	383	22	0,1%	5,82	2,9	0,17
Cantabria	214	25,21	2.477	608	3,5%	24,55	11,6	2,84
Castille- La Mancha	2.708	83,73	3.374	613	3,6%	18,16	1,2	0,22
Castille and Leon	2.945	153,77	7.204	2.077	12,1%	28,83	2,4	0,70
Catalonia	1.606	118,16	3.968	804	4,7%	20,29	2,5	0,49
Madrid Region	258	10,90	394	47	0,3%	11,92	1,5	0,17
Navarre	447	54,65	1.795	373	2,2%	20,79	4,0	0,81
Valencia Region	748	20,07	756	80	0,5%	10,60	1,0	0,11
Extremadura	1.898	33,26	1.223	301	1,7%	24,59	0,6	0,16
<b>Galicia</b>	<b>1.371</b>	<b>133,09</b>	<b>11.022</b>	<b>9.063</b>	<b>52,7%</b>	<b>82,23</b>	<b>8,0</b>	<b>6,45</b>
Balearic Islands	173	7,53	173	10	0,1%	5,91	1,0	0,05
La Rioja	166	15,52	728	77	0,4%	10,53	4,4	0,45
Basque Country	397	54,82	3.831	1.232	7,2%	32,15	9,6	3,10
Principality of Asturias	442	47,30	3.156	963	5,6%	30,51	7,1	2,14
Region of Murcia	302	6,92	240	6	0%	2,61	0,8	-
<b>Total Spain</b>	<b>18.273</b>	<b>928</b>	<b>46.559</b>	<b>17.191</b>	<b>100%</b>	<b>36,93</b>	<b>2,5</b>	<b>0,94</b>

Source: NFI 3 (2010), MFE (2010), Forest Statistical Yearbook (2005-2009). Annual felling considered according to Autonomous Region from the figures from the National Wood Balance and from exploitation licences.



# Production of wood and firewood

Value and quantity of wood and firewood production

## Introduction

The production of wood and firewood is the forestry sector's main commercial activity.

This generates income for the public and private owners of woodland, provides work in the rural environment, and is an indicator of the total contribution of forests to national economies.

## Current Situation

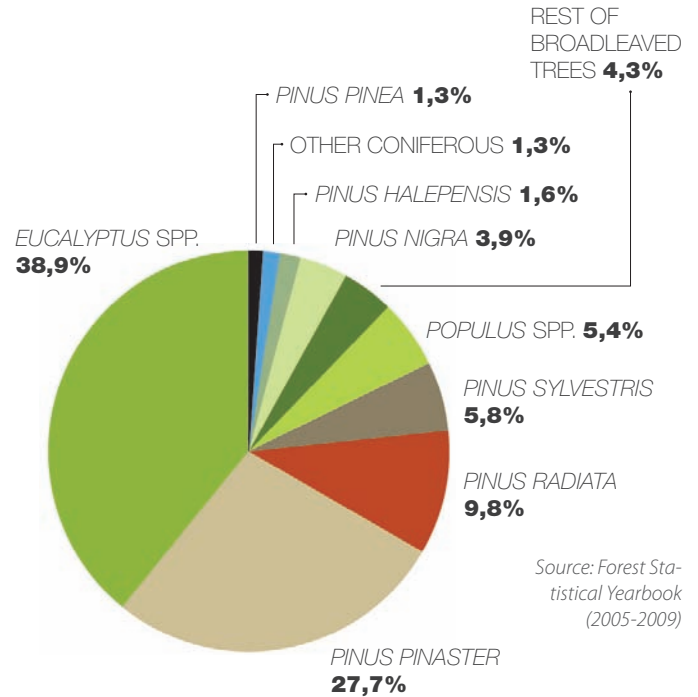
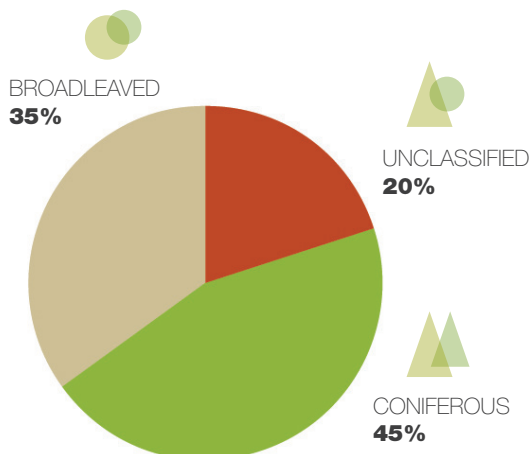
Average annual production of wood and firewood according to the figures of the past five years available (2005-2009) was 17.19 million cubic metres with bark – **14.45 million cubic metres** without bark – at a total commercial value of 782.24 million euros.

	Million m3 with bark	Million €
Wood production	15,63	757,44
Firewood production	1,59	24,85
Total	17,19	782,24

Source: Forest Statistical Yearbook (2005-2009)

45% of average production corresponded to felling of coniferous trees, 35% of broadleaved with 20% being unclassified mixes of species.

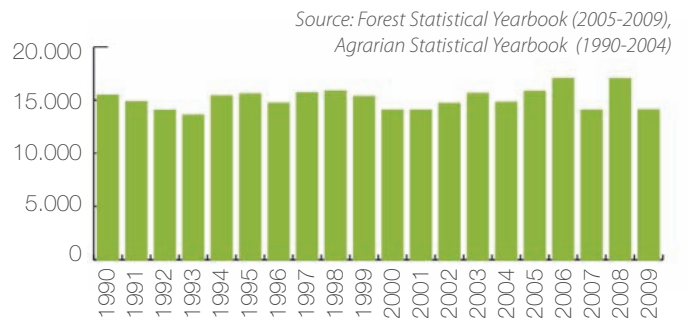
The principal **species** for wood production are Eucalyptus, Maritime Pine, Monterrey Pine, Scots Pine and Poplar, all with annual production close to or exceeding half a million cubic metres.



Source: Forest Statistical Yearbook (2005-2009)

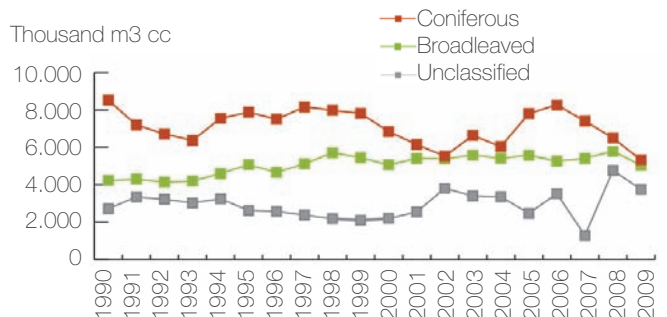
## Evolution

During the period 1990-2009 overall data showed a trend toward slight growth. Fluctuation was clearly linked to economic growth and to demand from the building industry. The decreasing cycles marked by massive felling in the Aquitaine-Les Landes Region (1999-2002 y 2007-2009) should be noted

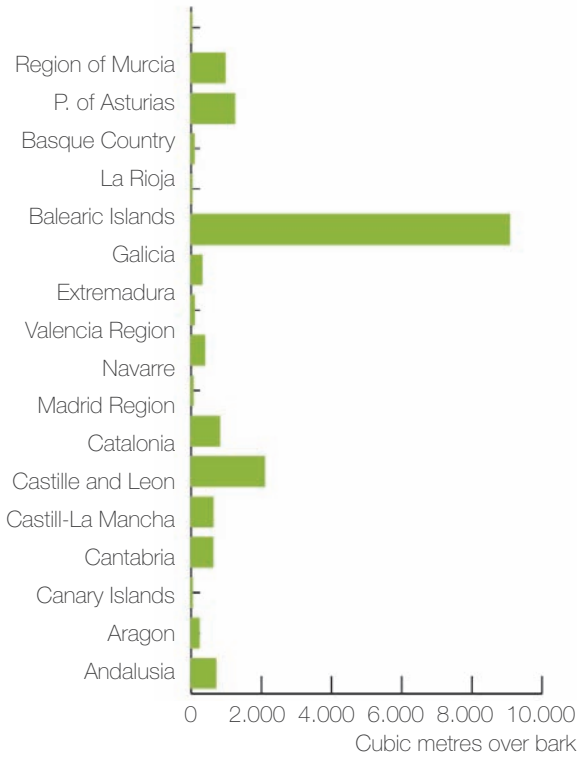


Source: Forest Statistical Yearbook (2005-2009), Agrarian Statistical Yearbook (1990-2004)

The growth trend in broadleaved trees continued practically constant over the whole of the 1990-2009 period. Production from coniferous trees showed greater fluctuation.

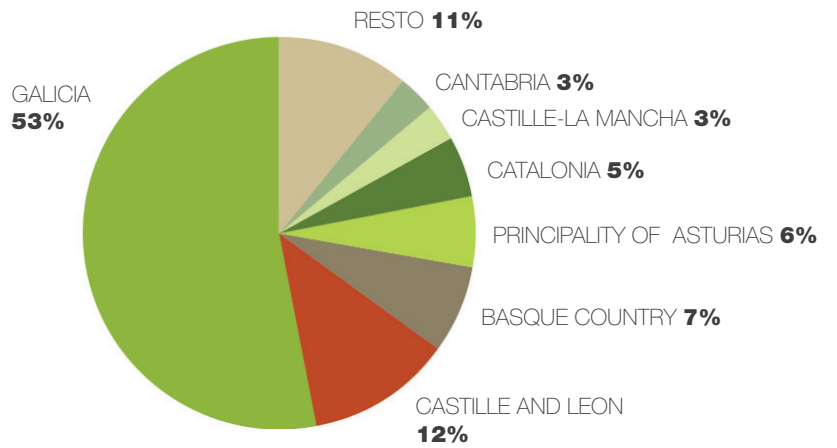


Source: Forest Statistical Yearbook (2005-2009), Agrarian Statistical Yearbook (1990-2004)

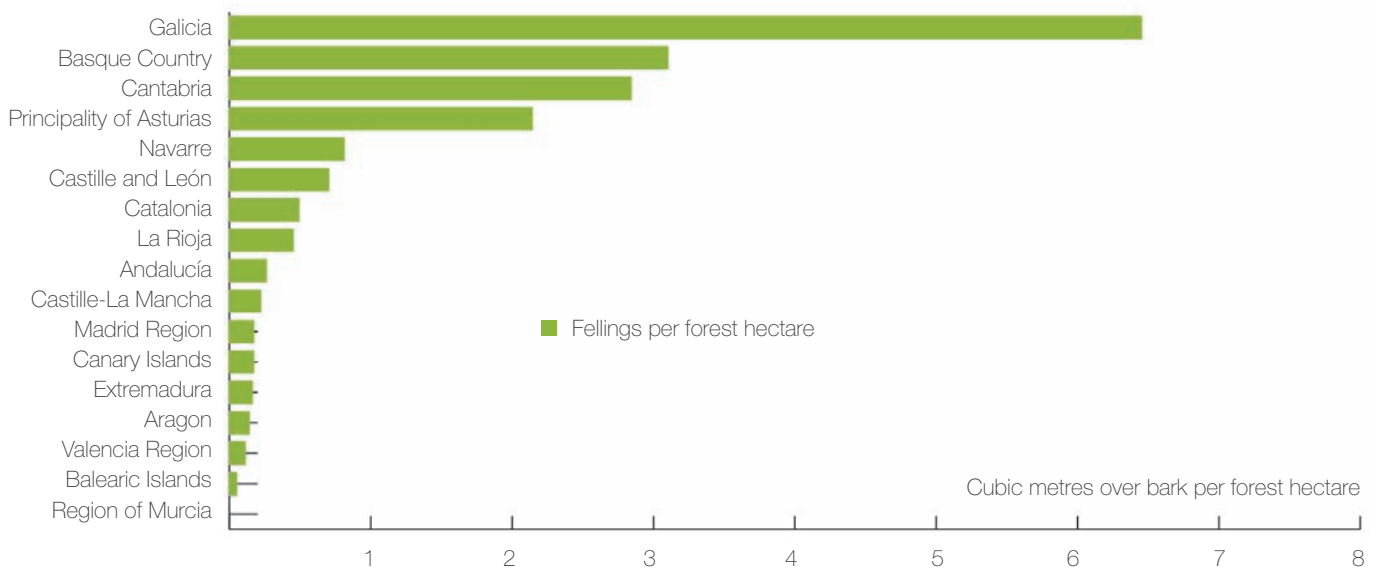


### Autonomous Regions

Nearly 70% of felling is found in the **Cantabrian area (Galicia, Asturias, Cantabria and the Basque Country)**. **Galicia** contributes 53% of total felling in Spain, followed by **Castille and Leon** with 12.1%.



Source: NFI 3 (2010), MFE (2010), Forest Statistical Yearbook (2005-2009). Annual felling considered according to Autonomous Region from the figures from the National Wood Balance and from exploitation licences.



# Non-wood products

Value and quantity of non-wood goods production

## Introduction

The pronounced diversity of Spain's forests has traditionally enabled a great variety of products to be exploited: some have fallen into disuse (esparto, pitch, pine needles, etc.) while others are still current (cork, chestnut, pine kernels). Interest in the exploitation of some products has even increased substantially (mushrooms).

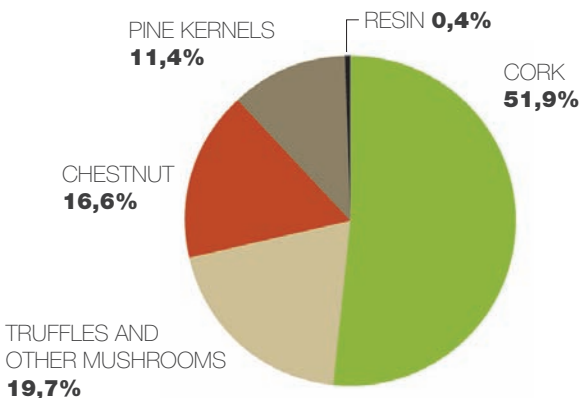
It is hard to provide statistical data for much of this type of product: it does not usually require an administrative licence for its collection and it is not easy to monitor its removal, above all on private land. Furthermore, it is often consumed by their collectors or forms part of non-commercial transactions.

## Current Situation

Non-wood forest products generate an annual average value close to 220 million euros.

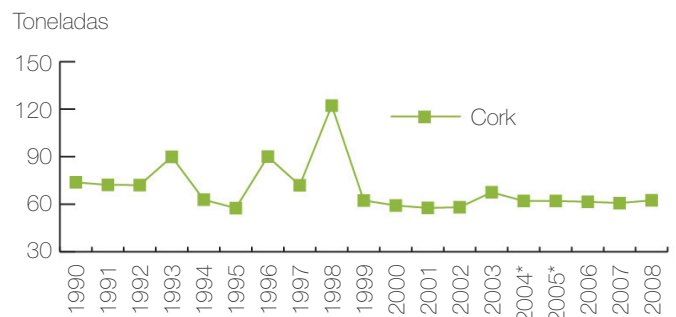
Type of product	Unit	Amount	Value (Thousand euros)
Cork	Tm	61.504	110.828
Truffles and other mushrooms	Kg	3.740.739	42.173
Chestnut	Tm	59.086	35.451
Pine kernels	Tm	11.345	24.333
Resin	Tm	1.705	903
Aromatic and medicina l plants	Tm	1.806	44
Esparto	Tm	902	4
Resto de Other vegetable products	-	-	5.327
<b>Total</b>			<b>219.066</b>

Source: Forest Statistical Yearbook (2005-2008)



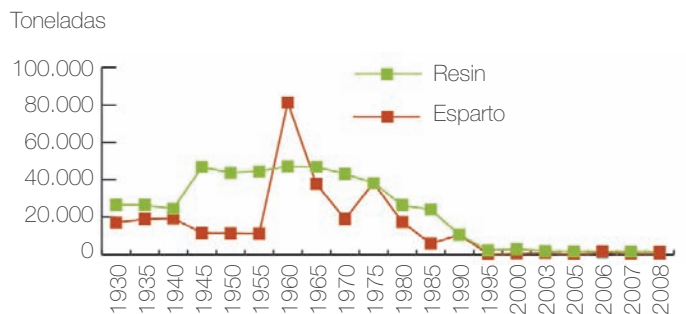
## Evolution

Spain is the world's second biggest cork producer and in area devoted to natural cork trees. (Portugal is the biggest.) Annual average production has settled around 60,000 tonnes although it fluctuates due to natural variations in production and the appearance on the market of imitations (plastic and screw caps).



Source: Forest Statistical Yearbook (2005-2009), Agrarian Statistical Yearbook (1990-2004). \*Estimates

**Resin** exploitation has had high importance in a large part of the pine forests of Castille and Leon and Castille-La Mancha. Its maximum production was reached in 1965 (47,156 tonnes), of which 50% was exported. From then on, the loss in competitiveness on the international market due to a failure to modernise together with an increase in labour costs marked the beginning of its decline, with Spain turning from an exporting country into a clear importer. Over recent years, there has been a reactivation of the sector due to the supply difficulties in the international market. Currently, Castille and Leon enjoys 100% of national production.



Source: Forest Statistical Yearbook (2005-2009), Agrarian Statistical Yearbook (1990-2004)

**Esparto** production was important until 1980 and has now practically disappeared these days with the exception of residual production in Andalusia





## Services

Value of marketed services on forest and other wooded land

### Introduction

Forests and other wooded land provide numerous services beneficial to the public, some of them generating economic value.

Grazing, hunting and fishing are traditional activities of great importance in forests, together with apiculture which provides honey, pollen, jelly and wax. Other activities which generate income are occupation licences for the development of infrastructures (wind farms, electricity lines or telecommunications antennae) or other productive activities (aggregate extraction, quarries, etc.).

### Current Situation: Hunting and Fishing

Each year almost a million hunting and over 700,000 fishing licences are issued, at a value of nearly 31 million euros.

Type of licence	Amount	Value * (euros)
Hunting	998.777	21.497.569
Fishing	726.360	9.432.705
<b>Total</b>		<b>30.930.274</b>

Source: Forest Statistical Yearbook (average 2005-2009)

\*Figure corresponds to 2009

The annual economic value of big and small game catches is 112.7 million euros.

Catches	Unit	Amount	Value (Thousand euros)
Small game	Unit	14.573.370	69.976
Big game	Unit	263.088	42.726
<b>Total</b>			<b>112.702</b>

Source: Forest Statistical Yearbook (2005-2009)

These sums should be combined with the income received by public and private forest owners through the leasing of land for hunting. 76% of the area in Spain may be used for hunting.

Wild boar is the big game species with the greatest number of catches (49.9%), followed by deer and roe deer. Small game is dominated by the catches of rabbit (mammals) and thrush, partridge, pigeon and quail (birds).

Big game (mammals)	No. catches	%
Wild boar	136.356	49,69%
Deer	93.152	33,94%
Roe deer	20.858	7,60%
Buck	9.662	3,52%
Mouflon	6.278	2,29%
Other	5.327	1,94%
Mountain goat	1.632	0,59%
Chamois	602	0,22%
Barbary sheep	532	0,19%
Wolf	39	0,01%
<b>Total big game</b>	<b>274.438</b>	<b>100,00%</b>

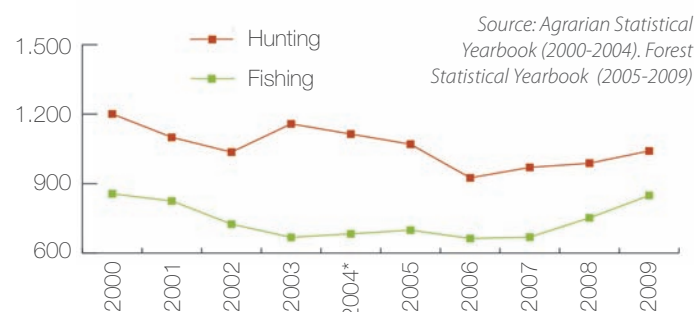
Small game (mammals)	Nº capturas	%
Rabbit	6.327.406	84,25%
Hare	1.064.250	14,17%
Fox	118.377	1,58%
<b>Total small game</b>	<b>7.510.033</b>	<b>100,00%</b>

Wild bird hunting	No. catches	%
Thrush	4.176.583	35,14%
Partridge	3.360.157	28,27%
Pigeon	1.648.245	13,87%
Quail	987.117	8,31%
Turtledove	705.068	5,93%
Corvids	344.552	2,90%
Other	214.658	1,81%
Starlings	199.772	1,68%
Aquatic and anatidae	115.148	0,97%
Pheasant	76.028	0,64%
Woodcock	48.233	0,41%
Lapwing	9.286	0,08%
<b>Total wild birds</b>	<b>11.884.847</b>	<b>100,00%</b>

Source: Forest Statistical Yearbook (2009)

### Evolution: Hunting and Fishing

During the 2000-2009 period, the number of hunting and fishing licences showed moderate fluctuations with a slowly increasing trend from 2006.



## Autonomous Regions: Hunting and Fishing

**Castille and Leon**, which has almost 9 million hectares, is the Autonomous Region with the largest area for hunting use, followed by **Andalusia** and **Castille-La Mancha**. In terms of the number of hunting licences, **Andalusia** is a clear leader with over 40% of licences. Castille and Leon is the Autonomous Region with the greatest number of fluvial fishing licences.

Region	Hunting				Fluvial fishing	
	No. licences	% Total National Licences	Area for Hunting Use (Ha)	No. licences per 1,000 Ha for hunting use	No. licences	% Total National Licences
Andalusia	<b>408.278</b>	<b>40,9</b>	7.034.315	<b>77,15</b>	39.450	4,7
Aragon	33.913	3,4	4.436.988	12,03	71.896	8,6
Canary Islands	17.522	1,8	180.597	<b>152,73</b>	10.110	1,2
Cantabria	6.765	0,7	485.528	21,93	10.559	1,2
Castille -La Mancha	114.059	11,4	4.520.405	39,72	114.136	13,6
Castille and Leon	86.009	8,6	<b>8.743.038</b>	26,92	<b>183.359</b>	22,0
Catalonia	50.879	5,1	2.949.101	27,16	60.523	7,2
Madrid Region	24.315	2,4	568.663	67,31	28.984	3,4
Navarre	16.234	1,6	Sin datos	Sin datos	24.065	2,8
Extremadura	105.865	10,6	3.615.245	46,1	135.000	16,2
Galicia	17.794	1,8	1.354.253	20,68	90.438	10,8
Balearic Islands	16.543	1,7	371.940	<b>70,02</b>	1.217	0,1
La Rioja	8.866	0,9	503.388	27,73	9.430	1,1
Basque Country	12.569	1,3	364.668	54,26	5.433	0,6
Principality of Asturias	13.872	1,4	948.747	23,02	19.652	2,3
Region of Murcia	9.687	1,0	744.984	20,47	4.247	0,5
Valencia Region	55.606	5,6	1.862.000	47,01	25.015	3,0
<b>Total</b>	<b>998.777</b>	<b>100</b>	<b>38.683.860</b>	<b>40,64</b>	<b>833.514</b>	<b>100</b>

Source: Forestal Statistical Yearbook (2005-2009)

## Extensive livestock farming

Grazing on forest and other wooded land is the main base for extensive livestock farming and explains Spain's natural landscape to a great degree. However, the percentage of extensive livestock population has fallen to 27% of the total existing livestock population in Spain.

In 2000, the total extensive livestock population was estimated at 5.23 million LU, of which approximately 2.27 million accounted for extensive livestock on forest and other wooded land environment according to the following distribution:

Type of ground	Area (Thousand ha)	Load (Live weight kg /ha)	Total live weight (Tm)	Total Livestock units (LU)
Natural meadows	1.095,2	138	151.137,6	629.740
Pasture	5.203,9	25	130.097,5	542.073
Rough grazing	4.028,2	10	40.282,0	167.842
Esparto fields	384,9	10	3.849,0	16.038
Open woodland	4.130,3	23	94.996,9	395.820
Firewood-yielding woodland	5.041,9	16	80.670,4	336.127
Timber-yielding woodland	7.240,9	6	43.445,4	181.023
<b>Total forest area</b>	<b>27.125,3</b>	<b>20,07</b>	<b>544.478,8</b>	<b>2.268.662</b>
Dry forage land	876,0	203	177.828,0	740.950
Stubble fields	6.816,1	22	149.954,2	624.809
Fallow areas	3.860,5	14	54.047,0	225.196
Irrigated forage crops	309,5	1.069	330.855,5	1.378.565
<b>Total cultivation</b>	<b>11.862,1</b>		<b>712.684,7</b>	<b>2.969.520</b>
<b>Total grazing</b>	<b>38.987,4</b>		<b>1.257.163,5</b>	<b>5.238.181</b>

Source: San Miguel, A. (2001)

In 2008, the extensive livestock population was estimated at 4.63 million UGM (23% of the total livestock population) of which 2.01 million LU corresponded to extensive livestock in forests.

## Forests under management plans

Proportion of forests and other wooded land under a management plan or equivalent

### Introduction

**Forest management plans**, such as zone management and forest resources regulation plans, work schemes, their respective updates and other equivalent plans etc, enable objectives and goals for a forest to be set, establishing the most appropriate management techniques for achieving and programming the necessary action to do so; these forest management plans are a basic tool for ensuring the sustainability of the management of forest and other wooded land, and as such have been recognised by the national Law 43/2003, of 21 November, on Forest and other wooded land. This law provides, as a general rule, the need to have in place forest management plans for all public and private Spanish forest and other wooded land, except in those cases when the forest area falls below the minimum threshold set up by each Autonomous Region.

**Forest certification**, a process by which a third party checks that forest management complies with particular requirements and obligations, is another issue related to forest planning, given that a valid forest management plan is an essential condition to obtain forest certification.

### Current Situation

The area subject to a current management plan in 2009 was 2.9 million hectares, which accounted for 10.5% of total forest area (forest and other wooded land) and 15.9% of forest land with tree cover.

The majority of forest and other wooded land under management plans were **publicly-owned (2 million ha)**, accounting for **25.7%** of public forest area. **Privately-owned** area with a valid management plan was **933.1 mil ha**, accounting for **4.7%** of private forest land.

#### Forest area subject to valid Management Plan (2009)

Public	Thousand ha	1.996,1
Private	Thousand ha	933,1
Total	Thousand ha	2.899,2
% Forest area	%	15,9
% Total area	%	10,5
% Public forest area	%	25,7
% Private forest area	%	4,7

Source: Advance of the Forest Statistical Yearbook 2009 (MARM)

With regard to forest certification, two systems are implemented: **PEFC**, with a certified area of **1,145.2 Mil ha** and **FSC**, with **126.8 Mil ha**.

#### Certified forest area (2010)

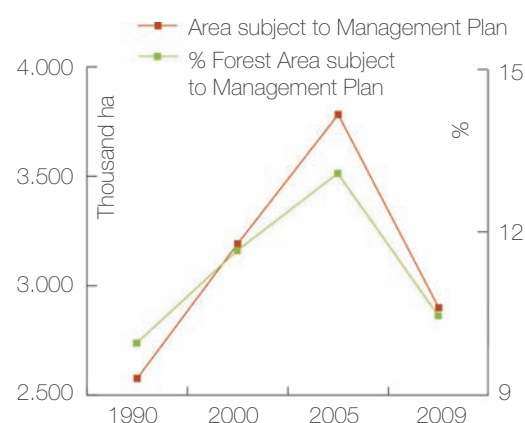
FSC	Thousand ha	140,2
PEFC	Thousand ha	1.289,5

Source: FSC, 2011; PEFC, 2011

Note that a part of the forest area with certified forest management is accredited for both certification systems.

### Evolution

Between 1990 and 2009, the net forest and other wooded land area under a management plan grew by **12.5%** (322.5 thousand ha). Note that the corresponding figure for 2009 only referred to current management plans, unlike figures from previous years.



Source: State of Europe's Forests 2011 (Forest Europe). Forest Statistical Yearbook 2005 (MARM); Advance Forest Statistical Yearbook 2009 (MARM). Compiled by authors.

The certified area in Spain has increased notably in recent years, given that certification systems were implemented in Spain subsequent to 2000.

Year	FSC certified forest area (Thousand ha)	PEFC certified forest area (Thousand ha)
1990	0,0	0,0
2000	0,0	0,0
2005	117,5	384,4
2010	126,8	1.145,2

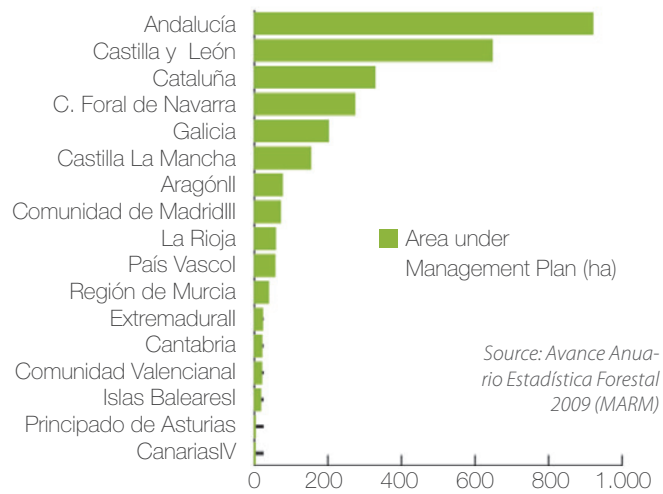
Source: FSC, 2011; PEFC, 2011

## Autonomous Regions

The Autonomous Region with the greatest area under a current management plan is **Andalusia**, with 919.85 thousand hectares, followed by **Castile and Leon** (645.97 thousand ha) and **Catalonia** (327.02 thousand ha).

At **46%**, **Navarre** has the largest forest area hosting a current management plan. It is followed well behind by **Andalusia, La Rioja** and **Catalonia**, which do not exceed 21%.

In all Autonomous Regions, forest planning is concentrated on public woodland with the exception of **Murcia**, where there is a greater balance between forest-planned public and private area.



Region	Area under a Forest Management Plan 2009			Relative Public Forest Area (%)	Relative Private Forest Area (%)	Relative Forest Area (%)	Relative Forest Area (%)
	Public	Private	Total				
	Thousand ha						
Andalusia	422,29	497,56	919,85	36,1	15,4	20,6	31,5
Aragon	79,51	n.d.	75,51	7,6	n.d.	2,9	4,9
Principality of Asturias	1,77	n.d.	1,77	0,5	n.d.	0,2	0,4
Balearic Islands	9,25	7,46	16,71	81,1	3,5	7,7	9,6
Canary Islands	1,00	0,65	1,65	0,9	0,1	0,3	1,2
Cantabria	19,73	n.d.	19,73	7,7	0,0	5,4	9,2
Castille-La Mancha	88,63	63,75	152,38	10,8	2,3	4,2	5,6
Castille and Leon	569,41	76,56	645,97	33,2	2,5	13,4	21,9
Catalonia	297,01	30,01	327,02	66,7	2,0	16,9	20,4
Valencia Region	19,60	n.d.	19,60	4,9	0,0	1,5	2,6
Extremadura	21,72	n.d.	21,72	11,8	0,0	0,8	1,1
Galicia	15,36	185,61	200,97	33,9	9,3	9,9	14,7
La Rioja	56,53	0,33	56,86	28,3	0,3	18,9	34,3
Madrid Region	41,92	28,11	70,04	38,6	9,0	16,6	27,1
Region of Murcia	12,80	24,93	37,73	8,9	7,3	7,7	12,5
Navarre	266,00	6,69	272,69	62,3	4,2	46,5	61,0
Basque Country	43,56	11,44	55,00	19,2	4,3	11,1	13,8
<b>Total</b>	<b>1.966,10</b>	<b>933,10</b>	<b>2.899,19</b>	<b>25,7</b>	<b>4,7</b>	<b>10,5</b>	<b>15,9</b>

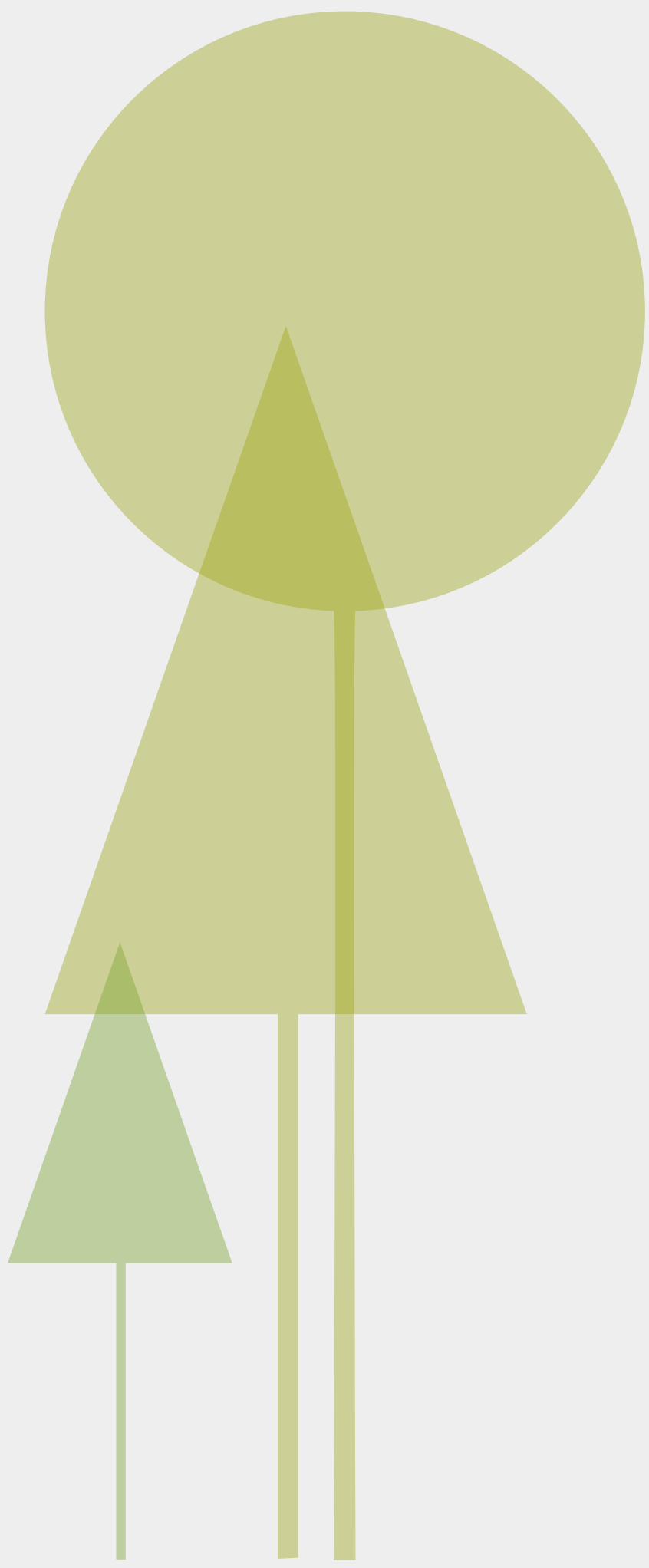
Source: Advance Forest Statistical Yearbook 2009 (MARM)

I Data 2005; II Data 2007; III Data 2008; IV Only the Las Palmas Province of Gran Canaria

The implementation process of forest certification over the past five years has proved uneven in the different Autonomous Regions. The Region with the greatest certified area is **Castile and León** (>498.19 thousand ha), followed by **Navarre** (>163.65 thousand ha). **Navarre**, followed by **La Rioja**, is also the Autonomous Region with the highest proportion of certified area in relation to forest with tree cover area (36.6% and 28.9%, respectively).

Region	Area subject to forest certification				Relative to forest area 2009		Period 2005-2010	
	2005		2009		FSC	PEFC	FSC	PEFC
	FSC	PEFC	FSC	PEFC	FSC	PEFC	FSC	PEFC
	Thousand ha		Thousand ha		%		Mil ha	
Andalusia	80,94	85,56	77,91	155,43	2,7	5,3	-3,03	69,88
Aragon	0,00	0,08	0,33	0,08	0,0	0,0	0,33	0,00
Principality of Asturias	0,00	2,33	0,00	6,57	0,0	1,5	0,00	4,24
Balearic Islands	0,00	0,00	0,00	0,00	0,0	0,0	0,00	0,00
Canary Islands	0,00	0,00	1,64	0,00	1,2	0,0	1,64	0,00
Cantabria	0,00	4,31	0,00	22,56	0,0	10,6	0,00	18,24
Castille-La Mancha	0,00	0,00	0,00	0,00	0,0	0,0	0,00	0,00
Castille and Leon	10,65	111,22	10,65	498,19	0,4	16,9	0,00	386,97
Catalonia	0,15	18,00	11,29	79,30	0,7	4,9	11,14	61,30
Valencia Region	0,00	1,22	1,08	1,22	0,1	0,2	1,08	0,00
Extremadura	0,00	0,00	0,27	0,00	0,0	0,0	0,27	0,00
Galicia	12,20	119,68	0,00	97,02	0,0	7,1	-12,20	-22,66
La Rioja	0,00	0,38	0,00	47,86	0,0	28,9	0,00	47,48
Madrid Region	0,00	0,00	0,00	0,00	0,0	0,0	0,00	0,00
Region of Murcia	0,00	0,00	10,07	10,07	3,3	3,3	10,07	10,07
Navarre	13,58	13,61	13,58	163,65	3,0	36,6	0,00	150,04
Basque Country	0,00	27,99	0,00	63,30	0,0	15,9	0,00	35,30
<b>Total</b>	<b>117,53</b>	<b>384,36</b>	<b>126,82</b>	<b>1.145,23</b>	<b>0,7</b>	<b>6,3</b>	<b>9,29</b>	<b>760,87</b>

Source: Forest Statistical Yearbook 2005 (MARM); Advance Forest Statistical Yearbook 2009 (MARM). Compiled by authors.



## **Criterion 4**

**Maintenance, conservation and improvement of biodiversity in forest ecosystems**

## Forest types and species composition

Forest area classified according to the number of concurrent tree species and type of forest stand

### Introduction

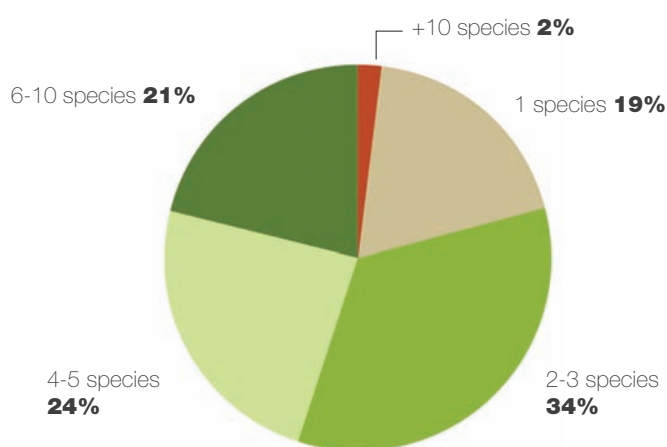
The wide typology of Spanish forests reflect their variety of climatic and topographic conditions. Thus, one can find forests typically Mediterranean, Atlantic or Alpine. Moreover, land use and management has resulted into valuable and idiosyncratic formations, such as the Spanish "dehesa".

### Current Situation

19 per cent of the forest area is composed of one single tree specie. Multi-specific stands (composed of two or more tree species) are the clear majority (81%).

No. species	Area (ha)	%
1 species	3.420.954	19%
2-3 species	6.120.322	33%
4-5 species	4.418.049	24%
6-10 species	3.923.874	21%
+10 species	390.018	2%
<b>TOTAL</b>	<b>18.273.218</b>	<b>100%</b>

Source: NFI 3 (2010). The calculation is based on the number of species present in NFI3 plots and by adding up the area corresponding to each plot in accordance with the allocation of strata.



The table below shows the different forest types according to the dominant species.

Tipo de bosque	Superficie (miles ha)	%
<b>Forests dominated by one conifer</b>	<b>6.288.369</b>	<b>34,5</b>
Aleppo pine ( <i>Pinus halepensis</i> )	2.080.679	11,43
Albar pine ( <i>Pinus sylvestris</i> )	1.035.548	5,69
Austrian pine ( <i>P.pinaster</i> )	836.440	4,60
European black ( <i>P.nigra</i> )	699.747	3,84
Mix of conifers	663.810	3,65
Stone pine ( <i>Pinus pinea</i> )	401.701	2,21
Juniper groves ( <i>J.thurifera, J.phoenica, J.turbinata</i> )	256.151	1,41
Junipers ( <i>Juniperus</i> spp.)	118.314	0,65
Black pine ( <i>Pinus uncinata</i> )	102.252	0,56
Canary Island pine ( <i>Pinus canariensis</i> )	79.950	0,44
Fir ( <i>A. alba</i> y <i>A. pinsapo</i> )	13.778	0,08
<b>Forests dominated by one broadleaved species</b>	<b>6.766.884</b>	<b>37,2</b>
Holm oak ( <i>Quercus ilex</i> )	2.815.450	15,47
Mix of broadleaved species	1.147.188	6,30
Pyrenean oak ( <i>Quercus pyrenaica</i> )	838.981	4,61
Beech ( <i>Fagus sylvatica</i> )	398.735	2,19
Oak ( <i>Q.faginea, Q.canariensis</i> )	332.386	1,83
Oak groves ( <i>Q. robur, Q. petraea, Q.humilis</i> )	327.340	1,80
Cork-oak ( <i>Quercus suber</i> )	271.675	1,49
Riverside woodlands	225.688	1,24
Chestnut groves ( <i>Castanea sativa</i> )	174.240	0,96
Wild olive groves ( <i>Olea europaea</i> var. <i>sylvestris</i> )	114.202	0,63
Birch groves ( <i>Betula</i> sp.)	28.625	0,16
Strawberry trees ( <i>A.unedo</i> )	27.997	0,15
Evergreen	20.843	0,11
Ash ( <i>Fraxinus</i> sp.)	12.220	0,07
Hazelwood	10.670	0,06
Carob ( <i>C.siliqua</i> )	7.226	0,04
Hollins ( <i>I.aquifolium</i> )	4.481	0,02
Invasive exotic broadleaved species	3.681	0,02
Laurel	3.474	0,02
Palm	1.783	0,01
<b>Mixed forest of conifers and broadleaved species</b>	<b>1.163.514</b>	<b>6,4</b>
<b>Dehesa</b> (Open agroforestry forests)	<b>2.435.364</b>	<b>13,4</b>
<b>Plantations</b>	<b>1.545.049</b>	<b>8,5</b>
Eucalyptus ( <i>Eucalyptus</i> sp)	583.483	3,21
Austrian pine ( <i>P.pinaster</i> )	295.461	1,62
Monterrey pine ( <i>P.radiata</i> )	231.312	1,27
Mixed species	191.953	1,05
Poplar ( <i>Populus</i> sp.)	98.293	0,54
Other broad-leaved	67.857	0,37
Other conifers	40.814	0,22
Mixed conifers and broad-leaved	35.876	0,20
<b>General total</b>	<b>18.273.218</b>	

Source: MFE 50 (2010).

## Autonomous Regions

The table below shows the wooded forest area according to its composition by the number of tree species.

	No. of species (Area –thousand hectares)					Total
	1	2-3	4-5	6-10	+10	
Andalusia	729	1.213	643	366	8	<b>2.959</b>
Aragon	53	358	488	593	71	<b>1.564</b>
Canary Islands	63	40	22	8	0	<b>134</b>
Cantabria	17	71	66	57	3	<b>214</b>
Castille- La Mancha	466	1.023	802	441	8	<b>2.739</b>
Castille and Leon	755	1.393	564	244	10	<b>2.965</b>
Catalonia	10	141	382	912	180	<b>1.626</b>
Madrid Region	76	134	44	15	0	<b>268</b>
Navarre	39	99	108	196	21	<b>463</b>
Valencia Region	12	174	348	217	3	<b>754</b>
Extremadura	1.067	700	122	31	1	<b>1.921</b>
Galicia	81	403	513	396	5	<b>1.398</b>
Balearic Islands	13	88	69	16	-	<b>185</b>
La Rioja	18	56	50	44	1	<b>170</b>
Basque Country	5	34	75	216	60	<b>391</b>
Principality of Asturias	20	75	117	215	23	<b>451</b>
Region of Murcia	44	200	63	9	-	<b>316</b>
Total	3.421	6.120	4.418	3.924	390	<b>18.273</b>

Source: NFI 3 (2010). The calculation is based on the number of species present in NFI3 plots and by adding up the area corresponding to each plot in accordance with the allocation of strata.

	No. of species (% of total area)				
	1	2-3	4-5	6-10	+10
Andalusia	24,6	41,0	21,7	12,4	0,3
Aragon	3,4	22,9	31,2	38,0	4,6
Canary Islands	47,1	29,6	16,8	6,3	0,2
Cantabria	8,0	33,2	30,8	26,7	1,3
Castille- La Mancha	17,0	37,3	29,3	16,1	0,3
Castille and Leon	25,5	47,0	19,0	8,2	0,3
Catalonia	0,6	8,7	23,5	56,1	11,1
Madrid Region	28,2	49,8	16,5	5,4	0,0
Navarre	8,4	21,5	23,3	42,3	4,5
Valencia Region	1,6	23,1	46,1	28,8	0,4
Extremadura	55,6	36,4	6,4	1,6	0,0
Galicia	5,8	28,8	36,7	28,3	0,4
Balearic Islands	6,8	47,6	37,1	8,5	0,0
La Rioja	10,7	33,1	29,7	25,7	0,8
Basque Country	1,2	8,8	19,3	55,4	15,4
Principality of Asturias	4,5	16,7	25,9	47,7	5,2
Region of Murcia	13,8	63,3	20,0	3,0	0,0
Total	<b>18,7</b>	<b>33,5</b>	<b>24,2</b>	<b>21,5</b>	<b>2,1</b>



# Regeneration

Area of regeneration of wooded forest area classified according to type of regeneration.

## Introduction

The regeneration of forest systems, either naturally or through human action, is a fundamental condition for maintaining forest ecosystems in the long term.

While natural regeneration contributes to the conservation of genotype diversity and to the maintaining of the composition of natural species and of ecological structure and dynamic, reforestation is a fundamental tool for quickening the implanting of vegetation in the cases where natural regeneration processes are very slow or not feasible and/or require a rapid establishment of the forest mass. Similarly, reforestation work enables goals for biodiversity conservation to be attained through the introduction and/or replacement of forest species.

The state of tree masses regeneration is evaluated through the variable *annual regenerated area, distinguishing between natural Regeneration, Forestation and Reforestation.*

## Current Situation

Average annual **regeneration** for the period 2003-2007 was **98.25 thousand ha** of wooded area.

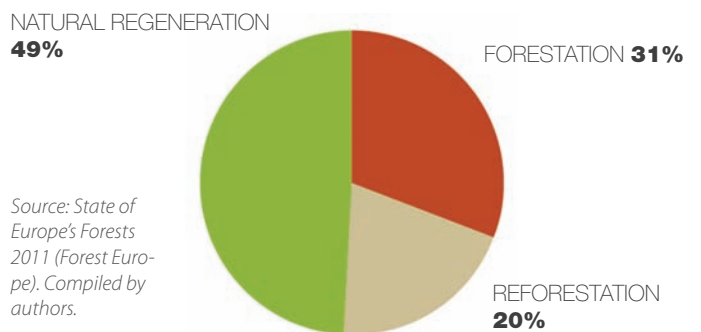
Almost half this regenerated area, **49%**, was due to **natural regeneration** and totalled **48.02 thousand ha** of annual average area.

Type	Average annual regeneration of forest periodo 2005 (2003-2007) (Thousand ha)
Forestation	30,97
Reforestation	19,26
Natural regeneration	48,02
<b>Total</b>	<b>98,25</b>

Source: State of Europe's Forests 2011 (Forest Europe).

**Forestation**, conversion into forest through human action on land which over the previous 50 years has lacked tree masses, covers an average annual area of **30.97 thousand ha** (31%). Of this, **67%** corresponds to reforestation of agricultural land undertaken within the framework of the EU's **Common Agricultural Policy (CAP)**, which represents **20.77 thousand ha/year**, while the remainder pertains to reforestation of non-wooded land carried out by Public Administrations as a whole (first reforestation).

**Reforested** land, reforestation of wooded land affected by forest fires and by shortfalls in regeneration, reached an annual average area of **19.26 thousand ha** (20%).



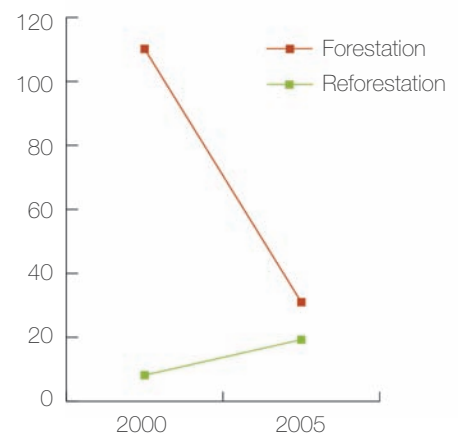
## Evolution

Between 2000 and 2005, annual average regenerated wooded land in the Forestation category fell significantly, both in CAP forestations and in first reforestation, from **110.13 thousand ha/year** to **30.97 thousand ha/year**.

However, the annual average **reforested** area, second reforestations, increased from **8.17 thousand ha** a year to **19.26 thousand ha** a year.

Year	Forestation		Reforestation	
	PAC	1ª RF	Total	2ª RF
Thousand ha				
2000*	51,83	58,30	110,13	8,17
2005*	20,77	10,19	30,97	19,26

\*Average five-yearly periods 1998-2002 (2000) and 2003-2007 (2005)  
Source: State of Europe's Forests 2011 (Forest Europe). Forest Statistical Yearbook 2006 (MARM). Compiled by authors.

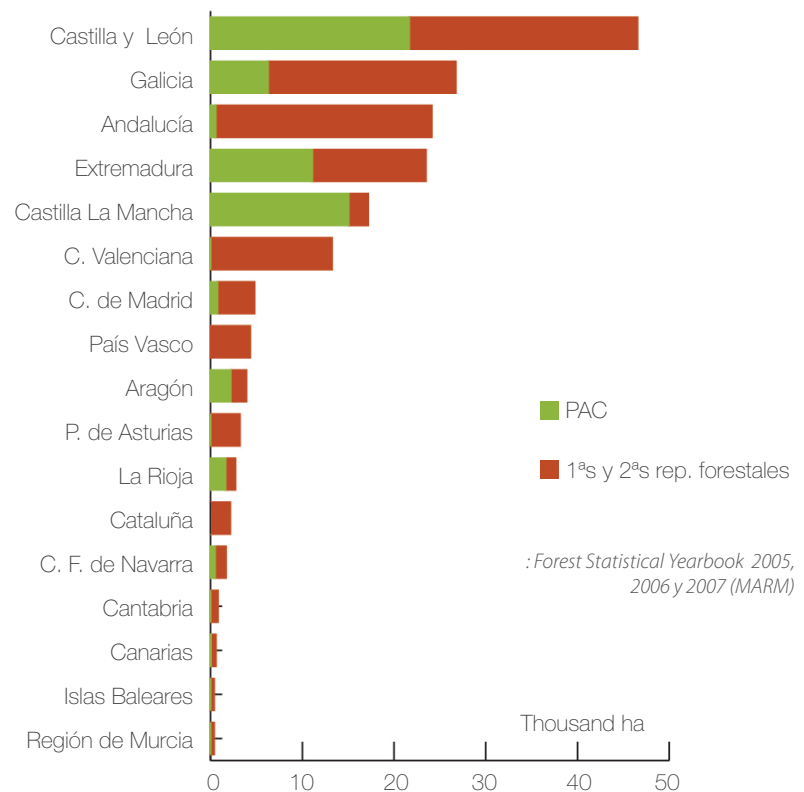


## Autonomous Regions

During the 2005-2007 period, the Autonomous Regions with the largest reforested area were **Castille and Leon** (46.6 thousand ha/year), **Galicia** (26.7 thousand ha/year), **Andalusia** (24.1 thousand ha/year) and **Extremadura** (23.5 thousand ha/year).

In terms of forestation of agricultural land, **Castille and Leon**, **Castille La Mancha** and **Extremadura** were the three Autonomous Regions with the largest reforested area, with 21.7 thousand ha/year, 15.1 thousand ha/year y 11.1 thousand ha/year, respectively.

Reforestation activity per Autonomous Region during the period 2005-2007 affected an area equivalent to 1.9% of the wooded area in **Galicia** and **Madrid**, to 1.8% in **Valencia** and 1.6% in **La Rioja**.



### Reforestation according to Autonomous Region period 2005-2007

Region	CAP Reforestation				First and second reforestations				Total Reforestations				Total relating to wooded area (%)
	2005	2006	2007	Total	2005	2006	2007	Total	2005	2006	2007	Total periodo	
Thousand ha													
Andalusia	0,0	0,0	0,6	0,6	4,5	16,5	2,5	23,6	4,5	16,5	3,0	24,1	0,8%
Aragon	1,0	0,0	1,2	2,2	0,6	0,5	0,5	1,7	1,7	0,5	1,7	3,9	0,3%
P. of Asturias	0,0	0,0	0,0	0,0	1,9	1,3	0,0	3,2	1,9	1,3	0,0	3,2	0,7%
Balearic Islands	0,0	0,0	0,0	0,0	0,0	0,2	0,2	0,4	0,0	0,2	0,2	0,4	0,2%
Canary Islands	0,0	0,0	0,0	0,0	0,3	0,0	0,2	0,5	0,3	0,0	0,2	0,6	0,4%
Cantabria	0,0	0,0	0,0	0,0	0,2	0,2	0,4	0,8	0,2	0,2	0,4	0,8	0,4%
Castille-La Mancha	4,1	6,4	4,6	15,1	0,8	0,0	1,3	2,1	4,9	6,4	6,0	17,2	0,6%
Castille and Leon	11,0	3,1	7,6	21,6	7,4	13,3	4,2	24,9	18,4	16,4	11,8	46,5	1,6%
Catalonia	0,0	0,0	0,0	0,0	0,9	0,4	0,8	2,2	0,9	0,4	0,8	2,2	0,1%
Valencia Region	0,0	0,0	0,0	0,0	6,0	2,6	4,6	13,2	6,0	2,6	4,6	13,2	1,8%
Extremadura	3,6	5,0	2,5	11,1	0,2	4,3	7,9	12,4	3,8	9,3	10,4	23,5	1,2%
Galicia	0,0	6,3	0,0	6,3	2,1	7,3	11,1	20,5	2,1	13,6	11,1	26,7	1,9%
La Rioja	0,6	1,0	0,1	1,6	0,8	0,0	0,3	1,1	1,4	1,0	0,4	2,7	1,6%
Madrid Region	0,2	0,3	0,3	0,8	1,1	1,5	1,5	4,1	1,2	1,8	1,7	4,8	1,9%
Region of Murcia	0,0	0,0	0,0	0,0	0,1	0,1	0,2	0,4	0,1	0,1	0,2	0,4	0,1%
Navarre	0,2	0,2	0,1	0,5	0,5	0,4	0,3	1,2	0,8	0,5	0,4	1,7	0,4%
Basque Country	-	-	s.d	s.d	1,3	1,8	1,2	4,3	1,3	1,8	1,2	4,3	1,1%
<b>Total</b>	<b>20,68</b>	<b>22,08</b>	<b>16,97</b>	<b>59,73</b>	<b>28,91</b>	<b>50,56</b>	<b>37,04</b>	<b>116,51</b>	<b>49,59</b>	<b>72,63</b>	<b>54,01</b>	<b>176,23</b>	<b>1,0%</b>

Source: Forest Statistical Yearbook, 2005, 2006 y 2007 (MARM).

# Degree of naturalness

Forest area classified by its degree of naturalness in “plantations”, “semi-natural forests” and “forests with no human modification”.

## Introduction

The degree of naturalness expresses the intensity and continuity with which a forest has been acted on and modified by humans. It has three categories: forests with no human modification, seminatural and plantations.

## Current Situation

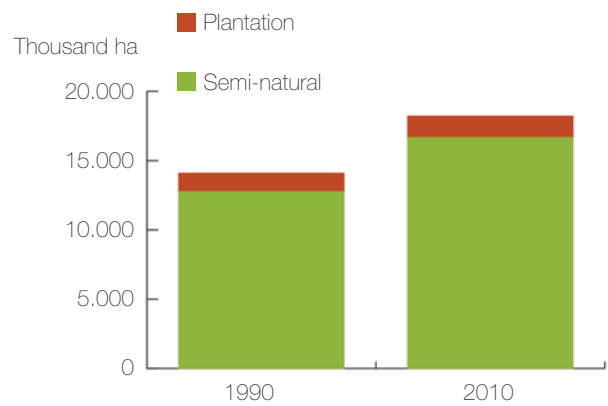
In Spain, no significant area of forest may be considered as “**not modified by humans**”, understanding as such primary forests or those not acted on for hundreds of years. At the European level, these forests are found in very remote zones or are those that are inaccessible due to their topography and climatic conditions.

Most of the wooded forest area (**91.5%**) is **semi-natural**, that which has been intervened by humans over time but which functions as a complete natural ecosystem.

Intensive silviculture **plantations** are formed by species which grow rapidly (*Eucalytus sp*, *Pinus radiata*, *Populus sp*, *P.pinaster* mainly) and occupy **8.5%** of the total wooded area.

Degree of naturalness	1990		2010	
	Area (Thousand ha)	%	Area (Thousand ha)	%
Not modified	0	-	0	-
Semi-natural	12.751	90,6%	16.654	91,5%
Plantation	1.329	9,4%	1.545	8,5%
<b>Total</b>	<b>14.080</b>	<b>18.237</b>		

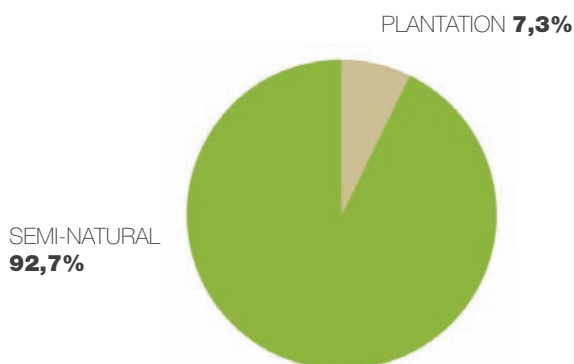
Source: NF12 (1990), MFE (2010)



The tables below display the area of plantation in 1990 and in 2010, grouped by their principal species.

Degree of naturalness	Area (ha)	%
No human modificaron	0	0,0%
Semi-natural	16.654.131	91,5%
Plantation	1.545.047	8,5%
<b>TOTAL</b>	<b>18.273.218</b>	

Source: MFE (2010).



## Evolution

Between 1990 and 2010, there was an increase in the degree of naturalness of Spanish forests. Despite the increase in absolute terms of plantations (216,000 hectares), occupation by seminatural forests rose from 90.6% to 92.7% of wooded area.

Type of plantation	Area (Thousand ha)
Eucalyptus ( <i>Eucalyptus sp</i> )	380
Aleppo pine ( <i>P.pinaster</i> )	201
Monterrey pine ( <i>P.radiata</i> )	174
Black poplar ( <i>Populus sp.</i> )	54
Mix of <i>P. radiata</i> and <i>P.Pinaster</i>	141
Mix of <i>P.pinaster</i> and <i>Eucalyptus sp.</i>	345
Plantationes of other conifers	35
<b>Total</b>	<b>1.329</b>

Source: NF12 (1990)

Type of plantation	Area (Thousand ha)
Eucalyptus ( <i>Eucalyptus sp</i> )	585
Aleppo pine ( <i>P.pinaster</i> )	295
Monterrey pine ( <i>P.radiata</i> )	231
Mixed species	192
Black poplar ( <i>Populus sp.</i> )	98
Other broadleaved species	68
Other conifers	41
Mix conifers and broadleaved	36
<b>Total general</b>	<b>1.545</b>

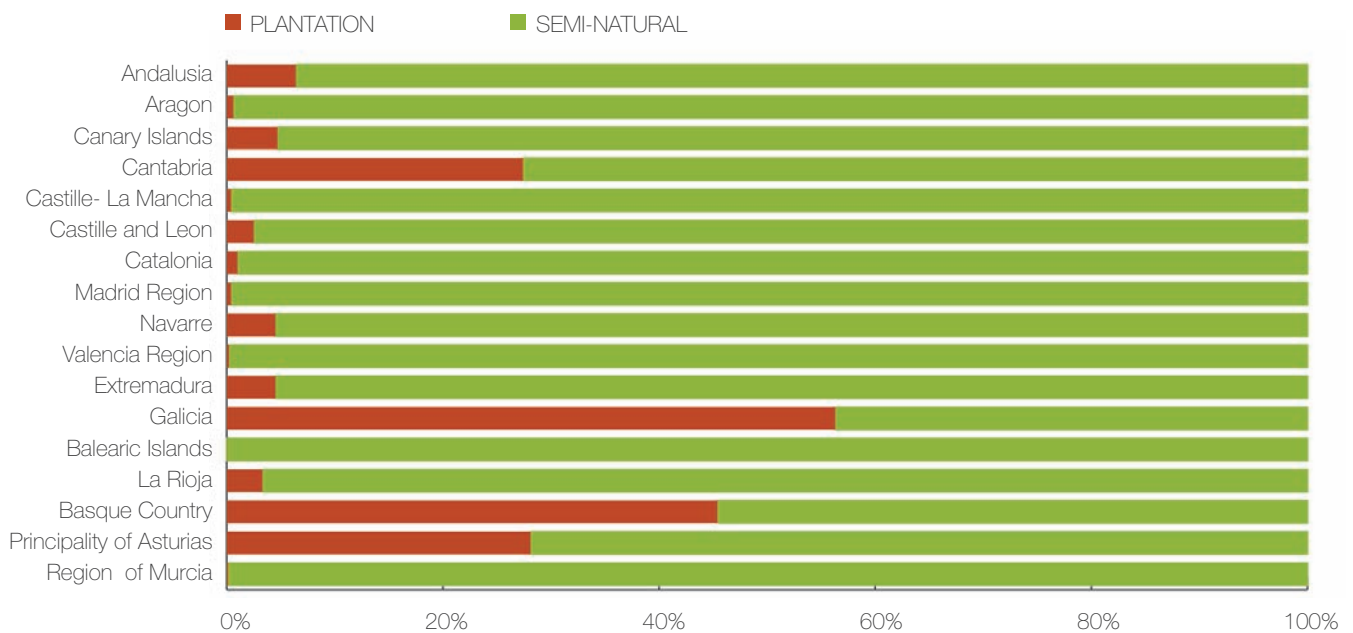
Source: MFE (2010)

## Autonomous Regions

Plantations are much more abundant in the Autonomous Regions of the Cantabrian region (Galicia, Principality of Asturias, Cantabria, Basque Country), with percentages between 25% and 45%. In the other Autonomous Regions, the percentage of plantation area fluctuates between 0.01% and 6.2%.

Region	Plantation			Semi-natural		
	Area	% Region	% National	Area	% Region	% National
Andalusia	186.848	6,4%	12,09%	2.711.817	93,6%	16,28%
Aragon	8.591	0,6%	0,56%	1.532.310	99,4%	9,20%
Canary Islands	6.167	4,7%	0,40%	125.722	95,3%	0,75%
Cantabria	58.269	27,4%	3,77%	154.156	72,6%	0,93%
Castille- La Mancha	10.452	0,4%	0,68%	2.692.517	99,6%	16,17%
Castille and Leon	74.668	2,5%	4,83%	2.858.228	97,5%	17,16%
Catalonia	16.644	1,0%	1,08%	1.588.808	99,0%	9,54%
Madrid Region	1.092	0,4%	0,07%	256.592	99,6%	1,54%
Navarre	20.089	4,5%	1,30%	426.650	95,5%	2,56%
Valencia Region	1.508	0,2%	0,10%	740.672	99,8%	4,45%
Extremadura	85.864	4,5%	5,56%	1.807.118	95,5%	10,85%
Galicia	767.971	56,3%	49,71%	597.193	43,7%	3,59%
Balearic Islands	13	0,0%	0,00%	173.077	100,0%	1,04%
La Rioja	5.401	3,3%	0,35%	158.803	96,7%	0,95%
Basque Country	177.169	45,4%	11,47%	212.735	54,6%	1,28%
Principality of Asturias	123.960	28,1%	8,02%	316.472	71,9%	1,90%
Region of Murcia	342	0,1%	0,02%	301.263	99,9%	1,81%
<b>Total</b>	<b>1.545.049</b>	<b>8,5%</b>	<b>100,00%</b>	<b>16.654.131</b>	<b>91,5%</b>	<b>100,00%</b>

Fuente: MFE (2010)



# Species introduced

Forest area mainly containing non-native species introduced.

## Introduction

Species introduced are non-native forest ones which develop beyond their natural area of distribution. Some of these species are of an invasive nature.

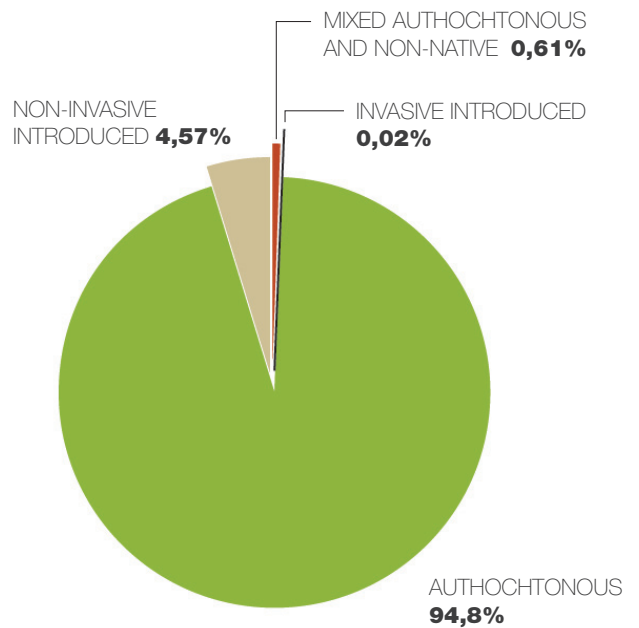
They have been introduced for various reasons: high productive performance, soil restorative capacity or for ornamental and landscaping use.

## Current Situation

Most Spanish forest area comprises autochthonous species (94,80%). Non-native species account for 4,59% of the wooded area (5,2% taking into account mixed formations of non-native and autochthonous species).

The main forest species introduced are eucalyptus (*Eucalyptus* sp.) and Monterrey pine (*Pinus radiata*), followed a long way back by other conifers like Douglas fir (*P.menziesii*) or larch (*Larix* sp.).

Invasive non-native species occupy 3,681 hectares (0,02% of the wooded area). These are principally broadleaved species like *Acacia* spp. and *Ailanthus altissima* included in the Spanish Catalogue of Invasive Species and *Robinia pseudacacia*, *Gleditsia triacanthos* and other acacia on the list of non-native species with invasive potential (Royal Decree 1628/2011, of 14 November).



## Evolution

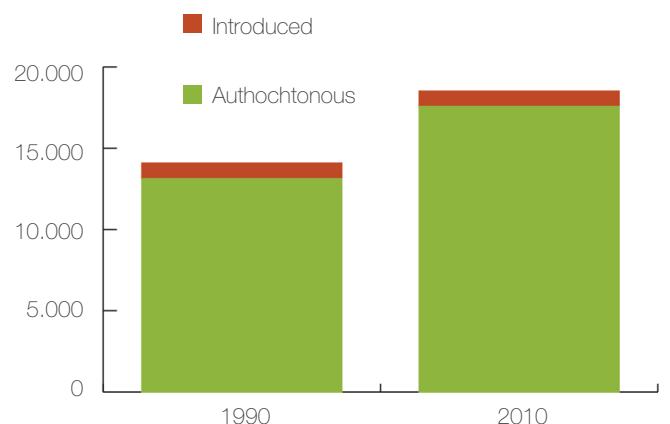
The wooded area containing introduced species in the main increased between 1990 and 2010 by 28,000 hectares. However, due to the general increase in the wooded area, the percentage of area occupied by non-native species fell from 6,6% in 1990 to 5,3% in 2010.

Area occupied by introduced species		
Year	Area (Thousand ha)	% Total of Wooded Area
1990	935	6,6
2010	963	5,2

Source: NF12 (1990), MFE (2010)

	Area (Thousand ha)	% Wooded area
<b>Non-invasive introduced</b>	<b>846,6</b>	<b>4,57</b>
Eucalyptus ( <i>Eucalyptus</i> spp.)	583,5	3,15
Monterrey pine forests ( <i>P. radiata</i> )	231,3	1,25
Conifers for production ( <i>Pseudotsuga</i> spp, <i>Larix</i> spp.)	26,2	0,14
Reforestations of <i>Quercus rubra</i>	4,2	0,02
Other conifers ( <i>Cupressus</i> sp, <i>Cedrus</i> spp, etc.)	1,4	0,01
<b>Invasive introduced</b>	<b>3,7</b>	<b>0,02</b>
<b>Total Species Introduced</b>	<b>850,5</b>	<b>4,59</b>
Mixed autochthonous and non-native	112,7	0,61
<b>Total Introduced + Mix</b>	<b>963,0</b>	<b>5,20</b>

Source: MFE (2010).



## Autonomous Regions

The table below shows the wooded forest area occupied by autochthonous species and those introduced.

Region	Area (thousand hectares)			
	Authoc. h.	Non-invasive introduced	Invasive Introduced	Autoch. and Non-native mixed
Andalusia	2.804	157,64	0,04	21,19
Aragon	1.562	0,12	0,01	0,56
Canary Islands	126	3,49	0	2,59
Cantabria	157	50,20	0,18	6,52
Castille- La Mancha	2.755	2,01	0,01	0,82
Castille and Leon	2.963	12,05	0	3,85
Catalonia	1.614	4,06	0,50	2,16
Madrid Region	270	0,01	0,08	0,07
Navarre	438	12,89	0,10	3,75
Valencia Region	753	0,26	0,01	0,25
Extremadura	1.837	78,09	0	5,63
Galicia	1.068	287,36	2,14	39,04
Balearic Islands	176	0	0	0
La Rioja	163	1,64	0	0,48
Basque Country	221	161,77	0,61	7,08
P. of Asturias	351	74,92	0,01	18,59
Region of Murcia	314	0,11	0	0,15
<b>Total general</b>	<b>17.572</b>	<b>846,62</b>	<b>3,68</b>	<b>112,72</b>

Source: MFE (2010)

Region	% of the Region's Wooded Area			
	Authoch.	Non-invasive introduced	Invasive Introduced	Autoch. and Non-native mixed
Andalusia	94,00%	5,29%	0	0,71%
Aragon	99,96%	0,01%	0	0,04%
Canary Islands	95,41%	2,63%	0	1,96%
Cantabria	73,43%	23,45%	0,08%	3,04%
Castille- La Mancha	99,90%	0,07%	0	0,03%
Castille and Leon	99,47%	0,40%	0	0,13%
Catalonia	99,59%	0,25%	0,03%	0,13%
Madrid Region	99,94%	0	0,03%	0,03%
Navarre	96,32%	2,83%	0,02%	0,82%
Valencia Region	99,93%	0,03%	0	0,03%
Extremadura	95,64%	4,06%	0	0,29%
Galicia	76,47%	20,58%	0,15%	2,80%
Balearic Islands	100	0	0	0
La Rioja	98,72%	0,99%	0	0,29%
Basque Country	56,56%	41,47%	0,16%	1,81%
P. of Asturias	78,97%	16,85%	0	4,18%
Region of Murcia	99,92%	0,04%	0	0,05%
<b>Total general</b>	<b>94,80%</b>	<b>4,57%</b>	<b>0,02%</b>	<b>0,61%</b>

## Genetic Resources

Register of seed sources, stands, seed orchards and clones included in the National Catalogue of Basic Materials.

### Introduction

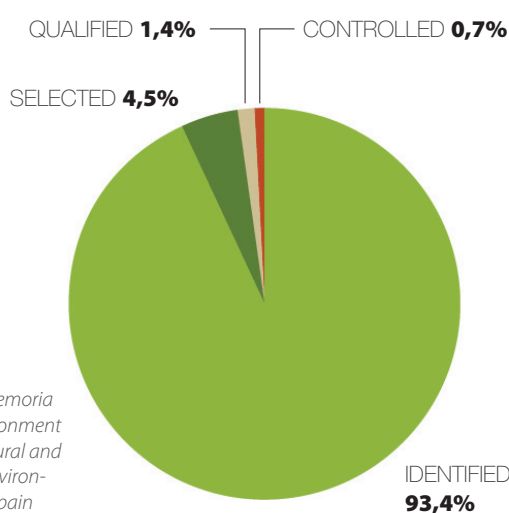
The genetic wealth of Spanish forests, both due to the abundance of species and the singularity of many populations, requires measures to conserve forest genetic resources. Conservation and improvement of genetic resources work together with the production of quality forest reproduction material are therefore very important actions.

The state of conservation of genetic resources is evaluated through the number of *admission units included in the National Catalogue of Basic Materials*

### Current Situation

The **National Catalogue of Basic Materials** is the register of admission units: seed sources, stands, seed orchards, parents of family, clones and clonal mixture, which have been authorised by the Autonomous Regions for the collection of seed units, and parts of plants used in production and marketing processes.

In 2010, the Catalogue comprised **7,280 admission units** shared between the categories Source-identified (6,803 units), Selected (324), Qualified (103) and Tested (50).



Source: Memoria "The Environment and the Rural and Marine Environment in Spain 2010" (MARM)

There are 16 species with a base material for the production of quality forest reproduction material in the categories Qualified or Controlled and for different types (seed orchard, parent of family or clone).

Species	No. admission units	
	Qualified	Controlled
Hybrids of <i>Castanea</i> spp.	16	16
Hybrids of <i>Juglans</i> spp.	6	0
<i>Juglans nigra</i>	22	0
<i>Juglans regia</i>	2	0
<i>Pinus halepensis</i>	1	0
<i>Pinus nigra</i> ssp. <i>nigra</i>	2	0
<i>Pinus nigra</i> ssp. <i>salzmannii</i>	1	0
<i>Pinus pinaster</i>	4	1
<i>Pinus radiata</i>	31	5
<i>Pinus sylvestris</i>	3	0
<i>Pinus uncinata</i>	1	0
Hybrids of <i>Populus</i> spp.	1	23
<i>Populus deltoides</i>	0	2
<i>Populus nigra</i>	0	3
<i>Prunus avium</i>	11	0
<i>Pseudotsuga menziesii</i>	2	0
<b>Total</b>	<b>103</b>	<b>50</b>

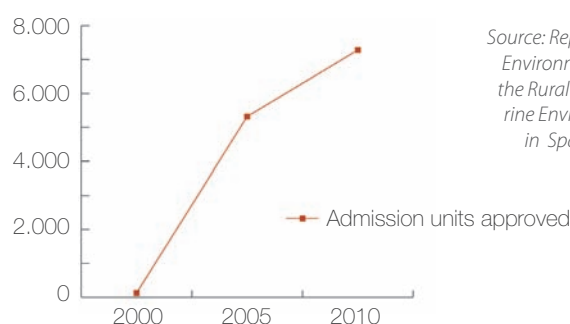
Source: Report "The Environment and the Rural and Marine Environment in Spain 2010" (MARM)

For the development of various national programmes for genetic resources conservation there is a Network of National Centres for Forest Genetic Resources: Puerta de Hierro, in Madrid; Alaquàs, in Valencia; Valsain, in Segovia; and El Serranillo, in Guadalajara.

Relevant works have been performed within the framework of the programmes of evaluation, conservation and improvement of genetic resources of the **Iberian elm** and the **yew**.

### Evolution

During the period 2000-2010, the number of admission units included in the Catalogue increased considerably from **126 units in 2000** to **7,280 in 2010**. However, a trend towards stabilisation has been observed in recent years, with an annual average incorporation of 80 units a year corresponding to the average of the most recent three-year period (2008-2010).



Source: Report "The Environment and the Rural and Marine Environment in Spain 2010" (MARM)

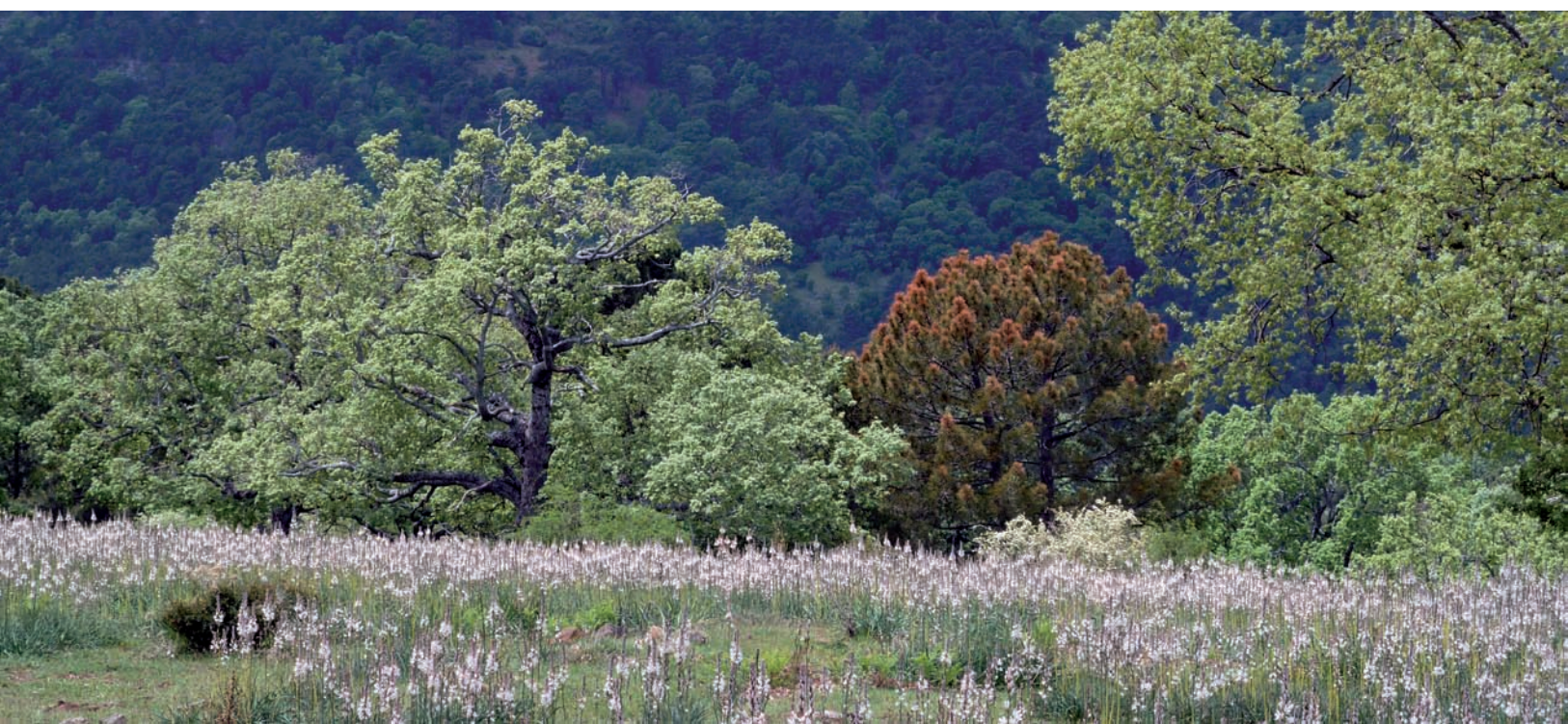
## Autonomous Regions

The different Autonomous Regions show major differences in terms of the number of admission units corresponding to the categories Source-identified and Selected.

Both in the Identified and Selected category **Castille and Leon** stands out for the high number of admission units catalogued, both categories representing the **49%** of the total national.

Region	Admission units		
	Identified	Selected	Total
	Unit		
Andalusia	420	48	468
Aragon	220	6	226
Principality of Asturias	121	11	132
Balearic Islands	44	0	44
Canary Islands	40	11	51
Cantabria	62	7	69
Castille-La Mancha	343	19	362
Castille and Leon	3.399	71	3.470
Catalonia	72	29	101
Valencia Region	640	15	655
Extremadura	161	37	198
Galicia	84	34	118
La Rioja	753	3	756
Madrid Region	166	2	168
Region of Murcia	62	0	62
Navarre	141	9	150
Basque Country	75	22	97
<b>Total</b>	<b>6.803</b>	<b>324</b>	<b>7.127</b>

Source: Report "The Environment and the Rural and Marine Environment in Spain 2010" (MARMI)





## Endangered forest species

The number of endangered forest species classified in accordance with the IUCN Red List relating to the total number of forest species.

### Introduction

Extinction of vegetable and animal species is the most recent stage in the biodiversity loss process. The study of the relationships between endangered species and the dynamic of forest ecosystems, together with the integration of proper forest management techniques, are fundamental aspects in the conservation of the forest's biological diversity. It should be noted that Spain, given its great variety of habitat and high specific diversity, is viewed as one of the 25 hot points on the planet.

The degree of danger to forest species is evaluated through the List of Wild Species under Special Protection and the Spanish Catalogue of Endangered Species, of the Royal Decree 139/2011, of 4 February.

### Current Situation

The number of land species included in the List of Wild Species under Special Protection is **749**, of which **35%** are included in the Spanish Catalogue of Endangered Species.

Category	List of Wild Species under Special Protection	Spanish Catalogue of Endangered Species		
		VU	ID	Total
		Unit		
Amphibians	28	6	2	8
Birds	256	24	18	42
Flora	296	33	112	145
Invertebrates	50	10	14	24
Mammals	45	14	5	19
Fish	13	2	10	12
Reptiles	61	5	7	12
<b>General Total</b>	<b>749</b>	<b>94</b>	<b>168</b>	<b>262</b>

VU= vulnerable; ID = in danger;

Source: Royal Decree 139/2011, of 4 February, for the developing of the List of Wild species under Special Protection and of the Spanish Catalogue of Endangered Species

The Spanish Catalogue of Endangered Species, which has a total of 262 land species, includes 94 in the Vulnerable category and 168 in the category of Danger of Extinction.

**Flora** is the taxon with the greatest number of wild species under special protection (296), of which 49% belong to the Spanish Catalogue of Endangered Species, with 33 species in a Vulnerable state and 112 in Danger of Extinction.

With regard to **birds**, 256 wild species are included in the List of Wild Species under Special Protection. The **Iberian Imperial Eagle** (*Aquila adalberti*), the **Bearded Vulture** (*Gypaetus barbatus*) and the **Cantabrian Capercaillie** (*Tetrao urogallus*) are among the 18 species included in the Spanish Catalogue of Endangered Species in the category of Danger of Extinction.

**Mammals** have 45 species in the List, with 42.2% of them are included in the Spanish Catalogue. The **Pyrenean Desman** (*Galemys pyrenaicus*) in the central system, the **Long-Fingered Bat** (*Myotis capaccinii*), the **Brown Bear** (*Ursus arctos*), the **European Mink** (*Mustela lutreola*) and the **Iberian Lynx** (*Lynx pardinus*) are the five land mammals included in the Spanish Catalogue of Endangered Species in the category of Danger of Extinction.

In terms of other land vertebrates, **amphibians, reptiles** and **peces**, a total of 102 species are contained in the List, accounting 13,6% of it. 32 species are included in the Catalogue, 19 of them classified in the category of Danger of Extinction.

With regard to **invertebrates**, 50 species are included in the List, 48% of them in the Spanish Catalogue of Threatened Species.

### Evolution

Considered in danger of extinction since 1990, the distribution of the **Brown Bear** has been reduced to population nuclei in the Cantabrian Mountains (eastern and western) and the Pyrenees (due to its reintroduction in the French Pyrenees). The bear population is experiencing a period of stabilisation with an upward trend, rising from 80 specimens in 2000 to some 120 at the end of 2010. Conservation strategies for the Cantabrian and Pyrenean brown bear were approved in 1999 and 2006, respectively.

In danger of extinction since 1990, the **Lynx** is found principally in the southwestern part of the peninsula. Over these two decades, its population has decreased drastically and nowadays its situation remains critical despite the measures launched to help it survive. The conservation strategy was approved in 1999 and updated in 2007.

The **Bearded Vulture**, the only osteophagous bird on the planet and classified since 1990 as being in danger of extinction, is distributed in the Pyrenees although individuals residing in the Basque Country have also been located and sightings reported in the Picos de Europa

and the Moncayo. Its population maintain a trend toward stabilisation and a minor increase. It has availed of a conservation strategy since 2000.

Also considered in danger of extinction, the **Imperial Eagle** nests in the southwestern part of the peninsula. From 2000 to the present, they have not only have maintained their numbers but have a seen a slight increase. Their conservation strategy was approved in 2001.

The two subspecies of capercaillie in Spain are distributed along the Spanish and French Pyrenees and Cantabrian Mountains. The Canta-

brian Capercaillie has been considered in danger of extinction since 2005 as a result of the fall in their population over previous years. At present, its situation remains critical. Its conservation strategy was approved in 2005.

The **Blue Chaffinch** is a species endemic to the Canary Islands, with two quite different subspecies which are restricted to the islands of Tenerife and Gran Canaria. Protection, improvement and increase of pine forests together with control of predators are key to conserving a species whose population continues to decline.



## Protected forest area

Area of forest and other woodland areas protected in order to conserve biodiversity, landscape and specific natural elements.

### Introduction

The declaring of protected natural spaces is a highly valuable tool for the protection of natural resources and one of the main pillars of nature conservation policy in Spain, Europe and the world.

The degree of protection of the forest surface in Spain is evaluated through the *forest area included within the group of Protected Natural Spaces (PNS), the forest area included in the Nature Network 2000 (NN 2000) and the forest area included in at least one of these two protection networks.*

### Current Situation

The forest area in Spain under protection in 2009 was **11.09 million ha**, (65.8% wooded and 34.2% unwooded) which accounts for 40.1% of forest land.

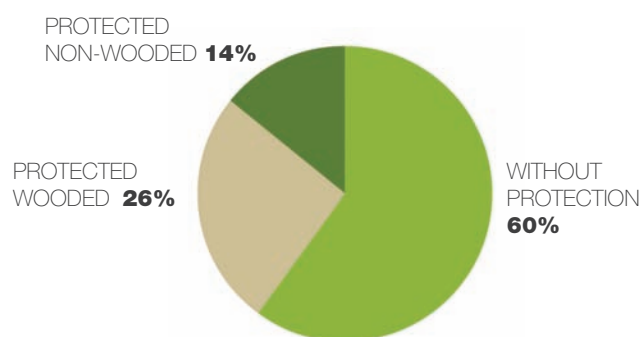
**Protected Natural Spaces<sup>2</sup>** offers special protection to **5.14 million ha**, while the **Nature Network 2000** (Places of Community Interest (LIC) and/or Special Protection Zones for Birds (ZEPA) provides **10.91 million ha**. The area enjoying both types of protection is 4.95 million ha.

Protected forest area 2009		
PNS (Million ha)	Wooded	3,27
	Non-wooded	1,87
	Total	5,14
Nature Network 2000 (Million ha)	Wooded	7,16
	Non-wooded	3,74
	Total	10,91
Total protected (Million ha)	Wooded	7,29
	Non-wooded	3,80
	Total	11,09
Protected wooded area with respect to total wooded land		39,9%
Protected non-wooded area with respect to total non-wooded land		40,4%
Protected total area with respect to total forest		40,1%

Fuente: Estadísticas Forestales 2009. Elaboración propia.

<sup>2</sup> National Park, Natural Park, Other Parks, Natural Reserve, Other Reservas, Protected Landscape, Natural Areas, Natural Monument, Protected Biotope and Other Figures.

The percentage of wooded area in Spain under some type of protection is **39.9%** while in the case of non-wooded land it is **40.4%**.



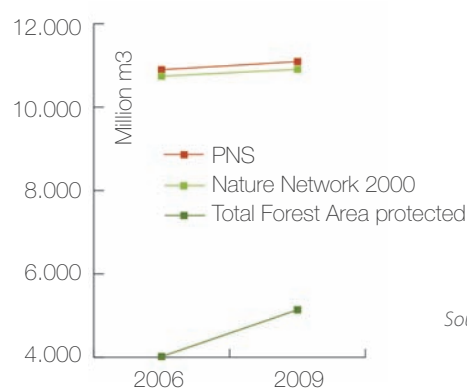
In the context of EU-27, Spain contributes most to the land area of Network Nature 2000, accounting for 18% of total land area in the European network.

### Evolution

Between 2006 and 2009 the forest area included in both Protected Natural Spaces and Nature Network 2000 increased, with notable growth in the forest area incorporated into PNS (1,123 thousand ha in three years).

	Evolution protected forest area (Thousand ha)		
	2006	2009	Rate of change
PNS	4.015,70	5.137,0	1.121,33
NN 2000	10.740,75	10.905,7	164,96
Tot. Prot. Wooded Area	7.188,13	7.293,4	105,30
Tot. Prot. Non-Wooded Area	3.708,47	3.797,7	89,25
Total Protected Forest Area	10.896,60	11.091,2	194,55

Source: Forest Statistical Yearbook 2006 (MARM); Forest Statistics 2009 (MARM). Compiled by authors.



In overall terms, the protected forest area increased by some **195 thousand hectares**.

Source: Forest Statistical Yearbook 2006-2009 (MARM).

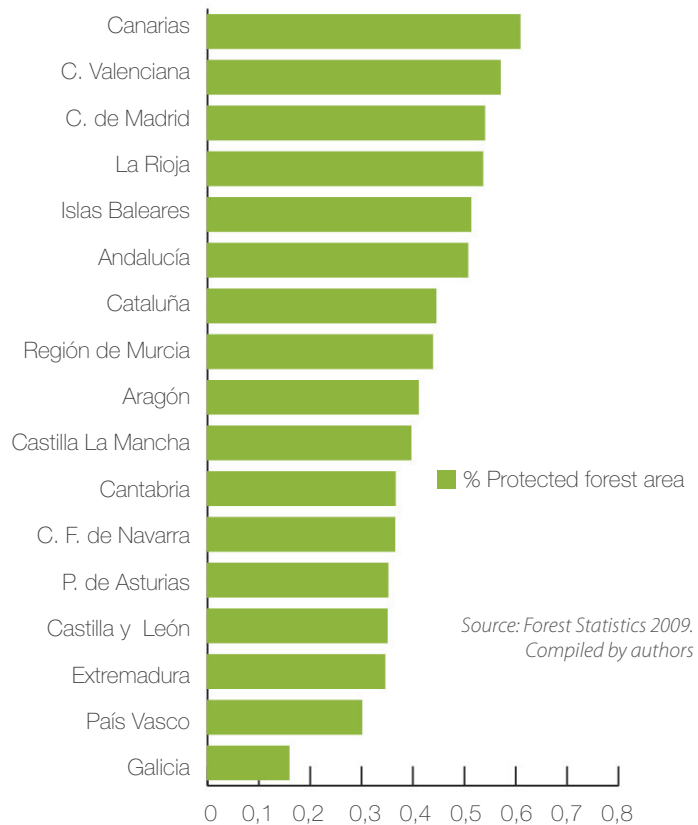
## Autonomous Regions

**Andalusia** is the Autonomous Region with the largest protected area included in PNS (1,440.6 thousand ha), followed by **Catalonia** (834.8 thousand ha) and **Castile and Leon** (510,3 thousand ha).

**Andalusia** also has the most forest space included in Nature Network 2000, with 2,236.1 thousand ha, followed by **Castile and Leon** (1,678.2 thousand ha) and **Castile La Mancha** (1,415.2 mil ha).

The **Canary Islands** (60.8%), the **Valencia Region** (56.9%), the **Madrid Region** (53.9%) and **La Rioja** (53.5%) are the Autonomous Regions with the largest proportion of forest area under some sort of protection. At the other end of the scale is **Galicia**, with only 15.8% of its area included in either of the protection networks.

With respect to wooded area, **Canary Islands** is top with 80% under protection. In terms of non-wooded area, the **Balearic Islands** have 74% protected.



Region	Protected forest area 2009					Protected forest area with respect to total forest area		
	PNS	RN 2000	Total protected forest area		Total	Wooded	Non-wooded.	Total
	Total	Total	Wooded	Non-wooded				
Thousand ha					%			
AAndalusia	1.440,6	2.236,1	1.605,76	653,86	2.259,6	54,9	42,3	50,6
Aragon	151,1	1.067,9	660,14	410,59	1.070,7	42,8	38,3	40,9
Principality of Asturias	209,9	255,6	133,09	135,19	268,3	30,1	41,7	35,0
Balearic Islands	67,7	93,9	78,42	32,89	111,3	45,3	74,1	51,2
Canary Islands	284,9	331,5	107,75	236,47	344,2	81,5	54,5	60,8
Cantabria	131,6	128,1	66,72	65,30	132,0	31,2	44,0	36,5
Castille-La Mancha	300,2	1.415,2	1.134,06	286,85	1.420,9	41,9	32,2	39,5
Castille and Leon	510,3	1.678,2	960,05	720,12	1.680,2	32,6	38,5	34,9
Catalonia	834,8	832,1	662,28	197,46	859,7	61,2	59,7	44,4
Valencia Region	176,8	701,1	456,79	264,44	721,2	61,1	50,9	56,9
Extremadura	262,7	921,4	609,35	329,41	938,8	32,1	39,7	34,4
Galicia	316,8	309,8	134,65	186,66	321,3	9,8	28,0	15,8
La Rioja	160,2	161,0	102,53	58,54	161,1	61,8	43,2	53,5
Madrid Region	77,7	225,1	164,79	62,22	227,0	63,8	38,1	53,9
Region of Murcia	63,5	207,2	151,72	61,44	213,2	50,3	33,1	43,7
Navarre	58,3	207,1	155,23	57,84	213,1	34,7	41,8	36,4
Basque Country	90,0	134,4	110,11	38,45	148,6	27,7	39,0	30,0
<b>Total</b>	<b>5.137,03</b>	<b>10.905,71</b>	<b>7.293,43</b>	<b>3.797,73</b>	<b>11.091,15</b>	<b>39,9</b>	<b>40,4</b>	<b>40,1</b>

Source: Forest Statistics 2009. Compiled by authors



## **Criterion 5**

**Maintenance and improvement of  
the protective function of forests**

## Protective forests

Area of forest and other forest land designated to prevent soil erosion, preserve water resources or maintain other functions of the forest ecosystem.

### Introduction

Protective functions of forests may be very varied: they contribute to the prevention and mitigation of erosion and loss of soils, to the conservation of water resources, to the stabilisation of riverbanks or sand dunes and even to the reduction of noise pollution. They also help to protect infrastructures like roads, railway lines, settlements, buildings and crops from damage caused by avalanches, landslides and rockfalls. Most forests are seen as having protective functions to some extent despite this sometimes not being the main goal from a management point of view.

Forest area designated for protective functions is evaluated through the variable *forest area included in the Catalogue of Public Utility Woodland* (CUP) and the register of protective woodland, although for various legislative reasons the latter has not been developed properly so there is no protective woodland declared as such.

### Current Situation

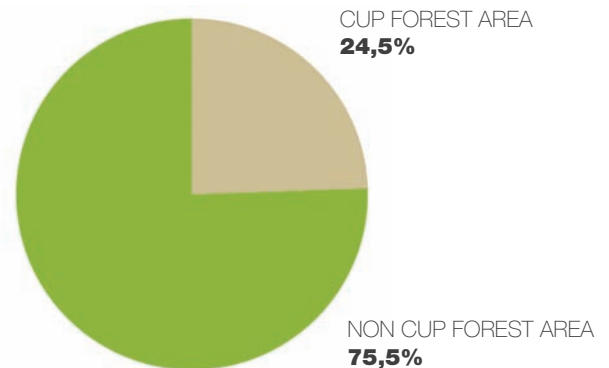
In 2009, the Catalogue of Public Utility Woodland comprised **6,766.71 thousand ha** of area in the public domain, accounting for **24.5%** of total forest area.

#### Catalogue of Public Utility Woodland 2009

Public forest area	Thousand ha	6.766,71
Public forest area with respect to total forest area	%	24,5%
Public forest area per capita	m <sup>2</sup> /hab.	1.439,1

*Source: NF13 1997-2007 (MARM). Directorate-General for the Natural Environment, 2009 (JCYL); Provincial Environmental Service of Zaragoza 2009 (Government of Aragon); Environment Department 2009 (Andalusia Regional Government). Compiled by authors.*

The ratio of public forest area and the population was 1,439 m<sup>2</sup> per capita.

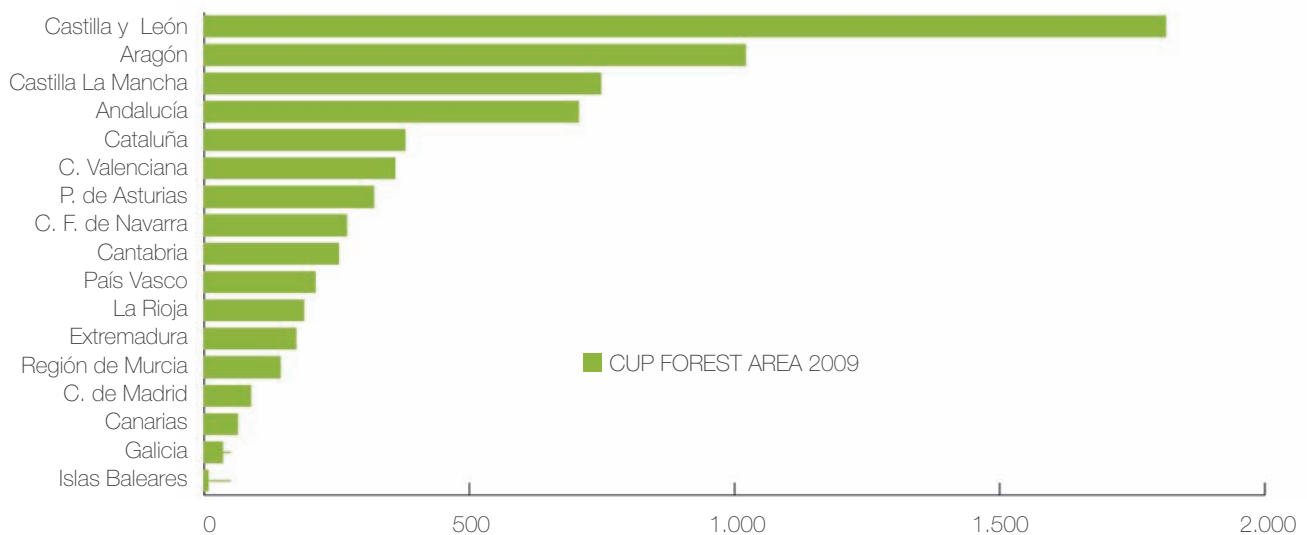


## Autonomous Regions

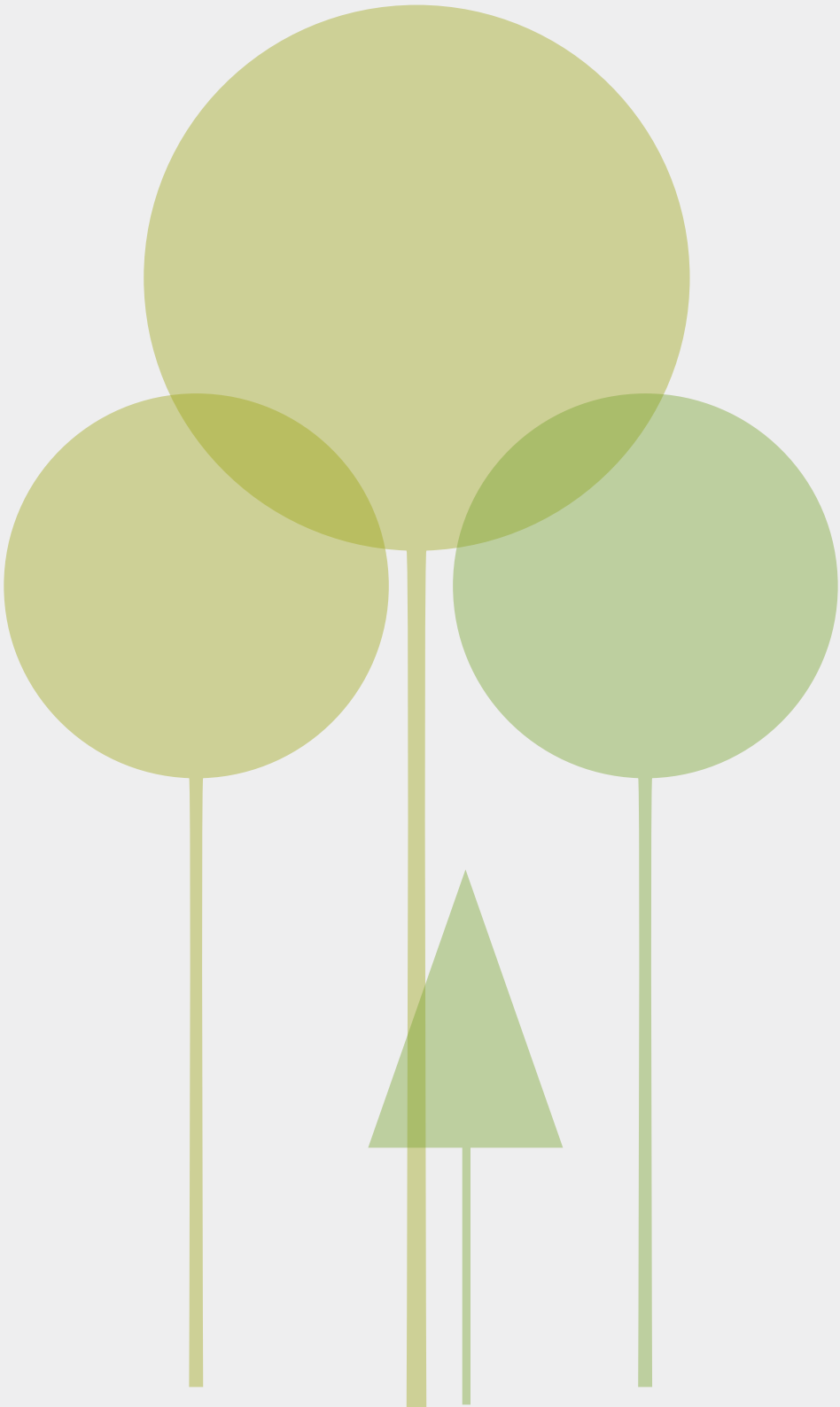
**Castille and Leon** (26.8%), **Aragon** (15.1%), **Castille La Mancha** (11%) and **Andalusia** (10.4%) are the four Autonomous Regions with the largest forest area included in the Catalogue of Public Utility Woodland. **Cantabria** and **La Rioja, Navarre, Basque Country** and **Asturias** have the highest proportion of regional public forest area,, with 69.9%, 62.2%, 45.8%, 42.1% and 41.7%, respectively.

Comunidad	Total	Relative to national forest area	Relative to regional forest area
	Thousand ha	%	%
Andalusia	705,41	10,4%	15,8%
Aragon	1.020,00	15,1%	39,0%
Principality of Asturias	319,13	4,7%	41,7%
Balearic Islands	7,01	0,1%	3,2%
Canary Islands	62,76	0,9%	11,1%
Cantabria	253,25	3,7%	69,9%
Castille-La Mancha	747,41	11,0%	20,8%
Castille and Leon	1.812,38	26,8%	37,6%
Catalonia	378,62	5,6%	19,5%
Valencia Region	359,15	5,3%	28,3%
Extremadura	172,54	2,5%	6,3%
Galicia	34,32	0,5%	1,7%
La Rioja	187,41	2,8%	62,2%
Madrid Region	87,33	1,3%	20,7%
Region of Murcia	142,89	2,1%	29,3%
Navarre	268,26	4,0%	45,8%
Basque Country	208,84	3,1%	42,1%
<b>Total</b>	<b>6.766,71</b>	<b>100,0%</b>	<b>24,5%</b>

Source: NFI3 1997-2007 (MARM), Directorate-General for the Natural Environment 2009 (JCYL), Provincial Environmental Service of Zaragoza 2009 (Government of Aragon) Natural Environment 2009 (JCYL); Provincial Environmental Service of Zaragoza 2009 (Government of Aragon); Environment Department 2009 (Andalusia Regional Government). Compiled by authors.







## **Criterion 6**

**Maintenance of other socio-economic functions and conditions**

# Forest ownership

Number of forest ownerships, classified according to categories of ownership and categories according to size.

## Introduction

The number of forest ownerships, the number of plots of land comprising them, their average size and who owns them are characteristics with major implications on sustainable forest management.

However, there is a shortage of information about these aspects for most forest areas, especially in the private area, although this lack of knowledge is beginning to be overcome due to the creation of geographical information systems over the past decade (some Autonomous Regions are performing in-depth studies of regional forest ownership).

The state of foreign ownership is evaluated through the variable *area according to public and private ownership*.

## Current Situation

At present, **68.6% of national forest area is in private hands** (19 million hectares), mostly individual owners.

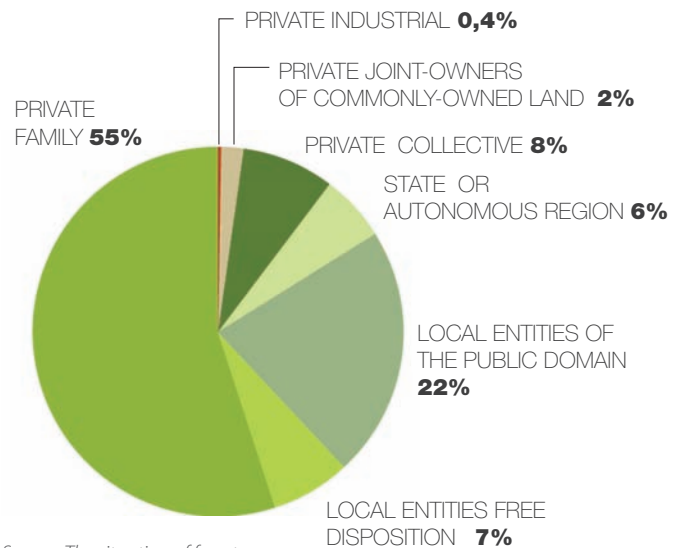
Public entities own just over **8.7 million hectares** (31.4%). Local authorities, especially Town Councils, own most public forest area, much more than the State or Autonomous Regions. The ratio of public forest area to the population is 0.19 hectares per capita.

Approximately, **6.8 million hectares** of public forest area is of public domain and is included in the **Catalogue of Public Utility Woodland**<sup>3</sup>.

Ownership forest area	Public	Thousand ha	8.714
	Private	Thousand ha	19.049
	Total	Thousand ha	27.763
	% Public	%	31,4
	% Private	%	68,6

Source: Forest Statistical Yearbook 2007 (MARM); Directorate- General for the Natural Environment 2009 (JCYL); Directorate-General for Forest Policy 2009 (JCLM).

<sup>3</sup> The Catalogue of Public Utility Woodland (CUP) is a public record of an administrative nature in which woodland declared as being of public utility is registered.

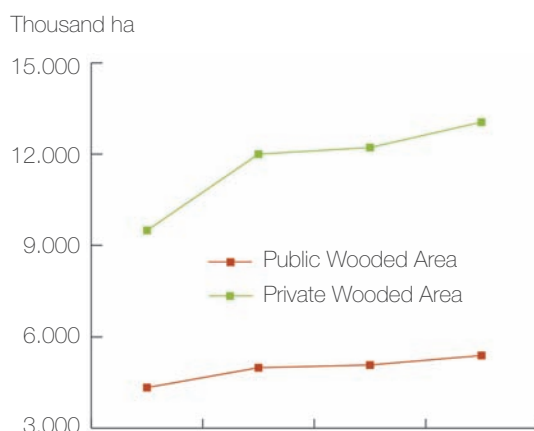


Source: The situation of forests and the forestry sector in Spain 2010 (SECF).

## Evolution

Therefore, the increase in privately-owned wooded forest area is linked to the abandonment of marginal agricultural and farming land and the reforestation of agricultural lands. It is estimated that **77% of the increase in wooded area produced during the period 1990-2007 corresponded to privately-owned lands (approximately 3.6 million hectares)**.

The increase of public wooded forest area during the same period, around **1.1 million hectares**, was mainly due to tree colonisation through the abandonment of grazing and the forestation of non-wooded forest land.



Source: State of Europe's Forests 2011 (Forest Europe). Forest Statistical Yearbook 2007 (MARM). Compiled by authors.

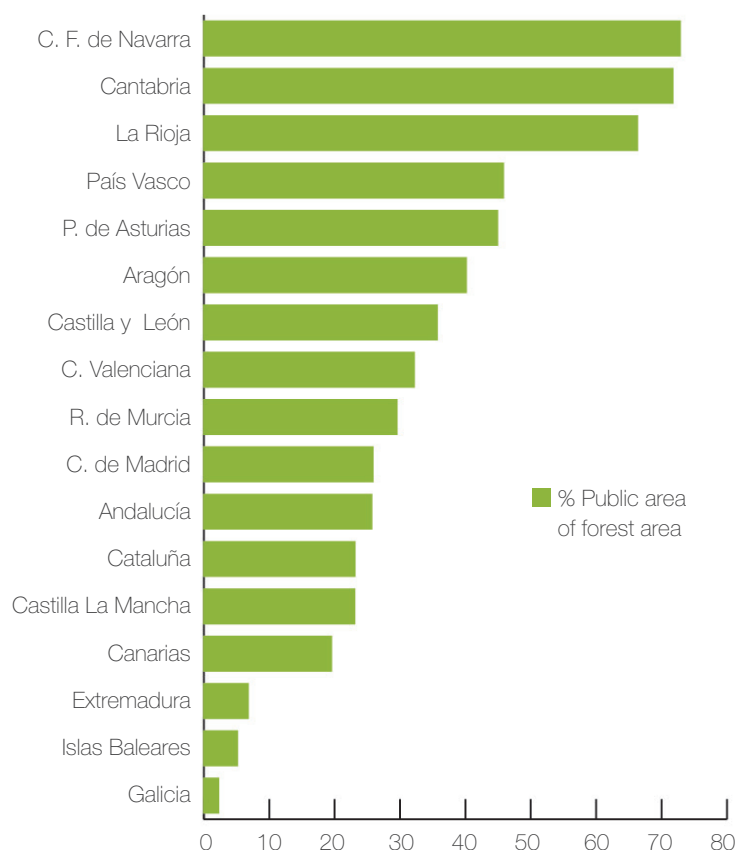
Source: Forest Statistical Yearbook 2007 (MARM); Directorate-General of the Natural Environment 2009 (JCYL); Directorate-General for Forest Policy 2009 (JCLM)

## Autonomous Regions

66.7% of national public forest area is concentrated in four Autonomous Regions: **Castille and Leon** (28.5%), **Andalusia** (13.1%), **Castille La Mancha** (13.1%) and **Aragon** (13.7%).

In terms of the comparison between public and private regional forest area, there are major differences in Autonomous Regions. The percentages of public ownership fluctuate between the 73% of **Navarre** and the 72% of **Cantabria** and little more than 2% of **Galicia** and 5% of the **Balearic Islands**.

With regard to public forest area per capita, **Castille and Leon** are at the head (0.97 ha/inhabitant), followed by **Aragon** (0.78 ha/inhabitant), **Navarre** (0.67 ha/inhabitant) and **Castille and Leon** (0.67 ha/inhabitant), all with values above half a hectare per capita.



Region	Ownership of forest area			Pub. For. Area with respect to total (%)	Priv. For. Area with respect to total (%)	Pub. For. Area per capita ha/inhabitant
	Public	Private	Total			
	Thousand ha					
Andalusia	1,144,89	3,325,00	4,469,89	25,6	74,4	0,14
Aragon	1,045,96	1,562,36	2,608,31	40,1	59,9	0,78
Principality of Asturias	343,06	421,54	764,60	44,9	55,1	0,32
Balearic Islands	11,40	212,20	223,60	5,1	94,9	0,01
Canary Islands	109,76	453,88	563,64	19,5	80,5	0,05
Cantabria	257,66	101,80	359,46	71,7	28,3	0,44
Castille-La Mancha	1,138,18	2,426,60	3,564,78	31,9	68,1	0,54
Castille and Leon	2,480,57	2,486,48	4,967,05	49,9	50,1	0,97
Catalonia	445,24	1,485,24	1,930,48	23,1	76,9	0,06
Valencia Region	403,49	851,85	1,255,34	32,1	67,9	0,08
Extremadura	183,76	2,543,47	2,727,23	6,7	93,3	0,17
Galicia	45,38	1,994,20	2,039,57	2,2	97,8	0,02
La Rioja	199,80	101,68	301,48	66,3	33,7	0,62
Madrid Region	108,52	311,57	420,09	25,8	74,2	0,02
Region of Murcia	143,30	342,72	486,02	29,5	70,5	0,10
Navarre	427,04	159,47	586,51	72,8	27,2	0,67
Basque Country	226,47	268,58	495,05	45,7	54,3	0,10
<b>Total</b>	<b>8.714,48</b>	<b>19.048,63</b>	<b>27.763,11</b>	<b>31,4</b>	<b>68,6</b>	<b>0,19</b>

Source: Forest Statistical Yearbook 2007 (MARM); Directorate-General of the Natural Environment 2009 (JCYL); Directorate-General for Forest Policy 2009 (JCLM).

# Contribution of the forestry sector to GDP

Contribution of forest activity and the timber and paper industry to Gross Domestic Product

## Introduction

The contribution of the forestry sector and its industry to the Gross Domestic Product (GDP) reflects its macroeconomic importance. Only the direct contribution of the forestry sector to GDP is taken into account, with the figures shown not including indirect sums from other sectors (for example: income from hunting, nature tourism or measures devoted to fires extinction).

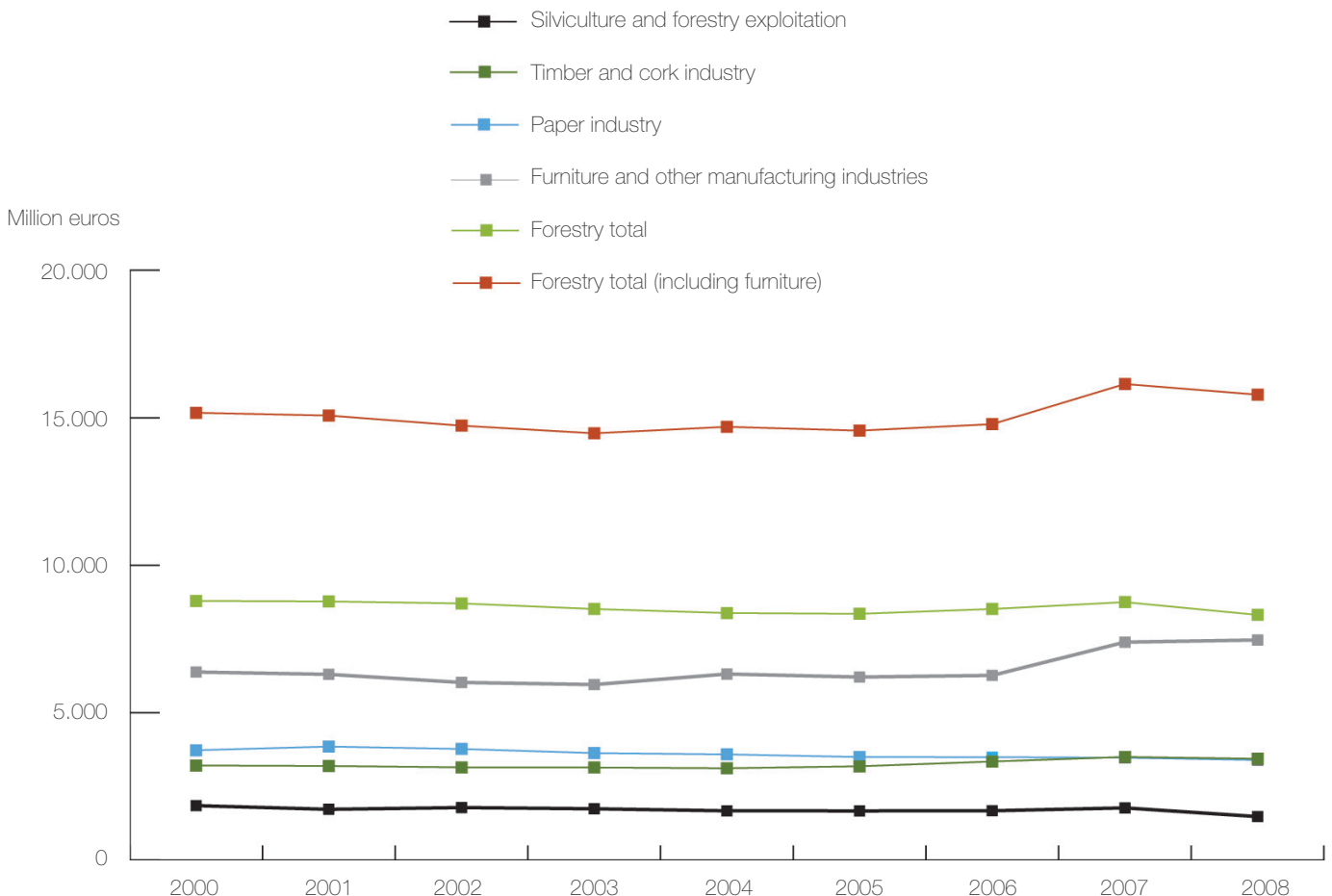
Forestry activity includes the economic movement derived from silviculture and forestry exploitation (Spanish National Economic Activity Classification- CNAE93 2). The forestry industry comprises the manufacture of timber products (CNAE93 20: sawmilling and manufacture of boards, joinery and cork) together with the paper, pulp and cardboard industry (CNAE93 21). Furniture and other manufacturing

industries (CNAE 36) have been calculated independently because, while in Spain they are considered as part of the forestry sector, European indicators do not include them.

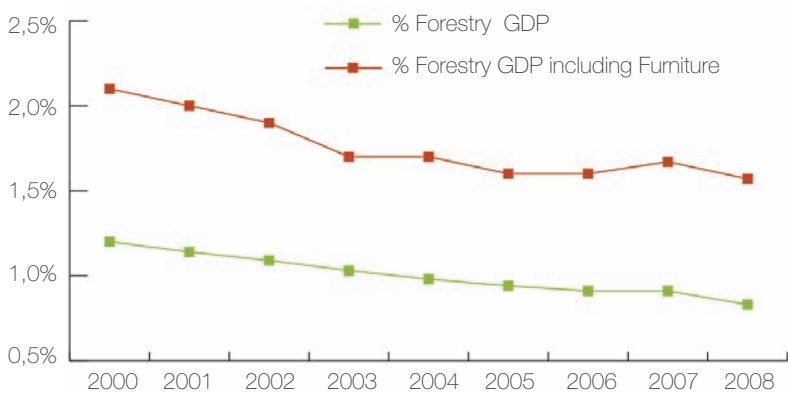
## Current situation and evolution

The following graphic shows the evolution of Gross Value Added (GVA) in Spain between 2000 and 2008 (most recent figure published) broken down into sectors of activity:

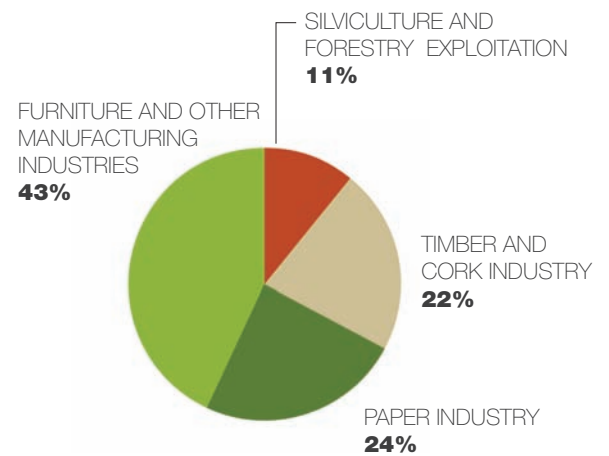
- The activities of the timber industry and the furniture industry show an upward trend.
- The sub-sectors of silviculture and exploitation and the paper industry show a slightly downward trend.



Between 2000 and 2008, the average contribution of the forestry sector was 1.0% of total Spanish GVA (1.76% including the furniture industry). The relative contribution of the forestry sector to total Gross Domestic Product showed a downward trend during this period.



Source: INE (2010). Spanish National Accounts Base



Forestry Sub-sector	2000	2001	2002	2003	2004	2005	2006	2007	2008	Average 2000-2008	
										Mill. €	%
Silviculture and forestry exploitation CNAE93 2	1.850	1.726	1.785	1.744	1.675	1.672	1.677	1.774	1.479	<b>1.709</b>	<b>11%</b>
Timber and cork industry CNAE93 20	3.211	3.194	3.148	3.142	3.117	3.184	3.347	3.501	3.441	<b>3.254</b>	<b>22%</b>
Paper industry CNAE93 21	3.729	3.853	3.772	3.631	3.588	3.498	3.494	3.475	3.397	<b>3.604</b>	<b>24%</b>
Furniture and other manufacturing industries CNAE93 36	6.379	6.301	6.027	5.955	6.313	6.210	6.266	7.393	7.466	<b>6.479</b>	<b>43%</b>
<b>Total Forestry</b>	<b>8.790</b>	<b>8.773</b>	<b>8.705</b>	<b>8.517</b>	<b>8.380</b>	<b>8.353</b>	<b>8.518</b>	<b>8.750</b>	<b>8.317</b>	<b>8.567</b>	
<b>Total Forestry (Furniture incl.)</b>	<b>15.169</b>	<b>15.074</b>	<b>14.732</b>	<b>14.472</b>	<b>14.693</b>	<b>14.563</b>	<b>14.784</b>	<b>16.144</b>	<b>15.783</b>	<b>15.046</b>	
GVA Spain	732.597	772.815	795.143	827.818	858.819	890.270	934.698	966.802	1.004.966	864.881	
<b>% Forestry GVA</b>	<b>1,20%</b>	<b>1,14%</b>	<b>1,09%</b>	<b>1,03%</b>	<b>0,98%</b>	<b>0,94%</b>	<b>0,91%</b>	<b>0,91%</b>	<b>0,83%</b>	<b>1,00%</b>	
<b>% Forestry (Furniture incl.)</b>	<b>2,10%</b>	<b>2,00%</b>	<b>1,90%</b>	<b>1,70%</b>	<b>1,70%</b>	<b>1,60%</b>	<b>1,60%</b>	<b>1,67%</b>	<b>1,57%</b>	<b>1,76%</b>	

Source: INE (2010). National Accounts of Spain

# Investment in the forestry sector

Total long-term investment in forestry services

## Introduction

Public investment in the forestry sector has its origin principally in the General Administration of the State and in the Autonomous Regions. It is devoted to the creation of action like the prevention and extinction of forest fires, hydrological forest protection, subsidies to private woodland, forestry treatments etc.

## Current situation and evolution

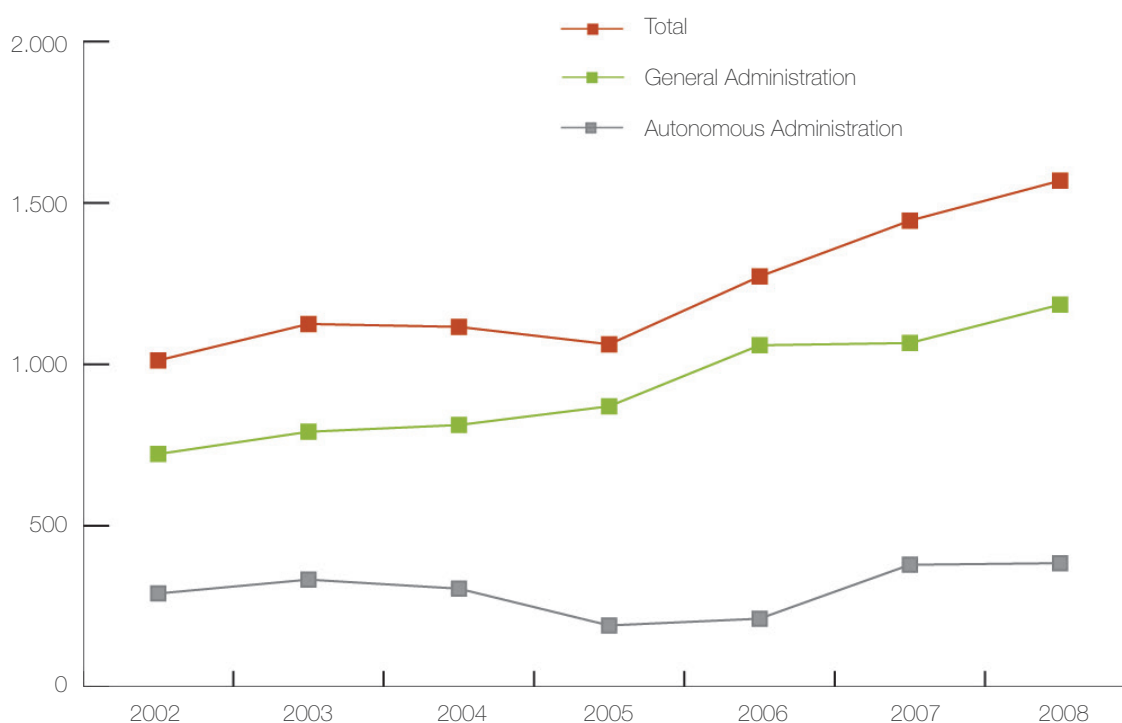
Data is only available up to 2008. The average public investment in the forestry sector was **1,228.6 million euros** during the period 2002-2008 (3% of total public investment), which is the equivalent of **51 euros per wooded hectare and 20 euros per capita**.

The breakdown of investment by type of action is detailed below.

Item	Investment (Million €)	%
Prevention and extinction of forest fires	584,8	47,6%
Hydrological forest protection	148,7	12,1%
Subsidies (different ends)	110,6	9,0%
Forestry treatments	109,3	8,9%
Forestation and restoration of vegetal cover	65,1	5,3%
Protection of wild flora and fauna	54,1	4,4%
Protection of natural spaces of special interest	36,9	3,0%
Creation and maintaining of forest roads	34,4	2,8%
Other investment in the forestry sector	30,7	2,5%
Public use for recreation and environmental education	19,7	1,6%
Development and planning of forest resources	13,5	1,1%
Forest pests and diseases	8,6	0,7%
Forest research	6,1	0,5%
Improvement of pastures	3,7	0,3%
Social participation and economic development	2,5	0,2%
<b>Total average investment (2002-2008)</b>	<b>1.228,6</b>	<b>100,0%</b>

Source: ASEMFO (2010)

Constant Euros 2009

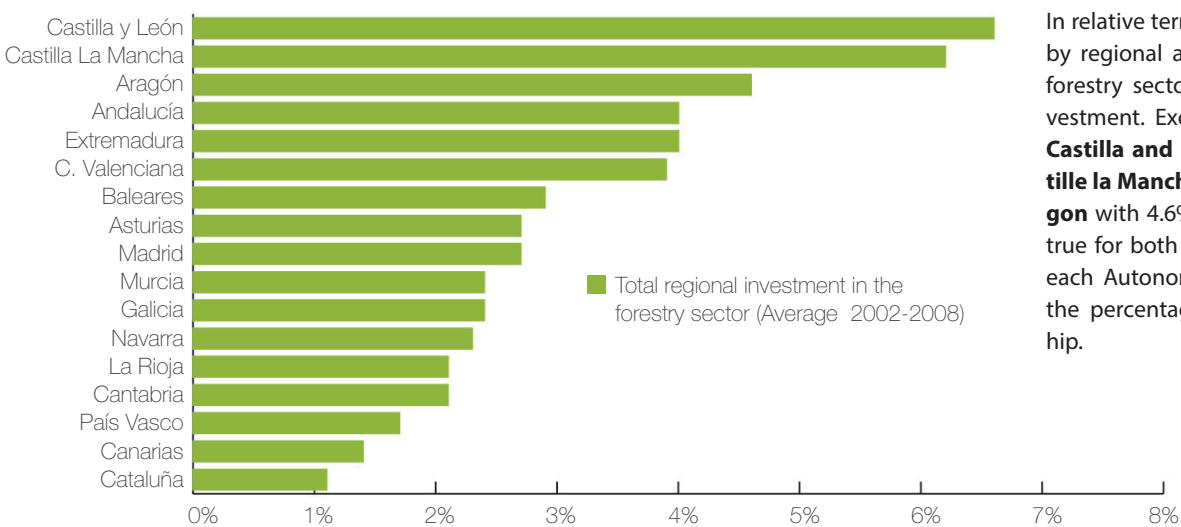


## Autonomous Regions

With regard to regional investment per wooded area of each Autonomous Region, **Madrid**, the **Canary Islands** and **Balearic Islands** all exceed 100 euros per hectare. Meanwhile, the Autonomous Regions to have invested most per capita are **Castile and Leon**, **Castile-La Mancha** and **Extremadura**.

Region	Data					Indicators		
	Population	Forest area (Ha)	Wooded area (Ha)	Forest investment (Million €)	% Total Public Investment	€/Ha Forest	€/Ha Wooded	€/inhab.
Andalusia	8.150.467	4.394	2.656	221	4,0%	50	83	27
Aragon	1.313.735	2.608	1.578	47	<b>4,6%</b>	18	29	35
P. of Asturias	1.058.923	765	451	29	2,7%	37	63	27
Balearic Islands	1.070.066	224	186	19	2,9%	<b>85</b>	103	18
Canary Islands	4.991.789	1.255	754	74	3,9%	<b>59</b>	98	15
Cantabria	2.076.585	564	134	16	1,4%	29	123	8
C.-La Mancha	576.418	359	214	11	2,1%	32	53	20
C. and Leon	2.022.647	3.565	2.740	105	<b>6,2%</b>	29	38	<b>52</b>
Catalonia	2.510.545	4.808	2.982	164	<b>6,6%</b>	34	55	<b>65</b>
Valencia Region	7.290.292	1.930	1.626	24	1,1%	12	15	3
Extremadura	1.080.439	2.727	1.921	42	4,0%	15	22	<b>39</b>
Galicia	2.738.930	2.040	1.405	57	2,4%	28	41	21
La Rioja	315.718	301	170	11	2,1%	38	67	36
Madrid Region	6.295.011	420	270	55	2,7%	<b>132</b>	205	9
Region of Murcia	1.443.383	486	316	13	2,4%	28	43	9
Navarre	614.526	587	463	19	2,3%	32	40	30
Basque Country	2.136.061	495	398	21	1,7%	42	52	10
<b>Total España</b>	<b>46.157.822</b>	<b>27.528</b>	<b>18.264</b>	<b>1.228</b>	<b>3,4 %</b>	<b>34</b>	51	<b>20</b>

Source: MFE (2010), ASEMFO (2010), INE (2011)



In relative terms, public investment by regional administrations in the forestry sector is 3.4% of total investment. Exceeding this figure are **Castilla and Leon** with 6.6%, **Castille la Mancha** with 6.2% and **Aragon** with 4.6%. This distribution is true for both current forest area in each Autonomous Region and for the percentage of public ownership.

Source: ASEMFO (2002-2008)



## Employment in the forestry sector

Number of people employed in the forestry sector classified according to gender, age, level of training and type of work.

### Introduction

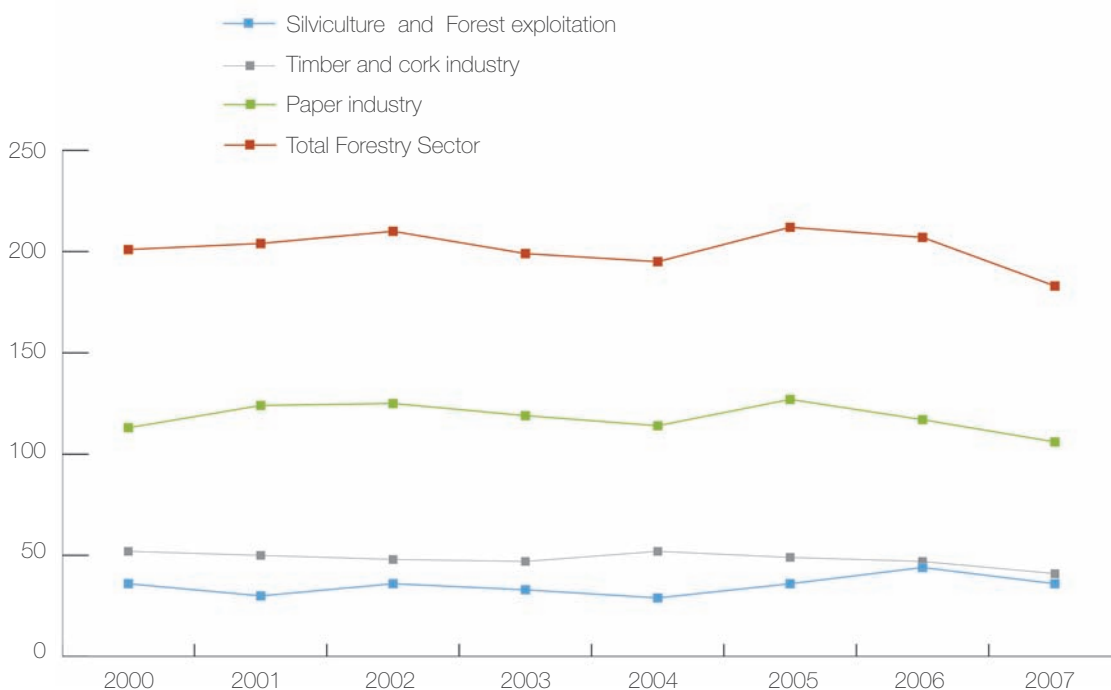
Employment in the forestry sector is divided into three sub-sectors: Silviculture and forest exploitation, the wood and cork industry and the paper industry. A large part of the forestry sector helps to tie people to the area and invigorate the rural economy, which gives it special added value.

### Current situation and evolution

In Spain, according to the figures available (2000-2007), nearly **200,000 people** work in the forestry sector, which is the equivalent of 1.13% of the active population. **59%** corresponds to workers in the wood and cork industry, **24%** to the paper industry and the remaining **17%** to silviculture and exploitation.

	Thousands of workers								Average 2000-2007	%
	2000	2001	2002	2003	2004	2005	2006	2007		
Silviculture and Forest exploitation	36	30	36	33	29	36	44	36	<b>35</b>	17%
Timber and cork industry	113	124	125	119	114	127	117	106	<b>118</b>	59%
Paper industry	52	50	48	47	52	49	47	41	<b>48</b>	24%
<b>Total Forestry Sector</b>	<b>201</b>	<b>204</b>	<b>210</b>	<b>199</b>	<b>195</b>	<b>212</b>	<b>207</b>	<b>183</b>	<b>201</b>	
Total Active Population	15.506	16.146	16.630	17.296	17.971	18.973	19.748	20.356	<b>17.828</b>	
% Active Population in Forestry Sector	<b>1,30%</b>	<b>1,26%</b>	<b>1,26%</b>	<b>1,15%</b>	<b>1,09%</b>	<b>1,12%</b>	<b>1,05%</b>	<b>0,90%</b>	<b>1,13%</b>	

Source: INE (2000-2008). Survey of the active population.

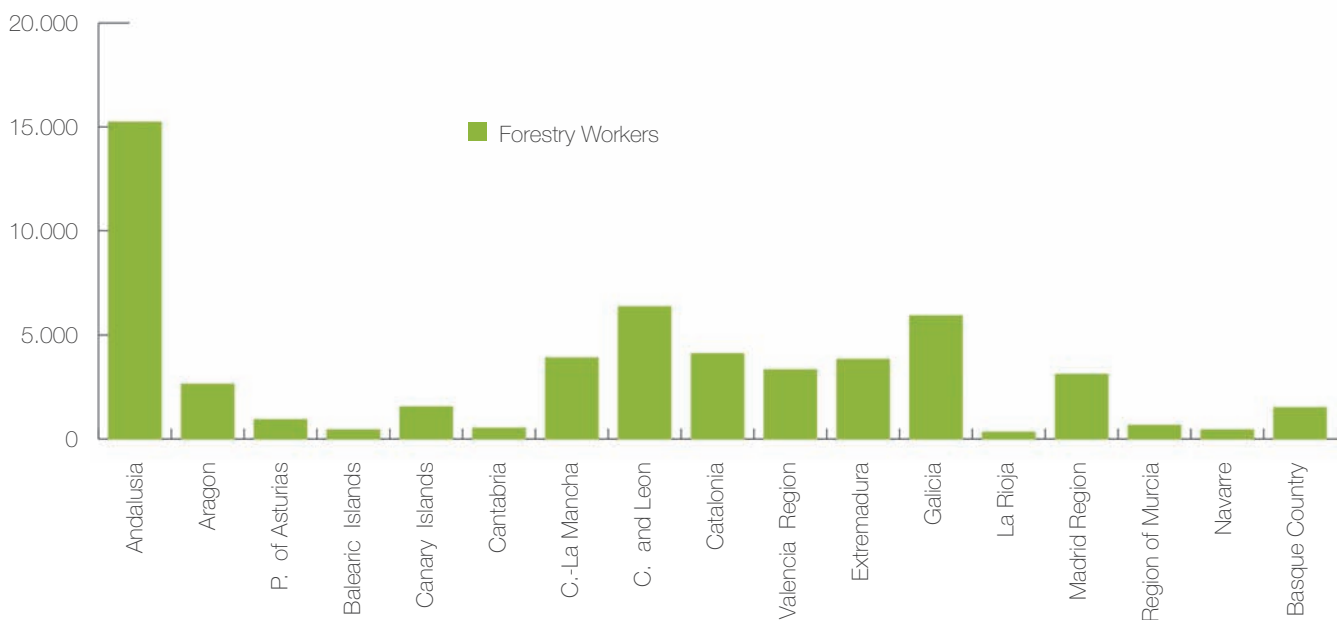


## Autonomous Regions

The only data available at the level of Autonomous Region are those provided by ASEMFO (National Association of Forestry Companies) ([www.foresdat.es](http://www.foresdat.es)) which includes the contracts of those workers involved in forest exploitation in accordance with the National Occupation Classification (Forest exploitation managers, engineers and forest workers, etc.) These figures are obtained from the Public Service of State Employment.

Region	Forest area (1.000 ha)	Forestry Workers (2002-2008)	% National Total	Workers / 1000 Ha Forest
Andalusia	4.394	15.225	27,8%	3.5
Aragon	2.608	2.636	4,8%	1.0
P. of Asturias	765	929	1,7%	1.2
Balearic Islands	224	439	0,8%	2.0
Canary Islands	564	1.547	2,8%	2.7
Cantabria	359	517	0,9%	1.4
C.-La Mancha	3.565	3.901	7,1%	1.1
C. and Leon	4.808	6.363	11,6%	1.3
Catalonia	1.930	4.106	7,5%	2.1
Valencia Region	1.255	3.327	6,1%	2.7
Extremadura	2.727	3.831	7,0%	1.4
Galicia	2.040	5.925	10,8%	2.9
La Rioja	301	326	0,6%	1.1
Madrid Region	420	3.111	5,7%	7.4
Region of Murcia	486	655	1,2%	1.3
Navarre	587	438	0,8%	0.7
Basque Country	495	1.499	2,7%	3.0
<b>Total general</b>	<b>27.528</b>	<b>54.776</b>	<b>100,0%</b>	<b>2.0</b>

Source: ASEMFO (2002-2008)



# Health and Safety at Work

Frequency of work accidents and illnesses in the forestry sector.

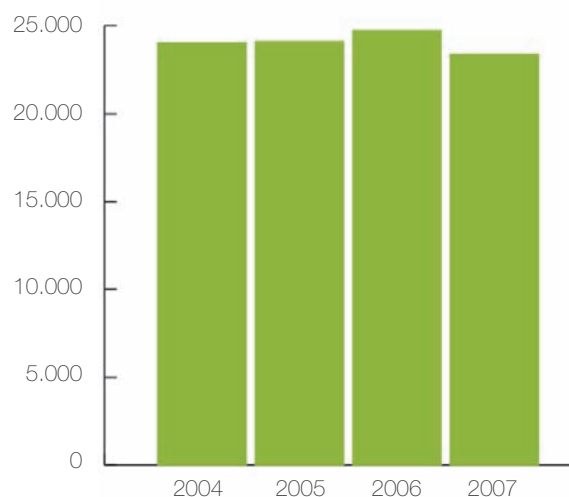
## Introduction

Health and safety at work is a key factor for responsible forest management, not only of the forest itself but logically also of those who work in it. The level of work accidents and illnesses reflects the current business and labour culture in the sector in terms of risk prevention.

## Current situation and evolution

According to available data (2004-2007), there are over 24.000 work accidents in the forestry sector each year in Spain. The trend during the period 2004-2007 showed growth between 2004 and 2006 followed by a significant fall in 2007.

No. of accidents



Region	Work accidents				Average (2004-2007)
	2004	2005	2006	2007	
Andalusia	3,558	3,464	3,439	3,604	3,516
Aragon	422	463	476	450	453
Asturias	455	453	485	443	459
Balearic Islands	381	411	407	445	411
Canary Islands	487	533	467	474	490
Cantabria	345	298	299	274	304
Castille La Mancha	1,667	2,043	2,185	1,888	1,946
Castille and Leon	1,456	1,500	1,572	1,672	1,550
Catalonia	4,434	4,386	4,031	3,467	4,080
Valencia Region	3,316	2,952	3,145	2,836	3,062
Extremadura	501	425	442	527	474
Galicia	2,172	2,219	2,358	2,369	2,280
Madrid	2,247	2,457	2,686	2,529	2,480
Murcia	456	435	498	476	466
Navarre	366	364	367	345	361
Basque Country	1,572	1,468	1,662	1,333	1,509
La Rioja	204	222	206	233	216
<b>National Total</b>	<b>24,039</b>	<b>24,093</b>	<b>24,725</b>	<b>23,365</b>	<b>24,126</b>

97.98 % of work accidents in the sector are minor while 1.44 % are serious. There is a mortality rate of 0.58%. In terms of branches of activity, the sub-sector of the **Timber Industry** shows the highest number of accidents in the forestry sector at 61.3%. With respect to the seriousness of the accident, the **Hunting** sub-sector displays elevated mortality, with 46.0 % of total accidents being mortal. 75.9% of mortal accidents correspond to this branch of activity.

The accident rate for the sector is high: **12 accidents per 100 workers**.

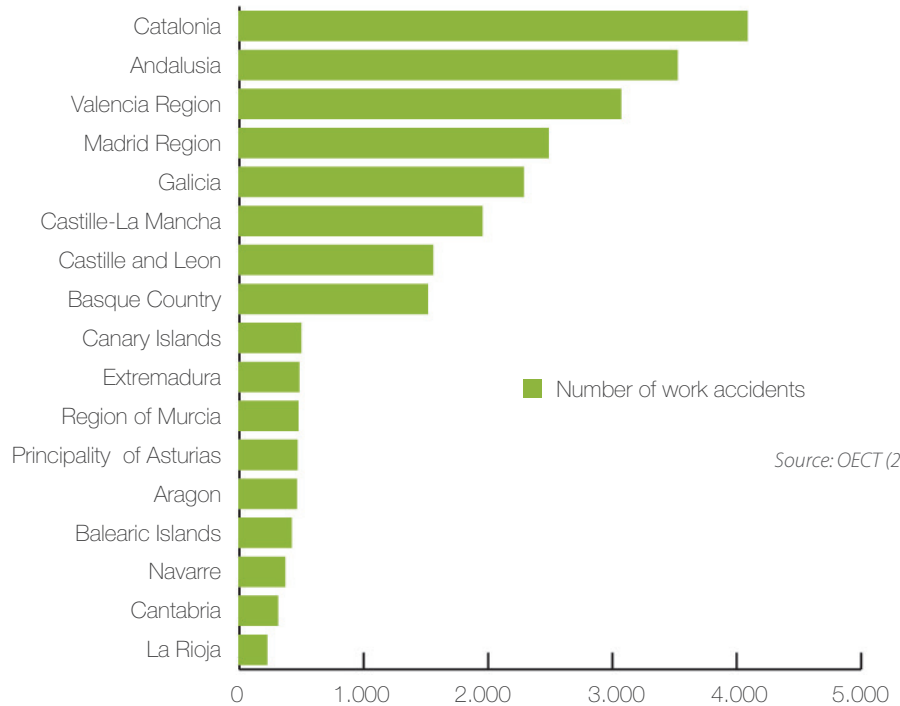
Branch of activity	Minor Accident		Serious Accident		Mortal		Total		No. workers	Rate
	Nº	%	Nº	%	Nº	%	Nº	%		
Hunting and animal capture	116	0,5	8	2,2	<b>106</b>	<b>75,9</b>	230	1,0	-	-
Timber and cork industry	14.546	61,5	233	66,9	13	9,0	14.791	<b>61,3</b>	115,9	13%
Paper industry	4.413	18,7	46	13,3	4	3,1	4.464	18,5	47,2	9%
Silviculture and forest exploitation	4.563	19,3	62	17,7	17	12,0	4.642	19,2	36,4	13%
<b>Total Forestry Sector</b>	<b>23.638</b>		<b>348</b>		<b>139</b>		<b>24.126</b>		199,4	<b>12%</b>

## Autonomic Regions

In terms of the average figure from 2004-2007, the following graphic reflects work accidents according to Autonomous Region.

The Autonomous Region with the highest number of accidents was **Catalonia**, although it is one of those which most reduced them -1000 accidents - over this period.

With respect to work-related illnesses, the only data available is from the period 2004-2006 from the sub-sectors of the timber and cork industry, the paper industry and hunting and animal capture.



Source: OECT (2008).

Region	2004		2005			2006		
	Industry		Industry		Hunting, animal capture	Industry		Hunting, animal capture
	Timber and cork	Paper	Timber and cork	Paper		Timber and cork	Paper	
Andalusia	26	3	41	6	2	18	1	-
Aragon	8	5	23	9	2	7	7	1
Asturias	11	0	3	2	-	4	1	-
Balearic Islands	11	0	5	2	-	7	0	-
Canary Islands	3	1	3	0	-	0	0	-
Cantabria	0	0	4	0	-	3	0	-
Castille-La Mancha	24	3	56	1	4	37	2	-
Castille and Leon	45	3	31	7	1	31	4	-
Catalonia	72	72	94	45	-	61	34	1
Extremadura	3	0	2	0	-	4	1	-
Galicia	30	0	59	3	7	40	4	2
La Rioja	12	1	12	0	-	7	0	-
Madrid Region	18	32	21	21	1	5	17	-
Murcia	13	2	6	0	3	6	0	2
Navarre	23	10	32	21	-	23	7	3
Basque Country	46	33	33	28	2	32	35	1
Valencia Region	24	9	28	7	-	22	4	-
<b>Total Spain</b>	<b>369</b>	<b>174</b>	<b>453</b>	<b>152</b>	<b>22</b>	<b>307</b>	<b>117</b>	<b>10</b>

Source: Ministry of Labour and Immigration State Observatory on Working Conditions (2008)

In the period 2004-2006, work-related illnesses in the forest sector rose in 2005 although the following year it fell 31%. As in the number of accidents, **Catalonia** continued to be the Autonomous Region with the highest number of **people affected** in the sector, accounting for **23%** of the cases of work-related illness throughout Spain.

## Forestry Training

No. of students at forestry training centres classified according to level of studies

### Current Situation

According to 2009 figures, **142 centres** are responsible for recognised studies in the forestry sector (**21** university centres and **121** Professional Training centres). With regard to university training, 14 centres provide courses in Technical Forestry Engineering and 7 in Forest Engineering. 91% - all except 1 - of the centres which provide university courses in the field of forestry are public.

With regard to professional training, there are 54 centres which provide **middle-grade** Professional Training courses -Forestry and Environment Conservation- at least one for each Autonomous Region, with the exception of the Madrid Region. In the case of **advanced-grade** Professional Training - "Management and Organisation of Natural Resources"- 67 centres cover all the Autonomous Regions with the exception of Cantabria. 83% of Professional Training centres providing training courses in forestry are public.

Region	Technical Forestry Engineering	Forest Engineering
CASTILLE LA MANCHA	1	0
ANDALUSIA	1	1
EXTREMADURA	1	0
CATALONIA	2	1
ASTURIAS	1	0
MADRID	1	1
VALENCIA REGION	1	1
GALICIA	2	1
CASTILLE AND LEON	3	1
TOTAL PUBLIC	13	6
CASTILLE AND LEON private	1	1
<b>TOTAL</b>	<b>14</b>	<b>7</b>

Source: INE (2010)

Region	Prof. Training centres middle grade			Prof. Training centres			Total
	Private centre	Public centre	Subtotal	Private centre	Public centre	Subtotal	
ANDALUSIA	1	9	10	2	10	12	22
ARAGÓN	1	3	4	1	4	5	9
ASTURIAS		1	1		2	2	3
BALEARIC ISLANDS		1	1		2	2	3
CANARY ISLANDS		6	6		4	4	10
CANTABRIA		1	1		0	0	1
CASTILLE- LA MANCHA	2	2	4	1	3	4	8
CASTILLE AND LEON	1	4	5	1	3	4	9
CATALONIA	1	5	6	1	7	8	14
EXTREMADURA	2	1	3	1	2	3	6
GALICIA		6	6	1	7	8	14
MADRID			0	1	2	3	3
MURCIA		1	1		2	2	3
NAVARRRE		1	1		1	1	2
BASQUE COUNTRY		1	1		2	2	3
LA RIOJA		1	1		1	1	2
VALENCIA REGION	1	2	3	2	4	6	9
<b>TOTAL</b>	<b>9</b>	<b>45</b>	<b>54</b>	<b>11</b>	<b>56</b>	<b>67</b>	<b>121</b>

Source: Ministry of Education (2009)

## Forestry students

While the number of university students have fallen considerably (-20%) in recent years, numbers of Professional Training students remain constant and have even shown a slight rise.

The percentage of female and male students is similar both in Technical Forestry Engineering and Forest Engineering, with **61% men** and **39% women**. Asturias is the Autonomous Region in which **the percentage is most balanced**, with female students accounting for 49%. It should be noted that of the total number of students who choose to continue with higher studies, 52% are women.

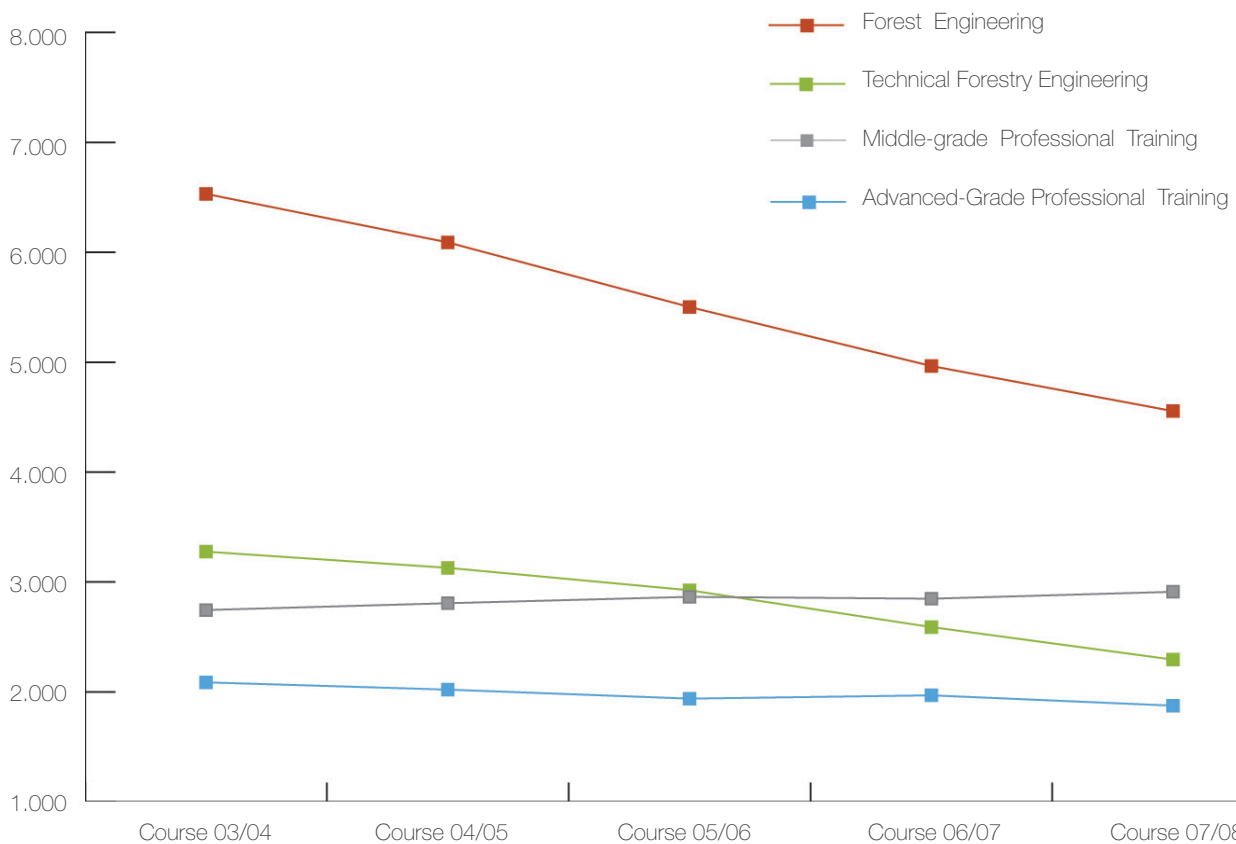
Andalusia is the Autonomous Region with **the highest number of Professional Training students** both in the middle and advanced-grade, accounting for 20% of the national total.

As at university, the number of male students taking Professional Training studies is greater than the number of females.

In terms of **postgraduate studies**, the Regions with a higher rate of doctors in forest engineering are; Madrid with 10.6%, **Castille and Leon** with **9.6%** and **Galicia** with **9.3%**. In all academic centres, apart from Andalusia and Castille-La Mancha, there is a decreasing trend in the number of doctorates.

With the creation of the European Space of Higher Education (Bologna Process) in the 2010-2011 academic year, different degrees which have a forestry component have been offered, with many schools keeping the degree of forestry engineering and others that of forestry engineering and natural environment engineering.

Evolution of students in the forest sector (2003-2008)



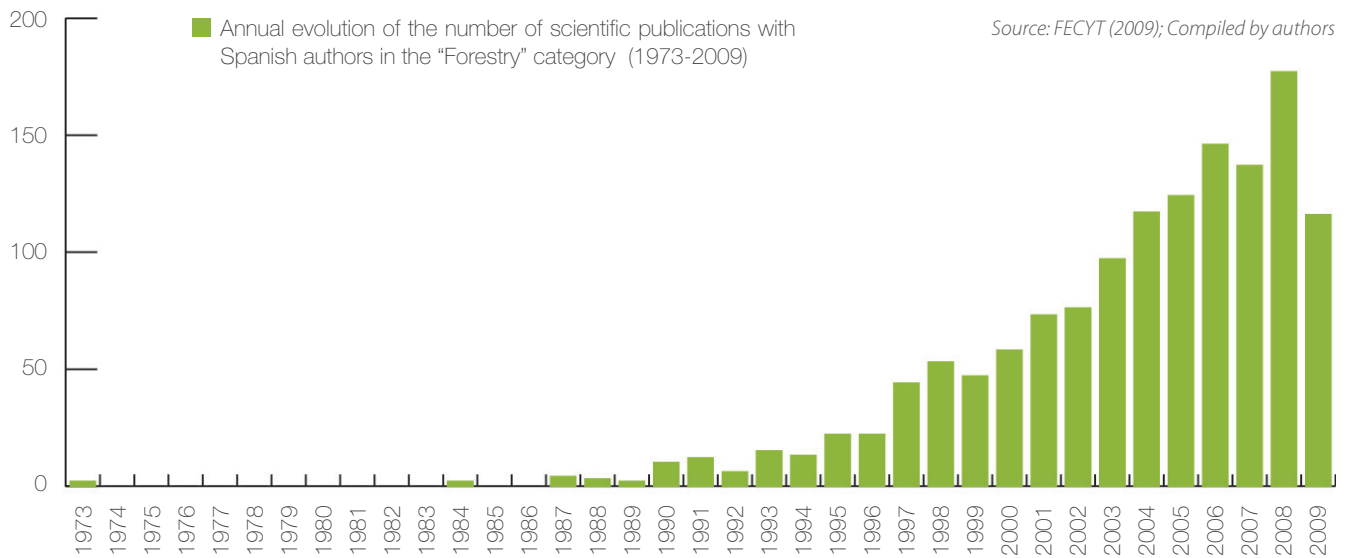
Source: Ministry of Education (2009)

# Forest Research

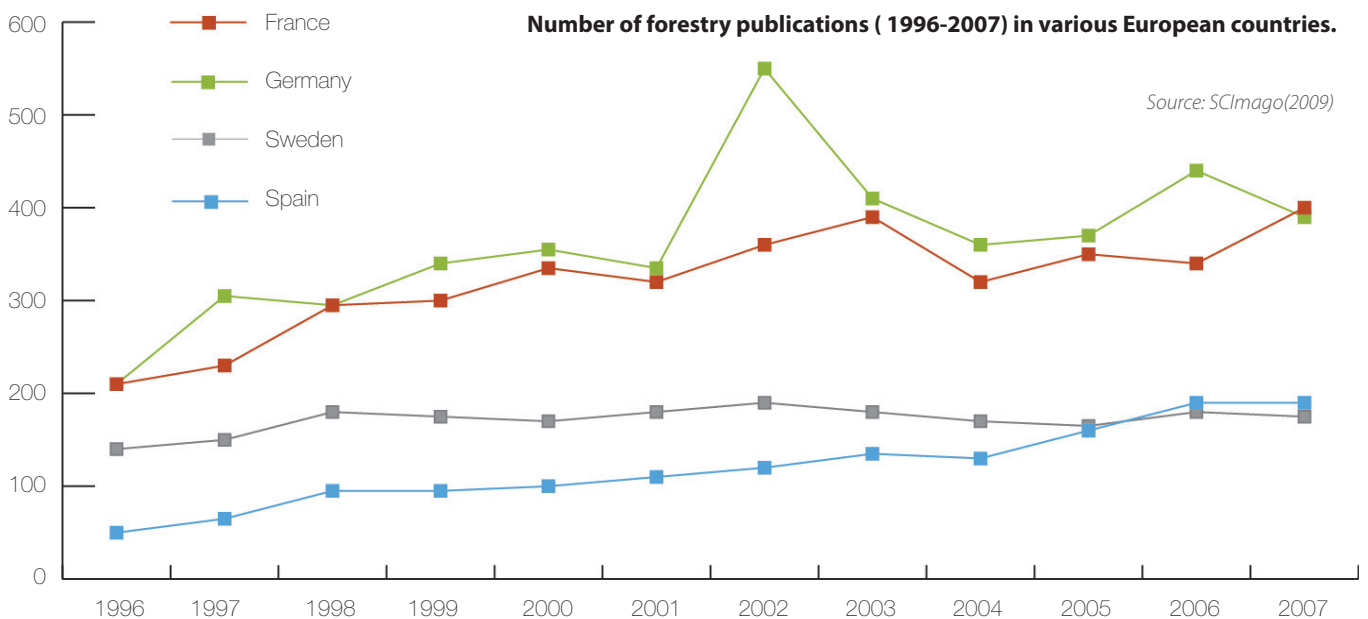
Number of scientific publications and patents

## Current situation and evolution

The number of scientific publications which include Spanish authors in the "Forestry" Area in the ISI WOK (FECYT 2009) data base, has grown significantly over recent years as a result from the general thrust in the R and D and i in Spain.

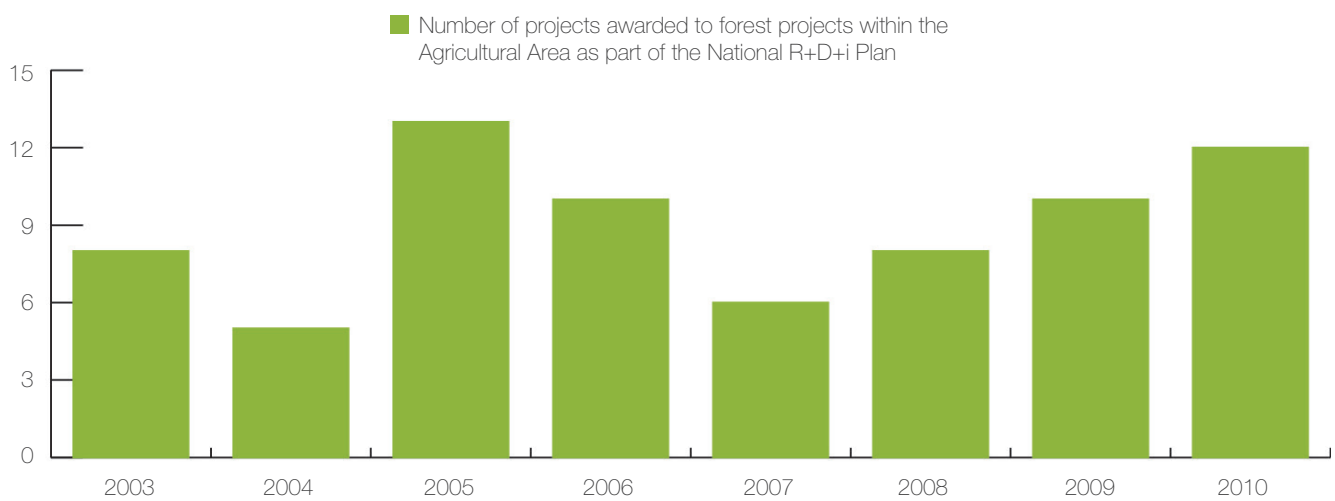


This significant increase has led to **Spain currently occupying 11th place in the world in terms of the number of scientific publications produced.** Over recent years, Spanish scientific production has grown faster than the average of other European countries with a great tradition in forestry research.



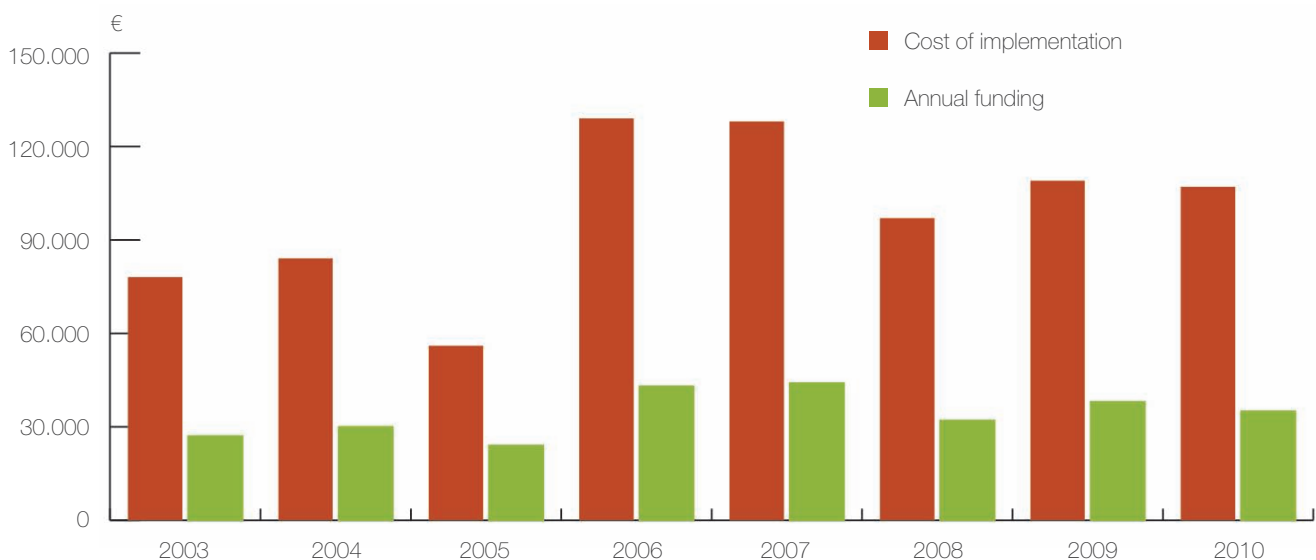
An indicator of forestry research is related to the creation of the National R + D + i Plan which, among other aspects, translates into funded research projects. Within the Agriculture area (which does not cover all the projects related to Forest Research), the number of projects awarded, the annual funding, and the fellows and technicians associated with these projects has remained relatively stable during recent years. This appears to indicate that other factors (changes in scientific culture) better explain the increase in scientific production.

#### Number of projects awarded to forest projects within the Agricultural Area as part of the National R+D+i Plan



Source: Ministry of Science and Innovation (2010)

#### Cost of implementation and current funding awarded to forestry projects approved within the Agricultural Area as part of the National R+D+i Plan



Source: Ministry of Science and Innovation (2010)

Currently, there are in Spain 380 patents stored at the Spanish Office of Patents and Brands (<http://invenes.oepm.es>) in the area of forestry.



## Trade in forestry products

The analysis of foreign trade (imports and exports) of the main forestry products provides knowledge about the degree of self-sufficiency and the sector's dedication to exports or imports.

### Current situation and evolution

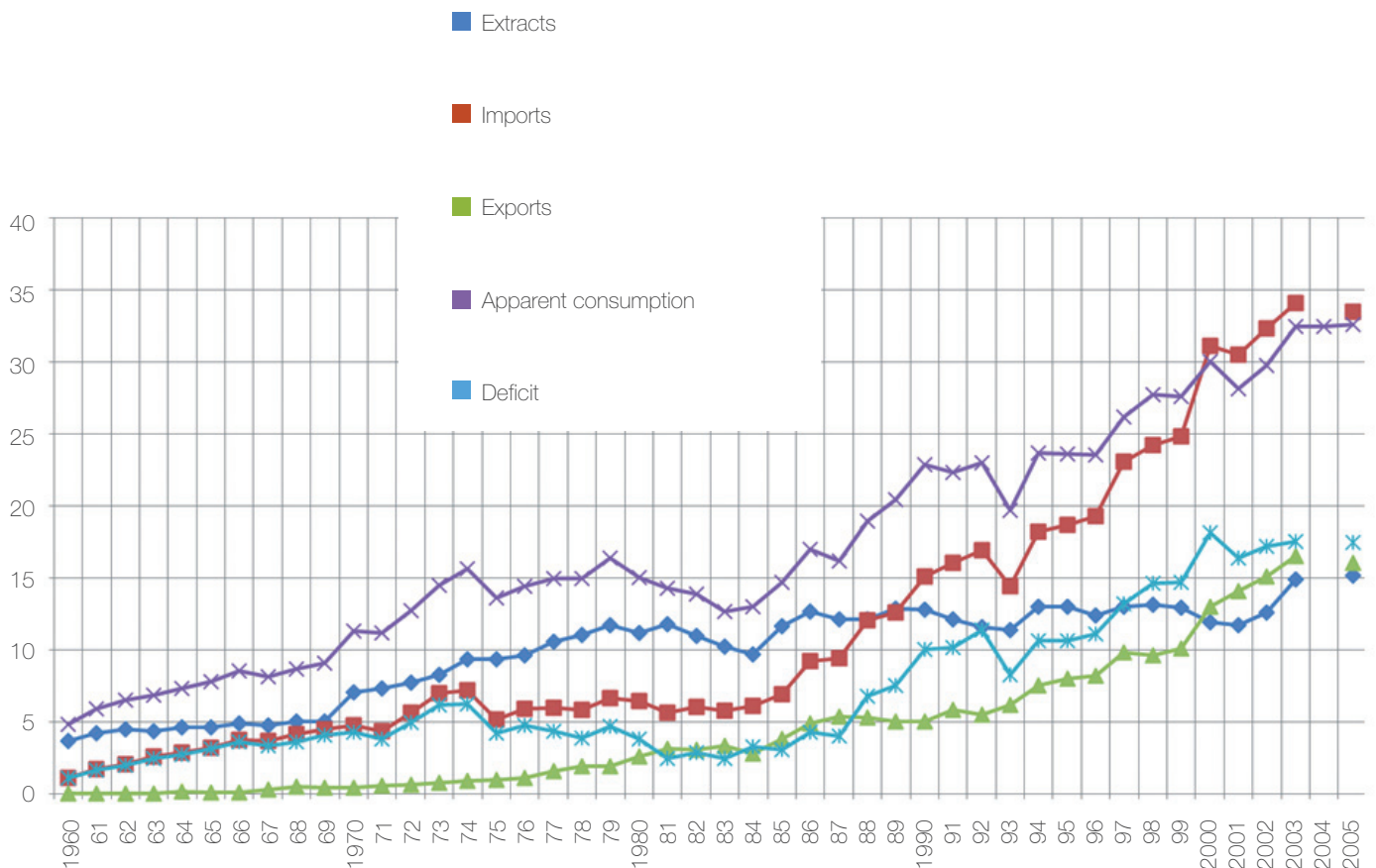
Wood **consumption** in Spain has grown in parallel to the country's economic development. As such, periods of economic growth coincide with increases and periods of recession tally with falls in wood consumption.

**In 2010, the apparent consumption of wood and firewood was 31,07million cubic metres without which represents a growth of 670% since 1960.**

However, average per capita consumption - 0.70 cubic metres without bark in 2005- displays values which still lag significantly - 40% - behind the European average (1.2 cubic metres without bark per inhabitant).

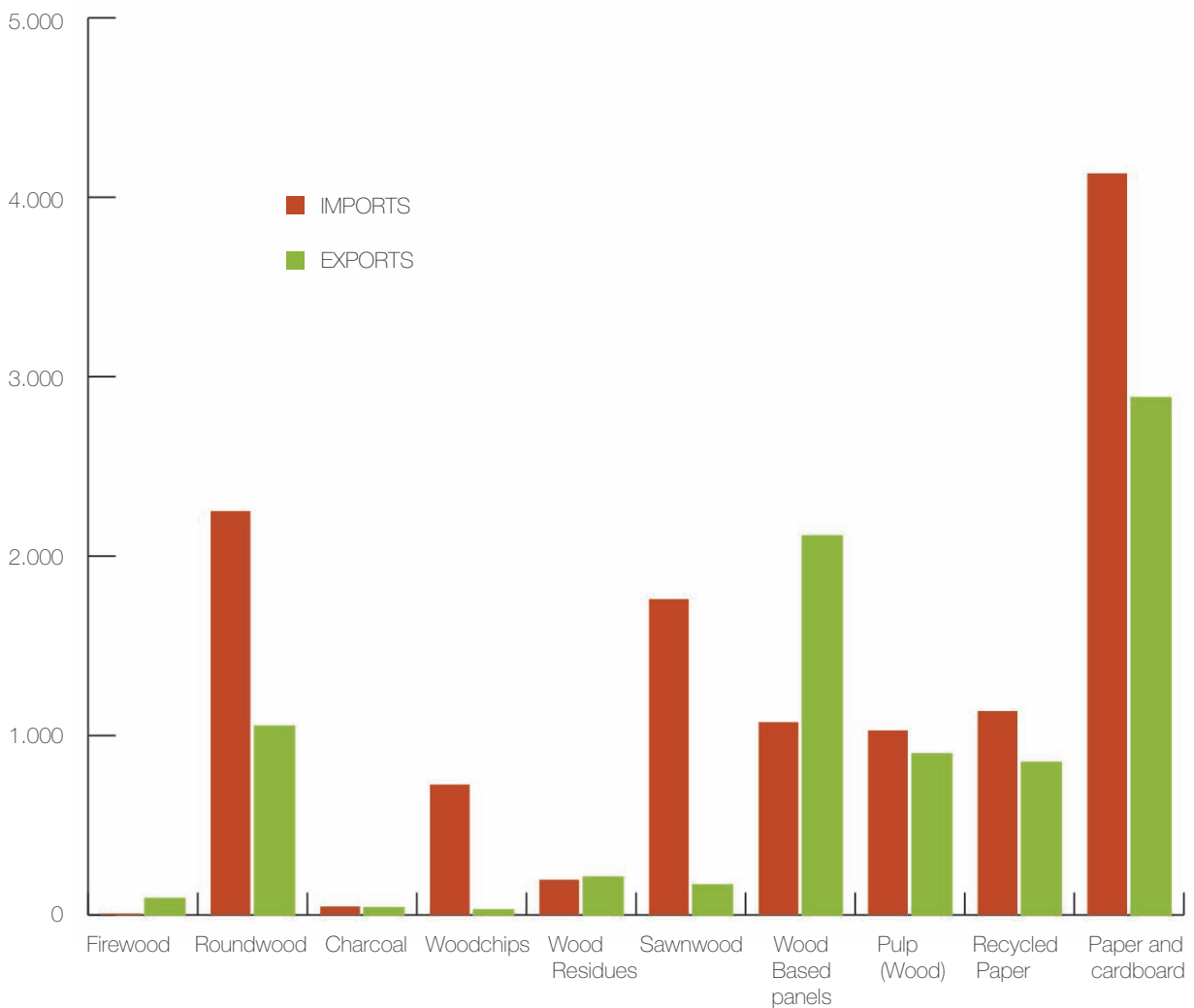
Exports have also been increasing (at a slower rate than imports) as a consequence of technological and business development of the forestry industry, amounting to 16 million cubic metres without bark in 2005.

Analysing foreign trade data according to production sub-sectors, the product in which Spain has the biggest deficit is Sawn timber; in absolute terms the biggest deficit is in Paper and Cardboard.



Forestry Products	Units	2008		2009		2010		Average 2008-2010	
		Imp.	Exp.	Imp.	Exp.	Imp.	Exp.	Imp.	Exp.
Firewood	1000 m3	18	153	3	61	2	59	8	91
Roundwood	1000 m3	2860	1014	1.868	807	2.025	1.332	2.251	1.051
Charcoal	1000 mt	39	34	55	55	48	31	47	40
Woodchips	1000 m3	738	45	542	18	900	20	727	28
Wood Residues	1000 m3	94	173	38	177	455	283	196	211
Sawnwood	1000 m3	2446	240	1.509	111	1.324	151	1.760	167
Wood Based panels	1000 m3	1333	2234	874	2.082	1.018	2.019	1.075	2.112
Pulp	1000 t	979	900	923	874	1.185	916	1.029	897
Recycled Paper	1000 t	1173	729	962	1.157	1.277	665	1.137	850
Paper and cardboard	1000 t	3997	2860	3.878	2.836	4.525	2.952	4.133	2.883

Source: MAGRAMA













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