

## Portugal

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### Summary

The evidence provided in this report shows that the Portuguese forest sector has been responsive to demands for its products, not only timber, but also cork and some other non wood forest goods and services. The area of forests almost tripled since the mid of the 1990s and the main cause of this has been that response to market conditions. Given the very high salience of private ownership, private forest owners played a major role in that response, even when there were no supported public policies, which was the case until the 1980s. Private forest owners obviously have not been alone in making up these adjustments to demand. Forest industries have been the essential connecting link between the forests and the final consumers, either in the domestic markets, or abroad.

The first jump in expanding the forest resource base was the installation of the cork oak stands in the southern regions, mostly from the mid of the XIXth century until the mid of the XXth century. This was and still remains an export oriented business. It has successfully resisted the arrival of plastics, and is now facing new forms of competition from this material. Again this competition is meeting an active response from the industry and the forest owners, but a lot is still undecided about the end of this game.

Pulp and paper is another story of creation of a new forest resource base and a new industry oriented essentially towards exports. Like in the case of cork, the quality of the product has been generally good, but here also new threats are arising. The resource base of the industry is under increasing risk of forest fires and the fundamentals of the Portuguese economy, in recent years, are not favouring exporting business.

The wood based panel industry is another case where the forest resources built up by private forestry during the last one hundred years were able to trigger and sustain industrial conglomerates of large international scope. Nowadays the leading group in the world in this industry is Portuguese. The tree species at the base of this industry is maritime pine. This is the species which has been suffering most with forest fires and this is not good news for the industry. However, entrepreneurs here have been able to evolve towards other products and other markets.

The rest of the forest industries (sawmilling, carpentry and furniture) are essentially made of small, even very small enterprises relying almost entirely on the domestic market. Rising real incomes and lower real interest rates, until the turn of the century

helped these activities. These favourable conditions stopped to hold at the same time as the exposure to foreign competition became more intense. The strong dependence of these industries on the macroeconomic situation of the country is now pushing them towards improvements in labour productivity, at lower levels of employment.

## 1. Consumption

### 1.1. Macroeconomic factors driving domestic forest products consumption

#### 1.1.1. Demographic trends

The trends in total population and in the share of urban population in Portugal are presented in table 1.1. The data shows a turning point in the urbanization of Portuguese population **in the eighties**. It is the decade where more than half of the total population changes from living in “rural” towns (up to 2000 inhabitants) to living in “urban” areas.

#### 1.1.2. GDP trends and fluctuations

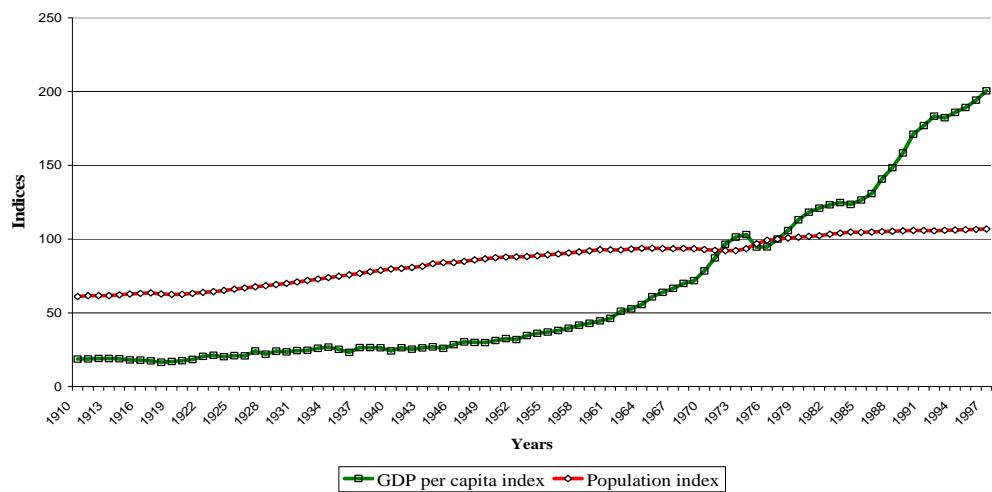
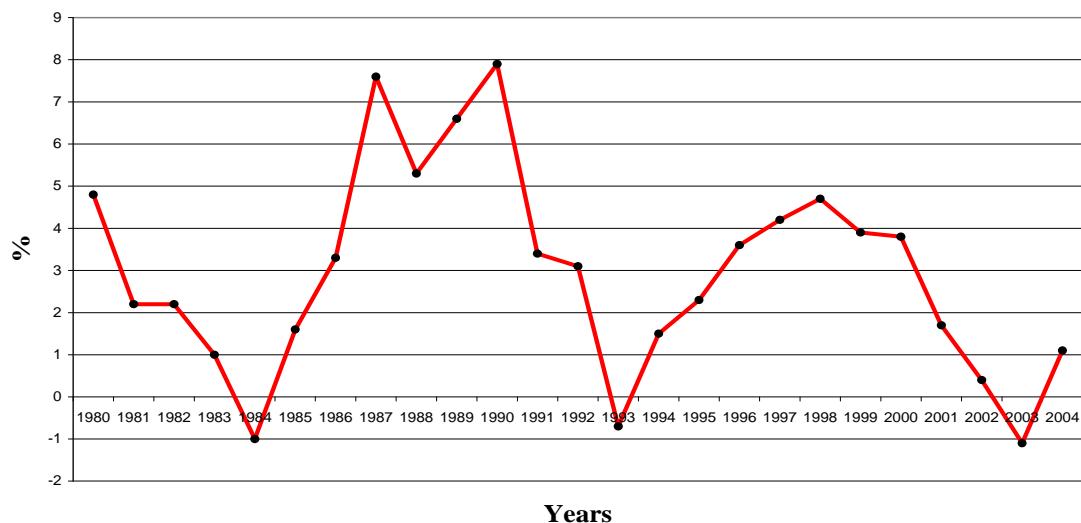
Graphic 1.1<sup>1</sup> shows the long run trends in total population and GDP per capita. We can see from these data another turning point in the Portuguese economy in the sixties, as far as consumption is concerned: until that time consumption was driven both by the growth in total population and in GDP per capita; since the sixties the contribution of demographic growth has been negligible and it is essentially the growth in GDP per capita that is relevant as a driver for private consumption. So taking together these observations and what was said in the previous section, the major trends in Portuguese economy, since the sixties, are the following:

- slow down in the growth of total population;
- massive rural out migration with growing concentration in urban areas;
- growth in real income per capita.

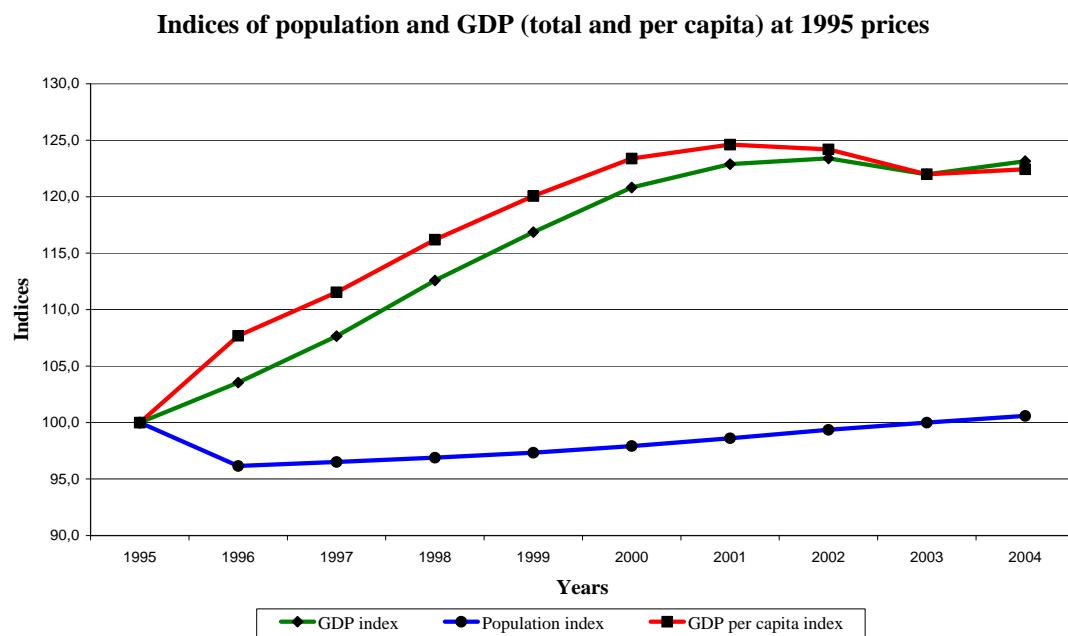
Besides this look at the long run trends, it is also necessary to look at the conjunctural variations in GDP. As we will see in the chapter about the wood-processing industries, these variations matter a lot for the dynamics of those which are oriented towards the domestic market.

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<sup>1</sup> The indices represented in the graphic are based on the data provided in annex of the book by Mateus (1998).

**Indices of total population and GDP per capita (base 100: 1977)**

**GDP real annual growth rate**

**Sources:**

- a) 1980-95: own calculations based on data from the “long series” of the Bank of Portugal
- b) 1996-2000: own calculations based on INE data for the National Accounts base 2000
- c) 2001-04: annual reports of the Bank of Portugal



### 1.1.3. Household expenditure distribution

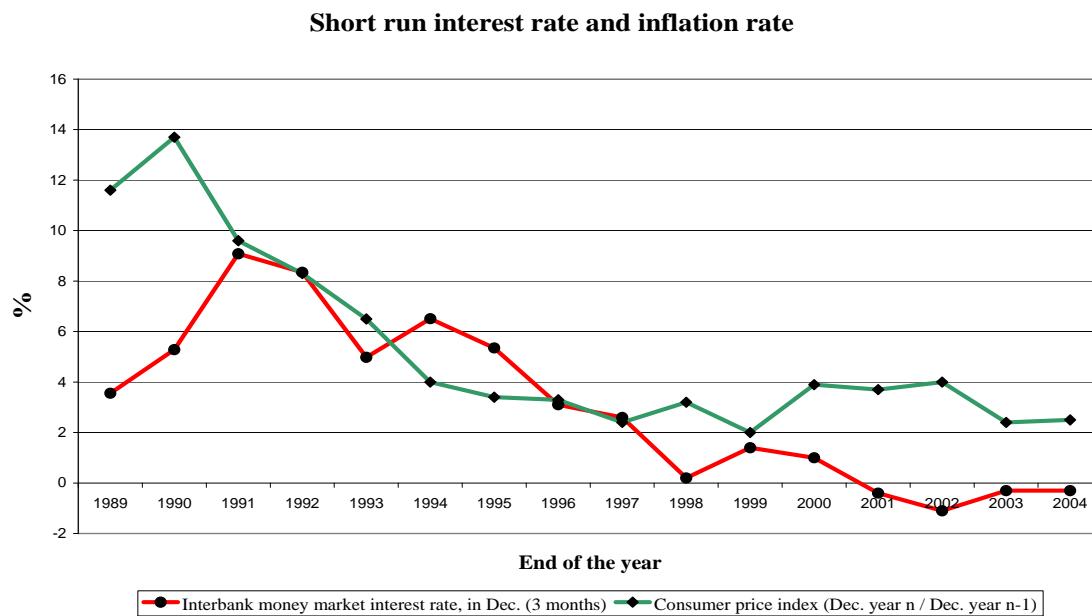
Table 1.3 shows the distribution of the average household expenditure by types of goods and services since 1980. The major trends are the following:

- a sharp decline in the share of food and beverages which was still very high in 1980/81;
- an increase in the share of housing and related equipment (furniture included) and services;
- an increase in the share of services such as transportation, communication, education, entertainment, cultural services, hotels, food away from home.

### 1.1.4. Real interest rates

Until the beginning of the 1990s real interest rates were increasing. The late 1980s and the early 1990s were a period of tight monetary policies to control inflation and prepare the country for accession to the Economic and Monetary Union. Because of this **real interest rates engaged in a declining trend since 1991** which led to negative values for the short run interest rates, in 2001/03.

Since the long run interest rates, including the rates for home acquisition, also followed this pattern, reinforced, in this case, by public subsidies, this was a positive driver of demand for the builders' carpentry and the furniture industry during the 1990s. This situation came to an end at the turn of the century when there was no more room for real interest rates to go down.



Sources:

a) Interest rate:

- 1989-92: 86 to 96 days same day interbank money market interest rate, in December (source: Bank of Portugal)
- 1993-98: LISBOR interest rate, for 3 months, in December (source: Bank of Portugal)
- 1999-2004: EURIBOR interest rate, for 3 months, in December (source: Bank of Portugal)

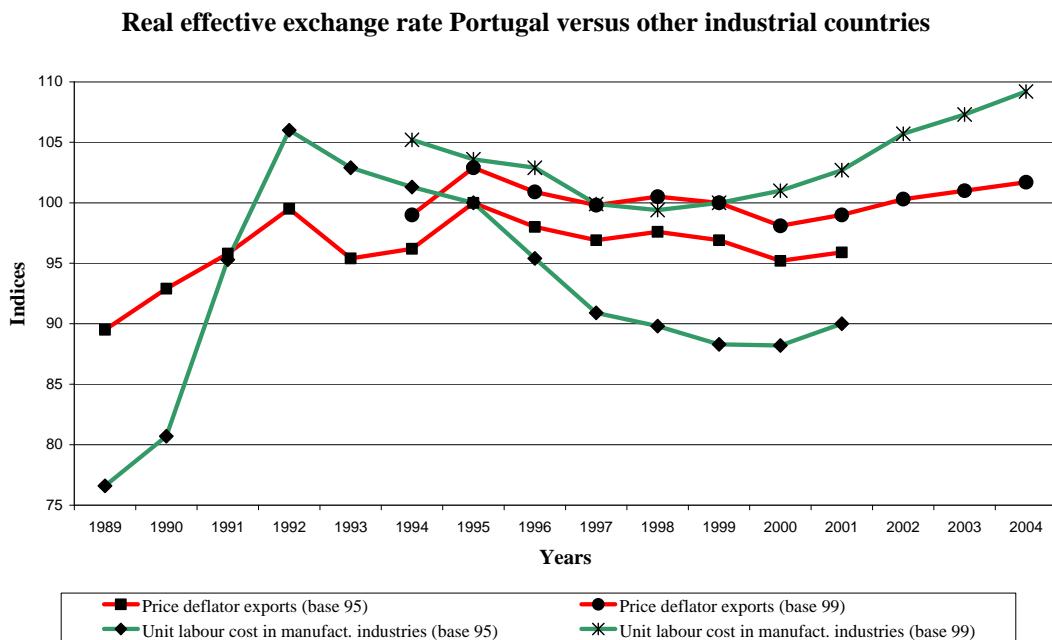
b) CPI: INE, Índice de Preços no Consumidor

- 1989-91: index for mainland Portugal
- 1992-2004: index for the whole country

### 1.1.5. Price and cost competitiveness

The following graph presents the real effective exchange for Portugal with respect to other industrial countries, since 1989, using as deflators the price of exports of goods and services and the unit labour cost in the manufacturing industries. Considering each of these indicators per se, the sign of a change in its value has an effect of opposite sign in competitiveness. This data shows the following situations in the price and cost competitiveness of the Portuguese economic during this period:

- a) **until 1992** there was an appreciation of the two effective exchange rates, with the one deflated by the unit labour cost going up faster, which means **increasing difficulties for export oriented activities**;
- b) **from 1992 to 1995**, the **situation of the export oriented activities started to improve** because, even though the rate deflated by the export prices went up, the rate deflated by the labour costs went down;
- c) **until 1999** the situation of the export oriented activities was **still fine** because the export prices went down, but the rate deflated by the labour costs decreased even more;
- d) **since 1999** the price and cost **competitiveness conditions took a negative trend** with both rates going up, but the labour costs increasing faster than export prices.



## 1.2. Demand for wood, cork and related products

### 1.2.1. Overview

Exports, and not domestic consumption, have been the major drivers of wood and cork production in Portugal during the last century:

- exports explain almost entirely the growth in cork oak production and eucalyptus for pulpwood;
- they also explain a good deal of the growth in pine wood production.

One result of this is that, since the XIX<sup>th</sup> century, forest products have contributed positively for the balance of trade in Portugal. Nowadays these products are **the fourth major group** in the Portuguese exports, generating 11% of the total exports in value. They were the second group until a few years ago, before a big project in car making industry took off. It is important to point out that the forest products have risen to a percentage of this magnitude around 1880.

Even though the global forest trade balance is positive, the forestry trade balance is negative, being compensated by a positive balance for manufactured forest products. This is due mostly to the following situations:

- imports of tropical timber for the furniture industry;
- some imports of pulpwood;
- imports of cork.

### 1.2.2. Wood and related products

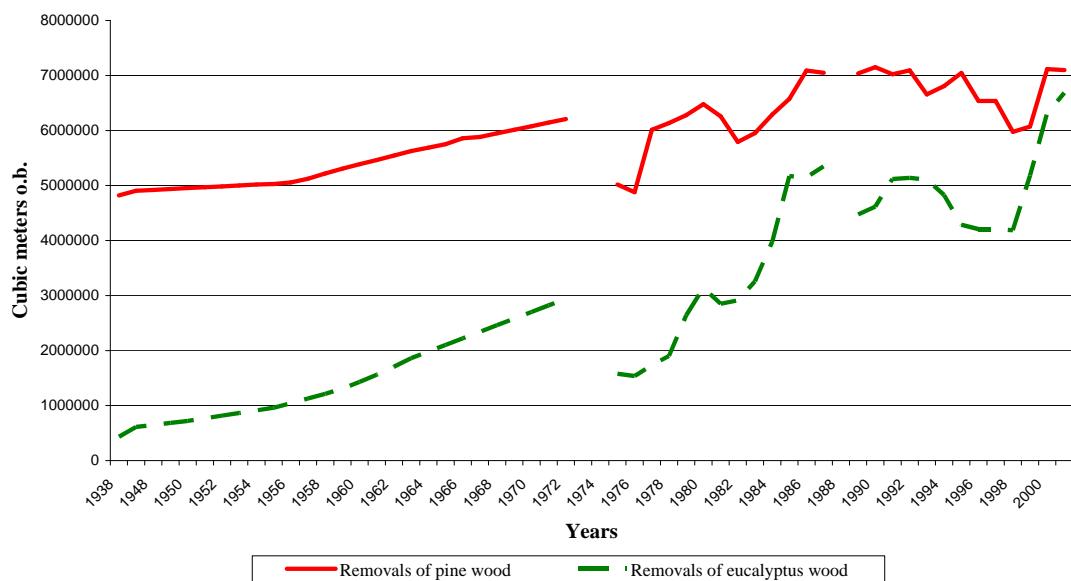
#### Removals

Removals of pine wood increased from mid 70s to the beginning of the 90s, declined during the 90s and gave signs of restart growing since the year 2000. The rise and fall of these removals is probably explained mostly by the rise and fall of the exports of sawnwood for pallets.

In spite of some difficulties during the 90s, the removals of eucalyptus wood for pulp show a clear positive trend, at higher growth rates than for pine. This is due to the derived demand from a growing pulp and paper industry, more competitive than the pine based sawmilling.

The 11,200,000 m<sup>3</sup> o.b. of annual feelings for wood supply are almost of the same amount as the 12,900,000 m<sup>3</sup> o.b. of net annual increment in the forests with the same main function. So the **derived demand by forest industries is in tight tandem with wood supply**. Net annual increment per hectare in forests for wood supply (4,6 m<sup>3</sup>/ha/year for *Pinus pinaster* and 9,0 m<sup>3</sup>/ha/year for *Eucalyptus globulus*) is relatively small due to poor forest management. With better management these increments could be increased by 20% or more.

**Removals of pine and eucalyptus wood**

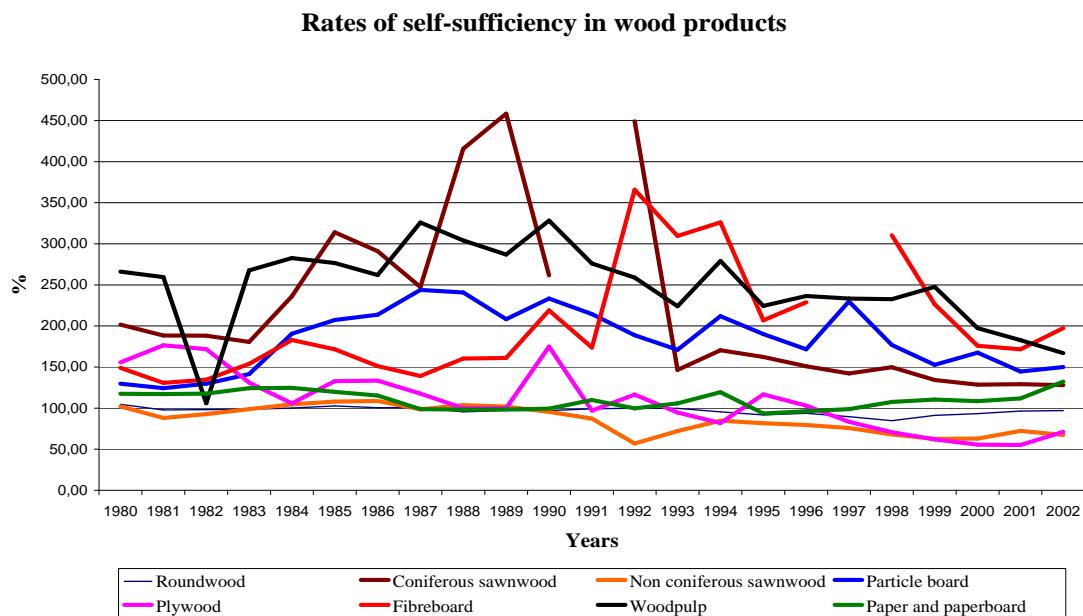


#### Domestic consumption and foreign trade

The trends in production, apparent domestic consumption and foreign trade based on the UNECE/FAO TIMBER database for 80s and 90s were the following:

- Portugal had an exporting position in all wood products categories throughout the entire period;
- The rate of self-sufficiency increased during the 80s and declined during the 90s.

Since these trends are common to all product categories, and given the date in the trend reversal, there are good reasons to advance the hypothesis that it is mainly due to changes in the macroeconomic policies and in the macroeconomic environment. The major change in this matter was the process of joining the Economic and Monetary Union, which left the exporting activities without the protection they had until then through variations in the exchange rate.



### 1.2.3. Cork

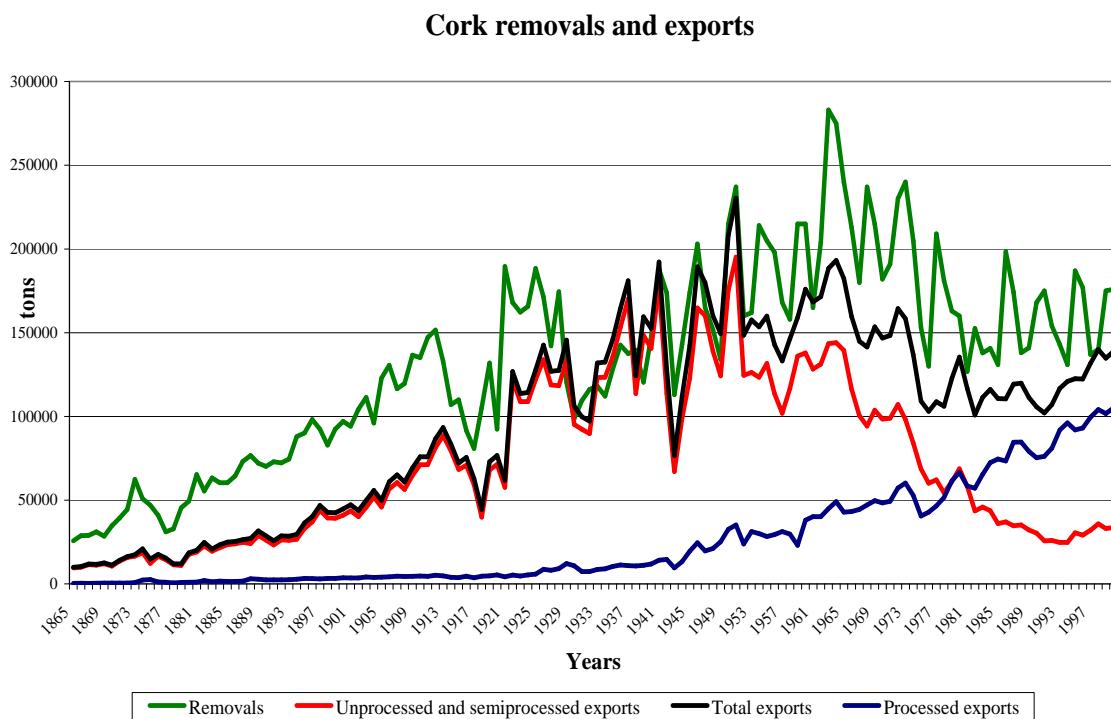
#### Main periods in historical development of cork production and consumption

Cork is the major non-timber forest product in Portugal, the country being the main producer of raw cork in the world (more than 50% of the world production). Since the Spanish Civil War, in 1936, Portugal also became the main manufacturer of this material in world.

Mendes (2002) provided the long series of cork removals and exports represented in the graph for the period since 1865<sup>2</sup>. These series show the following facts:

- a strong correlation between the amounts of cork removals and exports;
- three different periods in the dynamics of these two variables:
  - a) **from 1865 until the second half the 30s:**
    - positive trends in cork removals and exports (total, unprocessed and processed cork), only interrupted during World War I and the crisis of 1929;
    - exports of unprocessed cork being more important (in quantity terms) than processed cork until World War I, staying close to each other until the end of this period;
    - the last decade of the XIX<sup>th</sup> century as the moment of take off for the cork industries;
  - b) **from the second half of the 30s until mid 60s:**
    - positive trend in cork removals and exports of processed cork;
    - negative trend in exports of unprocessed cork;
  - c) **from mid 60s until mid 80s:**
    - sharp decline in cork removals;
    - continuing decline in exports of unprocessed cork;
    - decline in exports of processed cork;

<sup>2</sup> The graph is based on the series presented in Mendes (2002b), completed and updated with data from the [official](#) foreign trade and agricultural statistics.



d) since mid 80s:

- positive trend in cork removals recovering the level of the end of the 30s;
- positive trend in exports of processed cork recovering the levels (in quantity terms) of before the Revolution of 1974.

#### 1.2.4. Demand for other non wood forest products

As far as other forest products are concerned, besides wood and cork, export orientation is not the main destination of production. There has been a flow of exports in products such as chestnuts, pine nuts, carob, mushrooms and resin. In mushrooms the flow of exports may be higher than recorded in official statistics. Resin, after a fast development in the 70s following the decline of this industry in France, is currently at very low levels due to the competition from China and other low cost exporting countries.

A last note about two other relevant marketable products from Portuguese forests, which are honey and forest based livestock products. In the first one, there is a significative flow of exports but the domestic market is still predominant. For the second group, the orientation towards the domestic market more important than for honey. In both types of products there is a trend towards the establishment of certification schemes related to geographic controlled denominations, which aim at reaching an increasing number of quality concerned urban consumers.

#### 1.2.5. Demand for forest services

Massive urbanization of Portuguese population dates only from the sixties, and significative increases in real income for the majority of the population happened later than that. Still, in the beginning of the 80s, food and clothing represented 40,6% of the total expenditures of an average household. Probably for these reasons, urban

consumption of forest services (recreation, rural tourism, landscape amenities for primary or secondary residence) is a relatively recent phenomenon in Portugal. This may also explain the almost non-existence of empirical research on this topic in the country.

### **1.3. Supporting and impeding factors for enterprise development in forest product consumption**

#### **1.3.1. Supporting factors**

As shown in chapter 5, forest area was multiplied almost by three since the mid of the XIXth century until now. If some of this is due to natural regeneration, for the most part this is a response of private forest owners to expanding demand for forest products, in the domestic markets and from abroad. First it was the demand for cork. Then came the demand for sawnwood, mostly from pine. Finally, in the 1960s. picked up the demand for eucalyptus pulpwood.

In cork, wood-based panels and pulp and paper businesses, some large companies of international scope developed and export orientation has been the main driver of production. For most of the rest of the forest industries and related services, the domestic market is the main driver of production delivered by firms often of small size. The increase in disposable income, especially after the revolution of 1974 and the decline in real interest rates related with the accession to the Economic and Monetary Union expanded the domestic market for many of these firms throughout part of the 80s and 90s.

However, this good times are now coming to an end, or, at least, from now on business cannot be as usual for the SMEs which have relied almost entirely on the domestic market.

#### **1.3.2. Impeding factors**

The current problems in the forest industries and related activities, both the export oriented ones and those relying on the domestic market have to do with competitiveness conditions. The recent trends in the price and cost competitiveness conditions of the Portuguese economy are getting worse for the exporting firms. As we will see, this is triggering innovation and increases in productivity, but with negative effects on employment.

Also the firms relying on the domestic market have to do the same. The data collected for this report actually shows that they are also following this path. If they can adjust more quickly to the macroeconomic fluctuations, they have more difficulties to reach beyond the limits of the domestic market. At home they are facing increasing competition from abroad, and to go abroad many of them have not yet taken the necessary steps.

In brief, what the data presented in chapter 3 shows, combined with the data presented here, is the very **strong influence of the macroeconomic conditions** on the evolution of the Portuguese forest industries and, therefore, on the economic use of the country's forest resources. If these conditions favour expansion in the domestic demand and in the

price and cost competitiveness, it is good time for these industries. If those conditions change, the economic situation in these industries also change and relatively quick.

### Some publications of interest

Direcção Geral das Florestas-Divisão de Estudos. 1991. Perfil Florestal. Portugal. Lisbon: Direcção Geral das Florestas.

Instituto Nacional de Estatística. Estatísticas do Comércio Internacional (several years)

Instituto Nacional de Estatística. Estatísticas Agrícolas (several years)

Instituto Nacional de Estatística. Estatísticas do Turismo (several years)

Mendes, Américo M. S. Carvalho. 2002. A economia do sector da cortiça em Portugal. Evolução das actividades de produção e transformação ao longo dos séculos XIX e XX. Paper presented at the XXII Meeting of the Portuguese Association of Economic and Social History, University of Aveiro, 15-16 November 2002 (<http://www.egi.ua.pt/xxiaphes/Artigos/Américo Mendes.pdf>).

Mendes, Américo M. S. Carvalho. 2005. *Portugal*. In Valuing Mediterranean Forests: Towards Total Economic Value, Maurizio Merlo & Lelia Croitoru (eds.). Wallingford, Oxon (UK): CAB International. pp. 331-352.

Mendes, Américo M. S. Carvalho, Diana Feliciano, Marisa Tavares & Rafael Dias. 2004. The Portuguese Forests. Country level report delivered to the EFFE Project – Evaluating Financing of Forestry in Europe. Porto: Faculty of Economics and Management – Portuguese Catholic University.

### Statistical annex

Table 1.1: Portugal (Mainland, Azores & Madeira) – total population and urban population

Years of demographic census	Total population	Population living in towns of 10000 inhabitants or more	Population living in towns of 2000 inhabitants or more (%)
1911	5,960,056	836,862 (14,0%)	1,478,573 (24,8%)
1920	6,032,991	n.a.	n.a.
1930	6,825,883	n.a.	n.a.
1940	7,722,152	1,475,107 (19,1%)	2,398,772 (31,1%)
1950	8,510,240	1,671,365 (19,6%)	n.a.
1960	8,889,392	2,009,319 (22,6%)	n.a.
1970	8,663,252	2,284,839 (26,4%)	n.a.
1981	9,833,014	2,918,549 (29,7%)	4,679,985 (47,6%)
1991	9,867,147	3,271,619 (33,2%)	5,079,773 (51,5%)
2001	10,356,117	3,904,794 (37,7%)	5,960,721 (57,6%)

Sources: INE. V, VI, VII, VIII, IX, X, XII, XIII and XIV Population Census.

Notes: a) 1911, 1920, 1930 and 1940: total present population

b) 1950, 1960, 1970, 1981, 1991 and 2001: total resident population

Table 1.2: GDP (total and per capita) at 1995 prices

Year	Total GDP (1000€)	Annual rate of change in GDP (%)	Resident population	GDP per capita (€)
1995	80826.9		10,474,685	7716
1996	83692.2	3,5	10,072,500	8309
1997	87006.5	4,0	10,109,700	8606
1998	90991.8	4,6	10,148,900	8966
1999	94450.1	3,8	10,195,000	9264
2000	97641.6	3,4	10,256,700	9520
2001	99317.5	1,7	10,329,300	9615
2002	99731.3	0,4	10,407,500	9583
2003	98590.9	-1,1	10,474,685	9412
2004	99533.7	1,0	10,536,200	9447

Sources: a) GDP: INE, Contas Nacionais; b) Population: 1995-2002: INE, Anuário Estatístico 2003; 2003: INE, Estatísticas Demográficas 2003; 2003: Banco de Portugal, Relatório de 2004.

Table 1.3: Household expenditures distribution (% total expenditures at current prices)

	1980/81	1989/90	1994/95	2000
Food, beverages and tobacco	40.6	33.2	23.8	21.5
Shoes and clothing	10.1	9.3	6.3	6.6
Housing, furniture, housing equipment and maintenance, water, electricity, gas and other carburants	17.9	19.5	27.3	27.0
Health	2.6	3.0	4.6	5.2
Transportation and communication	13.5	15.9	17.6	18.3
Education, leisure, entertainment and cultural services	3.7	4.5	5.0	6.1
Hotels, restaurants, bars, and other goods and services	11.6	14.7	15.6	15.6

Sources: INE, Inquérito aos Orçamentos Familiares, 1980-1981, 1989-1990, 2000.

Table 1.4: Real effective exchange rate: Portugal versus other industrial countries

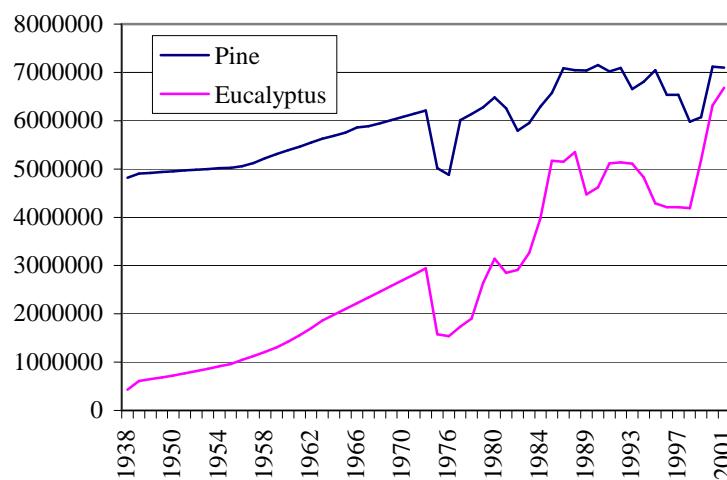
Year	Price deflator exports of goods and services		Nominal unit labour cost in manufacturing industry	
	Base 1995	Base 1999	Base 1995	Base 1999
1989	89.5		76.6	
1990	92.9		80.7	
1991	95.8		95.3	
1992	99.5		106.0	
1993	95.4		102.9	
1994	96.2	99.0	101.3	105.2
1995	100.0	102.9	100.0	103.6
1996	98.0	100.9	95.4	102.9
1997	96.9	99.8	90.9	99.9
1998	97.6	100.5	89.8	99.4
1999	96.9	100.0	88.3	100.0
2000	95.2	98.1	88.2	101.0
2001	95.9	99.0	90.0	102.7
2002		100.3		105.7
2003		101.0		107.3
2004		101.7		109.2

Source: European Commission – Directorate General for Economics and Financial Affairs. Price and Cost Competitiveness (several issues).

Table 1.5: Trade balance in forest products

	<b>1990</b>	<b>1992</b>	<b>1994</b>	<b>1996</b>	<b>1998</b>	<b>1999</b>
Forestry	Imports 27312	26598	30659	33203	59281	45998
	Exports 5989	7591	6579	7847	9601	10061
	Balance -21323	-19007	-24080	-25356	-49680	-35937
Forest Industries	Imports 108220	152244	172771	226551	301548	316160
	Exports 294219	277201	361442	396448	476905	479186
	Balance 185999	124957	188671	169898	175357	163026
Forest Sector	Imports 135532	178842	203430	259754	360829	362158
	Exports 300208	284792	368021	404295	486506	489247
	Balance 164676	105950	164591	144542	125677	127089
Economy	Imports 3589570	4087577	4595294	5558201	7081777	7436917
	Exports 2335798	2475202	3074273	3922604	4609978	4647800
	Balance -1253772	-1612375	-1521021	-1635597	-2471799	-2789117
Forest export/Forest imp.	225,2	161,6	180,8	155,7	134,9	135,3
Forest import./Total imp.	3,8	4,4	4,4	4,7	5,1	4,9
Forest export./Total export	12,9	11,5	12,0	10,3	10,6	10,5

Source: MADRP. Panorama da Agricultura 2000.

Figure 1.6: Removals of pine and eucalyptus wood (m<sup>3</sup> o.b.)

Source and methodology: Mendes *et al.* (2004)

Table 1.7: Portugal - Production, apparent consumption and foreign trade of wood products

Product Name	Flow	2000	2001	2002	2003*
Roundwood	Removals 1000 m <sup>3</sup>	10831,00	8946,00	8742,00	8742,00
	Imports 1000 m <sup>3</sup>	1342,10	1152,00	1080,00	1080,00
	Exports 1000 m <sup>3</sup>	570,10	812,00	807,00	807,00
	Consumption 1000 m <sup>3</sup>	11603,00	9286,00	9015,00	9015,00
	Rate of self-sufficiency (%)	93,35	96,34	96,97	96,97
	Production 1000 m <sup>3</sup>	1020,00	987,00	859,00	859,00
Coniferous sawnwood	Imports 1000 m <sup>3</sup>	45,00	50,00	47,00	47,00
	Exports 1000 m <sup>3</sup>	271,70	272,00	235,00	235,00
	Consumption 1000 m <sup>3</sup>	793,30	765,00	671,00	671,00
	Rate of self-sufficiency (%)	128,58	129,02	128,02	128,02
	Production 1000 m <sup>3</sup>	407,00	505,00	439,00	439,00
	Imports 1000 m <sup>3</sup>	252,20	202,00	227,00	227,00
Non-Coniferous sawnwood	Exports 1000 m <sup>3</sup>	11,70	9,00	15,00	15,00
	Consumption 1000 m <sup>3</sup>	647,50	698,00	651,00	651,00
	Rate of self-sufficiency (%)	62,86	72,35	67,43	67,43
	Production 1000 m <sup>3</sup>	722,00	700,00	736,00	736,00
	Imports 1000 m <sup>3</sup>	88,60	80,00	75,00	75,00
	Exports 1000 m <sup>3</sup>	379,60	296,00	320,00	320,00
Particle board	Consumption 1000 m <sup>3</sup>	431,00	484,00	491,00	491,00
	Rate of self-sufficiency (%)	167,52	144,63	149,90	149,90
	Production 1000 m <sup>3</sup>	31,00	32,00	32,00	32,00
	Imports 1000 m <sup>3</sup>	29,50	32,00	24,00	24,00
	Exports 1000 m <sup>3</sup>	4,70	6,00	11,00	11,00
	Consumption 1000 m <sup>3</sup>	55,80	58,00	45,00	45,00
Plywood	Rate of self-sufficiency (%)	55,56	55,17	71,11	71,11
	Production 1000 m <sup>3</sup>	495,00	470,00	440,00	440,00
	Imports 1000 m <sup>3</sup>	96,30	114,00	122,00	122,00
	Exports 1000 m <sup>3</sup>	309,90	310,00	339,00	339,00
	Consumption 1000 m <sup>3</sup>	281,40	274,00	223,00	223,00
	Rate of self-sufficiency (%)	175,91	171,53	197,31	197,21
Fibreboard	Production 1000 m <sup>3</sup>	1774,00	1806,00	1929,00	1929,00
	Imports 1000 m <sup>3</sup>	94,20	163,00	140,00	140,00
	Exports 1000 m <sup>3</sup>	969,10	980,00	914,00	914,00
	Consumption 1000 m <sup>3</sup>	899,10	989,00	1155,00	1155,00
	Rate of self-sufficiency (%)	197,31	182,61	167,01	167,01
	Production 1000 m <sup>3</sup>	1290,00	1419,00	1537,00	1537,00
Wood pulp	Imports 1000 m <sup>3</sup>	643,60	642,00	605,00	60,5,00
	Exports 1000 m <sup>3</sup>	744,40	792,00	979,00	979,00
	Consumption 1000 m <sup>3</sup>	1189,20	1269,00	1163,00	1163,00
	Rate of self-sufficiency (%)	108,48	111,82	132,16	132,16
	Production 1000 m <sup>3</sup>	1290,00	1419,00	1537,00	1537,00
	Imports 1000 m <sup>3</sup>	643,60	642,00	605,00	60,5,00
Paper and paperboard	Exports 1000 m <sup>3</sup>	744,40	792,00	979,00	979,00
	Consumption 1000 m <sup>3</sup>	1189,20	1269,00	1163,00	1163,00
	Rate of self-sufficiency (%)	108,48	111,82	132,16	132,16

Source: UNECE/FAO TIMBER database as of July 19, 2004.

(\*) - The UNECE/FAO data for 2003 is a repeat of the data for 2002. At the time this text was written there was no update available neither in this database, nor in national statistics.

## 2. Small scale forestry practices

### 2.1. Overview

Overall, the most salient fact of forest ownership in Portugal is the **very high share of private lands**: 93.4% (Mendes, 2005a). As the estimates presented in table 2.2 show, this importance of non industrial private ownership is almost total in cork oak forests. It is also very important in eucalyptus forests, but here with a non negligible presence of forest industries (pulp and paper companies) in ownership and/or management. Concerning maritime pine, the presence of state is also negligible, as for the other species, but the presence of communal forests is non negligible. This is a legacy of the forest policies of the 1930s up to the 1960s when the Forest Services carried out a programme of afforestation of the communal lands in the mountain areas of the Northern and Central regions where most of the communal forests are now located.

There is no quantitative data available about the size distribution of forest ownership, and there is very few available about the size distribution of forest holdings. This one dates back to 1995 and is presented in table 2.4. This data clearly shows the **regionally contrasting situation**, in Continental Portugal, **concerning forest ownership**:

- the Northern and Central regions are the home of small scale forestry, with about one half of more of the forest land in holdings up to 10 ha;
- in the Southern regions, especially in Alentejo, forest holdings are mostly above 100 ha.

There is some empirical evidence (Baptista & Santos, 2005) showing that the majority of the forest owners still live in the same town, or in places which allow them to visit their forests if not everyday, at least with some good frequency. What is less and less true, contrarily to what happened often in the past, is that they combine the condition of forest owners with the condition of farmers. More and more they are urban people who inherited rural land, some of which is afforested.

For those who are still farmers, the survey of 1995 from which data on table 2.4 was taken gives the information about the share of forest income in the total income of the farming and forest activities presented in table 2.5. The main conclusion is that forestry is the main source of income for an extremely small percentage of forest owners. For this reason, the incentive of the commercial outputs of forestry to have forest owners actively involved in forest management and forest investment is also very small for the very large majority of them.

### 2.2. Small scale forestry practices

#### 2.2.1. Northern and Central Portugal

Non-industrial private forest owners in Northern and Central Portugal are mostly of the following types:

- small private owners who, in many cases, are small part-time or aged farmers still living near their forests;
- larger private owners usually living in the city with their lands leased out to tenants or left under-utilised.

In the past, forestlands were a necessary complement to agriculture because they provided pasture to feed the livestock and brushwood, which after being used as bedding for animals was turned into manure to fertilise the land. The forests were also a

free source of fuel wood and non-wood products indispensable for the subsistence of the local communities. Therefore forestlands were actively used and were managed free of charge for their owners.

Currently things are different. Modern farming uses industrial fertilisers and foodstuffs, the rural households no longer use fuel wood or the non-timber products from the forests. Therefore, the forest owners don't have local people going around their forests to collect the combustible materials free of charge for the owners. Nowadays, if they want these materials cut and removed, they have to hire workers for that. Often it is very difficult to find workers who can do this job, under appropriate technical supervision and at an acceptable price. These costs are also aggravated by the difficult topography of many forestlands in the Northern and Central Portugal. Another aggravating factor of the risk of forest fires in the pine woods of these regions is the fact that resin taping was almost vanished from these forests.

Comparing three alternative options to reduce the accumulation of combustible materials in the forest, the costs are the following:

- mechanised cutting and removal from the forest: 500 euros/ha;
- mechanised cutting without removal from the forest: 125 euros/ha;
- prescribed burning: 7,5 euros/ha.

The first two options fall outside the range of the willingness to pay of most forest owners. The third one is affordable, but it has many restrictions in order to be implemented correctly. Also, it is still very much within the circles of forest research, lacking qualified personnel in the field to use it properly. So because the forest maintenance costs are rising beyond the willingness to pay of private owners, because the benefits are uncertain and do not occur in the short run, and also because part of these benefits are externalities for which the private owner is not compensated, the result is that the large majority of private owners spend very little money in the maintenance of their forests. Also they do not spend money in afforestation unless it is financed by others (pulp and paper industry for the eucalyptus, and generous public grants for the other species). So the growth and decay of the forests is left to natural regeneration and wildfires.

When the owner decides to cut, it is not because he is following some forest management plan guided by optimal rotation principles, but because he needs cash to make ends meet. This leads to the following management practices:

- clear-cut after a forest fire;
- commercial thinning removing the best trees and leaving behind the worse ones causing negative selection and lowering the productivity of the forests.

### **2.2.2. Southern Portugal**

In Southern Portugal the most important forest owners are the ones who have cork oak forests. Compared with the owners in Northern and Central Portugal, they have the following advantages:

- large forest holdings;
- a forest product like cork which, for that kind of holdings, may generate income almost every year;

- a topography less hilly than in Northern and Central Portugal leading to relatively lower harvesting and maintenance costs, in forestry.

Cork oak harvesting is regulated since the 1920s. The harvest in each tree has to be done every 9 years and not before, in order to protect the productive capacity of the tree. The most current method of extraction is to peel the whole tree (*pau batido*). The first harvest normally happens when the tree is 18 years old, and the second one 9 years later. These two harvests, however, have very low commercial value. So the first one with good commercial value happens when the cork oak trees are 36 years old or more. Cork production increases until the age of 60, the tree remaining with reasonable productive capacities until the age of 126, more or less.

About half of the production harvested comes from forest owners who take care of the harvesting on their own, with wage workers specialized in this job, and the other half comes from forest owners who sell the cork, on the tree to harvesters and merchants who take in charge the extraction of the production.

Because raw cork is a very heterogeneous product, and its quality can vary a lot even within a relatively small area, and since the prices are very much influenced by that quality, the market structure for this product is determined by issues of imperfect information, to the advantage of the bigger groups dominating the cork industries. Intermediaries working directly or indirectly for those groups travel throughout the cork producing territory with financial capacity and good field knowledge to buy the quantities and qualities of cork they need in favourable terms. One of the areas where some forest owners' organisations in these regions decided to enter was in setting up a system of classification of cork enabling the forest owners to get a fair price for their product.

### **2.3. Supporting and impeding factors for enterprise development in small-scale forestry and barriers to entrepreneurship: the role of forest owners organisations and forest policy**

#### **2.3.1. Number and history of the forest owners' associations**

In spite of the fact that, for many years, there has been a high percentage of forestland under private ownership, which is also very fragmented in a large part of the country, the collective organisation of private forest owners is a very recent phenomenon, as the data presented in annex clearly shows. In fact, the emergence of this movement happened only during the 1990s and has been relatively fast in recent years, especially in the Northern and Central regions where small scale forestry is largely dominant.

Now there are 133 associations recorded by the State Forest Services, which is more than twice the number of associations existing in 1998. Most of these organisations cover more than one county and there are several cases where more than one organisations work on overlapping territories. Anyway, with a total of 278 counties in Continental Portugal, the current number of associations is enough to embrace almost all the territory where forest exists. This does not mean that on its territory, each association has a membership representing the majority of the forest owners' or most of the forest land. In fact, they are still very far from that. The best examples are those where they represent about one fourth of the forest land in their territory. Even though

reliable and comprehensive data about the number of members and the corresponding forest land is lacking for the whole set of associations, we can say that, after a period of emergence and extensive growth of the forest owners' associationist movement during the 1990s, the time is now coming for a period of intensive growth where each of the existing associations has to increase membership, as well as the quantity, quality and diversity of the services provided to its members.

In terms of legal status, the organisations with statutes under the Civil Code ("associations") predominate by far. Cooperatives were only 31 out of 130, in January 2002. This structure has a historical explanation related to the origins of this recent emergence of forest owners' organisations. In fact, most of these organisations were created independently of the existing farmers' cooperative movement. It was only in July 2000 that the national confederation of agricultural cooperatives set up a specific federation for grouping existing and new farmers' cooperatives with a forestry section called FENAFLORESTA – Federação Nacional das Cooperativas de Produtores Florestais.

There are several reasons for most of the existing forest owners' associations being independent from the farmers' cooperatives. One reason is that many of the ones existing in the Northern and Central regions were promoted by an organisation which now has the nature of a national federation of local forest owners' associations called *FORESTIS-Associação Florestal de Portugal*. FORESTIS was created in 1992 by a group of persons independent from the farmers' cooperative movement, with the purpose of creating local forest owners' associations initially in the Northern and Central regions, and later on in the rest of the country. Because of several cases of mismanagement in farmers' cooperatives, the denomination "cooperative" was not attractive for some of the potential members to bring to these new organisations. For others with more conservative ideas, the word "cooperative" had a leftist connotation. Therefore, "association" was a better denomination. Also, an association was a much more flexible legal status, regulated by the simple rules of the Civil Code. An association can be very easily created with a relatively few number of initial members, and very small initial capital. It can also be very easily shut down, if things go wrong, without charges impending on the members and directors. It does not have the same tax benefits as a cooperative, but this is not a problem throughout the initial years of activity of this kind of organisations when the provision of taxable commercial services is not yet important.

In the Southern regions where large scale forestry is predominant, most of the existing associations have a different origin. They were promoted and are currently affiliated with *FPFP-Federação dos Produtores Florestais de Portugal*, which is a federation of forest owners' associations created by an agricultural confederation called *CAP – Confederação dos Agricultores de Portugal*. This confederation is independent of the confederation of farmers' cooperatives and disputes with this one and with other organisations the national representation of farmers' interests as a professional group.

So, briefly the 133 local forest owners' organisations are now split in four groups:  
a) a group affiliated with FORESTIS, based mostly in the Northern and Central regions where small scale forestry is largely predominant;

- b) a group affiliated with FPFP, based mostly in the Southern regions where large scale forestry is predominant;
- c) a group affiliated with FENAFLORESTA, the forestry federation of the national confederation of agricultural cooperatives;
- d) a group of local associations without affiliation to any national federation.

### 2.3.2. Primary functions

The existing forest owners' organisations have two main types of primary functions which will distinguished based on an economic criterion:

- a) the provision of services which are **public goods**:
  - representation and defence of the collective interests of their members;
  - raising society's awareness for the importance of forest public goods;
  - spreading information among their members and also among the rest of the population about what should be done to protect and promote forest resources;
- b) the provision of **private services** (non rival and with exclusion) to their members:
  - technical advice;
  - silvicultural works reducing the risk of forest fires.

Probably the main motive for the emergence of these organisations was the provision of **technical assistance** to the forest owners who are willing to **apply for the public incentives** to afforestation, reforestation and stand improvement existing since 1987, within the framework of programmes co-funded by the EU.

Until the mid 1980s, the Portuguese forest policy either did not pay attention to private forestry, or intended to promote this kind of forestry through direct intervention. The first forestry programme co-funded by the EU which started in 1987 (Mendes *et al.*, 2004; Mendes, 2005b) was the turning point in this type of policy. It was this change in forest policy that triggered the demand of technical assistance by private forest owners willing to apply for the new financial incentives. This demand does not come very much from the **very small** forest owners:

- forest holdings are too small to justify investments, even with public incentives which, even being very generous, always involve a good deal of transaction costs to be obtained;
- very small forest owners normally are more poorly informed about forest policy instruments.

Therefore the demand for technical assistance tends to come from forest owners with medium or large size holdings. The big ones can afford to pay the services of private forest consultants. So they don't tend to be very actively involved in the set up of forest owners' associations. The situation is different with forest owners in the middle ranges of forest holding size. This is the core group on which rely most of the more active forest owners' organisations in Northern and Central regions of small scale forestry. For this reason, the development path of these organisations since they started in the 1990s has been to attract forest owners in that group and to increase the quantity and diversity of services they need and ask for.

Besides the preparation of applications for the public incentives and the supervision of the forestry operations financed by this money, another type of service appreciated by

that group of middle range forest owners has to do with fire prevention. Since August 1999, when a governmental decree started with financial incentives for the creation of brigades of forest sappers of 5 men each, to carry on forest management operations reducing the risk of forest fires, a good number of forest owners' organisations enlarged their staff with one or more of these brigades. Since the public incentives came on a irregular and changing basis and required a considerable amount of matching funds from the forest owners' organisations some of those which initially participated in the programme dropped out later on. In spite of that, there are still a good number of forest owners' organisations which managed to keep their brigades on their own, or in partnership with other institutions (usually municipalities).

Still in the area of forest fires, some forest owners' organisations provide **technical assistance to the municipalities** in the preparation of projects for building or managing infrastructures supporting fire extinction (forest roads, water points, etc.). In some cases there is a good partnership between the two kinds of institutions, with each side keeping up with its specific responsibilities and capabilities. In other cases there is waste of public resources, with municipalities pretending to substitute for the responsibilities of the private forest owners, duplicating what forest owners' organisations are already doing, carrying on interventions at an inefficient local scale without any effort of intermunicipal coordination and sacrificing objectives of forest development to electoral motives.

Another area where the existing forest owners' organisations provide services to their members and to other forest stakeholders is in technical training.

There are also some making initial steps towards **certification**, but the process is still at a very early stage. Their are two areas of technical assistance where almost all the existing organisations are absent:

- economic accounting;
- legal advice.

There is no official system of forestry accounting and the large majority of forest owners don't hold private accounts, even for tax purposes. The existing forest owners' associations don't have capacity to provide legal advice to their members. This is a kind of service which is not regularly demanded by their members. Also it would be to expensive for a local organisation to have this kind of service available to those who need it, when they need it.

Finally there are three more areas where the existing forest owners' organisations are absent:

- **harvesting** of forest products;
- **marketing** of forest products;
- **forest industries**.

Harvesting of forest products is an activity for which there is a supply from private contractors. It is also an activity requiring equipment for which the forest owners' organisations don't have the necessary financial means. In this context, the position of most of the forest owners' organisations has been to stay away from these activities, and

simply assisting their members in terms of advising them about the fair prices for their products and in scaling the amount of forest products they are willing to sell.

The same thing happens with the marketing of forest products. This is an activity often organized in terms of spatial oligopsonies held by merchants who are capable of making the life very hard to those who want to jump into their business. Holding shares in forest industries or even holding the full ownership of this kind of firms is also very far away from the capacities of the existing forest owners' organisations. To our knowledge there is one case where one of these organisations tried to invest downstream, in an industrial activity. It is the case of an association grouping a relatively small number of large cork producers in the southern part of the country. This organisation invested in the establishment of a cork plank factory. The project did not stay very long in the only hands of the cork producers. The company ended up being sold to a foreign group with interests in the cork business until being finally bought by the major industrial group in the cork industry.

Briefly, what we can say about the current state of primary functions of the existing forest owners' organisations is that those functions tend to develop in areas where there is some kind of **strategic complementarity** between the services provided by the organisations and the capabilities of their members (Mendes, 1998b):

- a) forest owners, specially in the middle ranges of forest holding sizes, have some demand and willingness to pay for technical assistance to apply for public incentives to forestry and for services reducing the risk of forest fires, but left on their own, it would be very difficult for them to go forward in these directions;
- b) forest owners' organisations have a staff capable to respond to those demands and which can be sustained by the fees paid by the members they assist combined with the financial assistance the organisation can get from the public authorities.

With their current dimension and capabilities the forest owners' organisations hardly can go much beyond these two kinds of primary functions (technical assistance in forest investments and management, and preventive silvicultural works).

### 2.3.3. Relations with forest industries

The forest owners' organisations don't own and don't have any share in forest industries. Also there is no publicly negotiated agreement between those organisations and the forest industries concerning the marketing of forest products. There are reports of some kind of agreement and funding flowing from the pulp and paper industries to the FPFP, but this has never been made public.

The pulp and paper companies manage forest holdings in full ownership or under long terms leases which represent about 28% of the total area of eucalyptus. The two groups which were controlled by the State until its recent privatization merged these forestry operations in a single company. These groups and all the others set up a single company to take care of the operations of fire prevention and fire extinction in their forest holdings.

In the other two major segments of the Portuguese commercial forestry (pine and cork oak forests) the forest industries did not invest as much in upstream forestry operations as the pulp and paper industries did. In fact, they invested almost nothing at this level.

The pressure for **certification** in all the three major segments of the Portuguese commercial forestry, coupled with the pressure from substitute products, in the case of cork, is pushing the forest owners' organisations and the forest industries to some forms of cooperation in that direction. They created an interprofissional council in order to implement the PEFC in Portugal. Also, the forest owners' organisations and the forest industries working with cork established a interprofessional association to deal with the particular issues of this sector.

#### **2.3.4. Relations with the society at large**

Finally, the tragic dimension of the forest fires in recent years draw the attention of the whole society for the importance of protection and promoting forest resources. For this reason, we have been witnessing a growing number of initiatives promoted by organisations outside the traditional set of forest stakeholders concerned with forest issues. Most of these initiatives have not been much more than congresses, seminars or consultancy reports, not necessarily followed by effective actions to cope with the causes of the problems behind the large scale of forest fire damages. In spite of this, these initiatives are part of a positive learning process contributing to raise the awareness of the whole society for the importance of protecting and promoting the forest resources.

If we want to see a positive side in this large scale the forest fires have had in recent years, it is this fact that, for the first time, the Portuguese forest sector has a unifying issue which can bring together forest owners of all the regions in the country, all forest industries, other forest stakeholders and many economic interests and citizens not directly involved in forestry, but concerned by what happens in this sector.

Coming now to the role of forest owners' organisations, in all these discussions and concerns about forest fires, there are more and more people recognizing the good work done by some forest owners' organisations and the indispensable position they must have in the prevention of this threat to forest resources. This awareness explains why the section of the Forest Policy Law approved in 1996 which determined the creation of a Permanent Forest Fund to support the protection of forests and the provision of forest externalities, after the big fires of 2003, found politically favourable conditions to be finally implemented. That was done by establishing a supplement to the tax on fuels, earmarked for that Permanent Fund. Some of this money is now coming to projects presented by forest owners' organisations aiming at reducing the risk of forest fires and improving the structure of the existing forests.

### **2.4. Policy framework**

#### **2.4.1. Afforestation: the main priority of forest policy since its beginning**

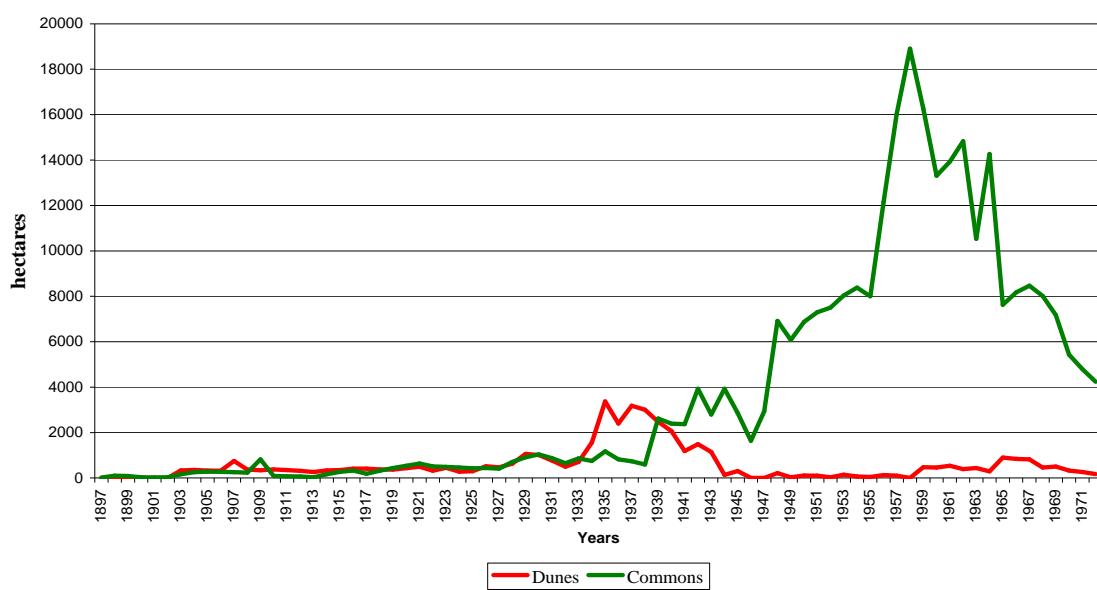
The large amount of uncultivated land fit for cultivation and without a productive use existing in the middle of the XIX<sup>th</sup> century (38,2 % of the total land area) explains why afforestation was, by far, a major priority of the Forest Services, which were making their beginnings by that time. This purpose is clear in the Decrees of December 24, 1901 and December 24, 1903 establishing the so called "**Forest Regime**" which remained as the fundamental forest laws of the country for almost one hundred years (Germano, 2000).

However, since those days, there has been a wide gap between the wishes of forest policy makers and foresters and the actual implementation of forest policy. If we look at where the Forest Services started their activities what we see is that they were devoted almost entirely to the management of some state owned forests representing a very small part of the total forest land in the country.

By the end of the XIX<sup>th</sup> century and in the beginning of the XX<sup>th</sup> century forest policy and Forest Services priorities moved to another front also in the public domain, more precisely the afforestation of the 25600 ha of dunes along the coast which remains until today one of the most socially valuable projects carried out by those services.

The next front to which forest policy and Forest Services moved their priorities was the afforestation of the communal lands in Northern and Central Portugal. After some preparatory work, this afforestation finally started in the 1930s, after the political regime had taken a dictatorial turn. These political conditions have to be mentioned because this afforestation was often implemented in a authoritative way, against the traditional uses of those lands by the local communities (Brouwer, 1995). The major output of this programme ("Plano de Povoamento Florestal" - PPF) was the afforestation of 318000 ha from 1935 until 1972, mostly with maritime pine. The management of these forests on behalf of the local communities made up the essential of the Forest Services activities from the 1930s until the present days (Rego, 2001). The Forest Services had to give part of the proceeds from the communal forests to the local communities, but they were allowed to keep the rest, making these services a potentially self-funded public agency.

**Afforestation carried out by the Forest Services**



Source: Mendes *et al.* (2004)

There is another intervention of the Forest Services during the 30s and 40s which deserves to be mentioned. It is the technical support provided to people working on resin tapping. This activity had several interesting features:

- a) it responded to a growing industrial demand in the country and abroad;
- b) with proper technical support, the labour costs in Portugal were such as to make it competitive in the world market;
- c) it provided alternative employments in rural areas which were strongly dependent on agriculture and some other forestry related activities;
- d) it provided a regular source of income to forest owners without damaging timber production if the activity was properly ran;
- e) it also protected forest resources against the risk of forest fires because resin tapers were a regular presence in the forest watching out even each tree against this and other potential damages.

The gap we mentioned before between the stated priorities of forest policy and Forest Services and their actual practice has to do with the fact that their three major fronts of intervention (public forests, afforestation of the dunes, and communal forests) are certainly a valuable part of the total forest land in the country, but are far from being the main one. Also they are certainly not the domains where took place most of the afforestation observed since the middle of the XIX<sup>th</sup> century. To see that, let us look in more detail to the trends in forestland use since then:

- conifers (basically maritime pine) rose from 210000 ha in 1867 to 1293040 ha in 1968/78 which cannot be driven essentially by the afforestation of 25600 ha of dunes and 318000 ha of communal lands, even if these 343600 ha were entirely made up of pine forests which is not true;
- cork oak and holm oak forests rose from 370000 ha in 1867 to 1174390 ha in 1995/98, which again, cannot be imputed essentially to the action of the Forest Services because these forests are mostly in the South, so far from the main domains of intervention of this agency;
- eucalyptus rose from a situation of almost non-existence in the middle of the XIX<sup>th</sup> century to 672149 ha in 1995/98, which was due essentially to the direct investment of the pulp and paper companies and to the investment of non-industrial private forest owners stimulated by the demand from those companies.

As we will see later on, most of this investment in eucalyptus plantations has not benefited from public incentives. So what are today the main three segments of Portuguese forests owe most of their growth since the middle of the XIX<sup>th</sup> century, not so much to public interventions, but to other factors and actors. Among these factors certainly processes of natural regeneration might have played an important role, but we should not forget the actions of non-industrial private forest owners' (NIPFOs). In fact, according to data referring to 1995, this type of owners are responsible for 76.6% of the forest land, pulp and paper companies manage 7.7 %, and only the 2.2% of state owned forests and part of the 13.4% of communal forests are left for the direct intervention of the Forest Services.

Whatever might have been the relative roles of forest policy and private initiative in the triplication of forest land since the middle of the XIX<sup>th</sup> century, afforestation remains today, as it was at that time, the main stated priority of forest policy, both for public policy makers and for private stakeholders. Several reasons contribute to these attitudes: a) forest land and forest production are still far from having reached the maximum of their economic and ecologic potential:

- further growth in forest area up to 5280000 hectares (60,2 % of the land area) is possible through afforestation of 1068000 ha of marginal agricultural lands non suitable for farming and about 863000 ha of other lands with forest potential (BPI *et al.* 1996);
- substantial productivity gains (around 20 % more in annual increments of *Pinus pinaster* and *Eucalyptus globulus*) resulting from improved forest management and use of better plants (BPI *et al.*, 1996);

b) afforestation and reforestation through the 1970s, 80s and 90s supported by public incentives lagged far behind the area of deforestation due to forest fires (the former was only 54 % of the latter) and have not taken up most of the land released from agriculture due to farm out migration (agricultural land fell by 1233000 ha during this period while forest and other wooded land increased only by 380207 ha);

c) timber and cork production are lagging behind the demand from the forest industries leading to increases in the real prices paid for these products by the industries, since mid 1995.

### **The EU co-funded programmes in the 1980s and 1990s**

Since the country's accession to EEC, in 1986, Portuguese forestry has benefited from a series of programmes of financial incentives to afforestation, reforestation and improvement of existing stands:

- the Forest Action Programme (*PAF-Programa de Acção Florestal*) implemented from 1987 to 1995;
- the Forest Development Plan (*PDF-Programa de Desenvolvimento Florestal*) implemented from 1994 to 1999;
- Reg. (EEC) 2080/92 implemented since 1994.

There are some common features to these programmes:

- a) the financial incentives were **grants**, not loans, or other kinds of incentives;
- b) there was no direct interventionism anymore by the Forest Services, the initiative being left to the forest owners.

Being initially the main managing institution of PAF, with the power of reviewing and monitoring the applications for funds, the Forest Services not only replaced the strategy of direct interventionism by one of **incentive regulator**, but also abandoned their possible role in the provision of technical assistance and other in kind support to private forest owners. An indicator of failure in this area of technical assistance is that again in PAF there were funds for the organisation of a public forest extension system which were left totally unused. When the power of reviewing and monitoring the applications for funds was shifted almost entirely to another agency (IFADAP), the Forest Services were left with no substantial instrument at their disposal to promote private forestry. The interested reader can find in Mendes *et al.* (2004) a more complete description and evaluation of these programmes.

### Public support to forest owners' organisations

#### *Situation during the 1980s*

As was said before, forest owners' organisations emerged in the 90s probably in response to the demand of forest owners for the technical assistance they needed in

order to apply for the EU co-funded afforestation programmes which started to be implemented in 1987. The first of these programmes (*PAF-Programa de Acção Florestal*) as well as another one which was implemented from 1981 to 1988 with World Bank funding provided financing for the establishing of forest owners' cooperatives, assisted by a public forest extension service also to be established with these funds. In both programmes there was no implementation of these two components. Coming from a secular tradition of direct intervention of forestry and almost total neglect of the need for the collective organisation of private forestry, the Forest Services lacked the expertise and the will to implement those measures (Mendes *et al.*, 2004; Mendes, 2005b).

Since PAF introduced a major change in forest policy by providing generous incentives for afforestation to private forest owners, leaving entirely to them the initiative to apply for those incentives and to mobilize all the necessary technical assistance for that, this benefited the forest owners with larger holdings who could afford to pay for that kind of assistance. Gradually the forest owners' organisations started to appear in order to respond to that demand, but this did not happen until 1992/94.

So, during the 1980s, the situation was that there was a need for the establishing of forest owners' organisations, and there were public funds available to get started with these kind of institutions, but the Forest Services in charge of using those funds lacked the expertise and the will to do so.

#### Public incentives during the 1st Common Support Framework (1989-93)

Most of the public support to forest owners' organisations during the 90s was provided by programmes included in the three Common Support Frameworks (CSF) regulating the transfers of EU structural funds since Portugal's accession:

- the 1st CSF, which ran from 1989 to 1993;
- the 2nd CSF, which ran from 1993 to 1999;
- the 3rd CSF, which started in the year 2000 to last until 2006.

In the 1st CSF there was a programme called PROAGRI designed and managed by the Ministry of Agriculture supporting the installation of farmers' organisations, mainly through **matching grants** for investment and operating costs lasting for **5 years**. These grants supported the creation or development of 132 organisations, but **only one of these was a forest owners' association** (Costa, 2002). This association was located in the Ribatejo & Oeste region.

Others that got started during this period, namely FORESTIS and the first local associations created with the technical support of this organisation were funded by programmes for regional development, not managed by the Ministry of Agriculture, but by the regional commission of the Ministry of Territorial Administration for the Northern Portugal. These programmes normally paid about 75% of the installation and operating costs of these organisations during the horizon of the programmes (1989-93 and 1994-99).

The main conclusion we can state for this period again is a lack of capacity or will from the Public Administration in charge of forestry (Ministry of Agriculture) in terms of promoting and supporting the take off of forest owners' organisations with specific

incentives especially tailored to their needs. These organisations started to develop in this period, but they had to look for public support somewhere else.

#### Public incentives during the 2nd Common Support Framework (1994-99)

The PROAGRI programme continued throughout the 2nd CSF, but with less favourable grants than in the previous CSF. In fact, after 1996, by imposition of the European Commission, a modulation was introduced in the **matching grants** supporting personnel costs going from 85% of those costs in the 1st year, to 35% in the 5th year.

Even though this programme, like the previous one, did not include any special provisions for forest owners' organisations, the demand for funds from this type of organisations finally got started with 39 new or existing organisations supported by the programme. As we can see in the following table, one of the major players in this rise of the forest owners' organisation movement in this period is FORESTIS. In fact, 24 out of the 39 forest organisations supported by PROAGRI during this period were from the Northern and Central West regions where FORESTIS has been more active. So, in brief, we can say that this 2nd CSF, through PROAGRI, **played an important role in supporting the take off of the local forest owners' organisations in the regions of small-scale forestry**, even though this programme was designed for the farmers' organisations and not specially tailored for forest owners' organisations.

#### Public incentives during the 3rd Common Support Framework (2000-06)

In the 3rd CSF there is finally a special programme to support forest owners' organisations in two ways:

- a) support for the creation of new organisations;
- b) support for the creation of extensions of existing organisations, outside their headquarters, in order to improve their outreach to the forest owners.

The support takes the form of **5 years modulated matching grants**:

- 100% of the personnel and operating costs in the 1st year declining gradually until 60% in the 5th year;
- 85% of the investment costs.

Until the month of May 2002, the number of applications approved for this programme reached 74, which shows a substantial increase, compared to the previous programme. Again **the regions of small-scale forestry have been the most active** in this process, in terms of number of applications. One conclusion we can draw from data presented in annex is the following:

- in the **North-Western region**, the current generation of applications for funds is mostly for **extensions** of the associations created during the 2nd CSF;
- in the **Central region**, the current programme is mostly for the **creation** of new organisations.

So the movement of creation of forest owners' organisations in the regions of small scale forestry originated in North-Western Portugal during the period of the 2nd CSF, mostly through the action of FORESTIS and is now moving southwards.

### Other incentive schemes for forest owners' organisations since 1999

Besides this incentive scheme, there is another worth to be mentioned for this period. It was established by a governmental decree of 1999 and has been financed entirely with national public funds, outside the framework of the EU co-funded programmes. Its aim is to support the installation and operating costs of brigades of forest sappers composed of 5 men each, which are supposed to carry missions of surveillance and first intervention in the extinction of forest fires, during the Summer, and silvicultural works reducing the risk of fires during the rest of the year. The State budget pays about 75% of the labour costs for a period of 5 years, accompanied with a support in kind in terms of a 4WD vehicle and some other equipment whose maintenance is then left to the participating organisations.

A good number of forest owners' organisations participated in this programme by applying for one or more brigades. The problem is that some of them did not manage to get the co-funding necessary to match the public financial support. Considering the total operating costs of one brigade, the public financial support does not cover more than half of the costs. So if these brigades don't provide services for which it makes sense to collect a payment from the forest owners, or if the forest owners' organisations in charge of these brigades don't establish partnerships with municipalities or other institutions to cover for the necessary matching funds, these brigades are not financially sustainable. An additional problem is the fact, that for several times, there were long delays in the payments of the public aids which put many forest owners' organisations under very serious financial stress. The result of this was that some of them dropped out from the programme. The ones that managed to continue fall mostly in two categories:

- they have a stable partnership with some municipalities to cover for the matching funds;
- during part of the year, they put the brigades to the direct service of their members who want silvicultural works done in their forests in order to reduce the risk of fire and who are willing to pay for that.

After the big fires of 2003, the Government in place decided to make some changes in forest policy. One of them was to maintain this programme, extending the horizon of the public aids from 5 to 10 years. The problem with this positive change was that it was accompanied by two measures which may be very detrimental to the continuation of these brigades and to the efficient use of the public support they can get. One is that this support is abruptly degressive from the 5<sup>th</sup> year onwards. This implies that the forest owners' organisations which were the first to participate in the programme, which manage to maintain their brigades until now and which built up more experience in this matter are now at the verge of extinguishing these teams because the public support goes down to levels which they cannot afford.

The other negative change has to do with the fact that the municipalities can now also participate in this programme. Since the municipalities don't own and don't manage forest land, there is a big risk here of use of public funds for local electoral motives. A final note about this period is that in 2003 and 2004, in the aftermath of the big fires of the Summer of 2003, the necessary measures were finally taken to implement a Permanent Forest Fund established by the Forest Policy Law of 1996. The major aim of this fund is to provide a national source of resources to promote the provision of

positive forest externalities and to support other actions for forest development with a public goods nature. This fund is financed by a supplement to the tax on fuels. The first applications for funds were accepted in late 2004, and were approved already in 2005. Among them there is a good package of projects collectively proposed by FORESTIS and its affiliated organisations in the domains of fire prevention and grouped forest management.

Besides these incentive schemes, the forest owners' organisations, like other institutions can apply for public support to technical training of their staff and their members and joint R&D projects with universities. One problem is that each incentive scheme has its own procedural rules which sometimes change overtime. For an organisation seeking to participate in several of these schemes this implies relatively high transaction costs.

#### Overall assessment of the public funding of forest owners' organisations

Without the support of public incentives, forest owners' organisations probably would not have taken off in Portugal, even though the incentives they initially got were not specially tailored to their needs. This situation improved a little bit, but through the addition of a diversity of schemes targeting very specific actions, with different procedural rules and not very flexible in the way the forest owners' organisations can adjust the public support to their real needs. The result is that they have to bear relatively high transaction costs to obtain those incentives which are essential to their survival. Mostly of them depend on those incentives to pay for 2/3 to 3/4 or more of their costs.

This is a justifiable rate of public support given the fact that in the primary functions of these organisations there is a great deal of provision of services with a public goods nature. Also the cases of good practice in terms of use of public incentives show that these organisations can gradually reduce the dependence on public incentives up to the range between 1/2 and 2/3 of their total operating costs, but it is very hard to go beyond that in the current stage of their development. Also the experience shows that they would very much benefited if the set of public incentives were consolidated in a single programme, with enough flexibility in its eligibility conditions to accommodate the different needs of these organisations at each stage of their development, without the very specific constraints they actually impose on them.

#### Forest fires and the Permanent Forest Fund

Forest fires are an old phenomenon in Portuguese forests. What is new is **scale** reached by these fires in recent years, especially in 2003. For many years the cork oak forests in the South were not very affected. Also the eucalyptus forests of the pulp and paper companies were usually left affected than the other forests. Forest industries did not seriously look at this as a major threat to their competitiveness. Politicians and society at large looked with some concern to this problem every Summer, but in Autumn the issue was quickly forgotten. With the scale that forest fires are taking in recent years everybody is concerned:

a) forests now burn a lot everywhere, not only where there is pine, but also where there is eucalyptus or cork oak;

- b) forest industries fear for their competitiveness, because pulp and paper companies see their forests burning and cork industries see their raw material getting more rare and more expensive;
- c) power companies and phone companies which are “planting” their distribution and communications lines in forests see them burning every Summer;
- d) the society cannot be indifferent when watching live on TV to so much destruction, including loss of human lives.

The result is that, with the dimension they are taking in recent years, forest fires are putting forests in the agenda of the entire society and are becoming an issue of common concern. Combined with this common awareness is the fact that it is a problem whose solution clearly calls for collective action. It is certainly for this reason that, after the big fire of 2003, it was relatively easy for the Government to get approved in the Parliament, without resistance in the rest of the society, a Permanent Forest Fund to support forest development, protection of existing forests and provision of forest public goods. The legal basis for this fund was in the Forest Policy Law of 1996, but it remained without the implementation decree until the big fires of 2003. Since this fund is fed with an additional tax on fuels, it is a way for most of the society to pay for the protection of forests and the provision of forest public goods.

Through their associations, private forest owners’ engaged in grouped projects to protect and improve existing forests, are becoming the main beneficiaries of this new source of funds. A very important thing is that this source is predictable, stable and nationally based, avoiding the vulnerability of dependence on foreign resources which the country cannot fully control.

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### Statistical annex

Table 2.1: Distribution of the area of forests and other wooded land by types of ownership (thousand hectares)

Types of owners	1928		1959		1974/82		1995	
	Area	%	Area	%	Area	%	Area	%
State forests	53.6	2.3	58	2.0	78	2.6	40	1.2
Communal forests	55.9	2.4	145	5.0	380	12.4	180	5.4
Private forests	2221.8	95.3	2697	93.0	2598	85.0	3129	93.4
<b>TOTAL</b>	<b>2331.4</b>	<b>100</b>	<b>2900</b>	<b>100</b>	<b>3056</b>	<b>100</b>	<b>3349</b>	<b>100</b>

Source: Mendes et al. (2004)

Table 2.2: Area of forests and other wooded land by types of ownership and tree species in 1995 (1000 ha)

Types of owners	Total		Maritime pine		Eucalyptus		Cork oak		Other wooded land	
	Area	%	Area	%	Area	%	Area	%	Area	%
State forests	40	1.2	27	2.8	0	0.0	2	0.3	11	1.1
Communal forests	180	5.4	116	11.9	14	2.1	1	0.1	49	5.0
NIPF	2910	86.9	822	84.2	470	69.9	690	96.8	928	93.9
Forest industries	219	6.5	11	1.1	188	28.0	20	2.8	0	0.0
<b>TOTAL</b>	<b>3349</b>	<b>100</b>	<b>976</b>	<b>100</b>	<b>672</b>	<b>100</b>	<b>713</b>	<b>100</b>	<b>988</b>	<b>100</b>

Source: Mendes (2005a)

Table 2.3: Area of forests and other wooded land by type of ownership and regions, in 1995 (hectares)

Regions	Total	Private forest land	%	State owned forest land	%	Communal forests		%
North West	352263	302484	85.9	133	0.0	49646	14.1	
North East	315154	223277	70.5	0	0.0	92877	29.5	
Other regions	2681583	2603239	97.1	39867	1.5	37477	1.4	
<b>TOTAL</b>	<b>3349000</b>	<b>3129000</b>	<b>93.4</b>	<b>40000</b>	<b>1.2</b>	<b>180000</b>	<b>5.4</b>	

Source: Mendes (2005b)

Table 2.4: Size classes distribution of forest holdings, by regions, in Continental Portugal, in 1995

Regions		Distribution by classes of forest land size (%)					
		0-4 ha	5-9 ha	10-19 ha	20-49 ha	50-99 ha	100 ha -
North West	Number of holdings	89.7	6.4	2.2	1.2	0.2	0.3
	Forest land	34.4	13.6	9	10.2	4.1	28.7
North East	Number of holdings	90.6	6.6	2.2	0.4	0.1	0.1
	Forest land	53.7	19.9	13.2	5.4	3.4	4.4
Central West	Number of holdings	91.5	5.8	1.7	0.8	0.1	0.1
	Forest land	53.1	18.4	10.7	10.8	2.4	4.6
Central East	Number of holdings	73.1	14.3	7.3	3.9	0.7	0.7
	Forest land	18.1	13.8	14.1	15.3	5.9	32.8
Ribatejo & West	Number of holdings	84.8	6.5	3.6	2.5	1.1	1.5
	Forest land	8.3	3.8	4.1	6.6	6.7	70.5
Alentejo	Number of holdings	23.8	12	15.6	14.9	11.3	22.4
	Forest land	0.5	0.9	2.5	5.4	9.2	81.5
Algarve	Number of holdings	58.9	14.2	11.6	9.5	3.5	2.3
	Forest land	7.5	7.5	12.5	23.2	17.9	31.4
Total	Number of holdings	85	8	3	2	1	1
	Forest land	15	7	7	9	7	55

Source: INE (1997)

Table 2.5. Distribution of the number of individual farmers with forestry by the percentage of this activity in their total income, in Continental Portugal, in 1995

% of forestry in the total income	% of the total number of farmers
0 – 25%	82
25 – 50%	13
50 – 75%	4
75% or more	1

Source: INE (1997)

Table 2.6: Number of local forest owners' organisations by regions and by years

Years	Regions							Total
	NW	NE	CW	CE	R & W	Alentejo	Algarve	
1977	1	1	9	1	4	3	0	19
1998	12	6	13	14	8	6	6	65
1999	13	40	15	20	10	4	6	108
2000	15	40	19	24	10	6	6	120
2002	21	25	28	28	11	8	6	127
2004	21	24	28	33	12	9	6	133

Source: DGRF

Table 2.7: Forest owners' organisations by type of activities and legal status

Activities	Forestry		Agriculture and forestry		TOTAL	
	Legal status	Associations	Cooperatives	Associations	Cooperatives	
2000		73	3	22	10	110
2002		71	5	28	26	130

Source: DGF

Table 2.8: Forest owners' organisations by type of legal status

Regions	2000			2002		
	Associations	Cooperatives	TOTAL	Associations	Cooperatives	TOTAL
NW	13 + 1*	1 + 1*	14	16	6	22
NE	39	1	40	23	2	25
CW	10	5 + 4*	15	16	12	28
CE	16	4 + 4*	20	18	10	28
Ribatejo & W	11	-	11	12	1	13
Alentejo	4	2*	4	8		8
Algarve	5	1	6	6		6
<b>TOTAL</b>	<b>98</b>	<b>12</b>	<b>110</b>	<b>99</b>	<b>31</b>	<b>130</b>

Source: DGF; Note: (\*) Inactive

Table 2.9: Funding provided by FFF

Instruments	Sources of funds	Period	Area (ha)
Credit to private forest owners	State budget allocations to JCI	1966-69, 1975	1,083
	State budget allocations to CCORA	1971-75	9,045
	State budget allocations to FFF	1966-86	116,806
Provision of plants to private forest owners		1965-86	53,136
Technical assistance to private forest owners		1966-84	10,035
Direct afforestation of private lands	World Bank	1981-86	58,977
<b>TOTAL</b>			<b>242,954</b>

Table 2.10: Targets and outcomes of the Portuguese Forest Project

Time horizon	Targets	Outcomes
	1980/85	1981/88
Afforestation (ha)	150,000	131,908
<b>1. By the Forest Services</b>		
- total area	90,000	71,908
- coniferous	60,500	50,026
- eucalyptus	16,000	8,429
- other broadleaves	13,500	7,886
- natural regeneration	-	5,586
<b>2. By PORTUCEL (pulp and paper company)</b>		
- total area	60,000	60,000
- coniferous	30,500	n. a.
- eucalyptus	29,500	n. a.
Creation of a public forest extension service	X	Nothing was done
Credit for co-operatives of forest owners	X	Nothing was done

Source: DGF

Table 2.11: Areas of afforestation, reforestation and stand improvement supported by EU co-funded programmes (PAF, PDF & Reg. 2080/92) from 1987 to 1999

Years	Total		PAF		PDF		Reg. 2080	
	(Re)affor.	Stand improv.	(Re)affor.	Stand improv.	(Re)affor.	Stand improv.	(Re)affor.	Stand improv. <sup>3</sup>
1987/88	20530	44154	20530	44154	0	0	0	0
1989	17410	52156	17410	52156	0	0	0	0
1990	20892	41511	20892	41511	0	0	0	0
1991	15319	19644	15319	19644	0	0	0	0
1992	16906	21948	16906	21948	0	0	0	0
1993	11313	9996	11313	9996	0	0	0	0
1994	34714	38251	6054	11480	8165	24776	20495	1995
1995	70286	63673	5141	10196	24090	51186	41055	2291
1996	24947	13450	564	164	4491	12643	19892	643
1997	40715	29888	0	0	9501	29189	31214	699
1998	36234	31161	0	0	9829	30892	26405	269
1999	33743	14768	0	0	7694	13805	26049	963
<b>TOTAL</b>	<b>343009</b>	<b>380601</b>	<b>114130</b>	<b>211249</b>	<b>63770</b>	<b>162492</b>	<b>165109</b>	<b>6860</b>

Sources: Mendes *et al* (2004)

Table 2.12: Forest owners' organisations supported by PROAGRI during the 2nd Common Support Framework (1994-99)

Regions	Cooperatives		Associations		Other forest organisation	Total
	Forestry	Agriculture & Forestry	Forestry	Agriculture & Forestry		
NW		1	9		2	12
NE		1	5			6
CW	1	1	3	1		6
CE		1	5	1		7
Ribatejo & W			2		2	4
Alentejo			3			3
Algarve			1			1
<b>TOTAL</b>	<b>1</b>	<b>4</b>	<b>28</b>	<b>2</b>	<b>4</b>	<b>39</b>

Source: Costa (2002)

Table 2.13: Applications approved or for approval for funding by the 3rd CSF in May 2002

Regions	Continuation of support from the PROAGRI programme	Creation of new organisations	Creation of a	Creation of an extension in an existing association	Total
			forestry section in an existing cooperative		
NW	9	3	2	8	22
NE	1	5	2	2	10
CW	2	12	3		17
CE	2	10	2	1	15
Ribatejo & W		2			2
Alentejo		2		3	5
Algarve	1	2			3
<b>TOTAL</b>	<b>15</b>	<b>36</b>	<b>9</b>	<b>14</b>	<b>74</b>

Source: Costa (2002)

<sup>3</sup> There were also 1285 ha of natural regeneration funded by this programme, not included in the table.

### 3. Wood-processing industries

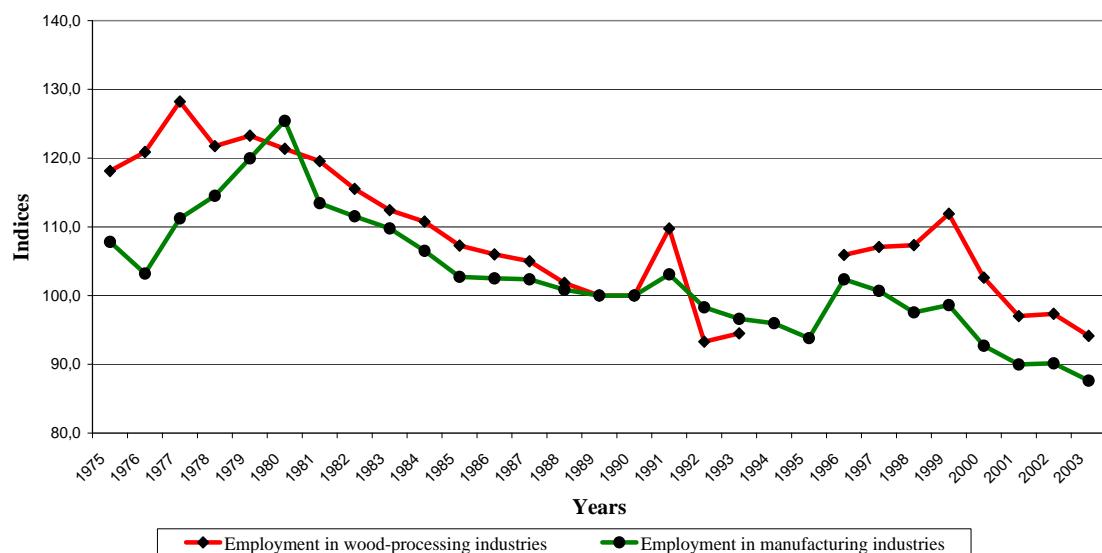
#### 3.1. Overview

In 2003, the wood and cork-processing industries contributed with 11.8% of the employment and 10.8% of the gross value added of the manufacturing industries. They are also a **positive contributor to an exporting position of the balance of trade**, but have a **smaller size** and a **lower labour productivity** than the rest of the manufacturing industries and the other economic activities. The pulp and paper industry stands far out of this pattern of productive structure. Also the panel and the paper products industries have labour productivities above the average for the manufacturing industries. The two major wood processing industries, in terms of value added, which are the wooden furniture and the pulp and paper industries, are in opposite positions in terms of those indicators:

- a) the wooden furniture industry is a negative contributor to the balance of trade and is based on small scale firms, with low labour productivity;
- b) the pulp and paper industries are positive contributors to the balance of trade and are based on large scale firms, with high labour productivity.

The panel industry has these same characteristics as the pulp and paper industries, but in a smaller proportion. So, under the term “wood-processing industries”, there is a very heterogeneous population of enterprises.

**Indices of employment in wood-processing and manufacturing industries**  
(1975-89: base 1989; 1990-2003: base 1990)



During the last three decades, there were three clear distinct periods in the evolution of **total employment** in the wood-processing industries:

- a) a period of **decline since 1977 until 1992**;
- b) a period of **growth for the rest of 1990s**;
- c) a period of **decline since the year 2000**.

With three to four years, in advance in the inflexion points, this follows the same direction as the trends in manufacturing industries. The current times are bad ones for these industries, in terms of employment prospects. At the turn of the century, **high**

**State budget deficits** and **increasing competition from abroad** put the Public Administration and private firms under high pressure to control wage increases. Also adjustments in the competitive situation of the Portuguese could not be handled by variations in the exchange rate. Adjustments now have to go through increasing **unemployment**. Finally there is **no more room for declines in the real interest rate** and many households were carrying substantial **debts**. For these reasons, industries, such as these, relying a lot on exports and on the investment demand from domestic households are under pressure to keep employment at previous levels. The efforts now are to increase labour productivity for lower levels of employment.

### 3.2. Economic trends and industry practices

#### 3.2.1. Sawmilling and planning

The main resource base for the sawmilling and planning industry has been for a long time and still is the forest of **maritime pine**. This resource is declining, in area, since the end of the 1970s due to the high and increasing risk of forest fires. In spite of this, maritime pine wood sawn for carpentry, furniture or pallets makes up most of the output of this industry. The other activity worth to be mentioned here is the sawing of tropical wood for the furniture industry.

The output of the industry **increased during the 70's**, mainly supported by the growth in exports of pallets (the percentage of exports on the total volume of production was 30,3% in 1975, and 61,2% in 1980 and the percentage of wood for pallets on the total volume was 4,1% in 1975 and 67,5% in 1980). However, since the beginning of the 1980s, passed this period of export orientation based on the sawing of wood for pallets, the industry has been a **declining**, in terms of output, employment and number of firms<sup>4</sup>, relying, for the most part, on the **domestic market**. The problems in the **beginning of the 80's** resulted from the decrease in foreign demand for pallets, with negative effects in the firms' profitability coming from the prices, the increase in competition among domestic exporters, worsening in the conditions of payment by importers, higher export duties in major importing markets and the increase in interest rates.

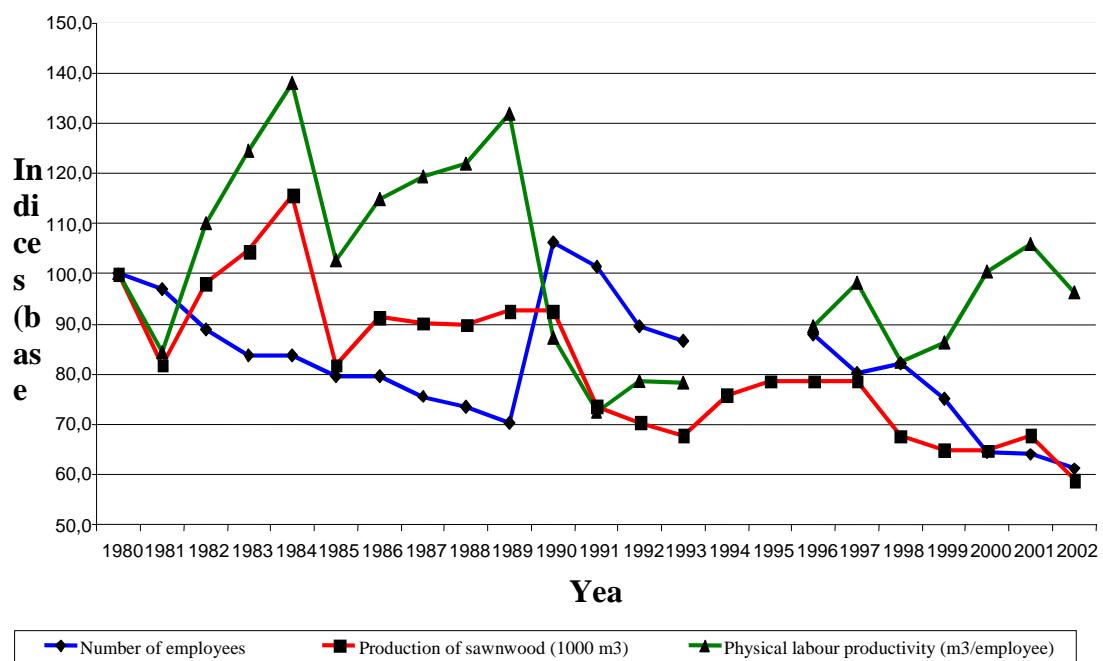
The situation improved in the second half of the 80's, due to an increase in foreign demand, but, again, in the beginning of the 1990s the situation of the industry became complicate again. It was the time of tight macroeconomic policies needed to prepare the accession to the Economic and Monetary Union. Also the major domestic resource base of this industry which is maritime pine has been in a process of degradation due to forest fires. One result of this is the fact that the price of this input rises faster than the export price of sawnwood. Finally, the small sawmills located in rural areas which were loosing population, lost with that some local demand for their products and services. This is one reason why the industry tends to be located in the Western part of the country, especially near the furniture industry, and the major harbours through which comes in imported roundwood.

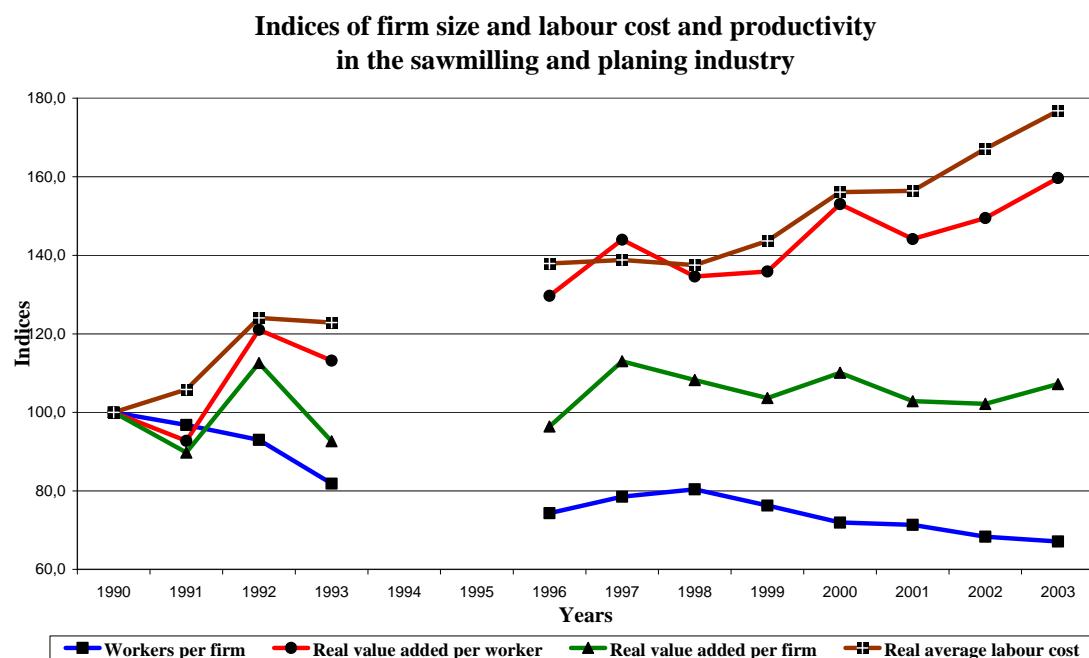
<sup>4</sup> If our analysis had gone more back in time, we would have seen that the decline in the number of firms and employment dates, at least, from the end of the 1990s, with an interruption in the 1970s due to the growth of exports of sawnwood for pallets (Mendes, 1996).

The decline in the number of firms which happened during this period, mostly in those rural areas, has not brought about a generalized increase in firm size. Also some sawmills initiated in the 1970s to export sawnwood for pallet business, shut down later on, with the crisis in this activity. Looking at the trends in average number of workers per firm, the tendency has been negative. Also the trend in the real value added per firm has been only very moderately positive. This average, however, hides the fact that there are a small number of relatively large sawmills which concentrate a big share of the industry's output, accompanied by a still relatively large number of much smaller sawmills. Some of the new sawmills of the 1970s oriented to the exports of wood for pallets had a big size, but did not resist the crisis. Some of the surviving ones **increased labour productivity** and **integrated their activities with carpentry**. This is the positive note for this industry in the 1980s and 1990s.

Still about the structural features of this industry, it is worth to note that, in some way, it adapted to a resource base made of a tree species which normally only yields small diameters. This is why a product such as sawnwood for pallets, in spite of its very low value added, was still interesting for an industry as this one, made of small firms, and capital needs to rotate as fast as possible.

#### Indices of employment, production and labour in sawmilling and



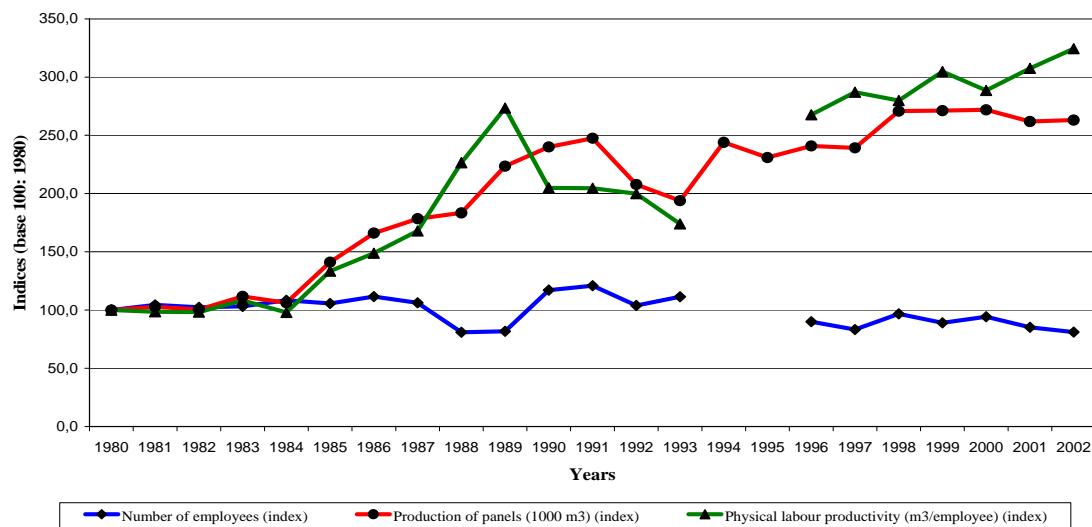


### 3.2.2. Wood-based panels

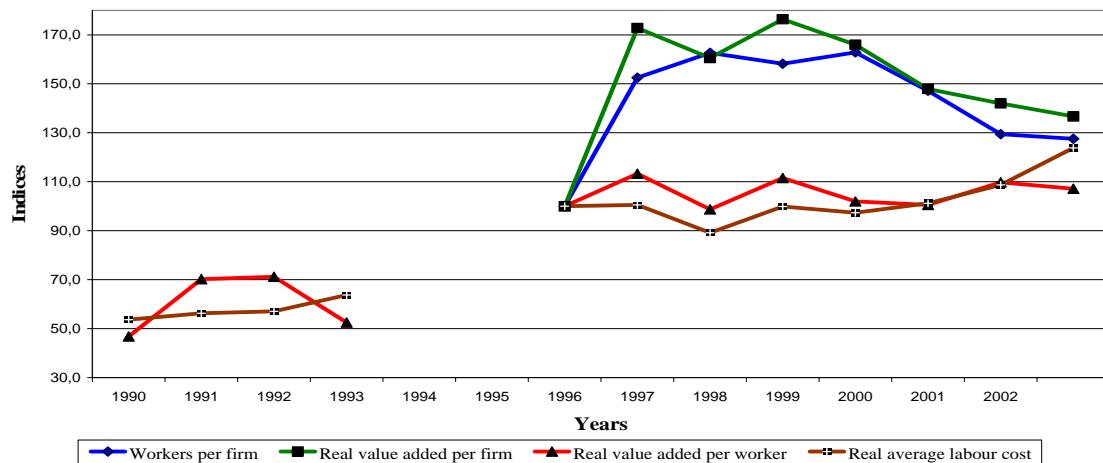
The wood-based panel industry started with the production of particle board based on chips from **maritime pine** obtained mostly from the sawmills. Nowadays particle board still make a large part of the industry's output, but the product on the top of the list is **fibreboard**. Even though the domestic market of the furniture, carpentry and construction industries is an important client of this industry, its main driver comes from **exports**. So we find here some of the more modern and more internalized firms in the Portuguese universe of forest industries. This goes to the point of having the leading group in the world in the wood panel industry (SONAE). Because of its export orientation, the output of this industry is very much influenced by the price and cost competitiveness conditions of the Portuguese economy. Until the turn of the century it was an **expanding** activity:

- the trends in output and labour productivity are positive over the period, but output is stagnating since the turn of the century;
- the size of the firms' activity in terms of workers and real value added increased until the turn of the century, but were reversed since then, reflecting the current bad conditions in the price/cost competitiveness of the Portuguese economy which affects an export oriented activity as this one.

**Indices of employment, production and physical labour productivity  
in the wood-based panel industry**



**Indices of firm size and labour cost and productivity  
in the wood panels industry**



### 3.2.3. Carpentry

In the productive structure of this industry, there are two major components to distinguish:

- the “**traditional carpentries**” of small dimension, which have a non standardized and diversified production, responding to the specifications of the local demand;
- the “**industrial carpentries**” with a specialized and standardized production, technologically more developed, with larger firm sizes and fabricating large volumes of products for the domestic and the foreign markets.

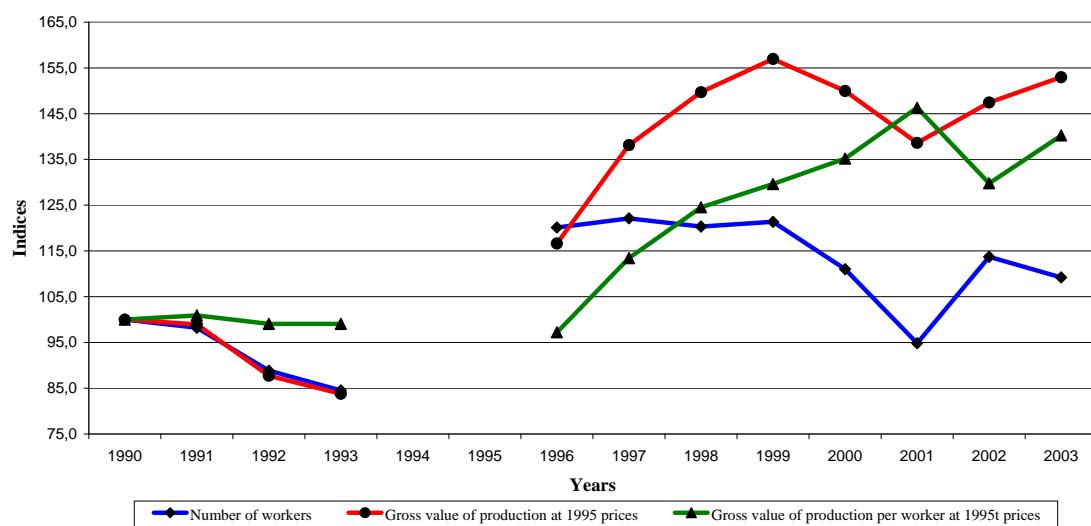
The traditional carpentries are not well covered by the official industrial statistics because of the very small size and informality of many of them. An important part of their output is made of **nontraded services**, not exposed to foreign competition. More precisely, this is the services of carpentry provided by these firms to respond to the

special needs of local clients, both in new constructions and in the repair of existing ones.

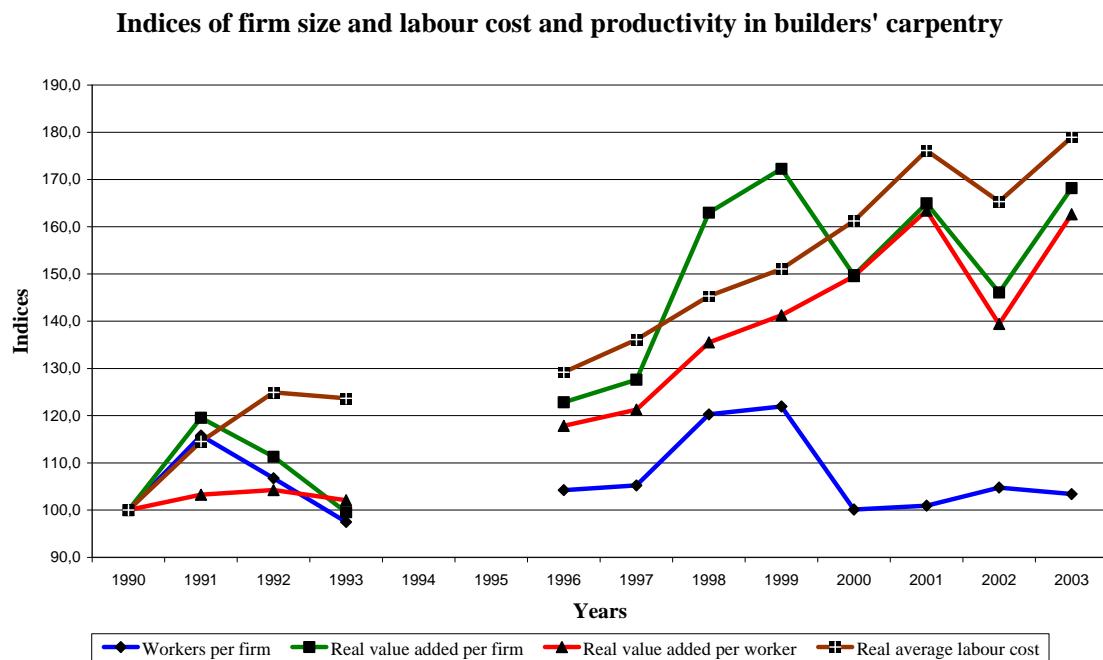
The main output of the “industrial carpentries” throughout the 80s and 90s, at least, has been the production of **doors**. This industry has not yet definitely engaged in other products such as windows or joinery. Part of the production is exported, mainly for EU markets. However, the main destination is still the **domestic market**. The output of this industry **fluctuates in close relation with GDP**, which is understandable in an industry very much orientated towards the domestic market. Therefore, the fluctuations in the output of this industry have been as follows, since the beginning of the 1990s:

- the first half of the 1990s was a time of decline in production and employment and stagnation in labour productivity;
- the second half of the 1990s was a period of growth in all these three indicators;
- at the turn of the century, the trend for production and employment became negative, with signs of stagnation for labour productivity.

**Indices of employment, production and gross labour productivity in builders' carpentry**



Throughout this period, the size of the firms, in terms of number of workers, does not seem to have gone through major changes. Firm growth, in terms of output, was handled through increases in labour productivity, not in employment per firm. As expected, increase in labour productivity goes together with a rising trend in the real cost of labour.



### 3.2.4. Wooden furniture

**Home furniture**, especially for living rooms, dining rooms and bedrooms, has been the major output of the wooden furniture. Most of these products are in full pieces, and are designed to meet the demand of costumers in the **domestic market**, some of which of very questionable taste, unfit for exports.

From this pattern of output it follows that this is another industry that has been very much **dependent on the evolution of GDP** and disposable income of the households. Since 1992, until 2002, the trend in the wooden furniture industry was positive, in terms of output and labour productivity, while employment started to fall since 1999. Again we find here the strong influence of the macroeconomic conditions already mentioned for the other industries. Like in other wood-processing industries, the current efforts here are **to increase labour productivity** for lower levels of employment. In spite of these efforts, the degree of **intra-industry specialization** is still relatively low.

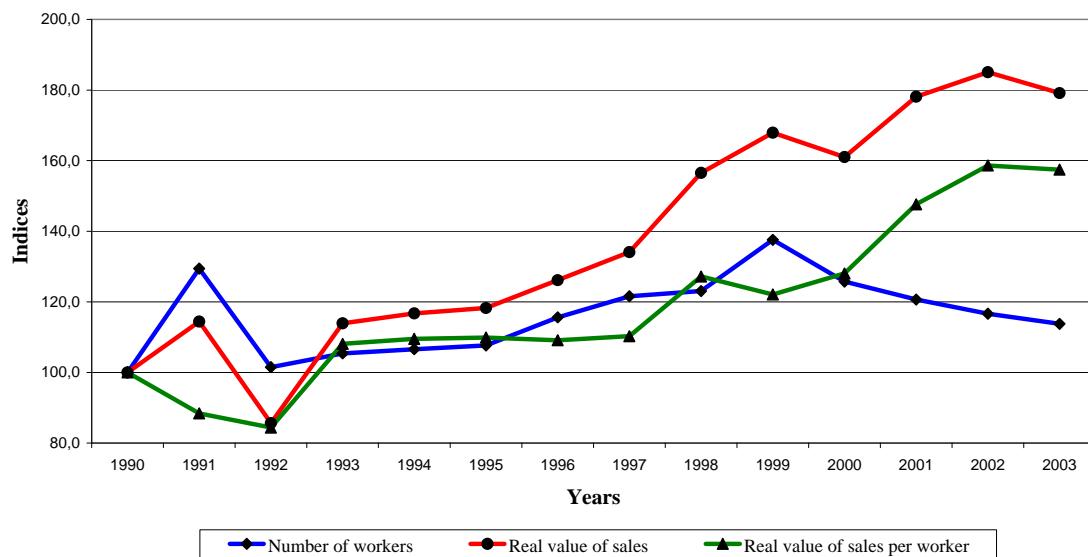
Throughout the period under analysis, there is no sign of major structural changes in firm sizes, measured in terms of number of workers per firm. The small size of many of the firms, the difficulties of getting them to coordinate their activities to access foreign markets and the existence of an expanding domestic market until the turn of the century have been a limiting factor of internationalization of this industry. Some cases of cooperation for marketing in the domestic and foreign market exist, but are and not easy to sustain.

The industry, however, is under tight **competitive pressure** at both ends:

- in terms of inputs, it relies a lot on imported wood and on labour whose real cost is rising;
- in terms of outputs, the domestic market is gradually being penetrated by imported furniture with a good price/quality combination and market channels more adapted to

reach out to the urban consumers (for example, the IKEA stores recently established in the country).

#### Indices of turnover, employment and gross labour productivity in the wooden furniture industry



### 3.3. Supporting and impeding factors for enterprise development in wood processing industries and barriers to entrepreneurship

#### 3.3.1. Sawmilling and planing

##### A) Weaknesses

The main domestic resources for this industry are under degradation by forest fires, for several decades already. The characteristics of these resources also led the industry to concentrate in the processing of small diameters and in products of relatively low value added, without need for high technological capacity, large firm sizes and optimization in the processing of timber resources.

A different segment which developed with less reliance on domestic forest resources is the processing of imported wood, namely tropical wood, to supply the furniture industry.

##### B) Strengths

One factor that has contributed to keep some of this industry and may still continue to do so is the existence of an active and well organized panel industry. The problem here is that this is a client which is interested only in the residues of sawmills, not in its main products.

##### C) Threats

If the industry is not able to move towards the production of pre-fabricated goods for carpentry and other construction activities, it will not even be able to keep a good share of its domestic market. The situation is worst in the foreign markets because, there is no abundant and good timber available at home to make high quality products to export at good prices.

##### D) Opportunities

Probably the best opportunity for this industry is to develop some forms of **integration downstream** with the carpentry and the furniture industries where are the clients for

products with higher value added. This needs cooperation between entrepreneurs in these industries which is not an easy thing to accomplish, and also a substantial improvement in the technological capacity of the industry. More interest by architects, engineers and consumers, in general, for construction with wood could help, but we are still far away from these good prospects in demand for wood. If the rising costs of labour have been a problem for the economic survival of some sawmills, they have also been an opportunity which has been taken for modernization and increase in labour productivity.

### 3.3.2. Wood-based panels

#### A) Strengths

Portugal is the home to the largest group in the world, in the wood based panel industry, named SONAE. Therefore, this group and also others which operate in this industry have a high technological capacity, and a very wide international scope.

#### B) Weaknesses

The problems referred before for the sawmilling industry concerning the domestic foreign resources, such as the small diameters, don't affect this industry in the same way. However, since the two industries are interconnected and sawmilling is upstream from the wood based industry, this activity has a strong interest for sawmilling to be in good shape. Since it is not the case, this is bad news for the wood panel industry.

#### C) Opportunities

With an industrial group with the size of the one which dominates this activity, it is easier to spot new opportunities in foreign markets, to sell products, or for direct investment there.

#### D) Threats

Bad macroeconomic conditions, as the ones the country has been experimenting since the turn of the century, affect the price/cost competitiveness of an export oriented, such as this one. This needs to be fixed as well as a forest policy more actively engaged in the protection and expansion of the domestic forest resource based. This depends on effective orientation towards the support to small scale private forestry, which has not been the case for many years in Portuguese forest policy.

### 3.3.3. Carpentry

#### A) Strengths

The fact that many of the firms in this business have a small size has not been necessarily detrimental to the efficiency of this activity. In fact, we have seen that output and employment have been able to adjust very quickly to fluctuations in the domestic demand.

It is also the wood- processing industry more widely disseminated throughout the country. So its more closely and more flexibly integrated with the economy, not only at the national, but also at the regional level.

#### B) Weaknesses

If the small dimension of many firms in this industry has the positive aspects we have just mentioned, it also has the inconvenient of not favouring the degree of technological capacity, size of operations and access to foreign markets needed to survive in an economy more and more exposed to foreign competition.

It is true that in the "traditional" segment of this activity there is one important of the output which has the nature of a **nontraded good**, because it is like the provision of

personal services specially tailored to the needs of local customers. So, in this case exposure to foreign competition is less relevant. This is not the case for bigger construction contracts and for the “industrial carpentries”.

#### *C) Opportunities*

One opportunity for this industry in a country like Portugal can come from the market for the **renovation** of old houses and buildings. Construction in this country has almost all the time been construction of new facilities. Renovation has been given much less priority. It is in the renovation business that the use of wood and the need for carpentries can be higher.

This type of demand can come, and is already coming, from urban people buying old houses in rural areas. It also can come from within urban areas where there are areas of historical and architectonic interest deserving for preservation. Finally there is the demand coming from **tourism developers** who value constructions where wood is an important material.

For some “industrial” carpentries the opportunities that still exist pass by the **integration upstream** with sawmilling and planing.

#### *D) Threats*

If the provision of nontraded services by “traditional” carpentries is not very much under threat, it is not the case of the firms producing standardized goods exposed to foreign competition. Without an abundant and high quality forest resource base to plug in and a tiny domestic market, the “industrial” carpentries may have a hard time to compete with similar firms from other parts of the world where those problems don’t exist.

### **3.3.4. Wooden furniture**

#### *A) Weaknesses*

The wooden furniture industry is still at a stage of being shaped by an orientation towards the domestic market. This was not a major problem until the turn of the century when disposable income was rising, interest rates were declining, households were investing in home acquisition and furnishing and foreign competition was not strong. All these conditions are being reversed now. So the internal structure of the firms and the relations among the firms have to evolve in a direction capable of finding new demands in the domestic market and reaching out to foreign markets. This is a very difficult structural change to make in an industry where firms are of small size and are not accustomed to cooperate. This also needs much more **intra-industry specialization** than what has existed until now. If this kind of cooperation is not accomplished by the firms themselves, to survive they may have to become producers of parts of furniture, under the dependence of foreign contractors who control the design, the assembling and the marketing of the final product.

#### *B) Strengths*

Most of the wooden furniture industry is concentrated in a very small area where there is a active population with entrepreneurship and know how accumulated through several generations should not be thrown out as traditional and incapable of reconversion. This high degree of **territorial integration** with the associated **social capital** could evolve towards a structure closer to the one of an “**industrial district**” if intra-industry specialization and cooperation develops.

*C) Threats*

Increasing competition in a stagnant domestic market and difficulties to reach out to foreign markets are putting the industry under heavy stress. It also is not adjusted to face new patterns in demand which will be less and less coming from the traditional local costumers with their very special tastes.

The furniture industry worldwide is also becoming more and more globalized which is a threat for a population of small firms accustomed to work for a domestic market where they did not have to face tough foreign competitors.

To add to these problems, there is the tendency for the real cost of labour to increase. So it is not anymore from the lower costs of this input that the industry can get a competitive advantage.

*D) Opportunities*

Increasing competition from foreign competitors, stagnation of the domestic market and rising costs of labour are being turned by some firms into opportunities to make structural changes which will help them to raise labour productivity and build capacity to reach out to new demands in the domestic market and abroad. Along the way other firms which are not able to do this are shutting down, the result being an increase in unemployment since the turn of the century.

**Some publications of interest**

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Mendes, Américo M. S. Carvalho (rapporteur). 1996. O Sector Florestal Português. Documento de Apoio ao Seminário do CESE, Póvoa de Varzim, 4-5 de Outubro de 1996. [Lisbon & Porto]: CESE-Conselho Para a Cooperação Ensino Superior-Empresa. (mimeo).

Mendes, Américo M. S. Carvalho (rapporteur). 1998. Livro Verde da Cooperação Ensino Superior-Empresa. Sector Florestal. Lisbon: Conselho para a Cooperação Ensino Superior-Empresa (referred as CESE 1998).

Mendes, Américo M. S. Carvalho, Diana Feliciano, Marisa Tavares & Rafael Dias. 2004. The Portuguese Forests. Country level report delivered to the EFFE Project – Evaluating Financing of Forestry in Europe. Porto: Faculty of Economics and Management – Portuguese Catholic University.

## Statistical annex

Table 3.1. Number of firms, employment, gross value added (total and per worker) and foreign trade in the wood and cork processing industries compared to the manufacturing industries and the total economy in 2003<sup>5</sup>

Industries	Number of firms	Number of workers	Number of workers per firm	Gross added value at market prices (1000 €)	Gross added value per worker (1000 €)
Sawmilling and planning	981	9553	9.7	126715	13.3
Panels	39	2546	65.3	80926	31.8
Builders' carpentry	5012	18675	3.7	221907	11.9
Wooden containers	158	1095	6.9	13747	12.6
Wooden furniture	6650*	43344*	6.5	488704*	11.3*
Pulp, paper and paperboard	54	5006	92.7	511928	102.3
Corrugated paper and paper products	363	7447	20.5	191373	25.7
Total wood processing industries	13257	87666	6.6	1635300	18.7
Total cork industries	2063	16742	8.1	363225	21.7
Total manufacturing industries	78431	886253	11.3	18470272	20.8
Wood-processing + Cork industries / Manufacturing industries (%)	19,5		11.8		10.8
Economy			5118000		135078700
Wood-processing + Cork industries / Economy (%)			2		14.9

### Sources:

- a) Number of firms, number of workers and gross value added in the wood-processing and manufacturing industries: INE, Estatísticas das Empresas 2003.
- b) Number of workers in the economy: Bank of Portugal (annual report for 2004)
- c) Gross value added at market prices for the economy:
  - the value reported is GDP, at current market prices, which, besides the sum of the value added for all the branches in the economy, also includes indirect taxes net of import subsidies;
  - the source is "INE, Contas Nacionais Anuais Preliminares 2004 (base 1995)"
- d) Foreign trade:
  - product names: the product names are abbreviated cut versions of the SITC Rev. 3 classification whose references correspond to the numbers appearing before each product
  - wood-processing industries (except wooden furniture) and economy: data collected from the tables based on the SITC Rev. 3 classification published in "INE, Estatísticas do Comércio International 2003"
  - manufacturing industries: data collected from the tables based on the CEA Rev. 2 published in "INE, Estatísticas do Comércio International 2003"
  - cork and wooden furniture: INE, Estatísticas Agrícolas 2003.

(\*) own estimates

<sup>5</sup> Due to the insufficient coverage of the Industrial Statistics, the values of the indicators for the number of firms, number of workers and gross value added in the wood-processing and manufacturing industries are possibly underestimated. For the case of employment, a better approximation is presented in chapter 5.

Foreign trade Products	Imports (1000 €)	Exports (1000 €)
248. Sawnwood	128153	57703
634. Wood panels	96817	169333
635. Builders' carpentry, wooden containers and other wood products	96056	125975
Wooden furniture	169181	140505
251. Wood pulp	55095	399104
641. Paper and paperboard	573366	826259
642. Paper and paperboard products	306500	112946
Total wood processing industries	1425168	1831825
Total cork industries	158292	890785
Total manufacturing industries	36286258	27442084
Wood-processing + Cork industries / Manufacturing industries (%)	4.4	9.9
Economy	41742495	28089666
Wood-processing + Cork industries / Economy (%)	3.8	9.7

Table 3.2. Employment in the wood-processing industries (number of workers)

	1975	1980	1985	1990	1996	2000	2003
Sawmilling	16406	16685	13291	17713	14654	10759	9553
Panels	2926	3184	3367	3380	2866	3000	2546
Carpentry	9419	9281	7934	17101	20544	18985	18675
Wooden containers	299	310	341	792	1222	894	1095
Furniture	13574	13204	10439	38095	44036*	47906*	43344*
Pulp	4134	4826	4521	6583	6696	5108	5006
Paper and paperboard	7806	7590	7342	5571			
Corrugated paper and paper products	4476	5633	5817	3887	8608	8910	7447
Total wood-processing	58425	60023	53052	93122	98626	95562	87666
Total manuf. industries	656366	763666	625433	1011339	1035324	937542	886253
Forest industries/ Manuf. industries (%)	8,9	7,9	8,5	9,2	9,5	10,2	9,9

Sources:

a) 1977-89: INE, Anuário Estatístico (several years); b) 1990-95 e 1998-2003: INE, Estatísticas das Empresas – Indústria; c) 1996-97: INE, Estatísticas das Empresas – Agricultura e Indústria, (\*) our own estimates

Table 3.3. Main products of the sawmilling and planing industry in 2003

Products	Value of sales (€)
Maritime pine wood sawn lengthwise (including strips and friezes for parquet flooring) and continuously shaped, planed, sanded or finger jointed	46,403,586
Maritime pine wood sawn lengthwise (including strips and friezes for parquet flooring) and continuously shaped, planed, but not sanded or finger jointed	35,653,317
Tropical wood sawn lengthwise and continuously shaped (except strips and friezes for parquet flooring) and continuously shaped and planed	37,188,163
Pallets and pallet collars	31,623,537

Source: INE, Estatísticas da Produção Industrial 2003

Note: This data refers to a sample of firms, not to the whole population.

Table 3.4. Markets for the sawmilling and planning industry in 2003

Products sold	Markets	Value of sales (100 €)	%
Sales of goods	Domestic market	250,473	84,4
	European Union	39,488	13,3
	Third countries	3,293	1,1
	Total	293,255	98,8
Services marketed		3,545	1,1
<b>TOTAL</b>		<b>296,801</b>	<b>100,0</b>

Source: INE, Estatísticas da Produção Industrial 2003

Note: This data refers to a sample of firms (probably most of them being “industrial carpentries”), not to the whole population.

Table 3.5. Output and labour productivity in sawmilling and planing

Year	Number of workers	Production of Sawnwood (1000 m <sup>3</sup> )	Physical productivity of labour (m <sup>3</sup> /worker)
1980	16685	2200	132
1985	13291	1800	135
1990 <sup>6</sup>	17713	2040	115
1995	n.a.	1731	n.a.
2000	10759	1427	133
2001	10692	1492	140
2002	10212	1298	127

Sources: a) Number of workers: table 3.2; b) Production of sawnwood: UNECE/FAO Timber database.

<sup>6</sup> In 1990 there were substantial changes in methodology and coverage of the Industrial Statistics. For this reason the hike in employment from 1989 to 1990 should not be interpreted as a real rise in this indicator.

Table 3.6. Output prices and average labour costs in the sawmilling and planing industry

Years	Industry's price index (base 100: 1995)	Average cost of labour at current prices (€)	Real average cost of labour (€)
1990	85,8	4025	4691
1995	100,0	n.a.	n.a.
2000	115,5	8458	7323
2001	116,2	8527	7338
2002	114,2	8953	7840
2003	113,8	9439	8294

Sources:

a) Industry's price index:

- the sources are the INE publications about the industrial price indices
- the index for 1990-94 is the general industrial price index base 1990, mathematically converted to base 1995;
- the index for 1995-2001 is the industrial price index for sawmilling and planing;
- the index for 2002 is the industrial price index for sawmilling and planing base 2000, mathematically converted to base 1995.

b) Nominal average cost of labour: INE, Estatísticas das Empresas (several years)

c) Real average cost of labour: nominal average cost of labour deflated by the industry's price index

Table 3.7. Number of firms, average number of workers per firm and value added per firm and per worker in the sawmilling and planing industry

Years	Number of firms	Number of workers	Gross value added at current prices (1000 €)	Real gross added value (1000 €)	Real gross value added per firm (1000 €)	Real gross added value per worker (€)
1990	1221	17713	110927.7	129286.4	105.9	7299
1991	1204	16906	101979.2	114454.8	95.1	6770
1992	1108	14945	119507.0	132051.9	119.2	8836
1993	1219	14475	112035.0	119567.8	98.1	8260
1994	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.
1995	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.
1996	1359	14654	132879.8	138705.4	102.1	9465
1997	1175	13382	145814.6	140612.0	119.7	10508
1998	1176	13719	149342.9	134786.0	114.6	9825
1999	1135	12559	140500.2	124556.9	109.7	9918
2000	1031	10759	138805.5	120177.9	116.6	11170
2001	1033	10692	130707.8	112485.2	108.9	10521
2002	1030	10212	127247.0	111424.7	108.2	10911
2003	981	9553	126715.4	111349.2	113.5	11656

Sources:

a) Number of firms, number of workers, gross value added at current prices: INE, Estatísticas das Empresas (several years)

b) Real gross value added: gross value added at current prices deflated by the industry's price index.

Table 3.8. Main products of the wood based panel industry in 2003

Products	Value of sales (€)
Fibreboard	94,367,256
Particle board covered with paper, except waferboard	69,257,040
Particle board made of wood, in rough, or simply sanded, except waferboard	42,920,989

Source: INE, Estatísticas da Produção Industrial 2003

Note: This data refers to a sample of firms, not to the whole population.

Table 3.9. Markets for the wood based panel industry in 2003 (values in 1000 €)

Activities	Sales of goods				Services sold	TOTAL
	Domestic market	European Union	Third countries	Total		
Particle board	75,202	49,054	13,764	138,020	124	138,144
Fiberboard	48,441	63,607	18,820	130,868	660	131,528
Plywood	65,771	9,209	--	74,980	343	75,322

Source: INE, Estatísticas da Produção Industrial 2003

Note: This data refers to a sample of firms, not to the whole population.

Table 3.10. Physical labour productivity in the wood panels industry

Year	Number of workers	Production of panels (1000 m <sup>3</sup> )	Physical labour productivity (m <sup>3</sup> /worker)
1980	3184	459	144
1985	3367	648	192
1990 <sup>7</sup>	3730	1102	295
1996	2866	1106	386
2000	3000	1248	416
2001	2711	1202	443
2002	2583	1208	468

Sources: a) Number of workers: table 3.2; b) Production: UNECE/FAO Timber database

Table 3.11. Output prices and average labour costs in the wood based panels industry

Years	Industry's price index (base 100: 1995)	Average cost of labour at current prices (€)	Real average cost of labour (€)
1990	85.8	6168	7189
1991	89.1	6712	7533
1992	90.5	6912	7638
1993	93.7	7992	8529
1994	96.3	n.a.	n.a.
1995	100.0	n.a.	n.a.
1996	94.7	12679	13389
1997	97.1	13069	13459
1998	103.5	12356	11938
1999	104.7	13997	13369
2000	106.4	13867	13033
2001	104.7	14188	13551
2002	104.0	15141	14559
2003	101.0	16747	16581

Sources:

a) Industry's price index:

- the sources are the INE publications about the industrial price indices
- the index for 1990-94 is the general industrial price index base 1990, mathematically converted to base 1995;
- the index for 1995-2001 is the industrial price index for the wood panels industry;
- the index for 2002 is the price index for the wood panels industry base 2000, mathematically converted to base 1995.

b) Nominal average cost of labour: INE, Estatísticas das Empresas (several years)

c) Real average cost of labour: nominal average cost of labour deflated by the industry's price index

<sup>7</sup> In 1990 there were substantial changes in methodology and coverage of the Industrial Statistics. For this reason the hike in employment from 1989 to 1990 should not be interpreted as a real rise in this indicator.

Table 3.12. Number of firms, average number of workers per firm and value added per firm and per worker in the wood based panels industry

Years	Number of firms	Number of workers	Gross value added at current prices (1000 €)	Real gross added value (1000 €)	Real gross value added per firm (1000 €)	Real gross added value per worker (€)
1990	n.a.	3380	39849.0	46444.1	n.a.	13741
1991	n.a.	3667	67347.7	75586.6	n.a.	20613
1992	n.a.	2820	53336.5	58935.4	n.a.	20899
1993	n.a.	3249	46926.9	50082.1	n.a.	15415
1994	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.
1995	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.
1996	56	2866	79697.9	84158.3	1502.8	29364
1997	34	2654	85743.4	88304.2	2597.2	33272
1998	37	3080	92393.3	89268.9	2412.7	28983
1999	35	2834	97154.3	92793.0	2651.2	32743
2000	36	3000	95550.9	89803.5	2494.5	29934
2001	36	2711	83766.6	80006.3	2222.4	29512
2002	39	2583	86571.1	83241.4	2134.4	32227
2003	39	2546	80926.1	80124.	2054.5	31471

Sources:

a) Number of firms, number of workers, gross value added at current prices: INE, Estatísticas das Empresas (several years)  
 b) Real gross value added: gross value added at current prices deflated by the industry's price index.

Table 3.13. Gross value of production in builders' carpentry

Year	Number of workers	Gross value of production at current prices (1000 €)	Real gross value of production (1000 €)	Real gross value of production per worker (1000 €)
1990	17101	317250	369755	21.6
1991	16797	325969	365846	21.8
1992	15191	293563	324379	21.4
1993	14455	290236	309750	21.4
1994	n.a.	n.a.	n.a.	n.a.
1995	n.a.	n.a.	n.a.	n.a.
1996	20544	442892	431248	21.0
1997	20883	535753	510727	24.5
1998	20577	590626	553539	26.9
1999	20754	627423	580410	28.0
2000	18985	606653	554527	29.2
2001	16218	572022	512565	31.6
2002	19448	614469	545225	28.0
2003	18675	641484	565683	30.3

Sources:

a) Number of workers: table 3.2; b) Gross value of production at current prices: INE, Estatísticas das Empresas (several years); c) Real gross value of production: gross value of production at current prices deflated by the carpentry's price index (base 1995)

Table 3.14. Output prices and average labour costs in builders' carpentry

Years	Industry's price index (base 100: 1995)	Average cost of labour at current prices (€)	Real average cost of labour (€)
1990	85.8	3342	3895
1991	89.1	3975	4461
1992	90.5	4404	4866
1993	93.7	4514	4818
1994	96.3	n.a.	n.a.
1995	100.0	n.a.	n.a.
1996	102.7	5169	5033
1997	104.9	5561	5301
1998	106.7	6040	5661
1999	108.1	6361	5884
2000	109.4	6870	6280
2001	111.6	7656	6860
2002	112.7	7258	6440
2003	113.4	7904	6970

Sources:

a) Industry's price index:

- the sources are the INE publications about the industrial price indices
- the index for 1990-94 is the general industrial price index base 1990, mathematically converted to base 1995;
- the index for 1995-2001 is the industrial price index for builders' carpentry;
- the index for 2002 is the industrial price index for builders' carpentry base 2000, mathematically converted to base 1995.

b) Nominal average cost of labour: INE, Estatísticas das Empresas (several years)

c) Real average cost of labour: nominal average cost of labour deflated by the industry's price index

Table 3.15. Number of firms, average number of workers per firm and value added per firm in builders' carpentry

Years	Number of firms	Number of workers	Gross value added at current prices (1000 €)	Real gross added value (1000 €)	Real gross value added per firm (1000 €)
1990	4746	17101	94532	110177	23.2
1991	4026	16797	99565	111745	27.8
1992	3949	15191	92332	102024	25.8
1993	4115	14455	89090	95080	23.1
1994	n.a.	n.a.	n.a.	n.a.	n.a.
1995	n.a.	n.a.	n.a.	n.a.	n.a.
1996	5470	20544	160194	155982	28.5
1997	5508	20883	171177	163181	29.6
1998	4748	20577	191685	179649	37.8
1999	4723	20754	204162	188864	40.0
2000	5262	18985	200095	182902	34.8
2001	4459	16218	190560	170753	38.3
2002	5151	19448	196873	174688	33.9
2003	5012	18675	221907	195685	39.0

Sources:

a) Numbers of firms and workers, gross value added at current prices: INE, Estatísticas das Empresas (several years)

b) Real gross value added: gross value added at current prices deflated by the industry's price index.

Table 3.16. Main products of builders' carpentry in 2003

Products	Value of sales (€)
Doors of prepared wood	68,627,111
Doors of unprepared wood	34,834,983
Floors	46,126,953
Other	n.a.

Source: INE, Estatísticas da Produção Industrial 2003

Note: This data refers to a sample of firms, not to the whole population.

Table 3.17. Markets for the builders' carpentry production in 2003

Products sold	Markets	Value of sales (€)	%
Sales of goods	Domestic market	215,738,828	80.0
	European Union	37,773,194	14.0
	Third countries	4,256,821	1.6
	Total	257,768,843	95.5
Services marketed		11,990,695	4,4
<b>TOTAL</b>		<b>269,759,538</b>	<b>100</b>

Source: INE, Estatísticas da Produção Industrial 2003

Note: This data refers to a sample of firms (probably most of them being "industrial carpentries"), not to the whole population.

Table 3.18. Employment in the wooden furniture industry<sup>8</sup>

Year	Wooden furniture (class 332 CAE Rev. 1)	Metalic furniture (Class 381200 of CAE Rev. 1)	Wooden and metallic furniture (Classes 332+381200)	Wooden and metallic furniture (Class 361 CAE Rev. 2)	Wooden and metallic furniture
1990	38095	5504	43599		43599
1991	49301	5881	55182		55182
1992	38669	5510	44179		44179
1993	40150	6005	46155		46155
1994	40603	6100*	46730*		46730*
1995	41005	6160*	47165*		47165*
1996	44036**			50651	50651
1997	46324**			53283	53283
1998	46886**			53930	53930
1999	52398**			60270	60270
2000	47906**			55103	55103
2001	45961**			52865	52865
2002	44435**			51110	51110
2003	43344**			49855	49855

Sources:

a) workers in class 332 of CAE Rev. 1 until 1995: INE, Estatísticas das Empresas (years 1990-91, 1992-93 and 1995)

b) workers in class 381200 of CAE Rev. 1 until 1993: INE, Estatísticas das Empresas (years 1990-91 and 1992-93)

c) workers in class 381200 of CAE Rev. 1 in 1994 and 1995: own estimation based on the rate of change of employment in the wooden furniture

<sup>8</sup> Since 1996 the official industrial statistics adopted a new version of the classifications of economic activities (CAE Rev. 2) which unfortunately placed in the same class (361) the wooden and the metallic furniture industries. This table explains the estimation of employment in the wooden furniture industry for 1996-2003, using the official data that was published in those statistics for this period.

d) workers in class 332 of CAE Rev. 1 in 1996: own estimation using the same rate of change as for the total employment in wooden and metallic industries referred in the last column.

Table 3.19. Turnover of the wooden furniture industry by types of products<sup>9</sup>

Years	Sales by types of furniture at current prices (1000€)				Deflated value of total sales (1000€)	Industry's price index (base 100: 1995)
	Dining and living rooms	Kitchens	Bedrooms	Parts of furniture and other furniture		
1990			178206	33732	211941	247017
1991			208673	43145	251818	282624
1992	55016	32664	66660	37132	191472	211571
1993	68438	30451	87245	77577	263711	281442
1994	74298	28181	97448	77730	277657	288325
1995	77737	55400	74607	84386	292130	292130
1996	83081	33977	110720	96253	324031	311568
1997	96333	63408	124461	67579	351781	331244
1998	113709	68808	133225	106909	422651	386689
1999	127128	79152	151123	105538	462941	414822
2000	132239	57130	151664	111651	452684	397789
2001	141044	95159	156007	119050	511260	439983
2002	154834	108790	158350	118790	540764	457112
2003	144847	107245	160097	115738	527927	442521
						119,3

Sources:

- a) Sales at current prices: INE, Estatísticas da Produção Industrial (years 1990 to 2003)
- b) Industry's price index:
  - the sources are the INE publications about the industrial price indices
  - the index for 1990-94 is the general industrial price index base 1990, mathematically converted to base 1995;
  - the index for 1995-2001 is the price index for class 361 of CAE Rev. 2 (wooden and metallic furniture) base 1995;
  - the index for 2002 is the industrial price index for class 361 of CAE Rev. 2 (wooden and metallic furniture) base 2000, mathematically converted to base 1995.
- c) Deflated value of sales: value of sales at current prices deflated by the industry's price index.

<sup>9</sup> The data from this source underestimates the actual turnover of the industry. So it is used here essentially to identify fluctuations and trends, not the absolute values of the indicators.

Table 3.20. Markets for the furniture industry in 2003 (values in 1000 €)

Manufacturing activities	Sales of goods				Services sold	TOTAL
	Domestic market	European Union	Third countries	Total		
chairs and armchairs	350,727	351,277	19,462	721,467	2,176	723,644
office and store furniture	92,873	15,772	8,567	117,213	467	117,681
kitchen furniture	105,729	1,850	90	107,670	1,124	108,794
other wooden furniture	301,307	85,324	14,679	401,311	3,116	404,427

Source: INE, Estatísticas da Produção Industrial 2003

Notes:

a) This data refers to a sample of firms, not to the whole population.

b) It is very unfortunate that the current classification of economic activities lumps together wooden and metallic furniture. For this reason we don't know what pertains to wood furniture in the three following classes referred in the table: chairs and armchairs, office and store furniture and kitchen furniture.

Table 3.21. Real value of sales per worker in the wooden furniture industry

Year	Deflated value of total sales (1000 €)	Deflated value of sales per worker (€)	Number of firms	Number of workers	Workers per firm
1990	247,017	6484	6583	38,095	5.8
1991	282,624	5733	6810	49,301	7.2
1992	211,571	5471	6561	38,669	5.9
1993	281,442	7010	6451	40,150	6.2
1994	288,325	7101	6715	40,603	6.0
1995	292,130	7124	6599	41,005	6.2
1996	311,568	7075	n.a.	44,036	n.a.
1997	331,244	7151	n.a.	46,324	n.a.
1998	386,689	8247	n.a.	46,886	n.a.
1999	414,822	7917	n.a.	52,398	n.a.
2000	397,789	8304	n.a.	47,906	n.a.
2001	439,983	9573	n.a.	45,961	n.a.
2002	457,112	10287	n.a.	44,435	n.a.
2003	442,521	10210	n.a.	43,344	n.a.

Sources: Number of firms: INE, Estatísticas das Empresas (several years)

## 4. Non wood forest product and services

### 4.1. Overview

According to our own estimates (Mendes, 2005), non wood forest products and services (NWFP&S) represent the main component of the gross total value of forest production:

a) Wood:	45.6%
b) NWFP&S (net of the negative externalities of forest fires):	54.4%
- cork:	32.7%
- other NWFP (resin, honey, fruits, mushrooms, plants, grazing and acorns):	16.3%
- hunting:	1.8%
- recreation:	1.4%
- environmental services (carbon sequestration, soil, water and landscape protection)::	13.7%

Most of this value of NWFP&S corresponds to marketed goods, namely cork, resin, honey, fruits (pine nuts, chestnuts and carob), grazing and acorns for livestock production and some gaming. With the exceptions of mushrooms and some of the honey and gaming, the main issue here is not so much to secure the property rights of the forest owners to ensure they can get a revenue from these products, but the fact that they are very unevenly distributed across the country. In fact, they are a significant component of the forest owners' income only in the Alentejo region where most of the cork production is located, as well as a good deal of the forestry based livestock production and hunting in areas with excludable access rights. This region is also the one where forestland ownership is more concentrated.

Another cautionary note to make about the economic importance of NWFPs is the same as for timber: they are all subject to a relatively high risk of destruction by forest fires. Given the level of this type of risk, the main priority for public policies and private stakeholders' strategies should be the protection of the existing resources against forest fires. Next may come securing forest owners' property rights on those products where they don't get benefits and there is a risk of overexploitation, namely mushrooms and game production. The other major front for action in terms of promoting the value of NWFP&S is in recreation. There is more and more "informal recreation" in forest areas which is not translated into increasing revenues for the forest owners and often ends up in aggravated risks for forest resources (careless behaviours of forest visitors contributing for the ignition of forest fires).

Concerning the internalisation of positive forest externalities, it can be argued that it is already in place through the incentive schemes to support private forestry and the Permanent Forest Fund presented in chapter 2. The issue here is more about the effectiveness and efficiency in the implementation of these instruments (Mendes *et al.*, 2004).

### 4.2. Cork

#### 4.2.1. The cork economy until mid 1930s

Since cork is, by far, the main non wood forest product in Portugal, we concentrate on this product here. The interested reader is referred to the two papers by Mendes (2002,

2005) for a more complete coverage of this activity. In Mendes (2002) there is a comprehensive statistical database for this product and related activities.

Cork acquired great commercial importance when cork stoppers became an important input in wine bottling, in the end of the XVIIth century. The take off demand for cork in Portugal for this purpose did not happen soon after cork stoppers became important in wine bottling in France. The innovation first touched the cork producing regions in France and Spain. The take off in Portugal happened since the middle of the XIXth century. Cork oaks have existed for a long time in Portugal, especially throughout the western part of the country, from North to South, but the definitive emergence of a "cultivated" cork oak forest for the purpose of cork production dates from that time.

Until the Civil War, in Spain, in 1936, the neighbouring country had the lead in terms of cork manufacturing, followed by some importing countries, Portugal having risen to the role of major producer of unmanufactured cork. After 1936 Portugal took over from Spain the leading position in cork manufacturing, having kept this position since then.

#### **4.2.2. From mid 1930s until mid 1960s**

Drivers of cork industries

During this period there were four relevant facts for the development of cork industries in Portugal:

- a) The Civil War in Spain which severely damaged cork industries in that country, especially in Cataluña;
- b) the development of plastic materials competing with cork agglomerates;
- c) the development of railways and road transportation;
- d) the instauration of the corporative regime of Salazar with policies of legal barriers to entry in industrial activities ("condicionamento industrial") and public regulation of the regional segmentation in cork labour markets.

The effect of the destruction of cork industries in Spain is that the Portuguese industry took over the Spanish position, becoming, since then, the leading country not only in cork production, but also in cork manufacturing. The main effect of the emergence of plastic materials was the crisis in the large firms of the Montijo/Seixal/Barreiro area, especially Mundet, which had based a lot of their strategy on the production of agglomerates and other materials now competed by plastics. Another effect was to make less competitive the cork firms installed in importing countries which had based part of their competitiveness in the full valorisation of cork through production of stoppers and utilisation of residues for agglomerates.

The development of railways and road transportation was to diminish the advantage of the industry in the Montijo/Seixal/Barreiro area over the industry in the Feira district in terms of access to the cork production areas.

The main effects of the industrial and labour market policies of the Salazar regime were to favour the development of the small family firms in the Feira district:

- a) they were totally or almost totally free from the requirements imposed by the "industrial conditioning" system which was not the case of the larger firms;

b) the public regulation of the cork labour markets consecrated the wage differentials between the Feira district and the industry in the South, with salaries lower in the former compared to the latter.

In the development of the Feira district during this period the Amorim group rose to a position of dominance over the small family firms in the area:

- a) some of these firms were run by former employees of the Amorim companies;
- b) the Amorim group supplied cork planks and credit to the small firms and exported most of their products (cork stoppers).

Overall, the main changes during this period were the rise of Portugal to the leading position in terms of cork manufacturing and the reversal of the relative positions between the industry in the North (Feira) and the industry in the South (mainly in the Montijo/Seixal/Barreiro area):

- a) in 1930 there were 24 cork industrial units in the Aveiro district, 111 in the Setúbal district and 297 in the rest of the country, while, in 1980, there were respectively 377, 139 and 103 (in Mendes, 2002);
- b) in 1939 there were 2677 cork industry workers in the Aveiro district, 9469 in the Setúbal district and 5276 in the rest of the country, while, in 1975, there were respectively 7319, 5703 and 2683 (in Mendes, 2002).

#### Drivers of cork removals and exports

Because of the destruction in the Spanish cork industry and the crisis of cork industry in some importing countries together with the development of cork industries in Portugal, the exports of unprocessed cork followed a negative trend, whereas exports of processed cork followed a positive trend interrupted by World War II and the Korean War.

Since exports were rising cork removals were also on the rise. This was possible because the new cork areas installed in the previous period were reaching the age of production. Also, during the early part of this period, there was an expansion in the area of cork oak. This expansion happened in some of the shrublands cleared for wheat production during the campaign for the expansion of this activity organized by the government between 1928 and 1938 ("Campanha do Trigo"). When the growing of wheat was not profitable due to the reduction in public support and the overexploitation of the land some of these lands turned into cork oak areas only. In those which remained in wheat production there were cases where cork oak plants were left growing in the middle of the wheat fields.

In the 40s, 50s and 60s the cork oak area declined due to the following factors:

- a) increase in the demand for charcoal during World War II;
- b) the hurricane of February 15, 1941;
- c) mechanization of agriculture;
- d) expansion of irrigated areas in some cork producing zones;
- e) substitution of cork oak by eucalyptus.

The three last factors in this list mean that during this period cork production had to meet the competition of innovations in farming activities, in processes, such as mechanization and in products, such as irrigated crops, as well as the competition of a

new forest species (eucalyptus). Throughout the whole period wheat benefited from the price support policy initiated in 1899.

The reduction in cork oak area happened in spite of the legislation protecting this species which was approved in the 1920s. During this period there were also some efforts to develop the research on the silviculture of cork oak and to renovate the cork oak areas through distribution to the forest owners, free of charge, of plants with good quality, accompanied by some technical assistance by the Forest Services. Most of these activities owed a lot to the work of Vieira Natividade, but did not survive very long after his death.

#### **4.2.3. From mid 1960s to mid 1980s**

##### **Drivers of cork removals and exports**

The insufficient investment on cork oak areas in the previous period and the fact that many of the areas where cork production was first developed were getting too old contributed to the reversal in the positive trend of cork removals which had been happening at least since the 1860s. The 1960s were also a period of rural abandonment which continued throughout the 1970s and 1980s. This phenomenon probably contributed to some degradation in the management of cork oak areas.

The occupation of the large farms in the cork oak areas of Alentejo after the Revolution of 1974 did not improve the management of this resource. Instead it appears that it contributed to the negative trend started in mid 60s. One result of this decline in cork removals was a positive trend in real prices.

For this decline in cork production may also have contributed the decline in exports. To this decline in exports may have contributed the fact that the industry in the Montijo/Seixal/Barreiro was in crisis. They had products such as agglomerates which did not compete well with plastics. They were also based on labour relations leading to higher wage costs and more conflicts than for the industry in the North. These problems got much worse after the Revolution of 1974.

##### **Drivers of cork industry**

The rise in real prices for cork and in real wages together with conflicting labour relations were fatal blows for major cork companies in the Montijo/Seixal/Barreiro area. The Feira district had much less labour conflicts before and after the Revolution of 1974. Because many of the firms there relied on family labour they also resisted more to the positive trend in real wages. The result was that the Feira district reinforced its relative position in the Portuguese cork industry.

This result also owes a lot to the type of inter-firm network build up during the previous period, more precisely the structure with a large group (Amorim) dominating the small family firms engaged in the manufacturing of cork stoppers. By developing a powerful network of cork purchasing agents, the Amorim group was able to mitigate the positive trend in real prices for cork. Since the group was also the supplier of cork to many small firms in the Feira district they also benefited somehow from this commercial organisation.

In terms of exports, the Amorim group managed to penetrate in new markets such as the Eastern European countries and Russia through trading business contracts. The group also continued to expand its marketing channels in other parts of the world. Another important development in the Feira district during this period is that the Amorim group picked up on the crisis of the firms in the south as far as the production of agglomerates is concerned and started its own production of agglomerates on new technological and commercial basis, more able to cope with competing materials. With this production the group controlled the local market of residues from the production of cork stoppers, tying up even more its connections with the small firms in this business.

#### **4.2.4. Since 1980s**

##### **Drivers of cork removals and exports**

During this period cork removals and exports returned to a positive trend. Since 1986 the country was member of the EEC which may have favoured some exports. However, here again firms' strategies may also have played an important role. Amorim and other large groups in the cork industry were active in developing their own marketing channels in the importing countries either by setting up companies there, or by purchasing existing ones which, in some cases, were their competitors. These investments were not confined to the European countries. Instead they aimed at the main countries in wine production and consumption not only within, but also outside Europe.

Pushed by exports, cork removals restarted to rise, now in a more stable social setting, after the land was returned to their former owners in the cork producing areas. This was also the time when the cork oak areas installed in the 20s and 30s with the "Wheat Campaign" reached the age of production.

After the decline observed in the previous period, the cork oak area started to increase largely due to the favourable financial incentives provided by the EU co-funded programmes initiated in mid 80s: the Forest Action Programme, followed by the Forest Development Plan and Reg. (EEC) 2080/92.

A threat to this increase in cork oak area is something already referred as a possible cause of the decline observed in the previous period: rural abandonment. With less and less people living in rural areas farmland turns into shrubland and the proper management of cork oaks and other forests becomes more and more difficult to do at affordable costs. The end result may be something that was not frequent before in cork oak areas, but is becoming more and more frequent in recent years: forest fires.

##### **Drivers of cork industry**

As was said in the previous section, the major industrial groups were engaged in investments abroad to improve their marketing channels in importing countries. This was necessary in order to cope with a negative trend in exports in the previous period. Also this was the time when the industry faced a serious threat of competition in its core product, the cork stopper. This threat is coming from synthetic and other materials considered to be more able for preserving the quality of the wine, than cork stoppers because of the substances can produce when it is in contact with wine.

Under the pressure of a rising real price for cork during most of the 90s, and under this high pressure for quality control in its core product, the major cork companies made substantial investments in the modernization of their plants, in quality control, in research and development of new products and in personnel training. Some of these investments benefited from support by EU co-funded programmes.

Still because of the need to improve quality throughout the whole production chain, some of them, including those mainly based in the Feira district, made large investments in vertical integration upstream, towards cork plank preparation. The productive capacity installed in these new plants located in the cork producing region of Alentejo is close to one half of the total average production of cork. So this is a big step in terms of concentration of the cork plank preparation industry.

#### **4.3. Overview of other non wood products**

##### **4.3.1. Resin**

Resin tapping rose to a relatively high level in the 70s and 80s, after the demise of this activity in France due to rising labour costs in this country. The emergence of China and other low labour cost producing competitors in the world market led to a rapid decline of this activity since 1986.

##### **4.3.2. Fruits from forests**

For many years and until not very long time ago, chestnuts were an important food in many rural areas. They had a role that was later substituted by potatoes. That function almost disappeared with the out migration of rural people and with the changes in their feeding habits. So, for some time, chestnut production suffered somehow from these changes in demand, but, in recent years, it is regaining commercial interest due mainly to an increasing demand from urban areas. This increasing commercial interest, here not only for the domestic market, but also for exports, also happens with pine nuts and carob.

##### **4.3.3. Wild mushrooms**

Wild mushrooms are not a very frequent ingredient in traditional Portuguese cuisine. More recently with the adoption of foreign recipes in restaurants of urban areas and good prospects for exports, mushroom picking developed. This activity has developed in an "open access" regime, with very few or even no benefits for the forest owners and an increasing risk of overexploitation of the resource.

##### **4.3.4. Forest based animal products**

Honey: The major new facts in recent years are the efforts of producers in terms of certification related to protected geographical denominations and the growth in exports during the last 10 years.

Forest based livestock production: After having been a very important activity in many mountain areas was in decline until the access of the country to the EU aids to livestock production and to less favoured regions. This support together with a rising urban demand for quality animal products stimulated an effort of the remaining producers in terms of certification related to protected geographical denominations.

Recreation: Recreation in forest areas is a relatively recent, but growing phenomenon, which started to develop after the improvement in real incomes that followed the Revolution of 1974. Most of this recreation is still "informal" since most forest owners are not organised to offer tourism facilities and other marketable services through which they can internalise some of benefits they can get from this type of demand.

Hunting: Without getting into details, we can say that the hunting law basically distinguishes two regimes: a "special" regime and a "general" regime. The special regime covers now about one third of Continental Portugal. It includes situations of common property and private property. Common property exists when a group of hunters join together to get the agreement of the landowners of a certain area to restrict the hunting rights to the members of their club, paying rent to the landowners in return. These are called the "associative hunting zones". Besides paying rent to the landowners, the hunting club also has to follow a management plan to improve the gaming resources and hire guards to protect them.

This type of regime was criticised because the procedure to get the landowners' agreement did not require their written consent. It was enough for the hunting club to post a public notice about the proposal to create a hunting zone and then wait for some time to see if some landowners were opposed to that. Thus some people's property was included in this kind of hunting zones without their knowledge, just because they were not there when the notice was posted. These regulations have been changed so that currently a written consent is required from all the landowners included in these associative hunting zones.

Another situation fitting in the special regime is the case of the "tourism hunting zones". Here gaming is managed as private property directly by the landowner or by some company which is leasing land for this purpose. So access to these zones is not restricted to the members of hunting clubs. Any hunter can access the lands as long as he can afford to pay the access fees and the prices for the pieces of game he gets. These areas are already a big business in Portugal, especially in the extensive farm estates of Southern Portugal (Alentejo), being one of the very few economic opportunities available in the innermost parts of this region.

The general regime is the land of the "*res nullis*" with features not far from an "open access" system. Here anyone with a hunting licence can hunt during the hunting season, the access to private property being free, as long as it is not an area under the special regime.

Hunters in the associative and in the general regime have been in conflict since the former was allowed by law because each associative zone that is created is taken away from the territory left open to the general regime. The Ministry of Agriculture has tried to manage this conflict, but since it is a politically sensitive issue, the public interventions have been fearful of clearly steering the process in the direction of the substantial reduction of the general regime in favour of the common property regimes.

#### **4.4. Supporting and impeding factors for enterprise development in non wood forest products and services and barriers to entrepreneurship**

##### **A) Strengths**

With a relatively small territory, Portugal has a relatively large variety of non wood forest products and services. Since a big part of that territory has Mediterranean features, this kind of products are of high importance for the economic viability of forests. All these products have a good quality capable of pleasing consumers of all income levels, if they can have the products at their reach.

The main case in the universe of Portuguese non wood forest products is cork. This is the only product where Portugal has a leading position in the world in all counts: production of the raw material, manufacturing and marketing. The leading firms in this industry have a wide international scope, high technological capacities and are active in innovation and marketing promotion of their products. Therefore on this product a whole economic cluster was built during the last century which has endured serious threats from competing products and activities. As often happens with this kind of products, in Portugal too, their economic development is very much compatible, and even supportive of the non marketable forest environmental services.

##### **B) Weaknesses**

If variety can a strength, it can also be a weakness. In fact, not all of these products have a current and potential output capable of sustaining a whole rural and industrial economy, such as cork. Many of them exist only in small territories and in relatively small quantities. So to be economic viable they need to be integrated with other activities and products. This requires high efforts of coordination which are hard to bring about, especially in remote and depopulated rural areas.

Another difficulty related to coordination, is the fact that the production and marketing of goods with quality labels requires the collective organization and self discipline of all stakeholders along the production and the marketing chain to keep up with the good quality standards. There are already a good number of labels and producer groups related to them, but this kind of collective organization is always a difficult thing to sustain in good shape. Also the small size of many of these operations does not allow them to reach out much beyond the local or the national markets.

In the case of cork the major weakness now is the risk of some degradation in the resource base of the industry. Some cork oak stands die suddenly, especially in years of draught. Also, the risk of forest fires which, in the past, was relatively low in the cork producing regions, is increasing and already took a heavy toll in recent years. Finally, from the 1930s to the 1980s, there was not enough renovation of the cork oak stands. This is happening now, with the EU-cofunded afforestation programmes started in 1986. However, the industry still has to wait thirty years more for the first hopefully positive results of these programmes. One consequence of this is the inflationist pressure on the prices of raw cork, even though, in real terms, the price increases have not always been as important as the industry sometimes claims.

Finally another issue which can sometimes be a serious weakness for the economy of cork has to do with quality control. Since cork is now under strong pressure from

competing materials based on the argument of the possible deterioration of wine by cork stoppers, controlling the quality throughout the entire productive chain, from the cork oak stand until wine bottling, and even beyond this point, is an issue of life and death for the economy of this product. To complicate things, cork is a very heterogeneous product. Also, traditionally there has often been not very cooperative relations between the main stakeholders in this activity. The situation is changing with interprofessional initiatives on the way, but this still remains a difficult area for making quick progresses.

### **C) Opportunities**

There is a potentially increasing demand from urban areas in the country and from abroad for this kind of products. As the income of the population increases, in spite of the conjunctural situations of economic crisis, rural areas are getting more and more national and foreign tourists looking for the consumption of these goods and services. The Alentejo region from where comes most of the cork production and where other important non wood forest products can be found is now a interesting destination for urban people looking for secondary houses. In weekends and for longer periods the region gets a good number of national and foreign tourists. This is helping to make the local economy viable.

The same can be said, for example, of the Douro Valley from where comes the Port wine. This valley is now becoming a route of tourism penetration to the remote, but very beautiful, rural areas of Northeast Portugal.

### **D) Threats**

All these products are threatened by the high and increasing risk of forest fires. This risk is partially due to natural conditions. However, these conditions have been there for many years. What is now feeding this kind of risk is mostly the depopulation of rural areas. So one of the best ways to control this risk is to make all the efforts possible to keep the economic and social viability of these areas. Promotion of the non wood forest products and services are always an essential part of these efforts where they are undertaken.

Concerning cork, we have already mention the threat coming from competing materials for wine stoppers. If cork were to be beaten in this game, that would probably be the end of the cork economy. The industry and other stakeholders in this activity are responding relatively quick and in an collectively organized way to this threat. They are turning it in an opportunity for technological, entrepreneurial and commercial innovation. However, the war is still far from being over and won by the cork economy.

## Statistical Annex

Table 4.1: Gross total value of forest production of in Continental Portugal, in 2001  
(Mendes, 2005a)

Outputs	Physical production (intermediate or final)	Unit value (euros per physical unit)	Value of production (000 euros)
<b>A. Direct use values</b>			<b>543,594</b>
Timber harvested			430,604
- Pulpwood			
Coniferous	2,153,000 m <sup>3</sup>	€19.54/m <sup>3</sup> o.b.	42,070
Broad-leaved	6,684,000 m <sup>3</sup>	€31.70/m <sup>3</sup> o.b.	211,883
- Saw-logs			
Coniferous	4,733,000 m <sup>3</sup>	€33.42/m <sup>3</sup> o.b.	158,177
Broad-leaved	221,000 m <sup>3</sup>	€41.89/m <sup>3</sup> o.b.	9,258
- Other industrial wood	220,000 m <sup>3</sup>	€41.89/m <sup>3</sup> o.b.	91,216
Fuelwood			37,273
Coniferous	286,000 m <sup>3</sup>	€38.22/m <sup>3</sup> o.b.	10,931
Broad-leaved	488,000 m <sup>3</sup>	€53.98/m <sup>3</sup> o.b.	26,342
Net growth in standing timber stock			75,717
Coniferous	2,060,000 m <sup>3</sup>	€19.53/m <sup>3</sup> o.b.	40,232
Broad-leaved	1,794,000 m <sup>3</sup>	€19.78/m <sup>3</sup> o.b.	35,485
<b>B. Non wood forest products</b>			<b>584,771</b>
Cork harvested			390,726
Reproduction cork	128,000 t	€2,937/t	375,936
Virgin cork	30,000 t	€493 /t	14,790
Resin	15,444 t	€200/t	3,089
Honey			7,619
Origin labelled honey	172.5 t	€3,970/t	684
Other honey production	4,361.5 t	€1,590/t	6,935
Fruits collected			53,310
Pine nuts	70 million cones	€0.20/cone	14,000
Chestnuts	26,118 t	€997,6/t	26,055
Carob	31,500 t	€272,3/t	8,577
Arbutus berries	15,130 ha x 0.2t/ha	€1,125/t	3,404
Elderberries (Sambucus nigra)	650 t	€1,960/t	1,274
Edible wild mushrooms	6,500 t	€2,500/t	16,250
Plants picked up for sale			1,400
Thyme, laurel and other cooking plants	80 t	€3,750/t	300
Aromatic and medicinal plants	1,100 t	€1,000/t	1,100
Forest goods for intermediate consumption in animal production			112,377
Acorns grazed by pigs in extensive rearing	51,450,000 FU	€0.1303/FU	6,704
Grazing resources under forest cover	674 million FU	€0.1303/FU	87,809
Grazing resources in scrub land (consumption by goats)	137 million FU	€0.1303/FU	17,864
Acorns and other products grazed by other animal species			No estimate
Net growth in the production capacity of non wood forest goods			No estimate, but probably positive

<b>C. RECREATIONAL SERVICES</b>			<b>37,883</b>
Hunting	219,005 hunters		21,383
Informal forest recreation	6 million day-visits	€2.75/day-visit	16,500
<b>D. TOTAL DIRECT USE VALUES</b>			<b>1,166,248</b>
Carbon storage	1,450,000 tC	€20/tC	29,000
Protection of agricultural soil			49,209
Protection of water resources	8,772,520 ha	€3.30/ha	28,934
Forest landscape and biodiversity conservation	594,509 ha	€95.36/ha	56,695
<b>E. TOTAL INDIRECT USE VALUES</b>			<b>163,838</b>
Damages caused by forest fires			136,850
Costs of fire prevention			17,350
Social costs of fire fighting			35,853
Losses of forest products burnt			38,320
Reforestation costs			45,327
Other forest externalities			No estimate
<b>TOTAL NEGATIVE EXTERNALITIES</b>			<b>136,850</b>
<b>TOTAL ECONOMIC VALUE</b>			<b>1,193,236</b>

### Some publication of interest

Bugalho, João & João Carvalho. 2001. *O associativismo cinegético em Portugal: a importância do associativismo cinegético para a conservação dos recursos naturais e o seu reflexo no desenvolvimento rural*. Lisbon: Ministério da Agricultura, do Desenvolvimento Rural e das Pescas, Direcção Geral do Desenvolvimento Rural, Série Estudos e Análises.

Cipriano, Ricardo Jorge Reis. 1999. *Análise do Panorama Cinegético em Portugal a Partir de Um Questionário aos Caçadores*. Report submitted in fulfilment of the Bachelor's degree in Forest Engineering. Lisbon: Instituto Superior de Agronomia (mimeo).

Mendes, Américo M. S. Carvalho. 2002. *A economia do sector da cortiça em Portugal. Evolução das actividades de produção e transformação ao longo dos séculos XIX e XX*. Paper presented at the XXII Meeting of the Portuguese Association of Economic and Social History, University of Aveiro, 15-16 November 2002 ([http://www.cgi.ua.pt/xxiaphes/Artigos/Américo\\_Mendes.pdf](http://www.cgi.ua.pt/xxiaphes/Artigos/Américo_Mendes.pdf)).

Mendes, Américo M. S. Carvalho. 2005a. *Portugal*. In *Valuing Mediterranean Forests: Towards Total Economic Value*, Maurizio Merlo & Lelia Croitoru (eds.). Wallingford, Oxon (UK): CAB International. pp. 331-352.

Mendes, Américo M. S. Carvalho. 2005b. Cork production and manufacturing in Portugal from the mid of the XIX<sup>th</sup> century to the end of the XX<sup>th</sup> century. Paper presented at the International Congress "Cork Plantations, factories and traders. The past, present and future of the cork business", Palafrugell – Girona (Spain), 16-18 February. (to be published in the conference proceedings).

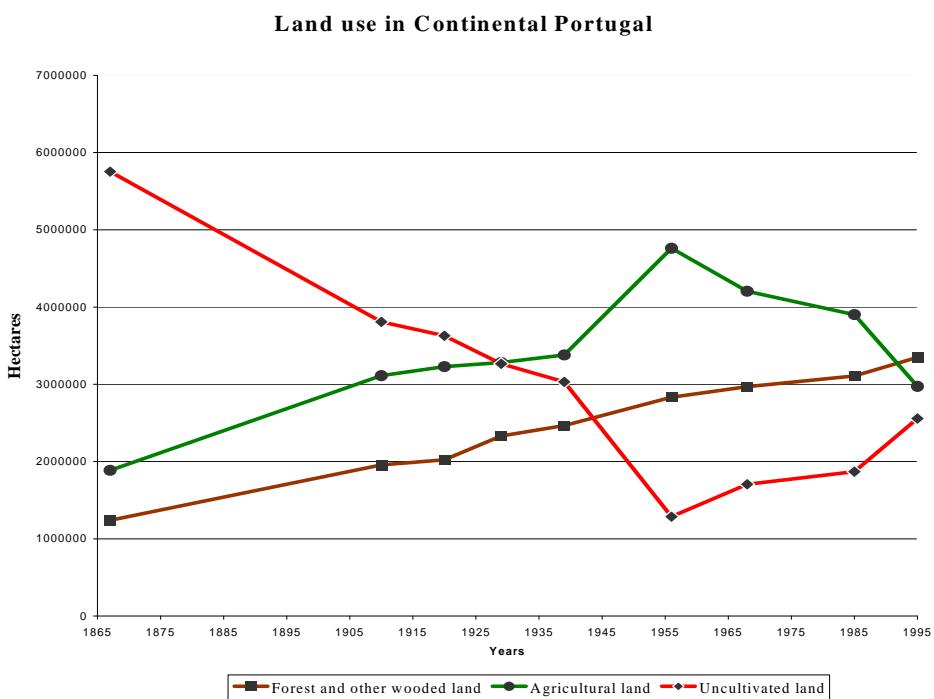
## 5. Forest and their economic importance

### 5.1. Forest resources

#### 5.1.1. Trends in forest land

Forestland has been growing at least since the first estimation available for this resource, which refers to the year 1867. Until the 50s there was simultaneous growth of forest and agricultural land. This was possible because of the large amount of uncultivated land fit for cultivation existing in the XIX<sup>th</sup> century, due to a multi-secular process of deforestation. With the intense rural emigration in the 1960s and 1970s farmland started to fall, while forestland continued to expand. However, since the 1970s the growth in forestland has not taken all the abandoned farmland, the result being an increase in uncultivated land in recent years.

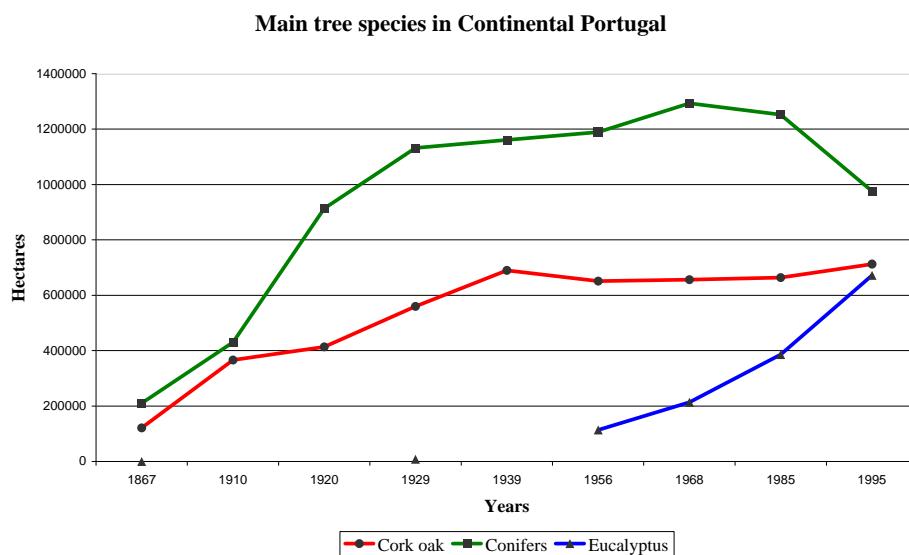
According to the most recent forest inventory (DGF, 2001), agricultural land represents 33.5% of the area of Continental Portugal, while forest and other wooded land<sup>10</sup> represents 37.7% corresponding to an area of 3,349,327 ha.



#### 5.1.2. Trees species origin and distribution

According to the 1995 Forest Inventory (DGF, 2001), the major forest species in Continental Portugal are maritime pine (29.1%), cork oak (21.3%) and eucalyptus (20.1%).

<sup>10</sup> "Other wooded land" is defined here as being burnt forests, areas of clear cut and land with trees below the density needed to be classified as "forests".



The major pine species is *Pinus pinaster*, which may have been introduced by man's hands, but long time ago, because there are traces of it since the Neolithic period. This species expanded since the XVI<sup>th</sup> century by plantation, by natural and artificial dissemination and by natural regeneration. Concerning natural and artificial dissemination and natural regeneration, it is almost impossible to specify the relative roles they have played in the expansion of pine forests. For some time, the Forest Services distributed seeds to the local populations who spread them in the fields they were abandoning from agriculture. In other cases, the dissemination of pine forests in abandoned farmland happened simply by natural dissemination. In the Central region, after a forest fire it is possible to see, in many places, the terraces and other infrastructures of the farmland existing there before pine came in.

The major species of eucalyptus existing in the country is *Eucalyptus globulus* originated in Tasmania. In the 1960s the eucalyptus plantations took off to supply wood for the pulp mills recently installed in the country. This species has been replacing part of the pine forests damaged by forest fires, especially in the Northern and Central regions. In the take off of this species, the Forest Services played an important role by distributing plants free of charge to the forest owners.

The Alentejo is the region of the most important agro-forestry systems in the country ("montados") based on cork and holm oak trees. Holm oak lost most of its economic value in the 1960s due to the swine fever, which decimated the stock of Iberian pigs, fed on the acorns from these trees. Cork oak has kept its economic value because of the continuing demand from the cork manufacturing industries where Portugal is the leader in the world since the Spanish Civil War, in 1936. More recently, the EU funds for the afforestation of farmland (Reg. 2080/92) have been used at great profit by the landowners to renovate and expand the cork oak forests. In the 50s, due to the initiative of the grand father of research on cork and cork oak, J. Vieira Natividade, there was a programme including the distribution to the forest owners, free of charge, of seeds collected from the best trees.

Still far from the importance they had in the past, other oaks and chestnut forests have been growing since the 1960s, especially in the Northern and Central regions. Part of this is, especially in the case of other oaks, is due to natural regeneration, namely in unmanaged forestlands and abandoned farmland. In the case of chestnut, there has been a regain in interest for this tree, namely for fruit production of good quality due to an increasing demand in domestic urban markets and in foreign markets.

#### 5.1.4. Forest functions

In 1995, the main function of 51.8% of the forest area was for wood supply. The second main function corresponding to 48.2% of the forest area was for non-wood forest products, essentially cork oak, in the Southern regions. In the Natura 2000 areas there are 594,509 ha of forests, which represent 17.8% of the total forestland.

Forests for wood supply: The 11,200,000 m<sup>3</sup> o.b. of annual fellings for wood supply are almost of the same amount as the 12,900,000 m<sup>3</sup> o.b. of net annual increment in the forests with the same main function. So the derived demand by forest industries is in tight tandem with wood supply. Net annual increment per hectare in forests for wood supply (4.6 m<sup>3</sup>/ha/year for *Pinus pinaster* and 9.0 m<sup>3</sup>/ha/year for *Eucalyptus globulus*) is relatively small due to poor forest management. With better management, these increments could be increased by 20% or more.

Biodiversity: Almost three fourths (73.7%) of the Portuguese forests are considered to be "semi-natural", meaning that they were developed through natural regeneration. Most of the rest (24.7%) is made of "plantations" (MCPFE, 1998, p. 58). About 1520000 ha (17.1% of the total land area of Continental Portugal) are land under some special protection status. In the Natura 2000 sites there are 594,509 ha of forests and in the National Network of Protected Areas there are 162,613 ha, which represents respectively 18.6% and 5.1% of the total forest land. As expected, the species of main commercial interest such as maritime pine, cork oak and eucalyptus have a lower incidence in these areas.

All tree species existing in the country, including all the endangered ones, are associated with forest ecosystems. These ecosystems are also important for animal species, especially mammals, birds and butterflies. As far as animal endangered species are concerned, 64% of the mammals and 30% of the birds in this situation are associated with forests.

#### 5.1.5. The output gaps: a resource base with further potential for growth

The secular growth in the forest resource base has substantial potential to go on much further. This growth can happen in three non mutually exclusive ways:

- a) extensive growth: growth in the forestland through afforestation of uncultivated land and substitution of farming by forest in abandoned farmland or in agricultural lands more suitable for forestry;
- b) intensive growth:
  - growth in increments through improved forest management and genetically improved varieties;
  - reduction in damages caused by forest fires through improved prevention, detection and fire fighting.

### Potential for growth in forestland

*Natural potential:* Available estimates about the potential area suitable for forestry, taking into consideration natural conditions, range from 5,280,000 ha (BPI *et al.*, 1996) to 5,524,631 ha (GCPF, 1986). If these estimates are good, they indicate that, by the end of the 90s, eucalyptus plantations may have reached its natural potential for extensive growth. The main margin for growth left for this species in the coming years is intensive growth through relocation to sites of higher productivity and genetic improvements to increase increments. For almost all the other species, there are substantial natural potential for extensive growth.

*Economic potential:* The estimates made by GCPF presented in the previous section don't take into the account economic constraints, namely the fact that forestry may not be an economic viable land use, namely in comparison to agricultural land use. The study by BPI *et al.* (1996) tried to take care of these constraints. The results of their estimates are the following:

- a) natural potential forestlands: 5,280,000 ha
- b) forestland in 1996: 3,108,000 ha
- c) natural potential growth: 2,172,000 ha
  - area currently farmed where conversion to forestry is economically viable: 1,068,000 ha
  - other areas: 1,104,000 ha

According to this study it should be in these 1068000 ha of land currently farmed where conversion to forestry is economically viable that the main efforts of afforestation should be focused.

### Potential for growth in increments

Silvicultural research available in Portugal indicates that, with better forest management, it is possible to increase current increments of maritime pine and eucalyptus stands about 20% (BPI *et al.*, 1996):

- a) maritime pine: from 4.6 m<sup>3</sup>/ha/year to 5.5 m<sup>3</sup>/ha/year (+19.6%)
- b) eucalyptus: from 9 m<sup>3</sup>/ha/year to 11 m<sup>3</sup>/ha/year.

## 5.2. Risks to forest resources

### 5.2.1. Distribution of damaged forest land by types of damages

Forest fires are publicly perceived as the major threat to forest resources in Portugal and actually cause very severe and irreversible damages every year. Besides this risk, there are others also important, namely the damage caused by insects and diseases. Even though it is not perceived as such, this type of damage has an incidence in terms of forest area wider than forest fires, as shown in the following table.

### 5.2.2. Forest fires

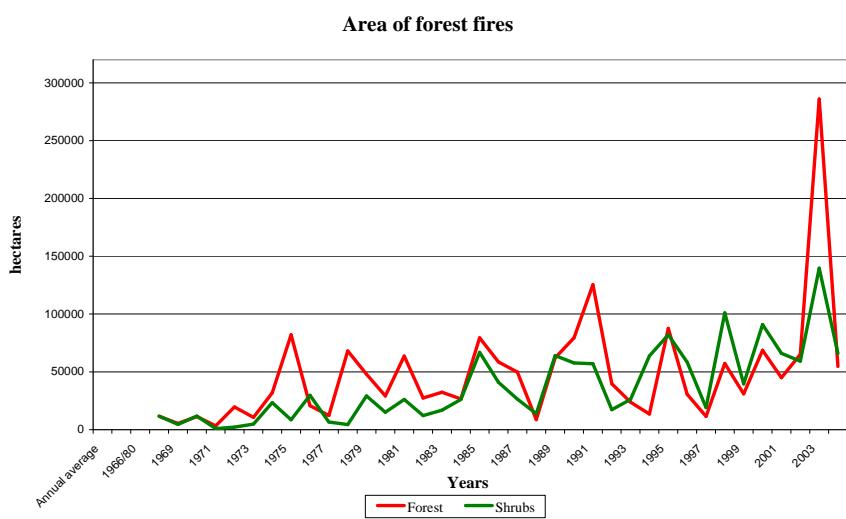
Forests damaged by fires versus afforestation and reforestation

Fire is a major threat to Portuguese forests, especially to the pine forests in the Northwest and Central West regions, which were reduced respectively by 41 and 21% between 1982 and 1995. This problem definitely emerged in the 1960s when the emigration from the rural areas was more intense. So the abandonment of traditional uses of forests, which until then helped keeping some minimum management standards,

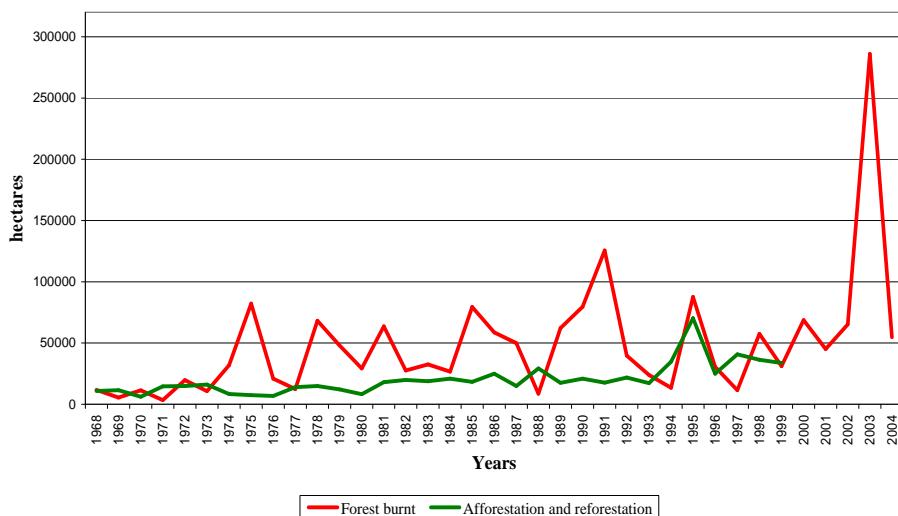
has certainly been an amplifying factor of the natural conditions (wet winters and hot and dry summers) favourable to the ignition of forest fires.

Since 1968, when data started to become available on the number and area of forest fires, the annual and cumulated areas of afforestation and reforestation have tended to be below the annual and cumulated area of forests burnt. More precisely, the cumulated forest area burnt from 1968 to 1999 is about the double of the area afforested or reforested during the same period.

The 283,063 ha of forests burnt in 2003 are the worst forest fires since there is quantitative data on this type of damage. They represent 8.5% of the total area of forests and other wooded land existing in Continental Portugal, according the 1995 Forest Inventory.



**Forest burnt and subsidised afforestation and reforestation**



### 5.2.3. Factors of vulnerability to forest fires

Natural conditions: A dominant characteristic of the climate in Continental Portugal is the fact that summer tends to be hot and dry, and winter tends to be humid. Combining this with the fact that most of the vegetal species in forests and scrub lands have a relatively high degree of inflammability, we have a situation where forest resources are under a high natural risk of damage by fire in summertime.

Tree species composition of forests: The kind of afforestation directly and indirectly promoted by the public policies for the last one hundred years as relied a lot on maritime pine, installed in stands which often have a high risk of inflammability because of the characteristics of this species and the monospecific composition of those stands.

For this frequent appeal to maritime pine contributed the following reasons:

- a) it is a pioneer species, that is, a species fitting sites which were poor and non afforested before;
- b) it is a species with a higher survival rate than the others.

Because of this second characteristic the Forest Services and private contractors tended to use it when they did not have enough knowledge about which species would fit better the sites they were afforesting.

Rural depopulation and increasing labour costs of forest management: The rural depopulation started in mid 50s and that is still going on is having the following negative impacts on forest management:

- a) decreasing local demand for inflammable forest sub-products (fuelwood, forest litter, shrubs, etc.), which tend to accumulate in the forests without removal;
- b) increasing labour costs for forest owners who have to hire workers if they want to reduce the accumulation of those inflammable materials in their forests.

The first of these two impacts is reinforced by technological changes in agricultural and household production. Nowadays, the forest sub-products mentioned above are not as demanded as before by rural households (most of them tend to use gas or electricity for cooking and heating) and by farmers (fertilization of farmland appeals more to chemical fertilizers than to manure).

Expansion of scrublands: Since mid 50s, the decline in agricultural land has not been fully compensated by an increase in forest land. What this means is that scrublands are now occupying areas which were farmed before. These scrublands are often very vulnerable to fire. So if a fire starts in one of them it may quickly spread to neighbouring forests.

Crisis of resin tapping: The rapid decline in resin tapping since mid 80s deprived the forests most vulnerable to forest fires (pine forests) from the regular presence of resin tapers. Their contribution to prevent forest fires was very important. Since they were obviously not interested in such kind of damage they were active in overseeing the forests against the risk of fire and they also worked in reducing the amount of inflammable materials in the forests.

### 5.3. Economic importance of forests

#### 5.3.1. An important sector as a whole, but weakened by heterogeneity and fragmentation

Considered in the aggregate, the forest sector is one of the main sectors in the Portuguese economy on several counts:

- a) its share of the GDP is high by international standards (third in the EU after Finland and Sweden);
- b) the same is true about the share in total workforce;
- c) for more than one century the share of total exports has been consistently high;
- d) the forest sector includes the only activities where Portugal has a leading position at world level (raw cork production and manufacturing).

This importance, as a whole, is very hard to translate into collective and cooperative force at the policy level and at the level of coordinated strategies by major private stakeholders in the sector. The reason is that, in fact, there are not **one** Portuguese forest sector, but three, at least, all very different from each other in terms of species, forest ownership and management and forest industries and market structures:

- a) the sub-sector based on pine;
- b) the sub-sector based on eucalyptus;
- c) the sub sector based on cork.

To these three we can add a fourth one including the non wood forest products besides cork, and the forest public goods. Another complicating factor has to do with the very high risks threatening forest resources, namely the risk of forest fires. The effective prevention and fighting of this risk demands intensive coordination and cooperation among all stakeholders, which are not easy to bring about given what we have just said, complicated by the unsuitable fact that fire fighting, in Portugal, is the responsibility of a large number of local associations of volunteer fire fighters, not professional, and difficult to coordinate.

Another relevant fact to point out hindering entrepreneurship in the forest sector is that the current state of property rights in forestry is such that a significative amount of the total economic value of forest production is not internalised in revenues for the forest owners, as we have shown in the previous chapter. What many of them actually get as revenues is too low to motivate and finance active management behaviours.

#### 5.3.2. Total economic value of forest production

We quote here in full the conclusions of the estimations made by Mendes (2005) for the total economic value of forest production in mainland Portugal, for 2001, already presented in detail in annex of chapter 4: "Taken as an aggregate, the non wood forest products result as being the main item in the TEV of forest production in Continental Portugal (€584.8 million). Cork stands out as the main contributor to this value (€390.7 million). Acorns and grazing form the second major element (€112.4 million) whose value is not imputed to forestry in national accounts as forest final production, since they provide intermediate consumption for livestock production. Wood forest products amount to €543.6 million, pulpwood (€253.9 million) being the main item in this group. Recreational services provided by forests are on the rise, but they are still a minor component of the total direct use value (€37.9 million). Also a good part of this value is

not yet internalised by forest owners. The estimation of both indirect use values and negative externalities of forests is incomplete. However, the available estimates show that the costs of forest fires are about 83.5% of the social value of forests corresponding to carbon storage, and the protection of agriculture soils, water resources and landscape quality." (Mendes, 2005, pp. 349-350).

### 5.3.3. Contribution to GDP

In Portugal, in 1998, the forest sector represented 2.93% of the GDP, which makes it **one of the top sectors in the economy in terms of value added**.

### 5.3.4. Employment in the forest cluster

#### Underestimation of forest employment in official statistics

Official statistics underestimate the employment in forest sector. For this reason, we corrected and expanded those data for one year (1995) for Continental Portugal. The results show that the **forest cluster** (forestry, forest industries, other forest related industries, forestry and forest industries' related services) gave work to **227,794** persons, which is **5.13%** of the total employment. This number is broken down as follows:

- forestry, logging, hunting and related services:	34,290 persons
(8000 of which in hunting and game propagation)	
- forest industries:	69,337 persons
- other forest related industries:	80,923 persons
- other forest related services:	43,244 persons

To see how official data **underestimates** employment in the forest cluster here are the values for these variables according to a recent paper issued by major international organisations such as ILO, UNECE and FAO, based on EUROSTAT and UNIDO databases which, in turn, rely on national official statistics (Blombäck, Poschen & Lövgren, 2003):

- forestry, logging and related services:	13,700 persons
- forest industries:	65,067 persons
- other forest related industries:	no data
- other forest related services:	no data

Relative position of the forest cluster in total employment: Now some data for comparison between employment in the forest cluster and employment in the other main clusters of the Portuguese economy, in 1995 (INE, 2003c):

a) agriculture and food industries:	698,600
b) wholesaling and retailing:	596,400
c) construction:	365,500
d) non marketed services of Public Administration:	358,800
e) textile and clothing industries:	287,000
f) education and research:	257,100
g) marketed services to private companies:	196,600
h) equipment goods:	139,900

As we can see, the forest cluster is one of the most important in terms in employment.

### Some publication of interest

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Direcção Geral das Florestas-Divisão de Estudos. 1991. Perfil Florestal. Portugal. Lisbon: Direcção Geral das Florestas.

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Direcção Geral de Ordenamento e Gestão Florestal. 1979. Distribuição da Floresta em Portugal Continental, Áreas florestais por concelhos 1978. DGOGF-Estudos e Informação N.º 284. Lisbon: DGOGF.

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Mendes, Américo M. S. Carvalho (raporteur) . 1996. O Sector Florestal Português. [Lisbon]: CESE-Conselho Para a Cooperação Ensino Superior-Empresa. (refered as CESE, 1996).

Mendes, Américo M. S. Carvalho. 2005a. *Portugal*. In Valuing Mediterranean Forests: Towards Total Economic Value, Maurizio Merlo & Lelia Croitoru (eds.). Wallingford, Oxon (UK): CAB International. pp. 331-352.

Mendes, Américo M. S. Carvalho, Diana Feliciano, Marisa Tavares & Rafael Dias. 2004. The Portuguese Forests. Country level report delivered to the EFFE Project – Evaluating Financing of Forestry in Europe. Porto: Faculty of Economics and Management – Portuguese Catholic University.

Santos, José Manuel Lima. 1997. Valuation and cost-benefit analysis of multi-attribute environmental changes. Upland agricultural landscapes in England and Portugal. Thesis submitted in fulfilment of the degree of Doctor of Philosophy. Department of Town and Country Planning, University of Newcastle upon Tyne (mimeo).

## Statistical annex

Table 5.1: Land use in Continental Portugal since 1867

SPECIES	1867	1910	1929	1950/56	1968/78	1980/85	1995/98
1. Forest and other wooded land	1240.0	1956.5	2332.0	0.0	0.0	0.0	0.0
	2832.3	2969.1	3108.2	3349.3	0.0	0.0	0.0
A) Forest land by tree-species dominance	0.0	0.0	0.0	0.0	0.0	0.0	3201.1
a) Coniferous	210.0	430.2	1132.0	1189.5	0.0	0.0	0.0
- Maritime pine	0.0	0.0	0.0	0.0	1293.0	1252.3	976.1
- Other conifers	0.0	0.0	0.0	0.0	0.0	0.0	0.0
b) "Montados":	370.0	782.7	940.0	1274.5	1192.5	1128.7	1174.4
- Cork oak	121.0	366.0	560.0	651.4	656.6	664.0	712.8
- Holm oak	249.0	416.7	380.0	623.1	535.9	464.7	461.6
c) Other oaks and chestnut	60.0	131.0	193.0	170.0	99.8	143.2	171.5
- Other oaks	n.a.	47.0	108.0	94.0	70.6	112.1	130.9
- Chestnut	n.a.	84.0	85.0	75.0	29.3	31.1	40.6
d) Eucalyptus	0.0	n.a.	8.0	113.3	213.7	385.8	672.1
e) Other	600.0	612.7	59.0	85.0	170.0	198.2	207.0
B) Other wooded land	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	148.2
2. AGRICULTURAL LAND	1886.0	3111.9	3282.0	4762.0	4205.9	3902.4	2972.9
UNCULTIVATED LAND FIT FOR CULTIVATION	5462.9	3426.6	2883.2	885.6	1279.9	1419.3	2054.6
Productive, but uncultivated land (fallow, grazing, etc.)	2116.0	1926.0	1565.0	395.6	n.a.	n.a.	n.a.
Other uncultivated land fit for cultivation	3346.9	1503.8	1318.2	490.0	n.a.	n.a.	n.a.
3. LAND UNFIT FOR CULTIVATION	291.0	381.7	382.7	400.0	425.0	450.0	503.1
4. TOTAL LAND AREA	8772.5	8772.5	8772.5	8772.5	8772.5	8772.5	8772.5
5. INLAND WATERS	107.3	107.3	107.3	107.3	107.3	107.3	107.3
6. TOTAL AREA	8879.9	8879.9	8879.9	8879.9	8879.9	8879.9	8879.9
Forest coverage (1./4.)	0.1	0.2	0.3	0.3	0.3	0.4	0.4

Sources and methodology: Mendes (2002)

Table 5.2: Maritime pine inventory data for 1982, 1987 and 1992

Types of stands	Inventory data	1982	1987	1992	1995
Pure and Mixed dominant stands <sup>11</sup>	Area (1000 ha)	1306.4	1247.9	1047.1	976.0
	Growing stock (1000 m <sup>3</sup> )	100,925.6	96,848.7	87,837.2	89,417
	Mean growing stock (m <sup>3</sup> /ha)	77.25	77.61	83.86	91.61
	Annual increment (1000 m <sup>3</sup> )	6989.1	6295.6	4932.6	n.a.
	Mean annual increment (m <sup>3</sup> /ha)	5.35	5.04	4.71	n.a.
	Growing stock (1000 m <sup>3</sup> )	103388.3	101324.1	93315.2	98804
All stands	Annual increment (1000 m <sup>3</sup> )	7164.4	6557.2	5236.5	n.a.

Source: Instituto Florestal (1993) for 1982, 1987 and 1992; DGF (2001) for 1995.

<sup>11</sup> Stands where maritime pine is the only or the dominant species.

Table 5.3: Eucalyptus inventory data for 1986, 1992 and 1995<sup>12</sup>

Inventory data	1986	1992	1995
Area (ha)	434700	529100	805546
Growing stock (1000 m <sup>3</sup> )	26955.2	21808.6	34897
Mean growing stock (m <sup>3</sup> /ha)	62.0	41.2	43.3
Annual increment (1000 m <sup>3</sup> )	n.a.	n.a.	n.a.
Mean annual increment (m <sup>3</sup> /ha)	(1)	(1)	(1)

Source: Instituto Florestal (1994) for 1986 and 1992; DGF (2001) for 1995.

(1): From forest inventory data reported in several publications by DGF (1992, 1998e, 1998f), the mean annual increment for eucalyptus in this period was around 10-11 m<sup>3</sup>/ha.

Table 5.4: Forest according to main functions

Functions	1985		1995		%
	1000 ha	1000 ha	1000 ha	%	
Wood supply	1846	57.6	1698	51.8	
predominantly coniferous			735	22.4	
predominantly broadleaves			584	17.8	
Mixed stands			379	11.6	
Non-wood forest products	1357	42.4	1577	48.2	
predominately coniferous			52	1.6	
predominately broadleaves			1161	35.5	
Mixed stands			364	11.1	
<b>TOTAL</b>	<b>3203</b>	<b>100.0</b>	<b>3275</b>	<b>100.0</b>	

Source: DGF- Inventário Florestal Nacional

Table 5.5: Area, growing stock, increment, fellings and removals in 1995

	Area 1000 ha	Growing stock volume 1000 m <sup>3</sup>	Annual net increment 1000 m <sup>3</sup>	Fellings		Annual removals 1000 m <sup>3</sup>
				1000 m <sup>3</sup>	1000 m <sup>3</sup>	
Trees in forest, total	3,383	275,760	14,312	11,500	11,300	9,400
Coniferous	1,179	147,782	8,323	6,200	6,100	4,900
Broadleaves	2,204	127,978	5,989	5,300	5,200	4,500
Trees in forest for wood supply <sup>13</sup>	1,897	188,020	12,900	11,200	11,000	9,100
Coniferous	1,021	140,871	7,890	6,200	6,100	4,900
Broadleaves	876	47,149	5,010	5,000	4,900	4,200
Trees in forest with other purposes		87,740	1,412	300	0	0
Trees in other wooded land			213	0	0	0
Trees outside forest and other wooded land		16,246	670	0	0	0
<b>TOTAL</b>		<b>292,006</b>	<b>15,195</b>	<b>11,500</b>	<b>11,300</b>	

Source: DGF (1999)

<sup>12</sup> The criteria used in each inventory are not the same. For 1986 and 1992 the data refer to the area available for wood supply. The data for 1986 does not include some southern counties.

<sup>13</sup> We evenly split the 344000 ha of mixed stands between coniferous and broadleaves species.

Table 5.6: Net growth of the standing timber stock in 1995 (1000 m<sup>3</sup> o.b.)

	Annual net increment	Annual removals	Net growth of the standing timber stock
Trees in forest, in other wooded land and outside forest	15,195	11,300	
Coniferous	8,323	6,100	2,223
Broadleaved	6,872	5,200	1,672

Table 5.7: Total area under special protection status in year 2000 (ha)

Protection status		Total protected area	Forest land in protected areas	
Natura 2000		Directive Birds	744,844	
		Directive Habitats	1,094,340	
		Total (without double counting)	Not available	
National Network of Protected Areas (NNPA)	Areas of national protection status	National,parks	70,290	
		Natural,parks	527,069	
		Natural,reserves	63,218	
		Botanic,reserves	24	
	Areas of regional protection status	Protected,landscapes	12,835	
		Classified,sites	2,301	
TOTAL (without double counting)		638,311	162,613	
<b>TOTAL (without double counting)</b>		<b>1,520,000</b>	<b>Not available</b>	

Sources: DGF (2001) and data collected from the DGF Internet site, on 19 November 2000.

Table 5.8: Tree species by protection status in year 2000

Species	Natura 2000		NNPA	
	Hectares	% of the total area of the species	Hectares	% of the total area of the species
Maritime pine	135,474	13.9	59,061	6.1
Cork oak	145,481	20.4	13,906	2.0
Eucalyptus	86,300	12.8	18,315	2.7
Holm oak	109,932	23.8	22,791	4.9
Other oaks	42,021	32.1	17,221	13.2
Stone pine	24,371	31.4	5,563	7.2
Chestnut	10,220	25.2	4,806	11.8
Other broadleaves	26,244	25.7	10,922	10.7
Other coniferous	14,466	52.9	10,028	36.7
TOTAL	594,509	18.6	162,613	5.1

Source: DGF (2001)

Table 5.9: Number of species existing in Portuguese forests, in 1995

Species	All species		Species existing in forests			
	Total	Endangered	Total	% of all	Number	% of all
Trees	63	5	63	100.0	5	100.0
Other vascular plants	4600	299	490	10.7	16	6.4
Fern	114	7	34	29.8	3	42.9
Moss	451	211	92	20.4	11	5.2
Mammals	70	25	35	50.0	16	64.0
Birds	350	10	122	34.9	3	30.0
Other vertebrates	46	5	12	26.1	0	0
Butterflies	151	1	74	49.0	0	0

Source: DGF (1999)

Table 5.10: Natural potential for forestland in Continental Portugal and suitable tree species distribution

Tree species	Area of forest in 1980/85	Area of forest in 1995/98	Potential area of forest
Maritime pine	1,252,300	976,069	2,253,990
Eucalyptus	385,800	672,149	530,780
Cork oak	664,000	712,813	916,676
Holm oak	464,700	461,577	640,885
Chestnut	31,100	40,579	84,288
Stone pine	56,250	77,650	209,824
Other oaks	112,100	130,899	67,841
Other coniferous	50,250	27,358	453,925
Other broadleaves	91,700	102,037	366,422
TOTAL	3,108,200	3,201,131	5,524,631

## Potential growth

Tree species	With respect to 1980/85		With respect to 1995/98	
	ha	%	ha	%
Maritime pine	1,001,690	80.0	1,277,921	130.9
Eucalyptus	144,980	37.6	-141,369	-21.0
Cork oak	252,676	38.1	203,863	28.6
Holm oak	176,185	37.9	179,308	38.8
Chestnut	53,188	171.0	43,709	107.7
Stone pine	153,574	273.0	132,174	170.2
Other oaks	-44,259	-39.5	-63,058	-48.2
Other coniferous	403,675	803.3	426,567	1559.2
Other broadleaves	274,722	299.6	264,385	259.1
TOTAL	2,416,431	77.7	2,323,500	72.6

Sources:

- a) Area of forest in 1980/85: Second revision of the National Forest Inventory (data collected on 24 March 1998, from the DGF site: <http://www.dg-florestas.pt/divinven.html>)
- b) Area of forest in 1995/98: DGF (2001)
- c) Potential area of forest: GCPF (1986)

Table 5.11: Degree of forest damage by types of damages in 1995

	Area (ha)	% of the total forest area
Degraded forest and other wooded land	641,000	18.5
- primarily damaged by insects and diseases	391,000	11.3
- primarily damaged by wildlife and grazing	23,000	0.7
- primarily damaged by fire	88,000	2.5
- primarily damaged by known local pollution	0	0
- primarily damaged by storms, snow or other identifiable abiotic factors	101,000	2.9
- area with damage by unidentified causes	38,000	1.1

Source: UNECE/FAO, 2000

Table 5.14: Gross value added of the forest sector (at current base prices, million euros)

	1995	1996	1997	1998	1999	2000	2001
Forestry	647	598	562	609	641	781	744
Forest Sector	Forest industries	1,652	1,388	1,490	1,591	1,611	
	(1) Total	2,299	1,986	2,052	2,200	2,252	
	(2) All sectors	70 292	74,844	80,791	87,158	92,813	99,798 106,169
	(1)/(2)	3.27 %	2.65 %	2.54 %	2.52 %	2.43 %	

Notes: forestry corresponds to branch 02; forest industries include branches 20 (wood and cork processing industries, except furniture) and 21 (pulp, paper, paperboard, and paper and paperboard products)

Sources:

a) 1995-99: INE (2003c);

b) Gross value added for all sector in 2000 and 2001: INE (2003c);

c) Gross value added of forestry in 2000 and 2001: INE (2003b).

Table 5.12: Forest fires, afforestation and reforestation in Continental Portugal since 1968 (ha)

Year	Burnt areas			Afforestation & reforestation	
	Forests	Shrubs	TOTAL	Annual	Cumulated
1942/51 <sup>1</sup>	Annual 5000	Cumulated			
1966/80				181272	181272
1968	11680	11680	11760	23440	10799
1969	5384	17064	4570	9954	11367
1970	11335	28399	11722	23057	6078
1971	3343	31742	915	4258	14561
1972	19670	51412	2238	21908	14896
1973	10618	62030	4834	15452	15991
1974	31777	93807	23297	55074	8331
1975	82086	175893	8601	90687	7376
1976	20790	196683	29800	50590	6825
1977	12360	209043	6568	18928	13903
1978	68165	277208	4368	72533	14812
1979	48060	325268	29179	77239	12120
1980	29219	354487	15041	44260	8230
1981	63649	418136	26148	89797	17920
1982	27436	445572	12121	39557	19785
1983	32427	477999	16953	49380	18742
1984	26580	504579	26133	52713	20829
1985	79440	584019	66815	146255	18278
1986	58612	642631	40910	99522	24882
1987	49848	692479	26420	76268	14890
1988	8628	701107	13807	22435	29229
1989	62165	763272	64070	126235	17410
1990	79549	842821	57703	137252	20892
1991	125488	968309	56998	182486	17574
1992	39701	1008010	17311	57012	21803
1993	23839	1031849	26124	49963	17194
1994	13487	1045336	63836	77323	34714
1995	87554	1132890	82058	169612	70286
1996	30542	1163432	58325	88867	24947
1997	11466	1174898	19068	30534	40715
1998	57393	1232291	100975	158368	36234
1999	31052	1263343	39561	70613	33743
2000	68646	1331989	90958	159604	
2001	44983	1376972	65945	110928	
2002	65160	1442132	59251	124411	
2003	286040	1728172	139661	425701	
2004	54663	1782835	65867	120530	

Notes: 1: annual average between 1942-1951

Sources:

- a) Average annual area of forests burnt in 1941-52: Soares (1993)
- b) Burnt areas since 1968 (data collected from the Forest Services)
- c) Afforestation and reforestation

Table 5.13: Number and size of forest fires

Years	Total	< 1ha	≥ 1ha				
			Total	[1 ha; 10 ha[	[10ha; 100ha[	[100ha; 500ha[	≥ 500ha
1980	2349						
1981	6730						
1982	3626						
1983	4539						
1984	7356						
1985	8441						
1986	5036						
1987	7705						
1988	6131						
1989	21896						
1990	10745	5399	5346				
1991	14327	9530	4797				
1992	14954	11311	3643				
1993	16101	12338	3763				
1994	19983	13360	6623				
1995	34116	23917	10199				
1996	28626	21063	7563				
1997	23497	17860	5637	5231	369	35	2
1998	34676	25842	8834	7687	906	167	74
1999	25477	19695	5782	5248	420	86	28
2000	34109	25307	8802	7621	898	233	50
2001	27188	20203	6985				
2002	26488	19996	6492	5549	730	168	45
2003	26180	20872	5308				
2004	19917	15751	4517				

Source: data collected from the Forest Services

Table 5.15: Employment in forestry and forest industries (number of employees in equivalent full time workers)

		1995	1996	1997	1998	1999
Forest Sector	Forestry	10,700	11,000	11,100	11,200	11 600
	Forest industries	72,000	70,400	71,200	73,400	71 500
	(1) Total	82,700	81,400	82,300	84,600	83 100
	(2) All sectors	4 403 900	4,472,100	4,545,400	4,677,700	4,751,000
	(1)/(2)	1.87 %	1.82 %	1.81 %	1.81 %	1.75 %

Notes:

forestry corresponds to branch 02;

forest industries include branches 20 (wood and cork processing industries, except furniture) and 21 (pulp, paper, paperboard, and paper and paperboard products)

Source: INE (2003).

Table 5.16: Employment in the forest cluster of Continental Portugal in 1995

Activities	Full-time workers
Forestry and logging	Forestry and logging (except planting and replanting, operation of forest tree nurseries and cork related activities) 10,000
	Activities related to cork and cork oak trees (cork extraction, pruning, grazing, etc.): 4,700
	a) Permanent employment 4,200
	b) Seasonal employment (number of equivalent permanent workers) 4,200
	Resin tapping 2,000
	Forest contractors (planting and replanting) 3,750
	Operation of forest tree nurseries 1,000
Forestry service activities	Fire protection (CNEFF) 10
	Forest fire fighters 580
	Forest owners' associations 50
Hunting, trapping and game propagation	Game propagation 5,000
	Game guards 3,000
Manufacture of wood and of products of wood and cork, except furniture	Sawmilling and planning of wood; impregnation of wood 17,800
	Manufacture of builders' carpentry and joinery 14,576
	Manufacture of veneer sheets; manufacture of plywood, blame board, particle board, fibre board and other panels and boards 2,000
	Wood and cork handcrafting 1,000
	Natural cork processing (cork planks) 1,000
	Manufacture of articles of natural or agglomerated cork (cork manufacturing industry) 14,000
	Manufacture of articles of natural or agglomerated cork (fabrication of cork granulates and agglomerates) 3,400
Manufacture of pulp, paper and paper products	Manufacture of pulp 5,224
	Manufacture of paper and paperboard 4,897
	Manufacture of corrugated paper and paperboard, containers of paper and paperboard, household and sanitary goods and of toilet requisites, paper stationery, wallpaper and other articles of paper and paperboard n.e.c. 5,440
Other forest related industries	Manufacture of resinoids 2,000
	Manufacture of furniture 75,116
	Restoration of furniture 1,000
	Construction and repair of wooden boats 300
	Manufacture of woodworking machinery 2,349
	Fabrication of painting, gluing, preservation and other chemical products for wood and furniture industries n.d.
	Manufacture of cork manufacturing machinery 158
Other forest related services	Haulage and transportation of timber and cork (from forest to factory) 2,300
	Wood import and export 770
	Wholesale of furniture 3,692
	Retail sale of furniture 31,834
	Forest Institute <sup>14</sup> 2,775
	Nature Conservation Institute 918
	National Forest Research Station 100
	Forest high education institutions 150
	Forest professional training 600
	Technological Centres for the wood and cork industries 55
	Business associations of forest industries 50

<sup>14</sup> This is the English translation of the official denomination of the public Forest Services, in 1995.

TOTAL EMPLOYMENT IN THE FOREST CLUSTER	FORESTRY, LOGGING, HUNTING AND RELATED SERVICES FOREST INDUSTRIES OTHER FOREST RELATED INDUSTRIES OTHER FOREST RELATED SERVICES TOTAL	34,290 69,337 80,923 43,244 227,794
TOTAL EMPLOYMENT IN THE COUNTRY		4,437,000
FOREST EMPLOYMENT IN % OF TOTAL EMPLOYMENT		5.13 %

Source: Mendes *et al.* (2004)

Table 5.15: Exports by groups of products

Groups of products	1999		2000	
	thousand euro	%	thousand euro	%
Machinery	4381271	19	4965972	20
Clothing and shoes	4653784	20	4372782	17
Vehicles	3531240	15	3778105	15
Forest products	2240899	10	2747878	11
Chemical products	1555436	7	1956360	8
Textile	1792710	8	1876119	7
Food products	1934573	8	1818019	7
Finished products (miscellaneous)	1522286	7	1593470	6
Minerals and metals	1361090	6	1578426	6
Energy	422582	2	673791	3
TOTAL	23395871	100	25360920	100

Source: INE

## Annex:

### Research organisations

#### *Faculdade de Economia e Gestão Universidade Católica Portuguesa*

Address: Rua Diogo Botelho, 1327 4169-005 Porto - Portugal

Website: [www.porto.ucp.pt](http://www.porto.ucp.pt),

Phone: (+351) 226 196 200 Fax: (+351) 226 196 291

#### *Gabinete de Estudos e Prospectiva Económica – Ministério da Economia*

Address: Rua José Estêvão, 83 A – 4º Esq. 1169 – 153 Lisboa -Portugal

Website: <http://www.gepe.pt>

Phone: (+351) 213 110 770, Fax: (+351) 213 110 773

#### *Direcção Geral dos Recursos Florestais*

Address: Avenida João Crisóstomo, 28 1069-040 Lisboa – Portugal

Website: <http://www.dgrf.min-agricultura.pt/>

Phone: (+351) 213 124 800 Fax: (+351) 213 124 988

#### *Instituto Nacional de Estatística*

Address: Av. António José de Almeida 1000-043 Lisboa- Portugal

Website: <http://www.ine.pt>, E-mail: [ine@ine.pt](mailto:ine@ine.pt)

Phone: (+351) 218 426 100 Fax: (+351) 218 426 373

#### *Estação Florestal Nacional*

Address: Avenida da República Quinta do Marquês

2784-159 Oeiras – Portugal

Website: <http://www.efn.com.pt>

Phone: (351) 214 463 700, Fax: (+351) 214 463 701

#### *RAIZ- Instituto de Investigação da Floresta e do Papel*

Address: Herdade da Torre Bela, Apartado 15 - 2065-999 Alcoentre- Portugal

Website: [www.raiz-iifp.pt](http://www.raiz-iifp.pt), E-mail: [raiz-mfc@raiz-iifp.pt](mailto:raiz-mfc@raiz-iifp.pt)

Phone: (+351) 263 480 010, Fax: (+351) 263 486 289

***Escola Superior de Tecnologia de Viseu Departamento de Engenharia de Madeiras***

Address: Campus Politécnico – Repeses, 3504-510 Viseu – Portugal

Website: <http://www.demad.estv.ipv.pt/dep/demad/>

Phone: (+351) 232 480 500, Fax: (+351) 232 424 651

***AIMMP – Associação das Indústrias da Madeira e do Mobiliário de Portugal***

Address: Rua de Álvares Cabral, 281, 4050-041 Porto - Portugal

Website: [www.aimmp.pt](http://www.aimmp.pt), E-mail: [geral@aimmp.pt](mailto:geral@aimmp.pt)

Phone: (+351) 223394200; Fax: (+351) 22339421

***AIMC- Associação de Madeiras do Centro***

Address: Av. Heróis de Angola, 125, 2.º Esq., 2400 Leiria - Portugal

Website: [www.aimc.pt](http://www.aimc.pt), E-mail: [aimc@mail.telepac.pt](mailto:aimc@mail.telepac.pt)

Phone: (+351) 244825989, Fax: (+351) 244802951

***APCOR – Associação Portuguesa de Cortiça***

Address: Av. Comendador Henrique Amorim, 580, Apartado 100  
4535 Santa Maria de Lamas - Portugal

Phone: (+351) 227442176, Fax: (+351) 227449768

***ANEFA- Associação Nacional de Empresas Florestais, Agrícolas e do Ambiente***

Address: Praça Infante Dom Pedro, 13B, Miraflores, 1495-149 Algés- Portugal

Website: [www.anefa.pt](http://www.anefa.pt), E-mail: [geral@anefa.pt](mailto:geral@anefa.pt)

Phone: (+351) 214 122 540, Fax: (+351) 214 122 549

***CELPA- Associação da Indústria Papeleira***

Address: Rua Marquês Sá da Bandeira, 74, 1.º Esq., 1069-076, Lisboa- Portugal

Website: [www.celpa.pt](http://www.celpa.pt), E-mail: [celpa@celpa.pt](mailto:celpa@celpa.pt)

Phone: (+351) 217 611 510, Fax: (+351) 217 611 529

***Instituto Superior de Agronomia Departamento de Engenharia Florestal***

Address: Tapada da Ajuda, 1349-017 Lisboa - Portugal

Website: [www.isa.utl.pt/def/](http://www.isa.utl.pt/def/)

Phone: (+351) 213 653 371, Fax: (+351) 213 645 000

***Instituto Superior de Agronomia Departamento de Economia Agrária e Sociologia Rural***

Address: Tapada da Ajuda 1349-017 Lisboa - Portugal

Website: [www.isa.utl.pt/deasr](http://www.isa.utl.pt/deasr)

Phone: (+351) 213 653 472/ (+351) 213 653 100, Fax: (+351) 213 620 743

***Instituto Superior de Agronomia Departamento de Produção Agrícola e Animal***

Address: Tapada da Ajuda, 1349-017 Lisboa - Portugal

Website: <http://agricultura.isa.utl.pt/dpaa/>

Phone: (+351) 213 653 284, Fax: (+351) 213 623 262

***Universidade de Trás-os-Montes e Alto Douro Departamento Florestal***

Address: Quinta dos Prados – Apartado 1013, 5000-911 Vila Real – Portugal

Website: [home.utad.pt/~floresta/](http://home.utad.pt/~floresta/)

Phone: (+351) 259 350 856, Fax: (+351) 259 350 480

***Universidade de Trás-os-Montes e Alto Douro Departamento de Ciências Veterinárias***

Address: Quinta dos Prados – Apartado 1013, 5000-911 Vila Real – Portugal

Website: [www.utad.pt](http://www.utad.pt)

Phone: (+351) 259 350 634, Fax: (+351) 259 350 480

***Escola Superior Agrária de Coimbra, Departamento Florestal***

Address: Bencanta - 3040-316 Coimbra – Portugal

Website: <http://www.esac.pt/Departamentos/prinflor.htm>

Phone: (+351) 239 802 940, Fax: (+351) 239 802 979

***Escola Superior Agrária de Bragança***

Address: Campus de Santa Apolónia - Apartado 172, 5301-854 Bragança – Portugal

Website: <http://www.esa.ipb.pt>

Tel: (+351) 273 303 200, Fax: (+351) 273 325 405

***Escola Superior Agrária de Castelo Branco Unidade Departamental de Silvicultura e Recursos Naturais***

Address: Quinta da Senhora de Mércules, Apartado 119, 6001-909 Castelo Branco - Portugal

Website: <http://www.esa.ipcb.pt>

Phone: (+351) 272 339900, Fax: (+351) 272 339901

***Escola Superior Agrária de Beja***

Address: Rua Pedro Soares, Apartado 158, 7801-902 Beja – Portugal

Website: <http://www.esab.ipbeja.pt/>

Phone: (+351) 284 314 300, Fax: (+351) 284 388 207

***FORESTIS- Associação Florestal de Portugal***

Address: Rua de Santa Catarina, 753, 4000 - 454 Porto- Portugal

Website: [www.forestis.pt](http://www.forestis.pt), E-mail: [forestis@mail.telepac.pt](mailto:forestis@mail.telepac.pt)

Phone: (+351) 222 073 130, Fax: (+351) 222 073 139

***FENAFLORESTA- Federação Nacional das Cooperativas de Produtores e Florestais***

Address: Rua Maria Andrade 13, 1199-013 Lisboa- Portugal

Website: [www.confragri.pt](http://www.confragri.pt), E-mail: [fenafloresta@confragri.pt](mailto:fenafloresta@confragri.pt)

Phone: (+351) 218 118 065, Fax: (+351) 218 118 008

***FPFP- Federação dos Produtores Florestais de Portugal***

Address: Av. Colégio Militar, Lote 1786, 1549-012 Lisboa- Portugal

Website: [www.geocities.com/fpfp-pt/](http://www.geocities.com/fpfp-pt/), E-mail: [fpfp@netc.pt](mailto:fpfp@netc.pt)

Phone: (+351) 217100071, Fax: (+351) 217100072

***Instituto de Investigação Científica e Tropical***

Address: Rua da Junqueira, nº 86-1, 1300-344 Lisboa - Portugal

Website: [www.iict.pt](http://www.iict.pt), E-mail: [iict@iict.pt](mailto:iict@iict.pt)

Phone: (+351) 213 616 340, Fax: (+351) 213 631 460

***Núcleo de Investigação Científica de Incêndios Florestais, Faculdade de Letras da Universidade de Coimbra***

Address: Praça da Porta Férrea, 3000-447 Coimbra – Portugal

Website: <http://www.nicif.pt/nicif.htm>, E-mail: [nicif@nicif.pt](mailto:nicif@nicif.pt)

Phone: (+351) 239 859 931, Fax: (+351) 239 836 733

***CEABN- Centro de Ecologia Aplicada Prof. Baeta Neves***

Address: Tapada da Ajuda, 1349-017 Lisboa - Portugal

Website: [www.isa.utl.pt/ceabn/](http://www.isa.utl.pt/ceabn/), E-mail: [ceabn@ip.pt](mailto:ceabn@ip.pt)

Phone: (+351) 213 616 080, Fax: (+351) 213 623 483

***Faculdade de Medicina Veterinária***

Address: Pólo Universitário do Alto da Ajuda, Av. da Universidade Técnica, 1300-477 Lisboa- Portugal

Website: [www.fmv.utl.pt](http://www.fmv.utl.pt)

Phone: (+ 351) 213 652 823, Fax: (+ 351) 213 652 889

***Estação Zootécnica Nacional***

Address: Fonte Boa, 2005- 048 Vale de Santarém, Portugal

Website: [www.iniap.min-agricultura.pt](http://www.iniap.min-agricultura.pt), E-mail: [ezn.inia@mail.telepac.pt](mailto:ezn.inia@mail.telepac.pt)

Phone: (+351) 243 767 300, Fax: (+351) 243 767 307

***Direcção Geral de Veterinária***

Address: Largo da Academia Nacional das Belas Artes, nº2, - 1200-105 Lisboa - Portugal

Website: <http://www.dgv.min-agricultura.pt>

Phone: (+351) 213239500, Fax: (+351) 213239694

**Research organisations and information sources**

Institution	Chapters									
	1		2		3		4		4	
	RO	IS	RO	IS	RO	IS	RO	IS	RO	IS
Faculdade de Economia e Gestão Universidade Católica Portuguesa	X		X		X		X		X	
Gabinete de Estudos e Prospectiva Económica - Ministério da Economia	X	X			X	X				
Direcção Geral dos Recursos Florestais		X		X		X		X		X
Instituto Nacional de Estatística		X		X		X		X		X
Estação Florestal Nacional	X		X		X		X		X	
RAIZ- Instituto de Investigação da Floresta e do Papel					X					
Escola Superior de Tecnologia de Viseu Departamento de Engenharia de Madeiras					X					
AIMMP – Associação das Indústrias da Madeira e do Mobiliário de Portugal						X				
AIMC- Associação de Madeiras do Centro						X				
APCOR – Associação Portuguesa de Cortiça						X		X		
ANEFA- Associação Nacional de Empresas Florestais, Agrícolas e do Ambiente						X				
CELPA- Associação da Indústria Papeleira						X				
Instituto Superior de Agronomia Departamento de Engenharia Florestal	X		X		X		X		X	
Instituto Superior de Agronomia Departamento de Economia Agrária e Sociologia Rural	X								X	
Instituto Superior de Agronomia Departamento de Produção Agrícola e Animal							X			
Universidade de Trás-os-Montes e Alto Douro Departamento Florestal	X		X		X		X		X	
Universidade de Trás-os-Montes e Alto Douro Departamento de Ciências Veterinárias							X			
Escola Superior Agrária de Coimbra Departamento Florestal	X		X		X		X		X	
Escola Superior Agrária de Bragança	X		X		X		X		X	
Escola Superior Agrária de Castelo Branco, Unidade Departamental de Silvicultura e Recursos Naturais	X		X		X		X		X	
Escola Superior Agrária de Beja	X		X		X		X		X	
FORESTIS- Associação Florestal de Portugal				X						
FENAFLORESTA- Federação Nacional das Cooperativas de Produtores e Florestais				X						
FPFP- Federação dos Produtores Florestais de Portugal				X						
Instituto de Investigação Científica e Tropical									X	
Núcleo de Investigação Científica de Incêndios Florestais, Faculdade de Letras da Universidade de Coimbra			X						X	
CEABN- Centro de Ecologia Aplicada Prof. Baeta Neves			X				X		X	
Faculdade de Medicina Veterinária							X			
Estação Zootécnica Nacional							X			
Direcção Geral de Veterinária								X		