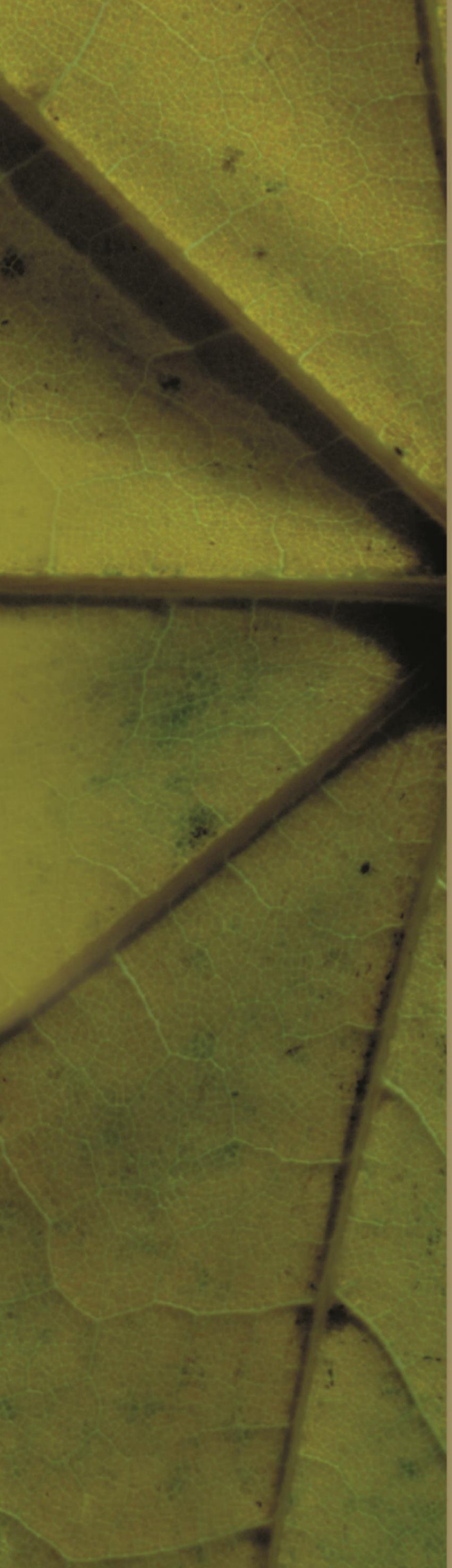


Acta Silvatica & Lignaria Hungarica

An International Journal in Forest, Wood and Environmental Sciences

COST E30
Economic integration of urban consumers' demand and rural forestry production

Special Edition
2005

Forest Sector Entrepreneurship in Europe: Country Studies.

Volume 2

ACTA SILVATIVA

&

LIGNARIA

HUNGARICA

ACTA SILVATIVA

&

LIGNARIA

HUNGARICA

AN INTERNATIONAL JOURNAL
IN FOREST, WOOD
AND ENVIRONMENTAL
SCIENCES

COST E30
ECONOMIC INTEGRATION OF URBAN CONSUMERS' DEMAND AND RURAL FORESTRY PRODUCTION

SPECIAL EDITION
2005

FOREST SECTOR
ENTREPRENEURSHIP IN EUROPE:
COUNTRY STUDIES.

VOLUME 2

ACTA SILVATICA ET LIGNARIA HUNGARICA
AN INTERNATIONAL JOURNAL
IN FOREST, WOOD AND ENVIRONMENTAL SCIENCES
issued by the Forestry Commission of the Hungarian Academy of Sciences

Acta Silvatica et Lignaria Hungarica (ASLH) publishes original reports and reviews in the field of forest, wood and environmental sciences in English or German language.

ASLH is published in serial volumes

HU ISSN 1786-691X (Print)
HU ISSN 1787-064X (Online)

Manuscripts and editorial correspondence should be addressed to
MAGDOLNA STARK, ASLH EDITORIAL OFFICE
UNIVERSITY OF WEST HUNGARY,
PF. 132, H-9401 SOPRON, HUNGARY

Phone: +36 99 518 122
Fax: +36 99 329 911
E-mail: aslh@nyme.hu

Information and electronic edition: http://aslh.nyme.hu

Cover design by ANDREA KLAUSZ
Printed by LŐVÉR-PRINT KFT., SOPRON

Forest Sector Entrepreneurship in Europe: Country Studies

Contents

Volume 1

Volume 2:

Italy

Davide PETTENELLA*[1] *and Susanne KLÖHN
Dipartimento Territorio e Sistemi Agroforestali – Università di Padova,
Via dell'Università 16 – 35020 Legnaro PD
Tel. +39.049 8277241; Fax +39.049 8272772; E-mail: davide.pettenella@unipd.it,
susikloehn@hotmail.com

Filippo BRUN
Dipartimento di Economia e Ingegneria Agraria Forestale e Ambientale - Sez. di Economia – Universita di Torino, Via Leonardo da Vinci 44 - 10095 Grugliasco (TO)
Tel + 39 011 6708628; Fax + 39 0112368628; E-mail: filippo.brun@unito.it

Francesco CARBONE and Lorenzo VENZI
Dipartimento di Ecologia e Sviluppo Economico Sostenibile- Università della Tuscia
Via s. C. de Lellis, snc -01100 Viterbo
Tel. +39.0761 357244; Fax +39.0761 357287; E-mail: lvenzi@unitus.it

Luca CESARO
Istituto Nazionale di Economia Agraria - Osservatorio di Economia Agraria per il Veneto
Via dell'Università 16 – 35020 Legnaro PD
Tel. +39.049 8839857; Fax +39.049 8839864; E-mail: luca.cesaro@unipd.it

Lorenzo CICCARESE
Agenzia per la protezione dell'ambiente e per i servizi tecnici
Via Curtatone 3 – 00188 Roma
Tel. +39.06 44442942; Fax +39.06 44442618; E-mail: ciccarese@apat.it

Summary

In Italy all wood related economic sectors operate in a highly disconnected forestry-wood system with a fragmented and limited internal supply. Characteristic for Italian forests is a large amount of coppice and natural or semi-natural forests with a low utilisation rate. 60 % of the forests are privately owned, usually scattered without management plans. Only 1/3 of the annual increment is harvested.

Lack of infrastructure makes access to forests difficult. In addition a strong regime of regulations and protected areas as well as a low mechanisation level make it difficult to harvest a sufficient volume of timber per surface unit. Work in forest enterprises is irregular, workers are often relatives and without professional education. Strict forest policy and low technological level lead to high harvesting costs and make domestic timber not competitive.

Domestic production of wood is insufficient for industrial demand. Thus Italian forest industry is strongly dependent on the import of wood. Relevant volumes of timber come from high productive poplar plantations. Italy is a strong net-exporter of finished products (furniture). Italian market of forest industry is "mature". Wood working

[1] **Editorial responsabilities:** Sections 1, 2, 4 and 5: D.Pettenella; Section 2: L.Venzi and F.Brun; Section 3: L.Cesaro and F.Carbone; Section 4 and the two NWFP&S case studies: S.Klöhn and L.Ciccarese. The authors are grateful to F. Grohmann for the review of the truffle case study.

industry consists mainly of small and medium size companies with high specialisation. Enterprises have long traditions and a large part is still handcraft

The market demand of NWFP&S was increasing over the last years, especially for recreational and tourist services. Back to nature trends and the request of biological products caused an increasing demand on NWFP. Particularly they offer a remarkable source of income, which might exceed the value of wood (e.g. Truffle).

For main NWFP well working networks of different kind of stakeholders along the production chain were created. Promotion of NWFP&S is often integrated in marketing efforts for other agricultural products and tourist attractions of the producing region. Some products are included in the certification system of agricultural products (e.g. Chestnut).

The increasing market demand of NWFP&S lead to property right regulations and collection control.

1. Consumption

1.1. State of the art and historical development

In Italy all wood-related economic sectors operate in a highly disconnected forestry-wood system, whose main features seem to be:

- a fragmented and limited internal supply (equal to 8-9 cubic meters per year; 60% of fuelwood), due to economic and environmental constraints; moreover, the internal supply is not distributed homogeneously. Most of the productive high forests (mainly coniferous) are in the North-eastern regions (75% of the wood removals of conifer roundwood comes from this area) while coppices predominate in the centre of the country. The only relevant examples of forest plantations are the poplar stands in the northern plain areas of the river Po valley (70% of the total industrial roundwood comes from less than 100,000 ha of poplar cultivations in the Po valley). On the other hand, with the overall situation of wood productivity in Italy, poplar plantations probably represent financially the most productive investment in the forest sector in Europe;
- a consequent low self-sufficiency rate for wood supply (around 36% for semi-finished products); part of the reason for this, beside the economic and environmental constraints, is the fact that Italy's geographical position and international location is such that importing from neighbour markets (such as Austria, France, Switzerland, Slovenia and Croatia) is easier and faster than purchasing on local markets. For example, in the softwood market the commercial flow between Austria and Italy is, quantity-wise, exceeded only by that between Canada and the USA. Furthermore, due to the size of production, wood, furniture and pulp and paper industries need continuous, homogeneous and reliable timber provisions, which can only be guaranteed by foreign supply.

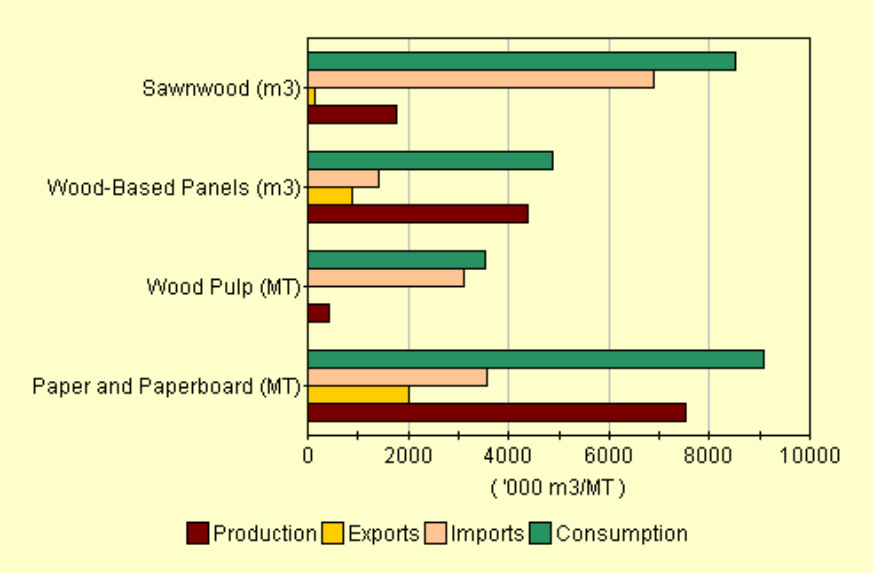
The lack of integration between domestic forest activities and the wood working industry is therefore one of the basic problem and at the same time one of the main challenge of the Italian forestry sector. The bulk of industrial activities is based on import of rough and semi-finished products, while internal supply is able only to cover

small niches of the market (poplar logs used for plywood and mechanical pulp production, coniferous timber used in building activities in some mountainous areas, etc.).

1.2. Forest products' and services consumption

In Figure 1 and in Table 1 data on production, exports, imports and apparent consumption of semi-finished products are reported. It is worthwhile to notice that Italy is a larger importer of semi-finished products, being a leading exporter of some finished products like furniture, window frames, special-use papers. Till 2002 Italy has been the larger world exporter in furniture, while currently it is the second after China. In the future, the process of delocalisation will probably bring about a reduced internal demand (or a stabilisation of import) of semi-finished products.

No data are available at national level on the consumption of services (see section 4 for some data on NWFP&S demand.



Source: FAO-ECE Timber Committee

Figure 1. Import, export, production and consumption of wood products in Italy

Table 1. Import, export, production and consumption of wood products in Italy

	Import		**Export**		**Production**	**Consumption**
	1000 m^3	million US$	1000 m^3	million US$	1000 m^3	1000 m^3
Sawnwood	**7295**	**2236.1**	**174**	**369.1**	**1600**	**8721**
Sawnwood (C)	5274	1228.1	49	87.1	700	5925
Sawnwood (NC)	2021	1008.0	125	282.0	900	2796
Wood-Based Panels	**1539**	**784.0**	**851**	**521.2**	**4020**	**4708**
Veneer Sheets	182	269.4	27	106.0	500	655
Plywood	378	249.2	139	160.4	420	659
Particle Board	642	164.4	202	96.2	2300	2740
Fibreboard	337	101.0	483	158.6	800	654
Roundwood	**5376**	**702.8**	**16**	**10.7**	**9550**	**14910**
Industrial Roundwood	**5143**	**692.0**	**14**	**10.5**	**4367**	**9496**
Sawlogs + Veneer Logs	0	0.0	0	0.0	2572	2572
Pulpwood + Particles	0	0.0	0	0.0	0	0
Other Roundwood	0	0.0	0	0.0	1090	1090
Wood Fuel	**233**	**10.8**	**2**	**0.2**	**5183**	**5414**
Wood Residues	**569**	**21.2**	**4**	**0.7**	**600**	**1165**
	Import		**Export**		**Production**	**Consumption**
	1000 Mt	million US$	1000 Mt	million US$	1000 Mt	1000 Mt
Wood Pulp	**3254**	**1771.8**	**14,1**	**8.1**	**462**	**3701.9**
Mechanical Wood Pulp	150	78.8	8	4.4	383	525
Semi-Chemical Wood Pulp	126	54.7	0,1	0.1	0	125.9
Chemical Wood Pulp	2947	1603.1	6	3.6	79	3020
Dissolving Wood Pulp	31	35.2	0	0.0	0	31
Paper + Paperboard	**3385**	**3251.5**	**2047**	**2527.1**	**8246**	**9584**
Newsprint	458	328.4	5	5.1	190	643
Printing + Writing Paper	1026	1412.3	908	1070.5	2780	2898
Other Paper + Paperboard	1901	1510.8	1134	1451.5	5276	6043
Other Fibre Pulp	**27**	**11.4**	**1**	**0.2**	**123**	**149**
Recovered Paper	**854**	**106.6**	**42**	**5.4**	**3300**	**4112**

Source: FAO-ECE Timber Committee

1.3. Market demand for forest related products and services by urban population

Italy is a country with a few number of large cities, while there is a large number of small- and medium size cities; it is not always easy to define the fringe between urban and rural areas. The presence of semi-rural urban areas is a common feature of the land-use system, especially in the recent industrialised regions.

There are no information available on the specific demand for forest related products and services by population living in large conurbations; however – as in other western European countries – it is possible to observe an increased demand for recreational and tourist services in rural areas. New more specific demands are connected with environmental education, specialised sport facilities (e.g.: mountain biking, horse riding), biodiversity.

An increasing attention has been paid by policy makers to the growing demand for new recreational areas and for landscape restoration in peri-urban zones. In the last two years, two Italian regions (Lombardia and Veneto) have approved laws to provide economic incentives - which are additional to those provided by the measures of the Rural Development Plans - for the creation of forests in plain areas, especially in peri-

urban areas. On the basis of these initiatives, Lombardia region is going to create new large plain forests (Lassini, 2003). This programme of the so called "10 grandi foreste di pianura" [Ten big plain forests] derives from a direct commitment of the regional President and it has a strong political support: several workshops and an international congress have been organized to present the initiative, which is clearly aimed to rise political consensus among citizens living in the plain areas. In Veneto region, a new forested area of about 200 ha has been created near Mestre urban area, where air pollution due to the heavy traffic along the highway Milano-Venezia is critical. The "Forest of Mestre" project plans for the establishment of additional 1,000 ha of forests in the next years. Even if the total forest area being realised through these initiatives is quite limited (few thousand hectares), it will be of high importance for improving the quality of life of urban populations and for restoring peri-urban landscape.

In addition to these programmes, the low quality of the landscape in many intensively used farmland has stimulated all the Northern regions to create special measures to support farmers willing to plant hedgerows.

1.4. Main problems and research questions in consumption for enterprise development

As stated before, there is a basic lack of knowledge on the specific demand for forest services as well as the demand for "green" products by urban population.

Annex A: Organisations studying forest products' consumption and main publications and information sources.

Organisations

- Universities with permanent groups of scientists carrying on research activities in the field:, Florence, Padua, Turin, Viterbo
- Institutes depending from the National Research Council (*Consiglio Nazionale delle Ricerche*): IVALSA (Florence)
- Research institutions depending from the Ministry of Agricultural and Forest Policies: INEA (*Istituto Nazionale di Economia Agraria*), ISS (*Istituto Sperimentale per la Selvicoltura*)

Publications

Baldini S., L.Rescic and R.Spinelli (1993). La forza lavoro nelle imprese di utilizzazioni forestali: risultati da un'indagine su scala nazionale, Monti e Boschi, 54 (1).

Benassi A. (1984). Analisi statistica dell'utilizzazione legnosa e del consumo apparente di legno in Italia. Ed. Zara, Parma.

Carlesi A., R.Zanzara and R.Sbrama (1983). L'apertura dell'industria ai mercati internazionali. Tendenze e problemi nei settori del mobile, della carta e delle macchine per il legno. Franco Angeli, Milano.

Cesaro L. and M.Merlo (1990). Il sistema delle utilizzazioni forestale e delle prime trasformazioni del legno in Italia. La Questione Agraria (40) pp. 65-92.

Cesaro L., L.Codemo and M.Merlo (1989). Utilizzazioni forestali e prima trasformazione del legno. ANARF, Coop. Pol., Milano.

Cesaro L., P.Gatto and D.Pettenella (1994). Marketing strategies for the survival of small sawmills in the Italian Alps. Proc. IUFRO Symposium of the Working Party S4.04-02 Managerial Economics in Forestry. Krakow, Poland.

Codemo L. and M.Merlo (1987). Imprese boschive e segherie. Risultati di un'indagine nella montagna veneta. "Cellulosa e Carta", (3) pp. 33-46.

Colpi C., Pettenella D. and Urbinati C. (1999). "Forestry in Italy", in: P. Pelkonen et Al., 1999, "Forestry in changing societies in Europe – Part II: Country reports", Silva Network.

CRESME (1995). Il legno e le costruzioni negli anni '90. Edilegno-Federlegno Arredo, Roma.

ERVET (1985). Il parco macchine per la lavorazione del legno in Italia. Un'analisi strutturale della domanda: il settore del mobile. Compositori. Bologna

Farinet A.(1989) Il settore cartario italiano: crisi, innovazione, riorganizzazione. CRESMES, EGEA. Milano

Florio M. (1982). Il falegname e l'economia politica. Sentieri di sviluppo per una industria tradizionale. Il Mulino. Bologna

Florio M. (ed.) (1987). Il controllo a lungo termine delle risorse naturali. Studi quantitativi sulla filiera forestale, Franco Angeli, Milano.

Gajo P. (1982). Le utilizzazioni legnose in Italia nel quadro degli scambi internazionali. Scritti di Economia agraria e forestale, Università degli Studi, Parma.

Gios G. and C.Pollini (1986). Le foreste dell'arco alpino. Costi di utilizzazione del legname. Cellulosa e Carta (4) pp. 23-28.

Gios G., G.Leonelli and C.Pollini (1991). Qualità e mercato: evoluzione e prospettive per il legname alpino. Cellulosa e Carta (6).

Gubert R (1980). La lavorazione boschiva del legname : una risorsa per lo sviluppo delle aree montane. I principali risultati di un'indagine sociologica in provincia di Trento. Economia Trentina (3).

ISAFA (1985). Inventario Forestale Nazionale. Ministero dell'Agricoltura e delle Foreste Corpo Forestale dello Stato Roma.

Marinelli A., Lassini P. and Pettenella D. (1998). "Il sistema foresta-legno italiano: problemi e prospettive per il 2000 di una politica dell'offerta interna di legname", CNEL, Roma

Merlo M. and F.Fodde (1996). Some annotations on the role of forest based production chain in Italian regional economies. In: P.Hyttinen A.Mononen and P.Pelli (eds.) Regional development based on forest resources. Theory and practices. EFI Proceding (9).

Merlo M. e M.Vianello (1985). L'evoluzione strutturale del sistema legno. Cellulosa e Carta, (1), 13-20

Ministero dell'Ambiente (1992). Relazione sullo stato dell'ambiente. Istituto Poligrafico e Zecca dello Stato Roma.

Musetti, F. and Petrella, A., 1996. Associazioni di produttori: tipologie in un contesto tipico. Rivista di Economia Agraria, Vol. 51 n. 2.

Pascolin M. and N.Tessarin (1985). Lavoro in montagna. Boscaioli e malghesi della regione alpina friulana. Franco Angeli, Milano

Pettenella D. (1991). Parte terza: il mercato. In M. Merlo, Elementi di economia ed estimo forestale-ambientale. Cusl-Nuova Vita, Padova

Pettenella D. (1994). Institutional changes in forest administrative structures: the Italian experience. Unasylva, 45 (178).

Pignatti S. (1998). I boschi d'Italia. Sinecologia e biodiversità. UTET, Torino.

Information sources

- Journals: Sherwood, Alberi e Territorio, L'Italia Forestale e Montana, Economia Montana, Dendronatura
- Web sites of the institutions mentioned in he text above
- Web sites of the associations of the wood-working industries: Federlegno-Arredo (panels, sawnwood, furniture), Assocarta (pulp and paper)
- Statistics by ISTAT (Istituto Centrale di Statistica), ECE-FAO Timber Committee, FAO
- On line information and publications by some Regional Administrations and Autonomous Provinces (see, in particular: Piedmont, Lombardy, Veneto, Trento Bolzano, Friuli, Emilia-Romagna, Tuscany, Umbria).

2. Small-scale forestry practises

Official statistics available for Italy do not differentiate between small-scale and large scale forestry, or between Non Industrial Private Forestry, Industrial Private Forestry (IPF) and Public Forests. In fact, IPF is practically unknown in Italy and most of the forests can be considered as non industrial, as we have done in this report.

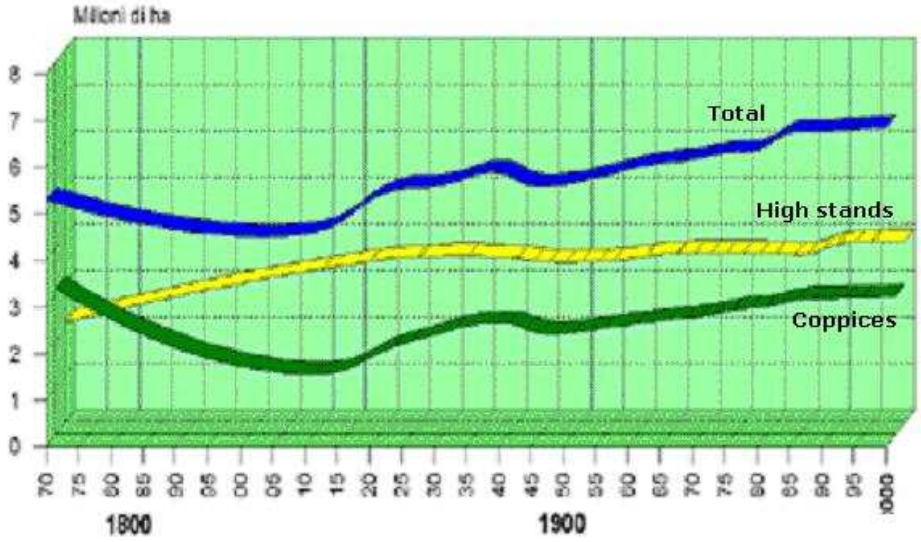
2.1. State of the art and historical development

Italian forests have been a timber reservoir for different populations since pre-roman times. Phoenicians, Greeks, Etruscans and Romans cleared forests transforming them into cropland. After the Romans, several barbaric invasions and natural catastrophes created the conditions for land abandonment and massive forest recolonisation. During the Renaissance age, socio-economic standards improved and forests were cleared again for crops, pastures and urban settlements.

Only sixty years after the Italian unity (1861) the central government was finally able to conceive a forest policy and the publication of important laws, still in force today (Colpi et al., 1999): nowadays, the most important law is a national one (dating 1923) (but forests are managed by regional regulations).

2.2. Small-scale forest holding

During last 130 years the Italian forest area is increased from 5,300,000 hectares in 1870 to 6,860,000 hectares in 2000 (see Figure 2).



Source: Statistics Office of State Forest Service

Figure 2. Forest surface development from 1870 to 2000

Such increment is mainly quantitative, since coppice forests prevail and represent nowadays 57% of the Italian forests. After a constant decreasing of forest lands, since the end of 1st World War (1919) an increment was recorded and forest area progressively increased until 1945. From the '50s, forests started again to extend, mainly because of vegetative colonisation on abandoned agricultural lands (Source: Statistics Office of State Forest Service).

Two main sources of information on the forest cover structure and distribution are available in Italy (Colpi et al., 1999):

- the National Forest Inventory (NFI): carried out in 1985-86, the NFI make out 8.6 million hectares of forests (Table 2); it must be pointed out that the NFI adopted a quite wide-ranging definition of forest, since it also consider as forests those lands covered by shrubs or scattered trees;
- the National Institute of Statistics (NIS): NIS publishes annual data on forest land extension (the most recent data is of 6.8 million ha), including only the forestland within non-abandoned public and private farms (Colpi et al., 1999).

Table 2. Forestland categories and their extension

Category	**Surface (ha)**	**%**	**Type**	**Surface (ha)**	**%**
High forests	2,178,900	25.1	even-aged	1,176,300	54.0
			uneven-aged	554,400	25.4
			irregular	377,100	17.3
			transitory (in conversion)	71,100	3.3
Coppice forests	3,673,800	42.3	simple	2,751,300	74.9
			with standards	922,500	25.1
Specialised production forests	288,900	3.3	timber	134,100	46.4
			non-timber products	154,800	53.6
Other forests			rocky	575,100	26.6
	2,160,900	24.9	riparian	110,700	5.1
			shrubs	1,475,100	68.3
Non-wooded inclusions	372,600	4.3			
Total	8,675,100	100.0			

Source: ISAFA, 1985.

However, natural conversion of abandoned agricultural and range land to forest is by large the most relevant form of in land-use change in Italy. This is confirmed by other sources of information, such as the Corine Land Cover 2000 survey, which detected 7.2 million ha of forests (9.4 million ha considering also shrubs and scattered trees).

Most recent estimate is EUROSTAT – 1998, based on a common international definition of forest (minimal cover 10% and minimal surface 0.5 ha), which reports for Italy a forest area of 9,857,000 hectares: of such area, 6,860,000 hectares are high stands, coppices and shrubs and maquis, while the remaining part is represented by small woodlots (rocky, riparian forests or shrubby vegetation) (Source: Statistics Office of “State Forest Service”).

Besides natural woodland, where native and spontaneous species are dominant, there is a remarkably large area of forest plantations with a strictly timber–production purpose, which had a great influence on the Italian forest-wood chain system during the last decades. A distinction can be made between fast growing plantations of timber or wood-pulp production, especially those of poplar in the Po valley which have a rotation length of around 10 years, and plantations aimed at the production of particularly valuable timber (walnut, cherry, ash, maple etc.), which have a longer rotation length, which in total cover 162,652 ha (ISTAT, 2000).

According to the general census of agriculture (ISTAT, 2000) the number of agricultural farms which possess forests is 605,222 ha with an average surface of 7.51 ha, mostly distributed in the smaller class of surface average (< 5 ha, see Table 2).

As in many other western countries, Italy’s economy has strongly shifted from primary and secondary to tertiary activities. Only 7% of the labour force is employed in agriculture, 32% in industry and over 61% in other activities, contributing respectively to GDP for 3.5%, 29.2%, 67.3% (Colpi et al., 1999). On the basis of the Italian national accounting system, GNP from forest related activities (wood and non-wood forest products) represents only 1.3% of the primary sector GNP and 0.05 % of total GNP, while the GNP of the wood working sector is about 4.5% of total GDP. Italian GDP

does not take into account any non-market public service provided by the forest sector, like erosion control, water conservation, landscape and biodiversity protection, etc.

Table 3. Land structure of agricultural farms with forests

	Forest area		Number		Average area
< 5 ha	258,018.62	5.67%	361,375	59.71%	0.71
5-20 ha	498,938.43	10.97%	168,073	27.77%	2.97
20-100 ha	748,153.88	16.45%	62564	10.34%	11.96
> 100 ha	3,043,047.91	66.91%	13,210	2.18%	230.36
Total	4,548,158.84	100%	605,222	100%	7.51

Source: ISTAT, 2000

Forest land in Italy is divided into private (60%) and public ownership (40%). Local municipalities are the owners of large proportion (68%) of publicly owned forests. The average size of privately owned forest properties is 7.51 ha (General Census of Agriculture, 2000). Privately owned woodlands are usually very scattered and rarely keep a forest management plan. This represents the main problems for an active management of the forest resource.

Italian forests grow annually of approximately 30 million m^3 of timber, but only 1/3 of this mass is harvested. Main causes are lack of infrastructures (roads, etc.), difficulties of access, strict regime of protection for protected areas, insufficient economic value of wood.

As in other Mediterranean countries, the social and economic role of non-wood forest products (NWFP) is traditionally of high importance for local communities. Market demand for chestnuts, hazelnuts, mushrooms, truffles, berries is so high that almost all the Regional Administrations have introduced property right regulations to control the collection of NWFP. These products are no more a public, free-access good, but products that can offer remarkable source of income to the forest owners and their association (Colpi et al. 1999).

Soil and water protection is the most important goal in Italian forest management, due to the very irregular morphological features of the country. At the same time people's demand for recreational and natural use has significantly increased during the last decades. The NFI distinguishes Italian forests on the basis of the prevailing function, as shown in Table 4.

Table 4. Woodland categories and prevailing functions

	Prevailing function (%)			
Category	**Production**	**Protection**	**Ecological**	**Recreational**
High forests	72.7	18.6	8.5	0.3
Coppices	82.2	14.3	3.5	0.1
Plantations	100.0	0.0	0.0	0.0
Other forests	4.8	89.3	5.7	0.2

Source: ISAFA, 1985.

Italian forests are indeed multifunctional, but very few data are available on all the public functions. Italy hosts three of the bio-geographic regions recognised by the EC

Directive Habitat, thus it hosts a wide varieties vegetation types (150). Referring to the management system, coppice is predominant in the centre of the country and comprises around 53% of the total forest area; high forests about 43%, mainly in Alpine stands; the remaining 4% is covered by shrubs and maquis in coastal areas and islands.

Statistic data concerning NWFP are not reliable, there are not regular surveys and mainly these products belongs to small scale economies. There are no precise data on revegetation and natural forest expansion which interest about 2 or 3 million ha of previous agricultural lands.

A second NFI, carried out by the national Forest Service, will be completed by the end of 2005. It has been designed to encompass information and data to accomplish the Forest inventory is outdated.

2.3. Small-scale forestry practices

In order to describe forestry practices and draw relevant strategies of owners we can use 4 main typologies of private properties (beyond public properties, mostly municipal approximately 1.8 million ha where protection, landscape and environmental objectives are more important ones). Private properties can be divided in:

- totally abandoned forests (1.2-1.6 million ha), and hundreds thousands of has of abandoned agricultural lands, covered by shrubby vegetation, in natural conversion to forests. for these areas no objective is actually understandable;
- properties not managed, because of their very small dimensions (351,000 has in 464,000 farms) for which objectives are, at least, fuel wood auto consumption;
- forests belongings to agro-forestry farms, mostly in hilly or mountain areas (1.5 million ha, 299,000 companies) where forest keeps the traditional yield-integration role of the agricultural activity;
- poplar cultivations and arboriculture, distributed mostly in ex-agricultural lands, where objectives are production and owners are very interested at the EU financial support.

Only 23.2% of the Italian territory is flat land, where intensive agricultural production systems and urban land uses are predominant. About 60% of the forests are situated in mountain areas, 35% in the hills and only 5% in the plains. Soil and water conservation is the main goal and constraint of forest management. In fact forestry practices are carefully controlled and restricted by specific rules, aiming at a sustainable planning and management of forest land. Silvicultural systems are based on “close to nature” principles which must simultaneously respect social – economical development and the enforcement of soil protection and water conservation, in other words the multi-functionality of the forest ecosystems. Therefore, clear-cutting of high forests is forbidden, since 1923, and operations leading to natural regeneration, such as selection systems and shelterwood systems (group, strip and edge), are strongly encouraged. Coppices are most commonly managed on a rotational basis, when the stumps are clear-cut, but several trunks known as standards are left, distributed evenly over the land for partial coverage of the soil and for dissemination.

In natural or semi-natural forests, which are mostly localised in mountain and hilly regions, choices and technical possibilities are very restricted, not only by regulations,

but by several real boundaries. So, silviculture and wood harvesting practices are affected: mechanisation level is lower than in other countries and often stumpage prices are negatives.

During last years, the problem of old coppices management arises: although still common in Italy, coppice is currently considered an outdated silvicultural system. The reasons are that its products are largely surrogated by other manufactured items and especially it doesn't guarantee, as well as high forests, the multiple functions that public opinion expect from forests (soil-erosion control, landscape amenity and recreation) (Colpi et al, 1999). More and more old coppiced stands in Italy are subjected to conversion operations leading to high forest. Generally conversion begins with thinnings in coppices that are by large older than their usual rotation age. When stems are relatively old, soil has improved and seed production is abundant the shelterwood system can then be adopted. Unfortunately the coppices conversion is a long and expensive activity and, therefore, very rarely is appreciated by private owners.

Another important aim of Italian forestry is to foster natural diversity and evolution in forests; therefore mixed forests are promoted and the spontaneous recolonisation of broad-leaved species in coniferous plantations is today strongly encouraged. (ibidem). At smaller scale forestry management rules are based on tradition, Harvesting id contracted to forest workers as small family business. Great hopes are set on new developed Forest Co-ops or Consortia (in most cases supported for development by public funds).

From the beginning of the 1990s there has been an important increase in the number of forest associations and unions: Federforeste (National Federation of Forest Communities) in June 2000 included 62 enterprises, with a total surface area of 400,000 has. This seems to be a fundamental way to help overcome the difficulties and limitations of land fragmentation, which must be strongly enhanced in the future in order to reduce total costs and make local timber more competitive on the market.

Most important reasons for associating are related to problems deriving from high property fragmentation and the necessity to supply services to the owners and to the managers (Musotti and Petrella, 1996):

- normative functions (supply contracts; quality marks; certification of the management systems);
- operating functions with internal relevance (technical and professional skill, equipment, management plans; plantations, tending, harvesting and transformation operations for associate partners; maintenance of systems and infrastructures; surveillance and defence services);
- operating functions with external relevance (concentration of the wood supply; channels of distribution; organisation and regulation of tourist-recreational activities; marketing);
- political-administrative functions (predisposition of business accounting; administrative attendance, authorisations, incentives; lobbying actions);
- The share of self-consumption: at small scale almost all non contracted wood is for family fuel and construction timber / agriculture.

It is very difficult to assess costs and benefit of Italian forestry, mainly because of heterogeneous conditions: while a great part of forest stand has negative stumpage prices (like most of the coppices in the centre of the country) other forests have positive balances, like many of the productive high forests (mainly coniferous) in the North-eastern regions and several coppices stands.

Relevant examples of forest plantations are the poplar stands in the northern plain areas of the river Po valley: they probably represent financially the most productive investment in the forest sector in Europe with a net annual increment of 20-25 m^3/ha, rotation periods of 8-10 years and with the predominant use of the final harvest for high-quality plywood production (Internal Rate of Return of 7-10%) (Colpi et al., 1999).

Owners' investments in small-scale forestry are almost none and the role of forestry in farm activities used to be a complementary job, but now forestry is almost neglected. The main form of timber procurement is importation! (Normally national forests are sold on stand) Forest activities and wood working industries are separate entities acting rather independently: the lack of integration between the two sectors is due to different policies and patterns of development. Forest activities seem more oriented towards the production of non-market public services than to an increase in the internal supply of wood products. While the wood industry is strictly oriented towards production and competition in the international market by giving as much added value as possible to the raw material imported (Colpi et al., 1999).

Despite the large wooded surface area, the Italian internal supply of timber is limited and not evenly distributed. According to ISTAT (2000), the total amount of utilised timber was 9,242,130 m^3, divided into fuelwood (59%) and industrial roundwood (41%). The latter is mainly (70%) represented by broad-leaves (45% comes from poplar plantations) and used as sawnwood (53%), panels and pulp (20%), agricultural poles (13%) and other semi-finished products (14%). The significant incidence of industrial roundwood originating from poplar plantations illustrates the low utilisation rate of natural forests. This situation can be due to strict forest policies and particularly to an extremely low technological level of local forest enterprises, that leads as a natural consequence to high harvesting costs, thus making the timber non-competitive with neighbouring countries.

2.4. Policy framework and production conditions

Main forest policy institution is the Ministry for Agricultural and Forestry Policies, in charge of co-ordination of Regional policies, which are autonomous. Property rights are basically individual on forestry (public/private), but almost 2 million ha are common lands, both pastures and forests. Small scale forestry production is not properly considered at present.

Financial incentives for Small scale forestry are not relevant to induce active management. Only in few cases (Autonomous Province of Trento) specific Institutions have been activated to cope with this issue. Beyond Universities, main research institutions are National Council of Research and Ministry of Agricultural and Forestry Policies while education and training institutions are represented by few high schools,

within the professional agricultural system and by 7 universities granting 1st and 2nd level degrees in Forestry Sciences.

There are no extension services, both for agriculture and forestry as such. Some activities are in dissemination of cultural practices and EU policy implementation. Many private consultants dealing with advisory, planning and managerial activities, Forest co-ops are active in this area. National State forests have been recently transferred to Regional authorities. There is a great heterogeneity in management, opening to public, activities and a little effort in extension work.

2.5. Supporting and limiting factors for enterprise development in small-scale forestry and barriers to entrepreneurship

The high incidence of utilisation costs in such a fragmented woodland, the difficulty in harvesting a sufficient volume of timber per surface unit, the low density of forest roads and the general poor quality of timber are limiting private and often public bodies in undertaking an active exploitation. The final result is that the progressive increase of forest land corresponds with a decreasing interest of the owners for the continued management of such important resources.

Large spaces for increasing forest productions are possible in Italy and two are the main solutions: the valorisation of the existing wood resources and the development of new systems with an efficient arboriculture. Existing forests are largely under-utilised and the role of the owners in their management is in constant decline. Many forest stands need human action, at least in order to reduce risks related to abandonment as fire.

Public agencies cannot continue to carry out the role of financing forest managers, because of progressive reduction in available funds and therefore it is indispensable improve private involvement, through economic motivations and participation in management and decisions.

Annex B: Organisations studying small-scale forestry and main publications and information sources.

See annex A, also for publications quoted in part 2.

3. Wood-processing industries

3.1. State of the art knowledge and historical development at country and regional level on wood processing industries and related policy framework

Forest, wood processing and furniture industries in Italy are included in a production chain characterised by relevant discrepancy between local (domestic) supply of wood and demand for industrial transformation or final consumption. In particular, must be recalled that domestic production is un-sufficient to satisfy industrial demand, and about 70% of industrial raw material is imported.

On the basis of official statistics, forest area in Italy is, about 6.85 million ha, including private properties, regional and state properties and municipalities. As shown in Table 1, the main part of forest land is located in mountains and hills. Most of these woods are coppices or maquis, from which the main product is firewood. High forest, both coniferous and broad-leaved is around 38% of the total, mostly located in mountain

areas. Soil and water conservation is, at the same time, the main objective and constraint of forest management in these areas. Strict regulations (i.e. only light selective fellings and silvicultural regimes based on natural regeneration, prohibition of clearfellings, limitations in forest road construction) are imposed on 92.4% of the forest land.

Table 5. Forest area by zone

	Mountain		**Hill**		**Plain**		**Total**	
	ha	**%**	**ha**	**%**	**ha**	**%**	**ha**	**%**
Coniferous forest	1171,277	28,88	217,662	9.13	50,811	15.10	1439,750	21.25
Broadleaved forest	674,721	16.64	353,614	14.83	129,570	38.51	1157,905	17.09
Mixed forest	220,893	5.45	114,819	4.81	15,328	4.56	351,040	5.18
Coppice	1585,352	39.10	1154,624	48.41	81,147	24.12	2821,123	41.63
Coppice with standard	386,188	9.52	361,653	15.16	32,900	9.78	780,741	11.52
Maquis	16,563	0.41	182,543	7.65	26,704	7.94	225,810	3.33
Total	4054,994	100.0	2384,915	100.0	336,460	100.0	6776,369	100.0
Forest Area		59.84%		35.19%		4.97%		100.00%

Source: ISTAT, 1995 – Forest Statistics

According to the recent agricultural census (2000) the wooded area of agricultural firms has decreased in the last decade of about 14%, while the total number of agricultural firms that own or manage forests has decreased of about 18%. This is manly due to the fact that collection of data in agricultural census is based on an interview to the farm owner/manager, so the decrement in the number of active farms has a direct consequence in the surface of managed forests as reported in the Census.

The economic role of forest sector in Italy is rather low. On the basis of the Italian Accounting system the Gross National Product from forest related activities (wood and non wood forest products) represents only 1.2% of GNP of primary sector (average of last 20 years) and 0.05 of total GNP. GNP of the wood working sector is about 6% of national GNP.

Wood related economic sector operate in a highly disconnected forestry wood system, whose main features are:

- a very high internal industrial demand, averaging 15 million m^3/year. Timber consumption mainly flows into two “wood chains” (or filières): on one hand the timber- building/furniture industries filière, on the other the timber-pulp and paper industry -printing industry filière. In both cases Italy behaves as a strong net exporter of some finished products: it is first in the world for exports in the furniture sector, while it holds a well-consolidated leadership on the European and North-American markets for exports of other wood-products;
- fragmented and episodic internal supply, due to the above-mentioned economic and environmental constraints; moreover the internal supply is not homogeneously distributed. Most of the productive high forests (mainly coniferous) are in the north-east, while coppices predominate in the centre of the country. The only relevant examples of forest plantations are the poplar stands in the Northern plain areas of the Po valley. By contrast with the overall situation of wood productivity in Italy, poplar plantations probably represent the most productive investment in the forest sector in Europe;

- a consequent low self-sufficiency rate, i.e. around 35% for semi-finished products; part of the reason for this, beside the economic and environmental constraints, is the fact that Italy's geographical position and international location is such that imports from neighbouring markets (mainly Austria, Croatia and France) are easier and more rapid than purchases on local markets. Furthermore, due to the size of production, the wood, furniture and pulp and paper industries need continuous, homogeneous and reliable timber provisions, which can only be guaranteed by foreign supply.

Due to the economic framework, the current situation of wood processing industries is rather differentiated between forest activities and first processing on one hand, and manufacturing on the other hand.

In principle, much of data on the production chain are not available in the official statistics, in particular those referred to harvesting enterprises, methods and equipment. Harvesting and first processing is less developed than the second part of production chain. Total number of enterprises is estimated to be around 8,700 (source info imprese – Union of Trade Chambers- no official statistic available).

Average annual harvesting is the only information available in the official statistics, on average the annual harvesting is between 9 and 7 million m^3, but many authors agree that data reported in the official statistics may represent only half of the actual harvesting. In rural areas, firewood production is an important underground economy, developed locally within small close circuits.

3.2. General information on wood processing industries in the country

The Italian wood industry is the result of an age-old manufacturing tradition in the wood working. Most of industries operating in the sector has more 100 years of working experiences, a quantity of them are still handcraft firms, while only a few has in the last decades reach the status of proper wood industries. Figures in Table 6 show summarise strong and weak points of the wood Italian sector.

Table 6. Italian forest-wood manufacturing sector in figures

Production value	million euro	38,100
Export	million euro	12,578
Import	million euro	5,463
Balance	million euro	7,115
Employment	unit	413,782
Employment into firms with more than 20 employment	unit	128,278
Firms	number	87,900
Firms with more than 20 employments	number	2,865

Source: Federlegno-Arredo, 2003.

From the structural characteristics point of view, the productive industry sector cover all the phases of the production chain. It is composed by 87,900 firms with more than 413,000 employees.

The wood sector is a relevant component in the Italian economy. With his strong contribution to national GNP (on average 5-6%) it is, together with fashion, one of the more important sector of the "made in Italy" in the world.

In the world market of wood furnishing the Italian industries are leader in the export, particularly in the UE market where they usually allocate 60% of productions, of which more than 20% it is exported in German only. More than 15% of the total export reaches non - UE countries, more than half of the former is imported by USA.

The weak point is the raw material (woods) imported by more than 60% of the total wood used. More of 50% of Italian timber production is firewood. The woods firms (industries and/or handcrafts) are distributed in the whole of Italy. Moreover from economic point of view, the wood working process is based on small and medium-sized companies and clusters (industrial districts with high level of specialisation/integration of industries). Triveneto (Veneto, Friuli Venezia Giulia, Trentino), Lombardia (Brianza), Toscana, Marche e la Puglia are the major geographic areas where the districts are located. These areas generate 60% of the Italian export.

3.3. Wood processing industries practices

In Italy, on the basis of recent investigation (no official statistics exists on this issue) there are 8,000-9,000 forest enterprises that employ around 24,000-28,000 forest workers (including both, temporary and permanent jobs). Many of them are private enterprises and the main part of workers are relatives of the entrepreneurs. Irregular work and use of not-professional workers is still a serious concerning in the country, particularly in some regions. For these reasons forest enterprises are indicated as the weak part of the wood production chain.

The rough material used by industry is, in major part, non-national timber and lumber, however, in many SMEs the national wood is used too, principally in the production of handcrafts.

SMEs are generally managed the owner, and the old-manufacturing tradition is the background. Except the SMEs included in districts/clusters areas, that are used to access foreign market, firms in other areas usually trade in local market.

The recent analysis produced by the National wood furnishing system (Federlegno-arredo) recognise in the **growth, strengthening** and **cross-action** the tree developing strategies of Italian firms in the middle term. These could be considered as the answers of the Italian wood and furniture system to the strong pressure of Chinese economy on the furnished market (low costs of production and high technologies bought in Italy an in Germany).

3.4. Policy framework and production conditions

A short premise must be done about institutional framework in Italy. In the last decade national government has implemented a relevant process of decentralisation. Currently the process is not completed, particularly concerning the last part (decentralisation to Provinces and Municipalities). However most of development policies (rural and regional development) are currently implemented at regional level. The role of central

administration is limited to co-ordination of regional policies, it acts as representative body with respect to EU institutions, and, only for some measures, mainly in the industrial sector, central administration keeps the role of policy maker.

(a) main wood industry policy institutions that directly influence wood processing
Low relevance: the only political body active in the sector is CNEL (National Council for Economics and Labour), with an Observatory on the forest sector.

(b) main reform policies - privatisation, liberalisation of prices and of international trade that affected the wood industry development
Not applicable

(c) main policy (incl. financial) incentives available to wood industry that directly influence management behaviour
Only general policies for SMEs are included in regional development policies. No policy or incentive directly targeted to wood industry exists.

(d) main regional policy / rural development institutions that are known to be active in wood industry SME support
At the first stages of production chain (forest harvesting enterprises and sawmills) policy implemented and measures activated are part of rural development policies. Within the category of forest measures aids and incentives for timber transformation and commercialisation are included in all 21 regional Rural Development Plans. And can be seen in Table 7 almost all Italian regions have adopted in RDP at least one measure to improve forest exploitation and wood harvesting. Most measures are, de facto, strictly comparable to those implemented under CE Reg. 867/90.

Table 7. “Other” forest measures in Regional RDP in Italian ob. 2 regions

		Piemonte	Valle	Lombardia	P.A.Trento	P.A.Bolzano	Veneto	Friuli V.G.	Liguria	Emilia R.	Toscana	Umbria	Marche	Lazio	Abruzzo
other forest measures	afforest. non agricultural land	X	X	X	X		X	X	X	X	X	X	X		X
	forest improvement	X	X	X	X	X	X	X	X	X	X	X	X	X	X
	forest planning and inventories		X	X	X			X	X			X	X	X	
	forest exploitation and wood harvesting	X	X	X	X	X	X	X	X	X	X	X	X	X	X
	eco-certification and production chains	X	X	X	X	X	X	X		X		X		X	
	infrastructures and forest roads							X	X			X			X
	forest association and consortia	X	X	X	X	X	X	X	X	X	X	X	X	X	
	reconstruction after forest fires	X		X	X		X	X	X	X	X	X	X	X	X
	manteinment of forest stability	X	X	X	X	X	X				X	X			
	fire prevention	X		X							X	X	X		

Moreover some specific measures are implemented by the regions, however the financial resources for these measure are rather limited.

(e) research institutions and their main competencies

3 main categories: University (Engineering, forest science, firm economics and management), research institutes of Ministry of Agriculture, some research activity done by private bodies (Federlegno – national association of wood sector enterprises).

(f) education and training institutions

Main institution active in education are Universities. Forest Sciences is currently in the curriculum of 12 Italian Universities. The degree has been recently reformed to adapt to the European standard. Now the courses are organised on a 3+2+1 years. Some of the universities offer a technical degree in wood technology/wood industry, limited to bachelor (3 years), and generally organised on the basis of agreements with industries and their association. Secondary technical education (and training) is organised by regions and financed, according to the case, by EU Social Found, Regions, and, in small part, by industrial sector.

(g) extension services (incl. rural and regional development) and consulting institutions

Agricultural sector has a long tradition of extension services, but this is generally limited to agricultural firms. In forest activities some kind of extension is done by regional agencies while in wood processing industry there is no organised extension service.

(h) the degree of bureaucracy measured for instance by the number of applications for R&D between different actors in supporting enterprises; number of projects started per number of applications

No data or information are available.

Annex C: Organisations studying small-scale forestry and main publications and information sources.

See Annex A.

4. Non-wood forest products and services

4.1. General information on forest related non-wood products and services in the country

(a) Historical development of non-wood forest products (NWFP&S) and services in the country
(b) NWFP&S definition, classification and relevance in rural economies

Historically, non wood forest products (NWFP) are of high importance in Italy. Change factors differ from product to product. In general urbanisation processes and loss of traditions caused also in Italy the decline of collection of NWFP. But for some products, considered more as a recreational service than a commercial good, demand has remarkably increased. Most of the non-food products lost their importance (Table 8).

Diseases caused production losses of chestnut in the middle of the 1980-ies. In the process of NWFP valorisation an important role has been the revision of property rights. Specific laws for gathering mushrooms for example were established, because population pressure were too high (Croitoru and Gatto, 2001).

Table 8. Production of NWFP in Italy 1950 – 2000 in 1000 tonnes

	1950	**1960***	**1970**	**1980**	**1990**	**2000**
Chestnut	228.4	165.7	58.7	63.4	49.6	63.2
Hazelnut	1.3	46.7	0.8	1.4	8	14.2
Pine nuts	3.2	3.8	3.7	1.6	1.9	3.3
Mushroom	3.5	9.1	7.7	1.2	1.8	1.1
Truffle	0.0304	0.0764	0.0838	0.0714	0.1074	0.0979
Acorn	62.8	92.9	0.5	13.7	4	2.7
Bark for tanning	4	1.2	0.1	0	0	0
Leaf and Twigs for tanning	0.5513	0.3	0.1585	0	0	0
Resin	0.7384	0.03	0.0123	0	0	0
Cork**	12.8	12.3	15.2	15.4	7.8	14.5
Medical plants and aromatic herbs ***	9.3	3.3	1	0	0	0
Leafs and herbs for fodder and stables***	10	15.4	0.8	0	0	0
“Corbezzoli” (seed of Arbutus unedo)	0.1943	0	0.0369	0	0	0
Juniper berries	0.6788	0	0.1326	0	0	0
Blueberries	0.3676	0	0.346	0.5228	0.0732	0.1258
Strawberries	0.5039	0	0.3513	0.078	0.0822	0.2124
Raspberry	0.4943	0	0.2037	0.09	0.0592	0.0641
Manna	0.0883	0	0	0	0	0
Corniole (legumes of Ceratonia siliqua)	0.0599	0	0	0	0	0
“Faggiola” (fruits of Fagus sylvatica)	0.1201	0	0	0	0	0

* 1960 forests and other land together
** “*sughero gentile*” and “*sughererone*” together
*** Summarized: (roots, flower, other parts)
Source: (ICS, 1951, ISTAT, 1961, ISTAT, 1971, ISTAT, 1982, ISTAT, 1993, ISTAT, 2003)

Prices of the same product differ very much by regions (Table 2). Usually regions with long traditions of production and the highest production rates have the highest prices.

Table 9. Production and Value of the main NWFP in Italy 1999

Product	Amount tons	Value million €	Price €/tonnes Medium	Price €/tonnes Min-Max	Main regions of production
Chestnuts	52,200	40.5	775	425 – 2,610	Campania, Lazio, Calabria, Piemonte, Toscana
Hazelnuts	20,100	30.3	1,505	995 – 2,540	Sicilia, Lazio. Campagna
Umbrella Pine seeds	4,861	7.9	1,615	250 – 1,785	Toscana, Campagna, Lazio
Mushroom	1,903	18.7	10*	6 - 15*	Toscana, Emilia-Romagna, Lombardia, Trento, Calabria
Truffles	86	18.3	212*	37 - 716*	Umria, Abruzzo, Marche, Piemonte, Emilia-Romagna
Acorns	29	1.1	380		Sardegna
Cork	13,528	13.8	1,330		Sardegna, Calabria, Campagna
Blueberries	324	1.3	4*	2 - 12*	Emilia-Romagna, Piemonte, Trentino- Alto Adige
Strawberries	338	0.9	3*	2 - 10*	Piemonte, Trentino- Alto Adige, Bolzano
Raspberries	121	0.4	3*		Trentino- Alto Adige, Bolzano, Trento

* Price per 1 kg
Source: ISTAT, 2002.

According to the NFI, 2% of the forest area was specific for production of NWFP. 17 100 ha (or 0.2 % of the total forest area) were classified as forests with prevalent tourism–recreational function (Table 10). Table 11 shows the distribution of forest that have prevalent function for tourism and recreational by management system.

Table 10. Distribution of main forest functions

	%
Wood production	58.1
Production of non wood forest products	2.1
Protection	34.4
Ecological	5.2
Tourism/Recreation	0.2

Source: ISAFA, 1985

Table 11. Forest area prevalent for tourism and recreational function

	Tourism/ Recreation (ha)	Total ha)	Tourism/ Recreation %
High forests	7,200	2,178,900	0.3
Coppice	4,500	3,673,800	0.2
Other	5,400	2,548,800	0.2
Total	17,100	8,401,500	0.2

Source: ISAFA, 1985

Considered that the total forest surface amounts to 6.9 million ha and that Italian population consists of 56.4 million inhabitants, forest area for one inhabitant amounts to 1,200 square meters.

In average, Italian people spend 4 times a year and every time 3 hours and 45 minutes in the forests for tourism and recreational reasons. The number of visits is decreasing from the North to the South of Italy. 2% of the visitors of Italian forests are people from foreign countries (Scrinzi *et al*., 1995). Table 12 shows the main activities during the visit of the forest.

Table 12. Activities during the visit of the forest

Main activity	Number	Average time	Recreational use	
	%	hours	million hours/year	%
Break in special rest areas	5.8	2.11	45.7	7.2
Break in other areas	10.2	2.15	84.7	13.4
Break in refugees	2.2	2.14	18.2	2.9
Free camping	0.8	2.33	7.1	1.1
Walking (without any special target)	21.9	1.35	107.6	17.0
Excursion by feed	21.7	2.04	124.5	19.7
Excursion by bicycle	2.9	1.25	13.5	2.1
Excursion by ski	0.6	1.44	3.5	0.6
Riding	1.1	1.12	5.1	0.8
Climbing	1.0	2.17	6.6	1.1
Walking (sport)	1.7	1.26	8.0	1.3
Photography (nature observation)	8.2	1.47	53.0	8.4
Gathering of mushrooms	9.9	2.09	64.6	10.2
Gathering of other products	6.3	2.10	48.6	7.7
Hunting	1.7	2.03	12.0	1.9
Fishing	1.1	1.50	6.4	1.0
Other	3.3	2.15	22.0	3.5
Total	100		631	100

Source: Scrinzi *et al*., 1995

Only few studies exist about economic evaluation and relevance of NWFP&S in rural economies. Farolfi (1990) examines the role of gathering mushrooms in Casentino area (Tuscany). For low-income classes, which consist mainly of housewives and pensioners, gathering mushrooms provide the whole income or 30% of the income respectively. Only higher age classes were represented within the mushroom collectors, nobody was younger than 30 years, the main part was between 50 and 60 years old, 70% were women. About 20% of the total harvest is used for eating, and the remainder is sold to local stores, on markets, to restaurants and private customers.

Croitoru and Gatto (2001) determine the value of hunting, mushroom gathering as well as recreation activities, hydro-geological protection and carbon sequestration for Italy (Table 6).

Table 13. Value of selected NWFP&S

	Method	**Value 1000 €**
Hunting	285,000 hunters in mountain areas; 250 €/hunter	71,250
Mushrooms	3 kg mushroom/ ha; 4 million ha of mushroom producing forests	60,000
Recreation	48 million days/ visitors; 2.5 € per visitor	120,000
Protection	Costs for restoration of degraded forests	1,321,500
Carbon sequestration	3.1 million t C stored in Italian Forests; 19.3 €/t opportunity costs	60,000

Source: Croitoru and Gatto, 2001

(c) Property rights regulation sys
(d) tem (access)

After the recent review of the Italian Constitution the state authority has transferred all the competency in the forestry and hunting sectors to the regions (Italian constitution, Art. 117). Still the state maintains a role in providing a general planning framework in the sector.

Access to non protected areas (Law 431/1985)	**Access to parks and reserves (L 394/1991)**	**Acquisition of natural products**
- public forests are under regulation of regions or local authorities **- restrictions on access can be imposed to forests in general or particular forests** - a general right to free access does not exist	- free access for natural parks and reserves of the state - access can be restricted due to nature conservation, limitations for groups - detailed regulations are up to the natural park authority	- traditional right of common use of lands (Law 1766/1927) two categories: 1) essential uses for basic needs (grazing, gathering of wood or fruits); 2) uses for economic purposes - admitted for personal and family needs (L 3267/1923)
Concerning private landowners		
- restrictions apply also to private forests, but not to private landowner himself (principles of private property) - regional law cannot explicitly permit access to private forests, it is accepted by landowners as long the owner did not ban other persons by enclosures	- landowners have to tolerate access, - possibility of compensation for restrictions to agro-forestry and other activities; no compensation for free access (Art 15 L 394/1991)	- forest owner has the possibility to 1) prohibit uses by contracts or 2) transfer a share of forests property to the holder of rights - uses are managed by special economic plans taking into account laws, parks and reserves, landscape protection as well as regional laws referring to gathering of natural products

Hunting: The state is the owner of the game. The state sells licenses for hunting meanwhile the regulation and control is lying under the responsibility of the Regions or Provinces. Hunters have free access to private forests if they are not closed for different purposes. National Law (*Legge Nazionale*) 157/92 gives possibility to sell the hunting rights to special hunting enterprises (*Aziende Faunistico-Venatorie*). The number of hunters was permanently decreasing from 1.5 million in 1986 to almost the half in 1999 (821,000 hunters) meanwhile the number of hunting enterprises is increasing (ISTAT, 2003).

National frame laws exist for gathering mushrooms (L.N. 352/1993), truffles (L.N. 752/1985) and medical plants (L.N. 39/1931). Provinces have set up regional laws to these objects; in addition regulations exist for berries and other plants at regional or park level (e.g. Toscana LRT 56/2000).

For gathering mushrooms governmental bodies (Provinces, Mountain Communities[2], Municipalities) sell daily or seasonal permissions for collection (prices for daily permissions for collecting no more than 2 kg range from 4 to 7 euro per person). In some regions permission is for free and residents can be favoured (reduced fee, largest quantities allowed etc.). The law contains specific limits for amount and time of collection for selected species. In some regions, e.g. in Piemonte the regional law states, that money from picking permits has to be transferred to land owners. Collection of natural products is generally forbidden in private gardens, forests near houses or when cultivation is professional and licensed (e.g. Truffle). Restrictions usually do not apply to forest owners, they may pick up unlimited quantities without permit or a permit free of charge (Mantau et al, 2001, p. 452-455).

(e) List of statistical information sources, databases, web sites at national/local/enterprise level, review articles

Web sites

Name	Area	Information	www
Italian Association of Farmers (*Confederazione italiana agricoltori, CIA*)	Italy	General information	www.cia.it
Ministry of Agriculture an Forest Policies (*Ministero delle Politiche Agricole e Forestali, MiPAF*)	Italy	Law Certification of Products (IGP, DOC), Policy	http://www.politicheagricole.it/
National Institute of agricultural economics (*Istituto Nazionale di Economia Agraria, I.N.E.A.*)	Italy	Actual problems	http://www.inea.it/
National Institute of Statistics (*Istituto Nazionale di Statistica, ISTAT*)	Italy	Detailed data about production and value of NWFP by region	www.istat.it
State Forest Service (*Corpo Forestale dello Stato*)	Italy	Statistics and development of some NWFP, Forest functions	www.corpoforestale.it
Institute of Biology, Agro-Environment and Forestry (*Istituto di Biologia Agro-Ambientale e Forestale, IBAF*)	Italy	Ecological and economic Aspects of agroforestry systems Rural development	http://www.scienceflash.it/ibaf/cnr.php
Experimental Institute for Forest Planning and Alps (Istituto Sperimentale per l' Assestamento Forestale e per l' Alpicoltura ISAFA)	Italy	Forest Functions (Tourism, Recreation) National forest inventory (NWFP&S included, currently no data about last inventory (1998) available)	www.isafa.it
Regional Agency for Development and Innovation in Agriculture and Forestry (*Agenzia Regionale per lo Sviluppo e l'Innovazione nel settore Agricolo-forestale, ARSIA*)	Toscana Region	Law, general information	www.arsia.it
Regional Agency for Development of Agriculture (*Agenzia Regionale Servizi Sviluppo Agricolo, ARSSA*)	Abruzzo Region	Law, general information	www.ruralnat.it

[2] Comunitá montana = association of municipalities in mountain areas

Articles

Author	Title	NWFP&S	Information
Baglioni, F., 2000	Piante tartufigene: a che punto siamo? Sherwood N.58/ 2001	Truffles	ecology, some laws
Bounous, G., 1990	Piccoli frutti per le zone collinari e montane. Monti e Boschi N.1 1990, 15-25.	Berries, other plants	Information about ecology and cultivation techniques, fruits of minor importance, cultivation as production alternative
Croitoru, L., Gatto, P., 2001	Una stima del valore economico totale del bosco in aree mediteranee. Monti e Boschi N.5 2001, 22 – 30.	Services	Estimation of the value of non wood forest products, hunting, forest functions, Carbon uptake in Italy
Farolfi, S., 1990	Ruolo economico dei prodotti secondari spontanei del bosco: un' indagine nel Casentino. Monti e Boschi N.1 1990	Mush-rooms	Survey about the role of mushroom gathering
Gottardo, E., Maragon, F., 2001	Metodi e procedure per la quantificazione del danno ambientale alle rirorse forestali. Sherwood N.68/ 2001, 43-46.	Services	Economic evaluation of forest resources incl. NWFP&S.
Mantau, U., Merlo, M., Sekot, W., Welcker, B., 2001	Recreational and Environmental Markets for Forest Enterprises. CABI Publishing. 541 p.	Services	Case studies about marketing of NWFP&S Law
Merlo, M. And Milocco, E., 1998	Lo sviluppo di Prodotti Ricreativo-Ambientali (P-RA) offerti dai boschi: modificazione dei diritti di proprieta o tecniche di marketing? Monti e Boschi N.6 1998, 4-13.	Services	Case studies about marketing of NWFP&S
Mezzalira, G., 1999	Gli "altri prodotti" degli arboreti da legno. Sherwood - Foreste ed Alberi Oggi, n°51 (11/99).	all	General information about NWFP&S in Italy (species, kind of services)
Minotta, G., 1990	La coltura del noce da frutto ed a duplice attitudine produttiva in collina ed in montagna. Monti e Boschi N.1, 1990, 27 – 33.	Hazel-nut	Production, ecological and technical characteristics
Sansavini, S., 1990	Frutta di bosco e frutticoltura di montagna. Monti e Boschi N.1 1990: 5-13.	Berries	Ecology and techniques of cultivation of different kind of berries
Saporito, L., 2002	Produzione di pinoli in popolamenti di *Pinus pinea* L.. Sherwood N. 78 2002, 35 – 39.	Pine nuts	Production and yield
Scrinzi G., Tosi V., Agatea P., Flamminj T., 1995	Gli Italiani e il bosco. Coordinate quali-quantitative dell'utenza turistico-ricreativa delle aree forestali in Italia. Comunicazioni di Ricerca dell'ISAFA 95/1, Trento. 46 pag.	Services	Survey of Italian population and their recreational activities in the forests, detailed information
Zanzucchi, C. 1990	La coltivazione delle piante officinali in collina e montagna. Monti e Boschi N. 1 1990, 45 – 48.	Medical plants	Technical and ecological characteristics of cultivation

Literature

Croitoru, L., Gatto, P., 2001. Una stima del valore economico totale del bosco in aree mediteranee. Monti e Boschi N.5 2001, 22 – 30.

Farolfi, S., 1990. Ruolo economico dei prodotti secondari spontanei del bosco: un' indagine nel Casentino. Monti e Boschi N.1 1990.

ICS, 1951. Annuario di statistica forestale 1949 – 50. Roma 1951.

ISAFA, 1985. Inventario forestale nazionale. Ministero dell' agricoltura e delle foreste Copro forest ale dello stato.

ISTAT, 1961. Annuario di statistica forestale 1960. Roma.

ISTAT, 1971. Annuario di statistica forestale Vol. XXII 1970. Roma

ISTAT, 1982. Annuario di statistica forestale Vol. XXXIII ed. 1981. Roma.

ISTAT, 1993. Statistiche forestali anno 1990 annuario v. 43. Roma.

ISTAT, 2002. Coltivazione agricole, foreste e caccia anno 1999. Roma.

ISTAT 2003. Bollettino mensile di statistica. Luglio 2003. Roma.

Mantau, U., Merlo, M., Sekot, W., Welcker, B., 2001. Recreational and Environmental Markets for Forest Enterprises. CABI Publishing. 541 p.

Scrinzi G., Tosi V., Agatea P., Flamminj T., 1995. Gli Italiani e il bosco. Coordinate quali-quantitative dell'utenza turistico-ricreativa delle aree forestali in Italia. Comunicazioni di Ricerca dell'ISAFA 95/1, Trento. 46 pag.

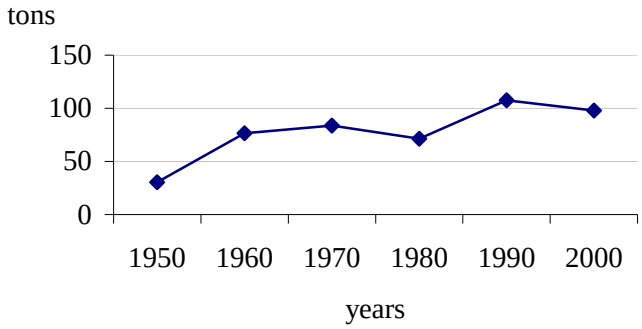
4.2. Case studies of successful marketing strategies

Case study 1: Truffles

(a) NWFP&S definition, area of production, harvesting level, technical characteristics of production

In Italy two main kinds of truffles occur: the white truffle (tartufo bianco, *Tuber magnatum* Pico) and the black truffle (tartufo nero, *Tuber melanosporum Vittad*). Furthermore there exist some hundred varieties. Truffles are added to pasta dishes or to liqueurs (black truffles), truffle butter, salami, sauces, olive oil, honey, etc.

The amount of truffles gathered each year was increasing since the war (Figure 2.), but truffle production differs between the years mainly for meteorological reasons. In Toscana it varies between 3,000 kg and 33,000 kg (Mazzei, 1998). In the year 2000 86.5 t of truffles were produced with a value of 18.6 million euro (ISTAT, 2003). Most important regions for truffle production are Umbria, Abruzzo, Marche, Piemonte and Emilia-Romagna.



Source: ICS, 1951, ISTAT, 1961, ISTAT, 1971, ISTAT, 1982, ISTAT, 1993, ISTAT,2003
Figure 2. Production of truffles in Italy 1950 – 2000

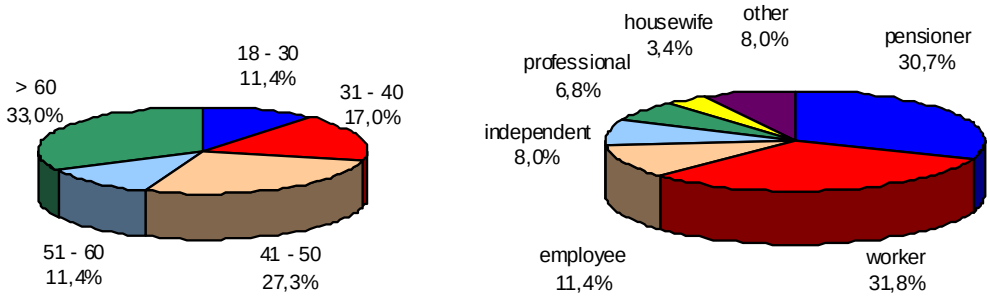
The whole value of the Italian truffle market exceeds 400 million euro, where around 500 tons (including imports) are manufactured (Raggi Vivai, 2004, http://www.raggivivai.it/prodotti/tartufo/sottomenu/curiosita.asp).

The real amount of truffles collected each year is likely higher than stated in official statistics since large amounts are sold unofficially. In Alba area (Piemont region) it is expected that a similar amount is sold unofficially (Cesaro *et al*., 1995).

(b) Description of the "product chain" organisation:
Truffles are collected in natural or planted forests for truffle production (*tartufaie*). There are some measures to increase truffle production also in natural truffle forests, like soil protection. Truffles are revealed with the help of dogs or pigs, and with special instruments they are taken out from the soil. They are cleaned and selected by species, size and quality. For conservation, 2 different methods are possible:

- vacuum packed with low temperatures (high quality truffles) or
- sterilised under a temperature of 120 – 130°C.

Usually truffle collectors operate in solidarity. In Toscana, 3100 truffle collectors were registered in 1990; and almost 5000 in 1995 (Marone, Mazzei, 1996). For whole Italy a number of 200 000 truffle collectors was estimated (CIA, 2003). According to a survey in Toscana region (Marone and Mazzei, 1996) 97% of collectors gather truffles in the province of residence. 16% of collectors were members of associations, 44% were carry on this activity for more than 25 years and have long family traditions. 78% of collectors are male and the average age 50 years (Figure 3).



Source: Marone and Mazzei, 1996

Figure 3. Distribution of age classes and professions of truffle collectors in Toscana

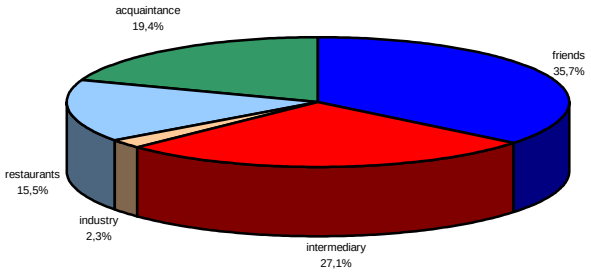
Motivations for gathering truffles are hobby, additional income or entirely income. The activity is very time consuming. Time consume varies between 28 and 200 days for truffle collecting, with a mean of 4 hours and it differs between natural and cultivated truffle areas (Table 14).

Table 14. Time consume per year [days]

	Average	**Maximum**
Natural Truffle Areas	64	200
Cultivated Truffle Areas	28	60

Source: Marone and Mazzei, 1996

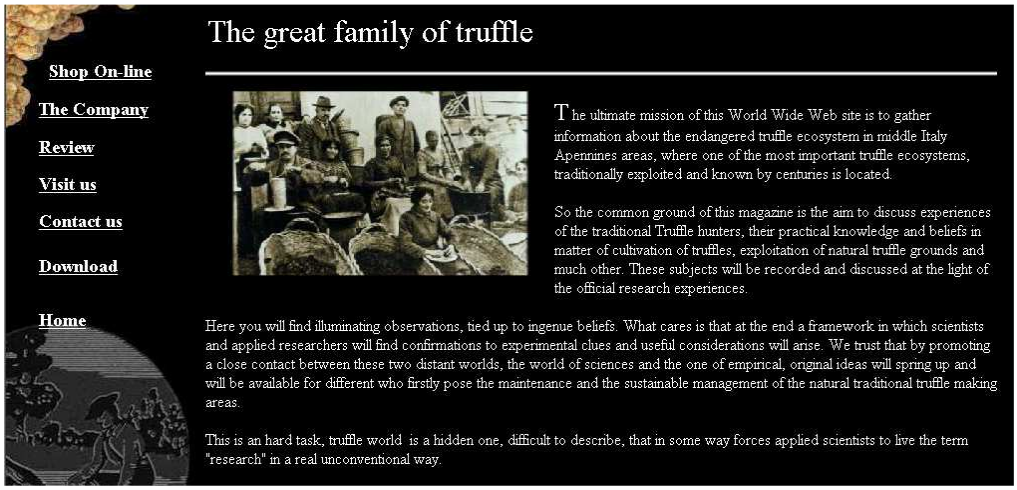
The truffle marked is traditional “not transparent” and full of secrets. First of all to keep the secret of the places where truffles are found, secondly to hide the amount, prices and income. Best places to find truffles are passed down from father to son, generation after generation. Truffle collectors of Toscana region stated that they mainly sale a large amount of truffles to friends and to truffle industry (Figure 4).



Source: Marone and Mazzei, 1996

Figure 4. Distribution of end-users of truffles in Toscana

In regions with a long tradition of truffle culture exist every year markets and fairs for truffles where they are sold. In Italy around 40 middle men are working with one colossus situated in Umbria, who is controlling around 75 % of the world market (Dickinson and Lucas, 1979 in FAO, 2001, http://www.anteprima.net/Ghiottone/appunti/articolo.asp?articolo=17, Figure 5).



Source: http://www.urbanitartufi.it/principale.asp
Figure 5. The Urbani's - a case of large (monopolistic) company

Import/Export
Italy is together with France and Spain major exporter of black truffles. Exports go mainly to Germany, Switzerland and United States. White truffles are less known and mainly imported by United States, but also from Belgium, France, South Africa and Switzerland. In 1989 United States imported 5.4 t of fresh or chilled truffles, mainly from Italy and France at a value of US$ 1.48 million or US$ 273/kg (Iqbal, 1993 in FAO, 2001).

(c) Policy framework

- Policy institutions involved in the sector and regulations (esp. property rights regulations) that directly influence the NWFP&S production and harvesting. It exist a national frame law about the collection, cultivation and commercialisation of truffles (Law 752/ 1985).Based on this law Regional Authorities have identified own laws or delegated the responsibility to Provinces or Mountain Communities.
  The collection of truffles is free in all non cultivated areas. The law distributes between cultivated and controlled truffle forests, which have to be signed. The Regional Authorities have to confirm cultivated or controlled truffle areas, usually with the help of special consortiums of experts. Controlled truffle forests are natural forests where limited amelioration interventions are allowed, meanwhile cultivated truffle forests are new forests planted with mycorrhized trees.
  Collectors have to have a licence for truffle collecting, that does not apply to the land owner.
  Furthermore the law identifies all details concerning the collection of truffles, like species, collection time, techniques of excavations etc.
  Umbria for example has developed rules and regulations that govern the harvesting, cultivation, conservation and marketing of truffles (Regional Law 10/1997). Truffles under managed production are the property of the landowner and are subject to separate regulation. If somebody else want to manage the forest for truffle production contracts have to be done between the landowner and the truffle collector.
  The consortium for recognition of truffle areas has to consist of representatives of

Mountain Community, agriculture organisation on regional and national level, State Forest Service and association of truffle collectors.

- Policy instruments (incentives, taxation, information) available and their role in NWFP&S development.
  In the official list of certified agricultural products of the Ministry of Agriculture and Forest Policy (Ministero delle Politiche Agricole e Forestali, MiPAF) 24 truffles of different kind or origin are mentioned as traditional products3 (prodotti tradizionali)
  (http://www.politicheagricole.it/QUALITA/TIPICI/ProdottiTradizionali.asp?Tipo=11).
  The National Association of "Towns of Truffles" (Associazione Nazionale "Città del Tartufo") was founded 1990 for promotion of truffles. 19 member towns are organizing together fairs and exhibitions and other festivities around the truffle (http://www.deliciousitaly.com/Piemontedishes1.htm).
  Furthermore there exist numerous associations of truffle collectors. The umbrella organisation for all of them is the National Federation of Associations of Italian Truffle Collectors (Federazione Nazionale delle Associazioni dei Tartufai Italiani, FNATI), which includes Associations of the regions Piemonte, Lombardia, Friuli Venezia Giulia, Liguria, Emilia Romagna, Toscana, Lazio, Marche, Abruzzo, Molise and Basilicata (http://www.aznet.it/artop/page4.html).
- Role of research, education, and training extension services in NWFP&S development
  Main research is concerning cultivation of truffles using mycorrhized planting stock for field plantations and the security of the presence of mycorrhizae in the nursery planting stock.
  The Ministry of Agriculture and Forest Policy has financed a project about the increment of the production of truffles in Italy. Main objects were the verification of methods for mycorrhization of plants, best habitats for cultivations and the foundation of a germoplasma bank of Truffle species (*Tuber spp*.)
  (http://www.politicheagricole.it/RICERCA/PROGFIN/Tartufo.htm).
  The Regional Agency for Development and Innovation of the Agricultural – Forestry Sector (*Agenzia Regionale per lo Sviluppo e l'Innovazione nel settore Agricolo-forestale, ARSIA*) gives technical assistance and supports research on the truffle sector.
  The National Research Centre of Truffles (*Centro Nazionale Studi Tartufo*) organizes courses for truffle controllers (http://www.tuber.it/pagine/corsi/index.php).

(d) Profit appropriation by the landowner/contractor/manufacturer/ dealer/seller
The establishment of one hectare of plantation with mycorrized plants (Black truffle) costs 13,000 euro/ha (ARSSA, 2000).

The Price of truffles is increasing. At the end of 90's the average price of white truffles in Piedmont region were 1,500 euro/kg (Cesaro et al., 1995). Table 15 shows prices of year 2002 and 2003 of some market centres in Piedmont.

[3] The term 'traditional product' intends to certificate a traditional way of processing, conservation and storage of the products (http://www.politicheagricole.it/QUALITA/Glossario.htm).

Very high quality white truffles can be sold for 3,000 euro/kg. The price for the final customers is calculated to be between 2,800 and 4,000 euro/kg including taxes and distribution costs (Associazione Tartufai del Monferrato di Murisengo, 2003). For black truffles prices of 950 euro/kg were paid this year (Borsa del tartufo, 2004).

Table 15. Prices for white truffles in Piemont region 24th, 26th and 27th November 2003

	Prices [€/kg]		Price for final customer [€/kg]	Truffles sold in 3 days [kg]
Market	**2002**		**November 2003**	
Asti	1,300 – 2,200	1,800 - 2,700	2,800 – 4,000	3.4
Moncalvo	1,300 – 2,200	1,800 - 2,700	2,800 – 4,000	1.5
Murisengo	1,300 – 2,200	1,800 - 2,700	2,800 – 4,000	1.5
Alba	1,400 – 2,500	1,800 - 2,700	2,800 – 4,000	2

Source: Associazione Tartufai del Monferrato di Murisengo, 2003

The prices of truffles vary not only between the kinds of truffles but also between their origin (Table 16). Highest prices reach truffles from places with old truffle traditions, like the white truffle from Alba in Piemonte. Prices are also increasing within the season (Gregori, 1991).

Table 16. Quantity and value of truffle production in Italy by region 1999

	Quantity		Value		
Region	**tons**	**%**	**million euro**	**%**	**euro/kg**
Piemonte	2.3	2.7	1.6	8.8	696
Emilia-Romagna	6.0	6.9	1.8	9.6	292
Toscana	5.2	6.0	1.4	7.4	260
Umbria	26.4	30.5	7.5	40.8	282
Marche	10.6	12.3	3.1	17.0	292
Lazio	6.4	7.4	0.7	3.8	109
Abruzzo	18.0	20.8	1.6	8.5	86
Molise	6.3	7.3	0.6	3.0	87
Other	5.3	6.1	0.2	1.1	38
Total	86.5	100.0	18.3	100.0	211

Source: ISTAT, 2002

(e) Contractual agreements between landowners and resource managers; networking and joint ventures among/between non-wood processing and service industries

In Toscana region exist an formal agreement between forest owners and association of collectors. No rent is paid, but the forest owners profit from the protection (access limitation) and melioration work done by the collectors.

(f) Characteristics of technological or organisational innovation behaviour in non-wood production, processing and service industries

Most important fields of innovation are:

- nursery/ plantation (A certification system of nurseries is necessary to assure mycorrhization.);
- mark of origin (No official trade mark exists for truffles from Italy);
- distribution (e-commerce).

One example of new commercialisation paths is the on-line market of the company "Alba Tartufi" (figure 4, http://www.albatartufi.com/).

Source: http://www.albatartufi.com/

Figure 6. Webpage of online market of the company "Alba Tartufi"

(g) "Territorial" marketing (i.e.: the integration of the NWFP&S to other services and products offered by the local community)

The history of acknowledgement of truffles in Piemonte region goes together with the international acknowledgement of the wine of that region which reinforced tourism too. Today Alba area has one of the highest percentages of agricultural workers and, at the same time, one of the highest average income rates. In addition to the truffle collecting, related activities such as food-processing industries, restaurants and on-farm tourism are all growing rapidly (Cesaro *et al*., 1995).

In Alba was found the 'Street of White Truffles of Alba in Lower Piermonte' (Strada del Tartufo Bianco d'Alba nel Basso Piemonte) to increase the value of the entire region including tourism, culture, environment and gastronomy (http://www.provincia.cuneo.it/turismo/tartufo_bianco.htm, http://www.italnet.it/cgi-bin/informa/articolo?tartufoX.txt+Art-331). Umbria region tries to attract tourists with truffles to sell wine and other products as well as activities like rafting, cultural events etc. (Figure 7).

Source: http://www.umbriadoc.com/eng/prodottotipico/generale/prodottotipicodoc_tartufo.htm

Figure 7. Example of territorial marketing in Umbria

(h) Lessons learns/driving forces/factors affecting competitiveness (SWOT analysis)

On the Italian market appeared in the last years truffles from China which have a less intensive aroma and sold for 50 US$/kg. Acquisition cost is around 3 euro/kg. They are sold mixed with other truffles or even plants are sold with the mycorrhised of that truffle. It is also practised that immature black truffles or Chinese truffles are aromized and sold for a high price.

Competition is arriving also from Eastern Europe, e.g. Yugoslavia, where the same kinds of truffles occur like in Italy (Raggi vivai, 2003, Greenside 2003). Sanctions are urgent, there are initiatives for a new law.

(i) Open questions (barriers to entrepreneurship) and related research needs

(j) Recommendations, proposals for documentation.

Web sites

Institution/ web-page	**Information**	**Region**
http://www. truffle.org/	promotion of research on truffle and other ectomycorrhizae	International
http://www.truffel.com/	General information about truffles	Italy
Nursery "Raggi Vivai"	General Information	Italy
http://www.raggivivai.it/	Chinese Truffle, amount and value of truffles in Italy Useful Addresses	
http://www.trovatartufi.com/	Techniques for save truffle production	Italy
Associations of truffle collectors http://www.aznet.it/artop/index.html	National and Regional Associations, Addresses	Italy
National Research Centre of Truffles (Centro Nazionale Studi Tartufo) http://www.tuber.it/	Ecology, fairs, courses, literature,	Italy

Regional Agency for Development of Agriculture (Agenzia Regionale Servizi Sviluppo Agricolo, ARSSA) http://www.ruralnet.it/	General information about truffles, truffle collection, cultivation of truffles (costs of establishment of tree plantation for truffles), laws	Abruzzo
http://www.langheroero.it/	General Information about truffle collection and commercialisation	Piedmont
http://www.mostratartufo.it/	General information about truffles, prices, laws	Piedmont
http://www.provincia.grosseto.it/	Promotion of utilisation of truffles	Toscana
Comune di Savigno http://www.comunedisavigno.it/tartufo_sapori.htm	General information about truffle promotion of truffles: national association of "Towns of truffles" (Associazione Nazionale "Città del Tartufo")	Emilia-Romagna
Regional Agency for Development and Innovation of the Agricultural – Forestry Sector (Agenzia Regionale per lo Sviluppo e l'Innovazione nel settore Agricolo-forestale, ARSIA) http://www.arsia.toscana.it/	Research about ecological and economic problems Experts about Truffle: G.Nocentini@arsia.toscana.it T.Mazzei@arsia.toscana.it	Toscana

Literature

ARSSA, 2000: Costo impianto tartufaia artificiale. www.ruralnat.it

Associazione Tartufai del Monferrato di Murisengo, 2003:

http://www.fieradeltartufo.com/index.html

Borsa del tartufo, 2004:
http://www.acqualagna.info/modules.php?name=Content&pa=showpage&pid=82)

Cesaro, L., Linddal, M. & Pettenella, D. 1995. The economic role of non-wood forest products and services in rural development. *Medit* 6(2): 28-34.

CIA, 2003: Tartuficoltura: nuove proposte di legge 17 luglio 2003 Anno 45 - n. 131 http://www.cia.it/nuovaagricoltura/07172003.htm#sommario

Dickinson, C., Lucas, J., 1979: The encyclopaedia of mushrooms. New York, G.P. Putnam's Sons. 280 pp.Giunta

GREGORI, G. (1991). Tartufi e tartuficoltura nel Veneto. Regione del Veneto, Assessorato Agricoltura e Foreste, Dipartimento Foreste, Padova. Tipografia Rumor, Vicenza. 177 pp.

FAO, 2001. Non-wood forest products from broadleaf forests. FAO NWFP Series, Rome.

Greenside 2003: Una legge regionale per salvare il vero tartufo italiano da frodi e contraffazioni. 21 febbraio 2003-02-21. http://www.greensite.it/
ICS, 1951: Annuario di statistica forestale 1949 – 50. Roma 1951.

Il Ghiottone Viaggiatore 2002: Taccuino dei Sapori. La truffa al tartufo. http://www.anteprima.net/Ghiottone/appunti/articolo.asp?articolo=17

Iqbal, M., 1993: International trade in non-wood forest products: an overview. FAO, Working Paper FO: Misc/93/11, 100 pp.

ISTAT, 1961: Annuario di statistica forestale 1960. Roma.

ISTAT, 1971: Annuario di statistica forestale Vol. XXII 1970. Roma

ISTAT, 1982: Annuario di statistica forestale Vol. XXXIII ed. 1981. Roma.

ISTAT, 1993: Statistiche forestali anno 1990 annuario v. 43. Roma.

ISTAT, 2002: Coltivazione agricole, foreste e caccia anno 1999. Roma.

ISTAT, 2003: Bollettino mensile di statistica. Luglio 2003. Roma.

Marone, E., Mazzei, T., 1996: Il tartufo in Toscana:Caratteristiche dei raccoglitori e flussi commerciali. Monti e Boschi N.5 1996, 21-29.

Mazzei, T., 1998: I tartufi in Toscana. Compagnia delle Foreste, Firenze, 184 pp.

Raggi Vivai, 2003: Il Tartufo/ Curiosita. http://www.raggivivai.it/prodotti/tartufo/tartufo.asp

Further reading

ARSIA Il tartufo. Piccola guida alle norme, alle procedure, ai servizi. ARSIA e Regione Toscana, 2002.

ARSIA: "Il tartufo: piccola guida alle norme, alle procedure, ai servizi", pubblicato dal Dipartimento dello Sviluppo Economico della Regione Toscana nel 1997. In distribuzione gratuita presso il C.R.D.A. dell'ARSIA e presso la biblioteca della Giunta Regionale Toscana

GAJO, P., MARONE, E. MAZZEI, T.: "Raccolta e Commercializzazione del tartufo in Toscana", pubblicato da ARSIA e Dip. Economico Estimativo Agrario e Forestale dell'Università di Firenze nel 1996. In visione presso il C.R.D.A. dell'ARSIA

TIBILETTI, E & ZAMBONELLI, A. (1999). I tartufi della Provincia di Forlì-Cesena. Provincia di Forlì-Cesena. Pàtron Editore, Bologna. 178 p.

VIGNA, E. 1999: Trifulau e tartufi**.** Provincia di Asti, Università di Genova. 343 p.

ZAMBONELLI, A. & DI MUNNO R. (1992). Indagine sulla possibilità di diffusione dei rimboschimenti con specie tartufigene: aspetti tecnico-colturali ed economici. Ministero dell'Agricoltura e delle Foreste, Ecoplanning. 356 p.

Case study 2: Chestnut

(a) NWFP&S definition, area of production, harvesting level, technical characteristics of production

Cultivation of chestnut has a long tradition in Italy. In former times chestnuts were called the "bred of the poor" and around 700 000 t of chestnut were produced each year, 10 times more than nowadays (Bellini, 2003). After the second world war production was still more than 200 000 tons per year (ICS, 1951).

Chestnut production has declined due to two main reasons:

- urbanisation processes and the drift of population toward the cities, together with the loss of traditional uses;
- fungal diseases in the 80s and 190es (Chestnut blight - *Cryphonectria parasitica* and phytophthora root rot - *Phythophtora cambivora*) (FAO, 2001).

Nowadays chestnuts become valid as a natural product (Pettenella, 2001).

Italy produced 63,200 t of chestnuts in the year 2000, that amounts approximately to 5% of the world production (ISTAT, 2003 FAO, 2004, Figure 8). Around 50% of production derives from Campania region (ISTAT, 2002, Figure 9).

In Italy 275,000 ha are covered with chestnut forests (75% in the mountain regions, 22% in the hills and 3% in the plain area). 30% of the chestnut forests are in Toscana region. For chestnut fruit production around 209 000 ha are used (Bellini, 2003).

Chestnuts are the most important non wood forest products in Italy from the economic point of view. The value of Italian chestnut production reached 57 million euro in 2000. The medium price per ton was increasing from 775 euro (1999) to 902 euro (2000). The variation of the price between the regions is very large, 1999 it ranged from 425 (Calabria) to 2600 (Bolzano) (ISTAT, 2002, ISTAT, 2003)

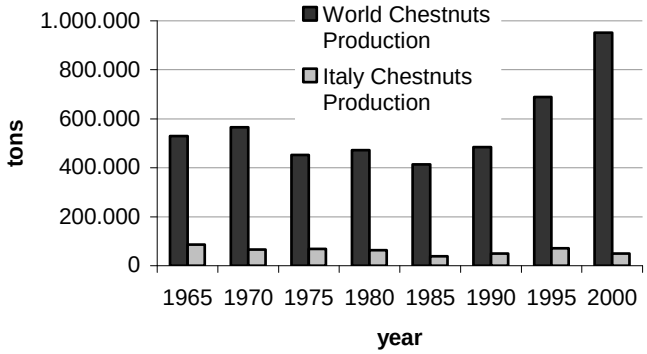


Figure 8. Chestnut production 1965 – 2000 (FAO, 2004)

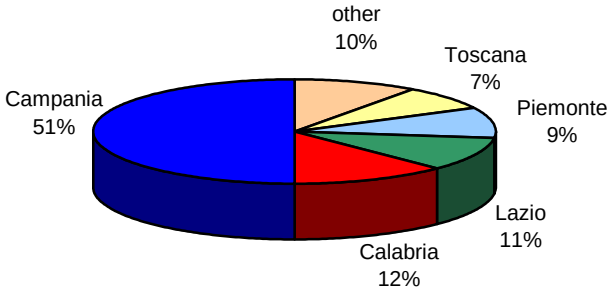


Figure 9. Italian chestnut production by regions (ISTAT, 2002)

In Italy, the term 'chestnut' is used to characterise two types of chestnut fruits: marron (*marroni)* and chestnut (*castagne*). By generalisation, a marron is larger and derives when the fruit contains only one nut, when there are more inside, usually 2-3, they are called chestnut (Galie, 2003).

Large amounts of chestnuts are still collected by hands or gathered on tarps. Mechanisation exist in form of special aspirators or tree shakers. Problem of mechanical collection is the destruction of the skin of the chestnuts, which gives the possibility for diffusion of pathogens (fungi).

One worker is able to collect 10-15 kg of chestnut of small sizes per hour and 20 – 25 kg of larger sized fruits per hour (Galie, 2003). For conservation chestnuts are frozen or dried until the moisture content is reduced by 50-90 % (Galie, 2003). One hectare of chestnut copse can produce up to 2.5 tons of chestnut fruits per year (Percivale *et al.*, 2003).

(b) Description of the "product chain" organisation:

- number of companies involved and management characteristics (e.g.: family enterprises, joint enterprises, stock companies…,)
- the role and share of SMEs in the product chain (quantity, % of the total harvesting and processing)
- trade activities (import and export flows and development patterns)

In Italy 89 000 agricultural enterprises are producing chestnuts on a surface of 76 000 hectares (ISTAT, 2001).

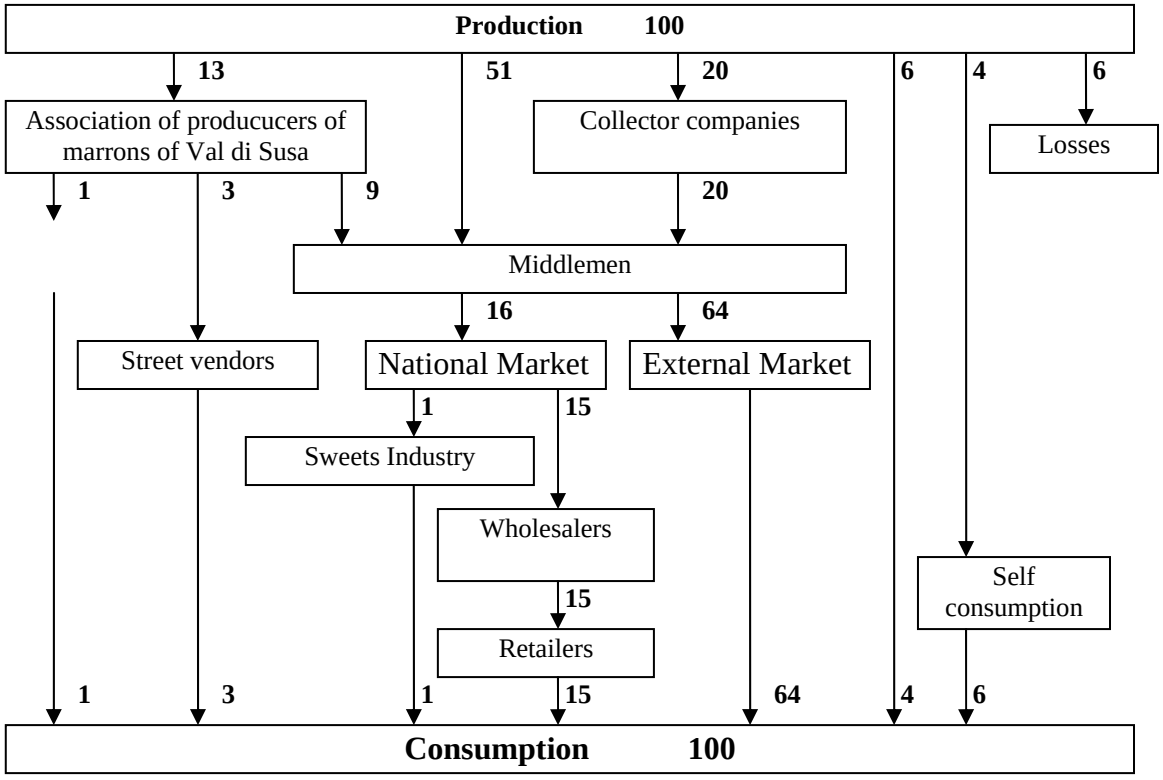
Production chain varies between chestnuts and marrons (Table 17).

Table 17. Distribution of consumption of chestnuts (Bellini, 2003)

	Chestnut and Marrons	**Marrons**
Peeled, for animal feeding and other uses	5%	< 5%
Self consumption	5%	10 - 15%
Internal markets (fresh consumption)	40%	20 - 30%
Processing industry	10%	35 - 40%
Dried	10%	
Export	30%	15 - 20%

Products of chestnut industry are dry chestnuts, flower, marrones glaces, chestnuts in alcohol, natural or vacuum packaged as well as peeled chestnuts which continue transformation processes (Bellini, 2003).

Percivale *et al*., 200? give an example of end use distribution in Val di Susa (Piemonte region, west of Torino) where high quality chestnuts are produced. Since there exist no chestnut processing industry 71 % of the production are exported or processed in other regions of Italy (Figure 10). The association of chestnut producers in the region has created a trademark *'marrone delle valle di Susa'* to guarantee a high product quality.



Source: Percivale et al., 2003

Figure 10. Distribution channels of chestnut production in Val di Susa (%)

Around half of Italian exports go to Europe (France, Switzerland and Germany) the other half to America and Asia. The imports are limited (less than 4,000 tons in 1998) (Bellini, 2003)

(c) Policy framework:

- policy institutions involved in the sector and regulations (esp. property rights regulations) that directly influence the NWFP&S production and harvesting;
- policy instruments (incentives, taxation, information, …) available and their role in NWFP&S development;
- role of research, education, and training extension services in NWFP&S development.

There are some incentives for reconstruction of old chestnut orchards and new establishment of chestnut plantation for fruits in Italy to recover the chestnut production especially in protected areas (Parco regionale dei Colli Euganei, 2001; INEA, 2003).

The cost for recovery of chestnut forests for fruit production vary between 6,000 and 9,000 euro (1998) depending on the region. There are possibilities to get financial support from the regions, for example in Lombardia (L 30/90) and Emilia Romagna (L 30/81) (Maresi, 1998).

Support is also given by the chestnut project within the Leader II – program of European Union. 4 of 11 Local Action Groups (LAG) are from Italy (INEA, 2003) The project includes the following topics:

- Creation of European Street of Chestnuts;
- International co-operation between universities and research centres about chestnut diseases and new products;
- Networking, creation of a webpage;
- European contest of gastronomy;
- Publication of a recipe book;
- Fair about European chestnut;
- Creation of a logo.

There exist no law about forest access and collection of chestnuts. As long as the forest owner not prohibits, collection is allowed. Restrictions (up to 2 kg per person per day) exist in some parks and natural reserves e.g. in the natural park '*Lagoni di Mercurago*' in Piemonte region (Consiglio regionale del Piemonte, 1993).

Main research topics are:

- diseases;
- cultivation, graft and crown care;
- recovering of old chestnut orchards and transformation of chestnut coppice;
- acquisition techniques.

(d) Profit appropriation by the landowner/contractor/manufacturer/ dealer/seller

Profitability of chestnut production depends highly on the place along the market chain, where the products are sold: forest owners who are able to sell their products on the roadside or at delivery price at the industrial firm yard will normally gain much more from their investments (Pettenella 2001, FAO, 1995). The collection costs amount to 50% of total cost of the sold chestnuts (Galie, 2003).

(e) Contractual agreements between landowners and resource managers; networking and joint ventures among/between non-wood processing and service industries

(f) Characteristics of technological or organisational innovation behaviour in non-wood production, processing and service industries

(g) "Territorial" marketing (i.e.: the integration of the NWFP&S to other services and products offered by the local community)

Table 18 shows some positive and negative aspects of marketing of chestnuts.

Table 18. Marketing characteristics of chestnut fruits (Pettenella, 2001)

Positive	**Negative**
Good nutrient values	Difficulties in obtaining a nut clean and of homogeneous size
Different final uses	Production variability
High added value products through processing	Fresh nuts quality maintenance problems
Easy storage (refrigeration)	Fungal infection and insect attach to fresh fruits, weevil damage during storage and later
Various by-products (honey, mushrooms)	Harvesting costs, high and concentrated labour requirements

For expansion of chestnut markets four instruments playing remarkable role:

- Certification (see Table 19)
- Networking and promotion
- New selling systems
- Procurement policy by public authorities

Table 19. Certification schemes applied in the chestnut market (Pettenella, 2001)

Scheme	**Examples**
Registration of Protected designation of Origin (PDO) and Protected Geographical Indication (PGI) under Council Regulation 2081/92*	Marron from Castel del Rio (PGI), marron from San Zeno (PGI), marron from Mugello (PGI), chestnut from Monte Amiata (PGI), chestnut from Montella (PGI),
Traditional Speciality Guaranteed (TSG) under Council Regulation 2082/92	8 different flour specialities from Toscana, Calabria and Liguria Regions
Organic productions certification under Council Regulation 2092/91 and under the system of the International Federation of Organic Agriculture Movements (IFOAM)	Marron from Mugello-Fano Garfagnana

* http://europa.eu.int/comm/agriculture/qual/en/prod_en.htm

Numerous associations and consortiums operate with the aim to increase the value of chestnut fruits and timber, e.g. Provincial Association of Chestnut Cultivation in Brescia *(Associazione Provinciale Castanicoltori Bresciani, ASPROCARB)*.

Mountain Communities of Toscana and Emilia Romagna regions have set up the *Associazione Nazionale Città del Castagno* (National Association of "Towns of Chestnut"). The foundation keeps on a range of activities, like creation of a web page and newsletter, are present at trade fairs and fests of festa della castagna (local fests devoted chestnuts, they support research e.g. in form of scholarships for theses, they give technical assistance in aspects of production of chestnut etc. Furthermore a museum and a "street of chestnuts" with nature trails for tourists are included in their activities (http://proxy.racine.ra.it/cittadelcastagno/home2.html). Similar activities exist in other parts of the country.

In Valgerola (Lombardia) a project was funded with the aim to increase the value of chestnut in the region. Main objectives were to increase production of chestnuts through cropping techniques improvements, promotion with advertisement for tourism, organisations of trade fairs and fests and development of local rural economies. Project partners were all groups along the production chain, from producers and collectors to a working group for commercialisation (http://www.museovanseraf.com/progetto.htm). In some regions and towns advertisement for tourism includes chestnuts as a speciality beside nature and cultural highlights, e.g. Sassetta (Toscana) (http://www.greenholiday.it/le_regioni/toscana/citta_e_paesi/paesi/sassetta.asp).

New distribution techniques are developing. For example the *Associazione per la* Valorizzazione *della Castagna*) has created a web-page with on-line shop for typical chestnut products (http://www.marrone.net/).

(h) Lessons learns/driving forces/factors affecting competitiveness (SWOT analysis)

(i) Open questions (barriers to entrepreneurship) and related research needs, Recommendations, proposals for documentation. Information:

Information is available mostly from the northern regions, meanwhile around 75% of production comes from the south of Italy.

Web sites

Provincial Association of Chestnut Cultivation in Brescia. *(Associazione Provinciale Castanicoltori Bresciani)*	Lombardia	General information about biology and utilisation of chestnut	www.infobrescia.it/asprocab
Association of protection of Marrons from Castione *(Associazione Tutela Marroni di Castione)*	Trento	Fair cultivation, techniques, general information	http://www.marronicastione.it/
National Association of "Towns of Chestnut" *(Associazione Nazionale Città del Castagno)*	Italy	Biological and technical aspects of production, commercialisation, producers (in construction), members of association	http://proxy.racine.ra.it/cittadelcastagno/index.html
Association for valorisation of chestnut (*Associazione per la Valorizzazione della Castagna)*	Italy	Recovering of chestnut cultivation fair	www.marrone.net/
Ministry of Agriculture an Forest Policies (*Ministero delle Politiche Agricole e Forestali, MiPAF*)	Italy	Certification of Products	http://www.politicheagricole.it/
National Institute of Agricultural Economics *(Istituto Nazionale di Economia Agraria, I.N.E.A.)*	Italy	Actual problems Leader II Program	http://www.inea.it/
Mountain Community Modena Est *(Comunità Montana Appennino Modena Est)*	Emilia-Romagna	Production of chestnuts and their role on Emilia Romagna, ecology and cultural aspects	http://www.regione.emilia-romagna.it
Projects for valorization of chestnut	Italy/ Europe	chestnut project of the Leader II program research, project examples	http://www.castanea.net/
Institute for Forest Pathology *(Istituto di Patologia degli Alberi Forestali, IPAF)*	Piemonte	Technical and ecological problems of reconstruction of chestnut forests for fruit production	www.ipla.org/

Case study 3: Environmental Education – Example of the social cooperative *Cooperativa Sociale "Terra di Mezzo"*

(k) NWFP&S definition, area of production, harvesting level, technical characteristics of production

Parco di Rubano

The co-operative is working on the field of environmental education[4] since year 2000. It started his work in a re-natured gravel pit owned by the town Rubano – "*Parco etnografico Bosco di Rubano"* (Etnographic Park of Rubano, further "*Parco di Rubano*", 10 km from Padova). The park consists of a lake (10 ha) and about 5.5 ha reforested area, mainly poplar, willow, oak and other typical broad-leafed species of the region. Furthermore the town constructed a visitor centre with laboratory, conference room, office, restaurant and bar as well as a little ethnographic museum and a wooden bread oven (see figures 10 and 11). Around that structures are defences with typical agrarian animals and garden areas.

Figure 10: Lake and re-naturated area of the "*Parco di Rubano"*

Figure 11: Ethnographic museum of the "*Parco di Rubano"*

[4] Environmental education in Italy distinguishes between environmental education, naturalistic education and agro-alimental education. They differ by the object of education but also by regulations. The object of the naturalistic education is nature; environmental education includes the role of men. Agro-alimental education is about agriculture and food production.

Casa Marina

Since 2004 the co-operative is managing a second centre of environmental education - *"Casa Marina"* in the heart of the regional park "*Colli Euganei*" (20 km southeast of Padova). The park covers an area of ca. 20 000 ha of hills of volcanic origin with a high proportion of forests. It has a high value for recreation in the densely populated area of the Po valley. The park owns several centres of environmental education and museums. It started with environmental education already in 1990 partly with own guides, partly the park gave the sector to other enterprises or associations, like the management of *"Casa Marina"* to the cooperative *"Terra di Mezzo"*. The structure *"Casa Marina"* consists of a laboratory for didactic courses, a hostel with 2 bedrooms for 24 persons with facilities for handicap people, a library about nature of the park and environmental education, kitchen, bar and a conference room (see figure 12). Near the centre are starting several hiking trails and one trail for handicap people which is suited for wheelchairs.

Figure 12: Centre of environmental education *"Casa Marina"*

In year 2005 the co-operative started new activities outside the centres - in an agricultural enterprise, at the lake *Fimon* (50 km from Padova) and in the pubic garden of Padova. Some didactic courses are realised directly in the classrooms.

Activities of the social co-operative *"Terra di Mezzo"*

1) Didactic courses are organised for kinder gardens, schools, group of handicap people and other. All together exist at the moment 16 courses of different topics (see figure 13). The groups are arriving by bus and stay one morning or the whole day. Room for lunch is provided by the co-operative. Half day visit costs 4.50 € (3 ours of activity), the whole day is 7.50 € (3+2 ours of activity) per child.

Figure 13: Course "The colours of the autumn" with collection of chestnuts near *"Casa Marina"*

2) Summer activity

"Parco di Rubano": During the summer holidays from middle June to middle September the parents can bring their child's to the park for the whole day or only half day. At "*Casa Marina*" one-week adventure camps are organised for children between 8 and 12 years. The child's spend the time in contact with the nature (see figure 14). During the camp 3 guides and one cooking man were employed for around 25 children.

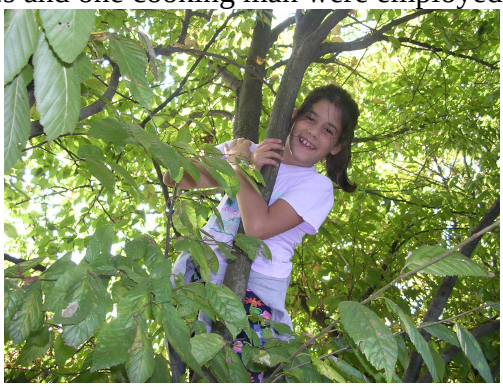


Figure 14: Adventure camp at *"Casa Marina"*

3) After school

After school is a new activity started in 2005. Child's are coming from school and spend the afternoon in the park. There is time for homework, playing and other activities (only at the park of Rubano).

4) *"Parco delle stelle"* – Park of the stars

In collaboration with the association of astronomers a series of evenings with presentation and star watching were initiated at *"Casa Marina"*. The entrance is free. This activity doesn't provide any income but promotion (see figure 15).

Figure 15: Astronomers at *"Casa Marina"*

5) *"Sentieri aperti"* – open trails for handicap people

Together with the region *Veneto*, the park *"Colli Euganei"* and the Commune of Galzignano the co-operative took part on a new project *"Sentieri aperti"* – open trails. The idea was to make it possible for everybody, also for handicap people, to enjoy nature. The financiering of that project came from the region. 8 electric cars were rented during the summer months at *"Casa Marina"* and given to everybody who was not able to walk inside the forest by its own – handicap but also old people. The service was for free for the people, the co-operative get financial contribution for organisational efforts (secretary, person who rent the cars). Some groups used the facilities of hostel and the possibility of guided tours.

6) Courses of further education
The co-operative is giving their experiences to other people which are working with children in the environmental sector. Courses for further education of teachers in the environmental sector are organised or for animators of summer activities.

7) Hostel at *"Casa Marina"*
The hostel is mainly used by groups. Often are coming scouts, naturalists and groups of handicap people. They use the structure to do their own activities but ask also for guided tours of the co-operative. During the summer it is used for the camps. It provides additional income to the environmental education, especially in the low (winter) season.

8) Conferences
The conference rooms of both centres can be rented from other people to do their own activity. Sometimes food is provided by the co-operative.

9) Collaboration with University of Padova
Good contacts exist to the faculty of agriculture (incl. forestry), natural sciences, biology and educational sciences. 7 students realised their training within the cooperative and four theses were elaborated. The outcome of this work is used to create new didactic courses.

10) Editorial work
The history of the park with land use changes over the time was illustrated in a little booklet. A book about environmental education is in preparation.

Table 20: Number of participants of didactic courses and summer activity (2004)

	"Casa Marina"	**"Parco di Rubano"**
Number of participants for didactic courses	5 000	10 000
Number of children for summer activity	50	70 (min. 45, max. 110) per day, 13 weeks

In respect to the facilities of *"Casa Marina"* 5000 participants on didactic courses is a very high number (see table 20). In contrast, between 16 000 and 18 000 people with up to 35 guides were visiting the guided tours of the whole regional park "Colli Euganei" (2000 – 2002, Trevisan, 2003).

(l) Description of the "product chain" organisation:
- number of companies involved and management characteristics (e.g.: family enterprises, joint enterprises, stock companies…,)
- the role and share of SMEs in the the product chain (quantity, % of the total harvesting and processing)
- trade activities (import and export flows and development patterns)
- the product is not possible to storage very link t the territory

The co-operative consists of 12 people, 2 of them are full time employed and 2 part time as well as 2 handicap people. Furthermore there are working 15 persons (seasonal workers, mainly students or housewife's) mainly as guides and 2 coordinators for environmental education and for the summer activity. The didactic courses are

elaborated by the co-operative itself as well as the activities during the summer. The co-operative teaches then the different courses to the guides. (In contrast the education of the guides of the regional park *"Colli Euganei"* was financed by the European Union.)

The status of the co-operative as a social co-operative means that they have to employ at least 30% of the fixed workers handicap people.
The main advantages of that status (apart of the benefits for the employed handicap) are:

- less taxes to pay
- direct contractual agreement with public authorities (no auction systems for getting public works).

Besides the cooperative and its workers other enterprises which profit from the activity are transport enterprises (for the buses), restaurants (own restaurant of *"Parco di Rubano"*, restaurants around *"Casa Marina"* , producers of typical products around *"Casa Marina"* (Vine, cheese, salami, honey etc.). Some products like honey are sold directly in the centres. The children are coming back with their parents to show the centres.

(m) Policy framework:

- policy institutions involved in the sector and regulations (esp. property rights regulations) that directly influence the NWFP&S production and harvesting
- policy instruments (incentives, taxation, information, …) available and their role in NWFP&S development
- role of research, education, and training extension services in NWFP&S development

In some regions of Italy, like the one of the case study – Veneto, guides of environmental education have to pass an examination to get a licence for this activity (L.R. n.33 del 4 November 2002).

Some municipalities give contributions to their schools for environmental education and some enterprises give contributions to their workers children for summer activity.

(n) Profit appropriation by the landowner/contractor/manufacturer/ dealer/seller

The cooperative is managing education for one agricultural enterprise. After the courses the children come back with the parents to buy cheese and other products.
Indirect income is provided due to the promotion of the landscape at "*Casa Marina*" for the park "*Colli Euganei*" for restaurants, producers of typical products, tourism.

(o) Contractual agreements between landowners and resource managers; networking and joint ventures among/between non-wood processing and service industries

The cooperative has a contract with all owners of the centres where it is working. With the town of *Rubano* the contract last 10 years. It is agreed that it has to be managed in interest of the people of the town without definition of the activity. No rent is paid to the town but all other expanses – electricity, water, gas, trash, maintenance etc. have to be paid by the cooperative. The management of the forest is laid to the cooperative.

In the case of *"Casa Marina"* exists a contract with the government of the regional park *"Colli Euganei"* for 7 years. Some restrictions are made regarding the activities for which the centre is used. A rent has to be paid to cover the expenses in contrast to *"Parco di Rubano"*, but all other costs are paid from the regional park. In addition the cooperative gets credits if it is providing some additional services for the regional park like distributing information for tourists or cutting the grass around the house. The cooperative is free to use the forests around the centre *"Casa Marina"* for their activities. These forests are mainly state owned and managed by the regional park *"Colli Euganei"*.

For the didactic courses at *"Casa Marina"* the communes inside the regional park *"Colli Euganei"* get a discount (15 communes with 10,000 children of kindergartens (age 3-6), elementary (age 6-10) and medial school (10-14) and other 6 000 of superiors (age 14-18)). The difference is paid by the park.

One municipality (outside the park) gives a contribution to families who send their children to the summer activity of the cooperative.

(p) Characteristics of technological or organisational innovation behaviour in non-wood production, processing and service industries

Environmental education with schools is usually a seasonal work, concentrated mainly in spring and partly in autumn – April, Mai and middle September, October until beginning of November. Last year a new course about chestnut was created. Thanks to that course the cooperative was able to prolong the season until the beginning of December at casa marina with a high number of participants.
Other activities, like the summer camps and after school activities cover the periods when the schools are closed.
In 2005/ 2006 the cooperative will introduce different prices for different seasons to increase the activities in the low season.
In the "*Parco di Rubano*" courses about energy (incl. photosynthesis) are offered only in the low season. These courses can be arranged in the park or directly inside the classroom.

To ensure the high quality of their work after every didactic course a questionnaire is distributed to the teachers regarding contents of the course, how guides are able to transfer the topic and how the children are involved.

(q) "Territorial" marketing (i.e.: the integration of the NWFP&S to other services and products offered by the local community)

Large efforts are made for promotion of the activities. Flyers about the didactic courses are sent to every school of the region Veneto every year (1300 letters). In the case of *"Casa Marina"* the presentation of the cooperative takes place together with the regional park at fairs and markets. The regional park supports the cooperative paying the print of the flyer on one hand, on the other hand the flyer of the cooperative are distributed together with the flyers for environmental education of the regional park. The prices of the courses of environmental education in *"Casa Marina"* and the regional park "*Colli Euganei"* are different. Since many additional costs, like secretary and telephone expenses are paid from the regional park, they can offer lower prices for

their services. But until now this competition didn't had any negative influence on the work of the cooperative. *"Casa Marina"* is completely booked for spring 2005.

The cooperative is trying to get direct contacts to responsible people of institutions and associations of the region. For example when they start to work in the regional park they went to all majors of the municipalities inside the park to ask about their needs or expectations for environmental education.

Thanks to the gestation of two centres for environmental education and some outside activities the cooperative starts to create an own network. Furthermore restaurant and bar at the "*Parco di Rubano*" used to distribute information. Since *"Casa Marina"* is operating as a visiting center to give information about the Park of *"Colli Euganei"* people get to know all the other activities of the cooperative. The cooperative is present at fairs and markets for nature and education also outside Veneto.

(r) Lessons learns/driving forces/factors affecting competitiveness (SWOT analysis)
The parks - very different in size, landscape and vegetation - are representing green dots of nature in a very high densely populated urban area. That means a high number of potential clients and also a high demand of services on environmental education.
Thanks to the good connections to the highway, schools are coming also from other parts of north Italy.

(s) Open questions (barriers to entrepreneurship) and related research needs

(t) Recommendations, proposals for documentation.

Literature

Bellini, E. 2003: Coltura e cultura del castagno. Associazione Nazionale Città del Castagno.

http://proxy.racine.ra.it/cittadelcastagno/index.html

Consiglio regionale del Piemonte, 1993: Norme per l'utilizzo e la fruizione del Parco naturale dei Lagoni di Mercurago. Legge regionale, n. 25. 7 giugno 1993. http://arianna.consiglioregionale.piemonte.it/base/rifpass/r1993025.html

FAO, 1995: Edible nuts. Non-woof forest products for rural income and sustainable forestry. N.5, UN Food and Agriculture Organisation, Rome.

FAO, 2001: Non-wood forest products from broadleaf forests. FAO NWFP Series, Rome.

FAO, 2004: FAOSTAT Agricultural Data – Production – Crops Primary. http://apps.fao.org/

Galie, E. 2003: E' tempo di castagne e marroni. Gli abbinamenti ideali. Il Quotidiano, martedì 28 ottobre 2003, http://www.ilquotidiano.it/.

INEA, 2003: http://www.inea.it/reteleader/galfrignano/conscastagna.html

ISTAT, 2001: 5° Censimento generale dell'Agricoltura.

http://www.census.istat.it/index_agricoltura.htm

ISTAT, 2002: Coltivazione agricole, foreste e caccia anno 1999. Roma.

ISTAT 2003: Bolletino mensile di statistica. Luglio 2003. Roma.

Parco regionale dei Colli Euganei, 2001. Il castagno da frutto nei Colli Euganei. Este. 16 p.

Trevisan, 2003: Colli Euganei da scoprire? Voila le visite guidate. Parco regionale dei Colli Euganei. Parco informa 02/2003. p.15-16.

Percivale, F., Peira, G., Varese, E. 200?. Sviluppi della coltivazione del Marrone della Valle di Susa ed iniziative per la sua valorizzazione. Agricoltura 38, p. 29-34.

Pettenella, D., 2001. Marketing Perspectives and Instruments for Chestnut Products and Services. In: U. Heiniger, Castanea sativa: pathology, genetic resources, ecology and silviculture. Forest Snow and Landscape Research, 76 (3).

5. Forests and ownership

5.1. State of the art and historical development

Italian forests are mainly concentrated in mountain areas, as showed in Figure 11. Accordingly with CORINE Land Cover statistical data, the total forested area in Italy is about 9.7 million ha), which include forests and other forest vegetation categories such as bushed areas, moors, grasses and abandoned lands under a process of natural colonisation by trees, etc. Of the total area, about 8.4 million ha are in mountainous and hilly areas and only 1.3 million in plain. Accordingly with other statistical data (MIPAF, FAO), the forests in Italy cover about 10.8 million ha.

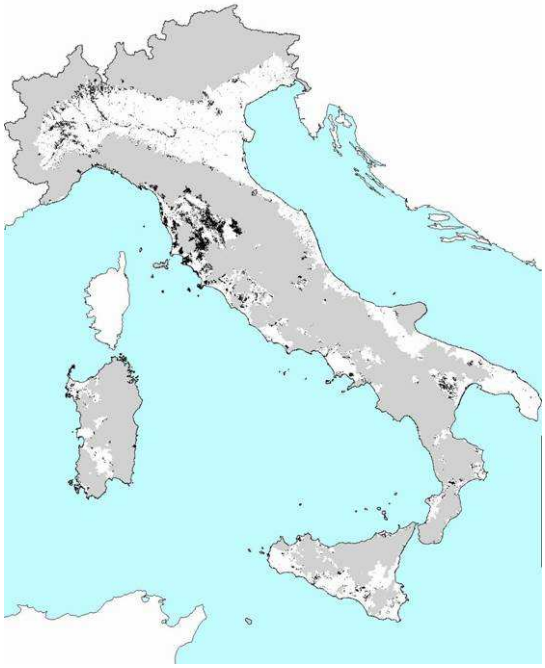
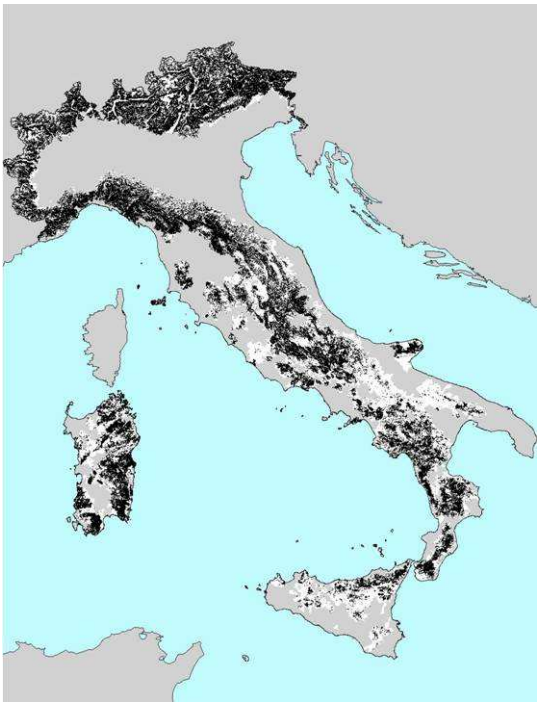


Figure 11. Italian forests in mountainous and hilly areas



Note: mountain and hilly areas are presented with grey colour

Figure 12. Italian forests in plain territories

In the last five decades a remarkable expansion of forest cover has be recorded in mountainous and hilly territories: making reference to the data of the Italy's Institute of Statistics, the forest area with dense tree cover is increased from 5.1 million ha in the late '40s to 6.3 in 2002 (+1.2 million ha); about 2-3 million ha are now under a process of natural conversion to forests. This is mainly due to the process of emigration of rural population from the marginal mountain areas to cities, with the associated abandonment of meadows, pastures and cultivated lands and their progressive colonisation by shrubs and trees.

In the same period in the plains areas the expansion of the forests has been of less than 50,000 ha. The current forest cover rate in plain lands is 2.1%; it has grown only of 0.1% with respect to 1970 and 0.3% with respect to 1950. In this case, the main limiting factors have been the demand for intensive farming in the highly productive flat areas and the demand for land due to the process of infrastructure development. In the last

50 years the tree canopy cover (forest areas and hedges) in plains, destroyed in the past by the development of the agriculture sector, has been only partially recovered.

5.2. Forest resources

As already mentioned, two main sources of information on the forest cover structure and distribution are available in Italy:

- the National Forest Inventory carried out in 1985-86 that adopted a broad definition of forest land including land covered by shrubs and scattered trees (total forest land extension is 8.6 million ha);
- the National Institute of Statistics publishing annual data on forest land extension (the most recent data is of 6.7 million ha) including only the forestland within non-abandoned public and private farms.

Making reference to more detailed source of information (the National Forest Inventory) forests in Italy extend over 8,675,100 ha, corresponding to 29% of the total land area. High forests make about 25% of this surface, coppices more than 40%. The remaining 35% are both **"specialised production forests**" (i.e., plantations for timber or wood paste production, tree farming, or non timber products woods: cork, chestnuts, etc.) and **"other forests"** such as scrubs, maquis, rocky or riparian woods, all rarely managed (Table 20). Most of the species present are native or spontaneous; the few exotic ones are generally used for industrial forestry ("special forest crops" category).

In high forests, conifers are dominant, both for extension (56.3%) and timber volume (63.1%). The most important species is Norway Spruce (*Picea abies* Karst); also mountain Pines (*Pinus sylvestris* L., *Pinus nigra* Arnold, *P. laricio* Poiret) and European larch (*Larix decidua* Mill.) are well widespread. Most coniferous forests are located in the Alps (montane and subalpine Spruce, Fir, Larch forests), but some important ones can be found also in the Southern Apennines (*Pinus laricio* Poiret). Broadleaved high forests are mostly beech woods (*Fagus sylvatica* L.), but also oak woods (especially *Quercus cerris* L.).

Table 20. Forestland categories and their extension

Category	Area (1000 ha)	%	Type	Area (1000 ha)	%
High forests	2,178.9	25.1	even-aged	1176.3	54.0
			uneven-aged	554.4	25.4
			irregular	377.1	17.3
			transitory (in conversion)	71.1	3.3
Coppice forests	3,673.8	42.3	simple	2751.3	74.9
			with standards	922.5	25.1
Specialised production	288.9	3.3	timber	134.1	46.4
Forests			non-timber products	154.8	53.6
Other forests			rocky	575.1	26.6
	2,160.9	24.9	riparian	110.7	5.1
			shrubs	1475.1	68.3
Non-wooded inclusions	372.6	4.3			
Total	8,675.1	100			

Source: ISAFA, 1985.

The national wood volume of high forests is about 405 millions of m^3 (about 211 m^3 ha^{-1}), with a total annual increment of 15,127.900 m^3 (on average 7.9 m^3 ha^{-1} yr^{-1}). Including only the trees with d.b.h. >17.5 cm, the total growing stock lowers to 341 millions of m^3 and the current annual increment is 5.1 m^3. Among spontaneous species, Spruce and Beech have the greater averaged increments (9.4 m^3 ha^{-1} yr^{-1} and 8.5 m^3 ha^{-1} yr^{-1} respectively).

Currently, the annual yield in high forests rarely exceeds 50% of the annual growth and harvesting, on average, is 35% of the current increment. This led to a general increase of the growing stocks in the last decades.

In the part of Italy (mainly in northern regions) where forestry practices have a high standard the silvicultural systems in use nowadays are based on the principles of a sustainable, "near-to-nature" forestry. Forest operations are carefully controlled and restricted, aiming both to timber production and to forest natural regeneration. Clear cutting is forbidden by law in about 95% of the high-forests, which are subjected to restricted use, in order to enforce soil and water conservation.

Currently the most common silvicultural systems applied in alpine high forests (especially in coniferous forests) are **selection system** and **shelterwood system** (mainly group, stripe or edge systems). This kind of treatments has determined the shifting of many even-aged forests (developed from past clear cutting or afforestation) to uneven-aged or irregular forests. In Beech high forests the most common practice is the **uniform system**. The opening of gaps or stripes by clear cutting is allowed only in stands composed by light-demanding species (larch and pines), in order to meet the ecological requirements of these species and guarantee the stand natural regeneration.

Coppice is largely widespread, especially with private owners. The most common system is clear cut, but for many species the law prescribes to leave some standards to favour seed production and sprouts regeneration in old stumps. The selection system is applied in many beech coppices, a lot of which are of public property (often mountain municipalities). Coppice with standards is a practice used sometimes only in some areas of central Italy for pure or mixed oak stands.

Although still common in Italy, coppice is currently considered an outdated silvicultural system. The reasons are that its products are largely surrogated by other manufactured items and especially it doesn't guarantee, as well as high forests, the multiple functions that public opinion expect from forests (soil-erosion control, landscape amenity and recreation).

More and more old coppiced stands in Italy are subjected to conversion operations leading to high forest. Generally conversion begins with thinnings in coppices that are by large older than their usual rotation age. When stems are relatively old, soil has improved and seed production is abundant the shelterwood system can then be adopted.

Another important aim of Italian forestry is to foster natural diversity and evolution in forests; therefore mixed forests are promoted and the spontaneous recolonisation of broad-leaved species in coniferous plantations is today strongly encouraged.

5.3. Forest ownership

The distribution of forest types by categories of ownership and management regime is presented in Table 21.

Table 21. Italian forests by categories of ownership and management regime (1000 ha)

	State and Regions	Communes	Other public	Private	Total
High forest	198	1019	193	1379	2789
• coniferous	111	636	103	588	1438
• broad-leaved	87	383	90	791	1351
(of which poplar)	4	4	5	105	118
Coppice	148	600	167	1932	2847
Coppice with standards	30	157	32	548	767
Total	376	1776	392	3859	6403

In the following box more recent data on forest ownership structure are presented (data refer to the land with an active managers and not to the entire Italian forest land).

Data on Italian forest enterprises (Agricultural Census 2000):

- No. of enterprises with semi-natural forests = 605,222
- No. of enterprises with plantations = 54,672
- Total = 659,894 enterprises with some forest land
- Semi-natural forests within active farms = 4,548,158 ha
- Land use for plantations in active farms = 162,652 ha
- Total forest land = 4,710,810 ha
- No. enterpriese with >100 ha of forestland (semi-natural forests) = 6,648
- No. enterpriese with >100 ha of plantations = 1,103
- Total no. of forest enterprises with >100 ha = 7,751 (= 25.4% of the total number of enterprises in Italy = 2,593,090)

5.4. Main problems and research questions in forest resources and ownership for enterprise development in the forest sector

Research questions related to factors affecting enterprise's competitiveness are the following ones:

- landownership structure and management responsibilities: size of forest holdings, social structure of the forest owner, management objectives (profit v. other objectives);
- benefit appropriation and obstacles to internalisation (e.g. legal frame, public opposition);
- marketing aspects: horizontal integration "product chain" networking, contractual agreements between landowners and resource managers, "territorial" marketing (forest as part of services and products offered by a local community);
- role of external assistance (consultants, contractors, venture capital,…).

Lithuania

Mizaras, S. - Mizaraite, D. Lebedys, A. - Pivoriunas, A. - Belova, O.

Stasys MIZARAS, dr., Lithuanian Forest Research Institute
Liepu 1, Girionys, LT-53101, Kaunas district, Lithuania, phone: 370-37-547221,
fax: 370-37-547446, e-mail: ekonsk@mi.lt

Diana MIZARAITE, dr., Lithuanian Forest Research Institute
Liepu 1, Girionys, LT-53101, Kaunas district, Lithuania, phone: 370-37-547221,
fax: 370-37-547446, e-mail: ekonsk@mi.lt

Arvydas LEBEDYS, Lithuanian Forest Research Institute
Liepu 1, Girionys, LT-53101, Kaunas district, Lithuania, phone: 370-37-547221,
fax: 370-37-547446, e-mail: arvis@takas.lt

Aidas PIVORIUNAS, Ph D st., Lithuanian Forest Research Institute
Liepu 1, Girionys, LT-53101, Kaunas district, Lithuania, phone: 370-37-547221,
fax: 370-37-547446, e-mail: aidas@forestry.lt

Olgirda BELOVA, dr., Lithuanian Forest Research Institute
Liepu 1, Girionys, 53101, Kaunas district, Lithuania, phone: 8-37-547221,
fax: 8-37-547446, e-mail Baltic.Forestry@mi.lt

Summary

In Lithuania forests occupy about 2 million hectares, it consists 31.3% of total land area. 32.2% of forests are privately owned. Annual removal is 6.5 million m³. The main production of the Lithuanian woodworking industry is sawn wood, furniture. Lithuanian forests are not only the source of wood products but also non- wood forest products such as berries, mushrooms, game etc. Forests are owned by 222.2 thousands private forest owners and 42 state forest enterprises. Forest industry consists 873 companies; most of there are SME's.

The main factors effecting the competitiveness of forest-wood /non-wood/services-consumer chain from the point of view of entrepreneurship in Lithuania: rich wood and non-wood products resources; low level of round wood prices;, favourable geographical location; low cost of labour; the possibilities to get financial support from EU funds.

Barriers to entrepreneurship: low level of domestic market development for wood and non-wood products (especially for small-sized round wood); the small-scale private forestry; high transaction cost for entrepreneurship; low capital resources (GDP per capita is low; biggest part of consumption expenditures fall to food and housing); low level of investments and innovations; very weak integration of forest sector to rural development programmes; low knowledge of business establishment and management; weak connections between research and business.

The main problems and research questions for enterprise development in the forest sector: domestic market development strategies; urban consumers demand for forest products and services, integration of forestry into rural development; clasterisation of

wood working industry; social structure of small-scale private forest owners;~~,~~ conflicts resolutions of multipurpose forest utilisation.
Possible policy implifications:

- The state support for private forest owners association and co-operation.
- Forest sector integration to rural development programmes.
- Creation of political and legal conditions for development of private forestry.
- Encouragement of small-sized and law quality wood use.
- Development of domestic wood market.
- Promotion establishing and development of SME's producing non-wood products and services in rural areas.
- Encouragement of SME's co-operation.

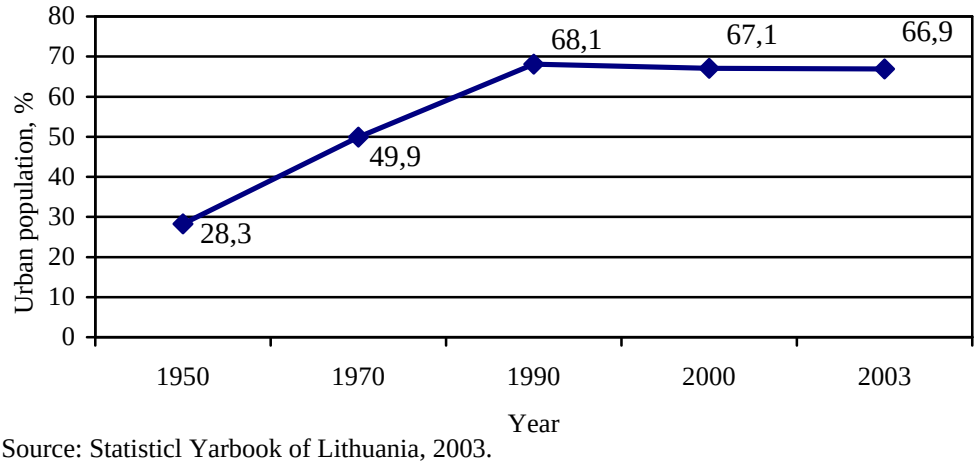
1. Consumption

1.1. State of the art and historical development

In Lithuania the role of forests vary depending on economic and social development of society. In days of old the hunting was very important activity for humans being. Forest was a shelter and source of game meat and plats. Later on wood as a resource started to be used very widely by the industry. The consuming of wood is increasing in Lithuania. Forest is a source of non-wood products. The most important non-wood products are mushrooms, wild berries, medicinal herbs and hunting products. Moreover the importance of forest services such as recreation, nature conservation, carbon sequestration, biodiversity conservation, erosion control etc. is also increased.

1.2. Forest products' and services consumption

Lithuania has a population of 3,610,500, of which 66.9% live in urban areas and 33.1% in rural areas (2003) (Figure 1). During last decade the number of population is decreased.



Source: Statisticl Yarbook of Lithuania, 2003.

Figure 1. Trends of urban population in Lithuania (1950–2003)

Small towns prevail in Lithuania (1–25 thousand inhabitants). GDP per inhabitant is 4229 euro (2002). The major part (more then 40%) of household consumption expenditure fall to food (Table 1).

Table 1. Household consumption expenditure per capita in 2002

Consumption expenditure	**%**
Food and non-alcoholic beverages	40.7
Alcoholic beverages and tobacco	3.7
Clothing and footwear	6.5
Housing, water, electricity, gas and other fuel	14.0
Furnishings, household equipment and routine maintenance of the house	4.9
Health care	4.8
Transport	6.9
Communication	5.2
Recreation and culture	4.3
Education	0.6
Hotels, restaurants, cafes, canteens	4.6
Miscellaneous goods and services	3.8

Source: Statistical Yearbook of Lithuania, 2003.

Supporting factor of enterprise development is the fast uptrend (4-7% annually) of GDP in Lithuania. Limiting factors are: the low population income level, the structure of expenditures (the biggest part of income is used for food and housing), which directly influence the level of investments (low investments level).

1.3. Market demand for forest related products and services by urban population

The wood products consumption is increasing in Lithuania (Table 2).

Table 2. Appeared consumption for main wood product categories, 1998-2002.

	1998	**2002**
Round wood (1,000 m³)	4,176	4,967
Sawn softwood (1,000 m³)	588	593
Sawn hardwood (1,000 m³)	103	46
Particle board (1,000 m³)	108	178
Plywood (1,000 m³)	26	29
Fibreboard (1,000 m³)	35	55
Chemical wood pulp (1,000 million t.)	3	2
Paper and paper board (1,000 million t.)	89	132
Graphic paper (1,000 million t.)	37	40
Sanitary and household paper (1,000 million t.)	11	9
Packaging materials (1,000 million t.)	41	76
Other paper and paper board (1,000 million t.)	0	7

Source: Statistical Yearbook of Lithuania, 2003.

In 1994 the annual removal was 4,161,000 cubic meters, while in 2003 – 6,460,000 cubic meters. The import of round wood is low in Lithuania: 1995 – 15,000 cubic meters, 2003 –77,000 cubic meters. The part of round wood is exported due to the insufficient demand in domestic market. In 2003 the export of round wood was 1,363 thousand cubic meters this is 21.0% of total round wood production.

In 2003 the production of sawn wood was 2,000,000 cubic meters, which 1,009,000 cubic meters has been exported. The import of sawn wood reached 359,800 cubic meters. 79% of round wood and 50% of sawn wood have been used for domestic needs

in 2003. The annual consumption of non-wood products is depended on fruits and mushrooms yield. The major part of forest fruits and mushrooms is exported.

Over the last decades market supply of mushrooms increased because the market in Europe was developed: 1965-1971—210 tones/year, 1996-2003—2031 tones/year. Market supply of the wild berries changed slightly: 1963-1971—1297 tones/year, 1996-2003—1702 tones/year. Market supply of medicinal herbs decreased, because the import of medicinal herbs was more efficient: 1965-1971—337 tones/year, 1996-2003— 47tones/year (Ministry 2004).

The main consumption based supporting factor for enterprise development in the forest sector is increasing wood and non-wood products and services consumption. The main limiting factor is the large part export of low processed wood and non-wood products (mushrooms, fruits).

1.4. Main problems and research questions in consumption for enterprise development

The main problems are: inadequate development of small-sized and low quality wood domestic market; low concentration of sawmills; small-sized holdings of private forest owners; the lack of information about forest utilization for non-wood products production.

Research questions: distribution consumption of wood and non-wood products;~~,~~ services between urban and rural consumers;~~,~~ domestic and foreign consumers wood and non-wood products demand analysis;~~,~~ estimation of household consumption non-wood forest resources.

Annex A: Organisations studying forest products' consumption and main publications and information sources.

Organisations studying forest products consumption and their speciality:

- The Ministry of Environment – round wood, non-wood products.
- Association "Lietuvos mediena"(Lithuanian wood) – timber products.
- Statistics Lithuania–all forest products.

Main publications and information services on forest products consumption:

- Statistics Lithuania – various publications in Lithuanian and English, (http://www.std.lt)
- "Statistical Yearbook of forestry" published annually by the State forest survey service, in Lithuanian and English, (http://www.lvmi.lt/vmt)
- "Timber economy"– monthly newsletter, published by association "Lietuvos mediena", in Lithuanian, (http://www.lietuvosmediena.lt)
- "VMT naujienos" quarterly newsletter, published by the State forest survey service, in Lithuanian, (http://www.lvmi.lt/vmt)
- "Lithuanian Timber Market Statement"– annual report for UNECE Timber Committee sessions, prepared by the State forest survey service, in English, (http://www.unece.org/trade/timber).

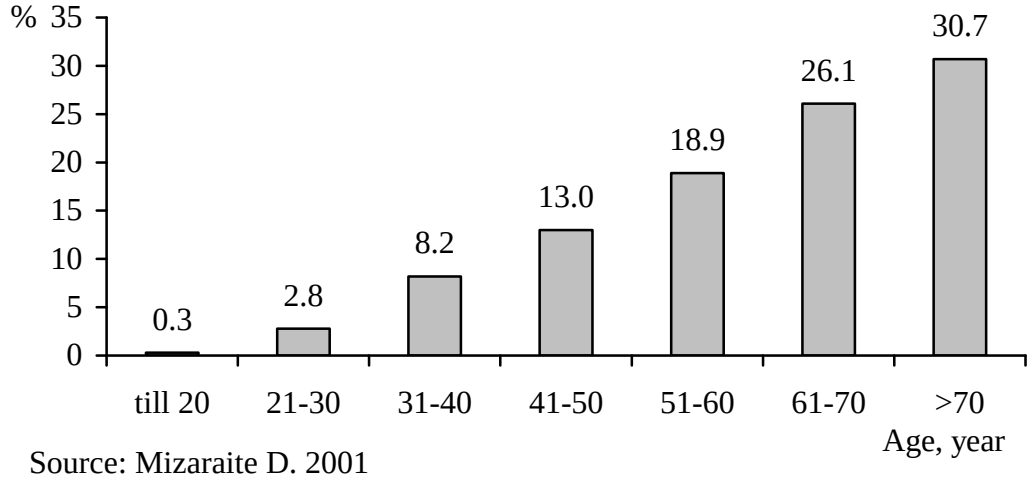
2. Small-scale forestry practises

2.1. State of the art and historical development

In Lithuanian the private forest ownership dominated till Land Reform, which has been implemented in 1920. Private forest owners owned about 65% of total forest area. 600,2 thousand hectares private forests have been transferred to the state forests during 1919-1937. Since 1938 private forests constituted only 173 thousand hectares (about 16% of total forest land area). In 1940 private forests have been nationalised by Soviet Governance. Since 1950 the private forest ownership has been avoided in Lithuania. After the restoration of independence forest property rights have been restored. The structure of forest ownership has changed due to an ongoing Land Reform process. According to the Forest Act of the Lithuanian Republic, forests are divided into state and private. Share of forest sector (forestry, wood working, pulp, paper and furniture industry) in national GDP is 3.6%. The private forest sector constitutes 222.2 thousand private forest owners and 665.7 thousand hectares of private forests (01-07-2004). This is 32.2% of total forest area, a figure that is projected to increase to 40–47% in the future. The reform of forestland is implemented more than 10 years and still it is ongoing process, (Ministry 2003). The restitution process is planed to finalise in two or three years.

2.2. Small-scale forest holding

Average size of private forest holding is 4.6 hectares. Holdings with the area up to 3 ha accounted 58% of the total number of private forest holdings in Lithuania. About 55% of private forest owners live in rural areas. The majority (over 82%) of private forest owners reside in the county where their forests holdings are located. The main problems in ownership are: the private forest holdings are too small for efficient forest management, strict state regulation, the absence of a compensation system for covering the losses accrued by forest owners due to restrictions on forest use in order to promote environment protection and conservation, limited domestic wood market, especially on small-sized timber. 30.7% of forest owners are more than 70 years old (Figure 2).



Source: Mizaraite D. 2001

Figure 2. Private forest owners by age (01-01-2001)

Half of private forest owners are females (52.2%). According the survey results the occupational status of private forest owners is following: wage earners – 44.5%, retired persons – 28.0%, farmers – 11.3%, unemployed persons – 5.4%, entrepreneurs – 4.3%, other occupation – 6.5% (Lietuvos miškų 2004).

Wood volume removed by private forest owners from forest estate is small-sized. Mostly it is up to 100 cubic meters. The big part of small-sized private forest owner's holdings are not managed. However, the share of wood harvesting from small-scale forestry is 42% (Table 5).

Table 5. Wood harvesting from small-scale forestry

	Year										
	1993	**1994**	**1995**	**1996**	**1997**	**1998**	**1999**	**2000**	**2001**	**2002**	**2003**
Mill.m³	0.07	0.17	0.70	0.77	0.90	0.79	1.02	1.41	1.76	2.40	2.70
%	1.5	40.0	11.7	14.0	17.3	16.1	20.8	26.4	32.6	38.0	42.0

Mostly forestry-related operations (felling, reforestation, thinning) are carried out by contractors or private forests owners together with families' members. Non-wood products, tourism, recreation and hunting is also important part of small-scale forestry.

2.3. Small-scale forestry practices

Forest owner's objectives have been surveyed in 2001 and 2004 (Mizaraitė 2001, Lietuvos miškų 2004). According the surveys results the most important objectives for forest ownership are: to provide themselves with timber (firewood and rounwood) for private forest owners own purposes; income generation from wood and non-wood products sales. The objectives of nature protection and non-wood products (mushrooms, wild berries) use for home consumption have also big priority.

The most important activities of private forest owners are: cuttings (2.7 million m³ in 2003), reforestation (964 hectares in 2001), mushrooms and wild berries harvesting, hunting. Share of home consumption in small-scale forestry production is about 30% (fuel wood, construction wood).

The Forest owners association of Lithuania (FOAL) is the organisation that represents and unites private forest owners. FOAL was established in 1993 and has 39 local units, which united more than 3000 active members. The main services that FOAL provides its members are information and advice on private forestry, education of private forest owners in forest management, and representation of private forest owners.

20 forest owners' co-operatives have been established during ten years. Co-operatives have very broad-scale operations such as consultancies and training of private forest owners, timber trade, preparation of forest management plans, forest cuttings, reforestation, improvement of recreational areas etc.

Estimated average income per hectare per years is about 200 Lt. Forest land taxes are not applied in Lithuania. Forest owner's income is taxed by 15%. Owner's investment in small-scale forestry is very low. More than 30% of agriculture landowners have a forestland. The most important form of timber procurement is timber sold on stump to

the harvesting companies. Prevail "spot" market, characterised by direct market transactions between the timber supplier and the timber demander.

2.4. Policy framework and production conditions

The Department of Forests at the Ministry of Environment is responsible for forest policy and legislation concerning the Lithuanian forestry sector. The forestry administration also includes the State Environmental Protection Inspectorate, the General Forest Enterprise and the State Service of Protected Areas. All these institutions, like the Department of Forests, come under the auspices of the Ministry of Environment.

The State Environmental Protection Inspectorate is the main institution responsible for monitoring the implementation of the Forests Act. This institution has eight regional departments. It administrates the licenses for forest felling by private forests owners and state forests managers and has an advisory role, guiding private forest owners on forest use, reforestation and protection. Main laws and regulations that direct influence small-scale forestry production:

Rule/regulation	Provisions
Property rights:	
Law on Land	This Law shall establish the relations of ownership, management and use of land in the Republic of Lithuania. This Law is obligatory for all land owners, managers and users.
Law on Land Reform	This Law shall regulate the order of Land Reform and procedure of land privatisation.
Law on the Restoration of the Rights of Ownership to the Existing Real Property	This Law shall regulate the procedure and conditions of the restoration as well as the recognition of continuity of the restoration of the rights of ownership to the citizens of the Republic of Lithuania to the real property.
Forest management:	
Forestry Law	The purpose of the Forest Law is to regulate reforestation, protection and usage and to form the legal preconditions for the management of all ownership type forests. The Law is obligatory for all forest owners, managers and users.
Law on Protected Areas	The Law shall regulate social relations related to system and management protected areas. The Law is obligatory for all forest owners, managers and users.
Regulations on Management and Use of Private Forests	The regulation is obligatory for all forest owners, managers and users.
Special Conditions of Land and Forest Use	The regulation is obligatory for all forest owners, managers and users.
Regulation on Forest Use and Protection in Nature Protected Areas	The regulation is obligatory for all forest owners, managers and users.
Regulation of Sanitary Forest Protection	The regulation is obligatory for forest managers, owners, users and visitors.

Rules of the Fire Prevention Service	The rules are obligatory for all forest owners, managers, users and contractors dealing with forest harvesting.
Regulations of Reforestation	The regulation is obligatory for forest managers and advisable for forest owners.
Rules of Thinning and Sanitary Felling	The rules are obligatory for state forest managers and users.
Regulations for Final Forest Felling	The regulations are obligatory for all forest owners, managers and users.
Non-wood activities on forests:	
Hunting Regulations	The regulation is obligatory for hunting area owners, users and managers.
Rules of Visitation of Forests	The regulation is obligatory for forest owners, users, managers and forest visitors.
Rules of picking-up of Mushrooms in the Forests	The regulation is obligatory for users of non-wood products.

Main policy incentives available to small-scale forestry that directly influence management behaviour: the support for forest sanitary (against insects and diseases) protection, forest fire protection as well as afforestation of abandoned agricultural land. The support from EU funds will be committed for improvement of private forests infrastructure, investments to wood processing and marketing of wood products as well as afforestation of agriculture land. Main regional policy/rural development institutions that directly influence small-scale forestry production is the Department of Forests at the Ministry of Environment (Figure 3).

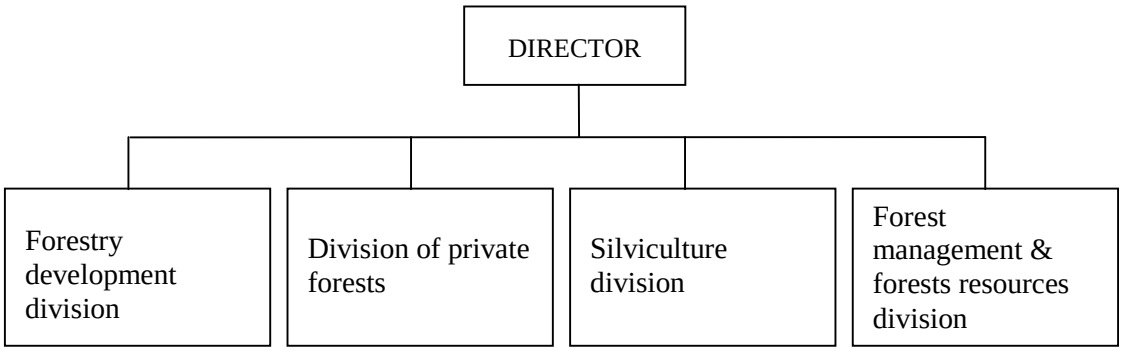


Figure 3. The organisational structure of the Department of Forests.

The most important forest research institutions are Lithuanian Forest Research Institute and Faculty of Forestry of Lithuanian University of Agriculture. Lithuanian University of Agriculture (Faculty of Forestry), Kaunas College of Forestry and Environment Engineering are institutions of higher education of forestry. Undergraduate and post-graduate studies in forestry and applied ecology are dominating in Forest Faculty.

Private Forest Extension Centre was established in 2000. The founders are Forest Owners Association of Lithuania, Chamber of Agriculture of Republic of Lithuania and Danish Forestry Extension. The overall objective of the PFEC is to promote, support and strengthen the sustainable development of the private forest sector in Lithuania by providing advisory, training and commercial services to forest owners.

The Lithuanian Agricultural Advisory Service provides advisors on farm economy, animal husbandry, plant production, buildings and machinery and countryside tourism. The Chamber of Agriculture of Republic of Lithuania provides the consultation dealing with rural development, co-operation, agriculture activity etc. According to the legislation the staff of Regional Environmental Protection Departments should constantly advise private forests owners on forest legislation.

2.5. Conclusions: Supporting and limiting factors for enterprise development in small-scale forestry and barriers to entrepreneurship

The activity of following types of companies is legal in Lithuania:
1. Personal companies. 2. Trust partnership. 3. Commandite partnership. 4. Join-stock companies. 5. State enterprises. 6. Municipal enterprises. 7. Agriculture companies. 8. Co-operatives.

Mostly forest business is developed by personal companies, join-stock companies and co-operatives. Also this activity can be carried out by farmers without registration any type of company. Farmer is natural person, who producing agriculture and forest products. The farm should be registered on a Farmers' Farms Register. Supporting factors for enterprise development in small-scale forestry:

- The number of agriculture sector workers is decreasing in Lithuania. The forestry is one of the alternative activities in rural areas, which enhancing establishments of new workplaces.
- Favourable geographical location of country for foreign forest products trade development.
- Large volume of wood resources. 2.7 million cubic meters (42% of total annual removal) have been cut in private forest during 2003.
- Increasing the demand for countryside tourism, non-wood products (mushrooms and fruits) and hunting.
- No tax for forestland.
- EU granting for forestry and rural development.
- Human resources – 222,000 private forest owners.

According data of the case study in Lithuania the most important barriers for business development of small-sized companies are frequent changes of legal acts (44% of respondents); high taxes (22% of respondents); high bureaucracy. The lack of investment capital and current asset, the difficulty of obtaining credits are also impeding the development of forestry enterprises (Dubauskas 2004).

Limiting factors and barriers for entrepreneurship in small-scale forestry:

- Small-sized private forest holdings and insufficient association and co-operation of forest owners. The two private forest owners associations have been established in Lithuania. These institutions unite only about 2% all private forest owners.
- Public agencies with a lack of interest to deal with small-scale private forestry.
- Low level of forest sector integration into national rural development programmes.
- Strict regulation of forest use in protected areas and the absence of a compensation system for covering the losses accrued by forest owners due to restrictions on forest use in order to promote environment protection and conservation.

- Restrictions for constructional activity in protected areas.
- Limited investment's power of private forest owners.
- Lack of business training and extension system for private forest owners.
- Small share of private forestry in GDP.
- Private forest owners for household needs use significant part forest resources.
- Absence of research regarding to entrepreneurship of small-scale forestry.
- The old age of private forest owners.
- Big part of forest owners reside in cities.
- Private forest owners have not hunting management rights in own forests.
- Fast development of tourism as well as countryside tourism is suspended by criminality.
- Unfavourable credit market, high interest rate of loans.
- Lack of information and advising about forestry business development, which enhance to increase the employment in rural areas and income level of rural population.
- Low level of education and enterprising competence of rural population.
- Due to the costliness miserable possibilities to get an advise of extension services about business development, partnership in business, funding and legal consultations.

Possible policy implifications:

- The state support for private forest owners association and co-operation.
- Forest sector integration to rural development programmes.
- Creation of political and legal conditions for development of private forestry.

Annex B: Organisations studying small-scale forestry and main publications and information sources.

- The State Forest Survey Service presents annually the statistic data about private forestry in publication "Lithuanian Statistical Yearbook of forestry". The publication consists data about private forest area, number of private forest owners and holdings. Also these information are available on the website http://www.lvmi.lt/vmt.
- The activity of private forest owners is analysed by the Ministry of Environment. Results of analysis periodically are published on informational publications (Private forests in Lithuania, Ministry of Environment of the Republic of Lithuania, 2003).
- The annual reports about activity of the State Environmental Protection Inspectorate is presented on a website http://vaai.am.lt. This report consists a chapter "State forest control". Information about illegal fellings and other results of control in private forests, individual forest management plans, reforestation of clear cutting areas in private forests is presented in this chapter.
- The regulations and circumstances of individual forest management plans preparation is presented on a chapter "Private forests" of Lithuanian Forest Management and Inventory Institute website http://www.lvmi.lt.
- Information about Forest Owners Association of Lithuania (FOAL), the Private Forest Extension Center (PFEC), private forest owners co-operatives and regulations, other legal acts dealing with private forests management, data about wood markets is presented on a website of FOAL http://www.forest.lt.

- On a website http://gmu.lt of the General Forest Enterprise the data about private forests, which are located in the territories under auspices of state forest enterprises and national parks, training, education of private forest owners, forest-related services for private forests owners.
- The informational bulletin "State Forest Survey Service News" is quarterly published by the State Forest Survey Service. The informational bulletin consists information about forest removals, timber trade in state forests as well as private forests. The bulletin is available on a website http://www.lvmi.lt/vmt.

3. Wood-processing industries

3.1. State of the art and historical development

During the period of the centrally p1anned economy (1945-1990), the wood industry was developed with additional supplies of raw material from Russia. It was built in the form of wood p1ants for the large-scale industry and a considerable number of small sawmills run by agriculture enterprises.

During this period, plants for the production of fibreboard and particleboard were established. Pulp, paper and paperboard showed a constant increase in production between 1950 and 1989. Most of the production was consumed in the domestic market and Lithuania was the net importer of wood products. In the 1980's Lithuania was receiving wood products (roundwood, sawnwood, pulp and paper) in the roundwood equivalent of about 2-2.5 million m^3 from other Soviet Republics (mainly Russia). Additionally, every year nearly 3 million m^3 of roundwood were supplied from national forests.

Introduction of the market economy initiated immediately after independence in 1990, accompanied by a privatisation process of the existing industry and restitution process of forestland. A steady decrease in production of all commodities resulted in the early stages of independence, which can be seen as a natural reaction to the closure of the traditional markets in the former Soviet Republics, but also a decrease in the raw material supply from Russia. As a consequence, an important number of production facilities were closed, more significantly a hardboard plant, one pulp mill and several large sawmills. It was only after 1994 that the wood industry decline showed a positive trend, followed by a new period of stabilisation and development. The growth rate of the primary wood industry, with the exception of pulp and paper production, was exceeding that of other industry segments in the country. A higher productivity in the industry could be recorded after 1996. Production volumes of sawn timber were kept relatively constant since mid-1990s. It was the structure of the sawn timber producers that varied considerably. Investments in new sawmills replaced part of the shortfall of timber traditionally produced by the former large sawmills. The rest of the volume is now produced by a number of small sawmills.

New markets, mainly in Western European countries but also in the North America were identified and became the main export markets. A number of newly estab1ished wood industries started successful operations. New entrepreneurs developed markets for value added products, varying from dimensional wood to laminated solid wood boards, dowels, elements for staircases, parquet and garden furniture. After regained

independence Lithuania became the net exporter of wood products - wood industries export nearly 70% of their products.

3.2. Wood processing industries

The main production of the Lithuanian woodworking industry is sawn wood, plywood, paper and their products, furniture. (Figure 4). There is the trend of increasing employment and turnover of wood processing industry. Wood products are produced by sawmills and enterprises specialising in the production of boards, carpentry products, furniture, paper, etc. as well as by enterprise where the production of such products is not the core activity. In the last years, the turnover of wood products accounted for 10 per cent of the total turnover of manufacturing industry in Lithuania. There are about 100 large specialised enterprises in the wood industry of Lithuania.

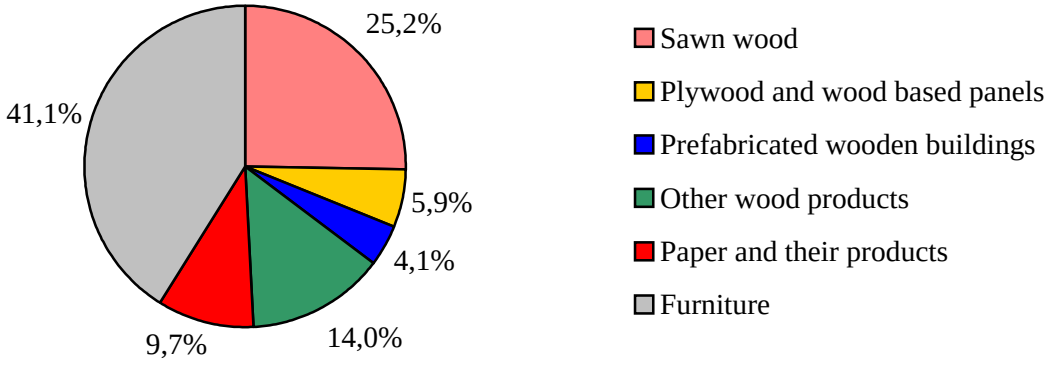


Figure 4. Wood processing structure (2002)

In addition, wood products are also produced by enterprises of other industries, such as construction companies, agricultural and forestry enterprises, etc. In total, there are registered to Statistics Department about 900 companies which are engaged in the production of one or another wood product line (Table 6).

Table 6. Structure of wood industries in Lithuania, 2002

1. Number of enterprises	**Total,%**		**Size of enterprises (by number of employees)**						
2. Number of employees			**Micro**	**Small**		**Medium**		**Large**	
3. Sales			**0-9**	**10-19**	**20-49**	**50-99**	**100-199**	**200-499**	**500 -**
Manufacture of wood and wood products (except furniture)	1	100	12.0	28.5	42.4	11.7	3.1	1.7	0.6
	2	100	1.4	9.9	32.7	20.5	9.3	12.7	13.5
	3	100	2.5	5.7	23.1	15.0	19.9	13.5	20.8
Sawmilling and planning of wood, impregnation of wood	1	100	11.9	31.8	43.7	8.6	2.5	1.1	0.4
	2	100	1.5	13.8	42.8	18.7	9.3	8.3	5.6
	3	100	2.2	8.2	22.4	10.9	29.4	10.3	16.6
Manufacture of veneer sheets; plywood, laminboard, particleboard, fibre and other panels and boards	1	100	4.4	17.4	34.8	13.0	13.0	8.7	8.7
	2	100	0.1	1.5	6.3	5.0	10.1	17.8	59.2
	3	100	0.1	0.7	11.0	3.6	12.5	16.2	55.9
Manufacture of builders' carpentry and joinery	1	100	16.0	26.9	38.6	13.4	3.4	1.7	-
	2	100	2.6	11.1	33.4	26.4	12.4	14.1	-
	3	100	2.7	5.1	34.0	23.2	14.6	20.4	-
Manufacture of wooden containers	1	100	12.7	14.6	50.9	16.4	3.6	1.8	-
	2	100	1.7	5.8	41.5	31.3	9.7	10.0	-
	3	100	5.1	4.7	44.6	26.0	9.5	10.1	-
Manufacture of other products of wood; manufacture of cork, straw and plaiting materials	1	100	6.1	34.7	38.8	18.4	-	2.0	-
	2	100	0.2	11.6	27.7	36.8	-	23.7	-
	3	100	0.7	7.3	19.0	56.7	-	16.3	-
Manufacture of pulp, paper and paper products	1	100	7.7	26.9	23.1	15.4	15.4	11.5	-
	2	100	0.6	5.1	8.8	13.2	27.1	45.2	-
	3	100	0.5	2.1	3.2	19.6	34.2	40.4	-

If we include several hundred of small enterprises engaged productions of various wood products, the total number of enterprises in the wood industry would reach approximately 2,000 and employment above 40,000. In addition, there are more than 8,000 individuals registered for producing various wood products.

According to Lithuanian legislation micro-enterprise is defined - less than 10 employees, small enterprise is defined – 10-49 employees, medium enterprise is defined – 50-249. Lithuanian wood industry is very fragmented – there is only 31 company employing more than 200 people. SMEs account for more than 60% employment and about half of sales in the whole forest industries sector in Lithuania. In sawmilling the role of SMS's is much higher – they account for more than 75% of employment and 65% of turnover. As Lithuania is a small country, regional distribution does not play the most significant role. Small and medium companies are spread countrywide; only in North Eastern Lithuania the number of sawmills is lower. Larger scale industries (wood based panel, furniture producers) are located mainly in or close to the biggest cities (Vilnius, Kaunas, Klaipeda), i. e. closer to infrastructure and consumers. Value added in forest industries was constantly increasing during the last years. Since 1995 to 2003 the whole forest industry's value added was growing by 15-20% annually, mainly due to rapidly developing wood processing working and furniture sub-sectors. In 2003 the gross value added by wood industry totalled at 470 million euro, i.e. 16% of total value added in manufacturing sector and 3.2% of whole country's GDP. Wood industries sub-sector accounts for 53%, furniture – 38% and paper industry –9% of gross value added in forest industry.

All industrial round wood, which is consumed within the country, is processed in wood processing industries (sawmills, wood-based panel mills). There is no woodpulp production in Lithuania, and all paper production is based on recovered fibre pulp and imported woodpulp. The value added by wood industries per 1 m³ of processed industrial round wood has doubled in real terms since 1995 reaching 70 euro/m³ in 2003. That proves the positive development of Lithuanian wood industries.

Lithuanian forest industry is export oriented, and during the last year forest industry products accounted for 10% of country's export earning. Wood processing and furniture industries export 70% and paper industry – 40% of their products.

3.3. Wood processing industries practices

Wood industry was privatised after 1990's. Lithuanian private owners account for 70% and foreign investors – 30% of capital. Lithuania comparing to other Baltic states has not attracted very intensive inflows of foreign capital into wood industries so far. Currently foreign investment totals at 45 million euro, and which main investors are Norway, Canada, U.S. and Finland.

Lithuania exports raw wood materials (round wood, chips), sawn wood, plywood, wood based panels and increasing volumes of high value-added wood products. In 2003, furniture and its components occupied 43% of the total wood export (Figure 5). Sawn wood is another major export commodity (21%). Lithuania imports large volumes of sawn wood (270,000 m³), wood-based panels, furniture, and paper products. Raw material (round wood) import remained insignificant after regained independence, since early 1990's its imports never exceeded 0.1 million m³.

In 2003 the balance of the Lithuanian foreign trade remained positive export (76.0 million euro) greatly exceeded the import (38.4 million euro). Only the trade balance in paper products is negative. The biggest part of the export production goes to Germany (19%), followed by Sweden and UK (15%) and other major export partners (5-10%) are: Russia (10%), Denmark, USA, Latvia and France. Poland (22%) and Germany (12%) were the main import partners in 2003.

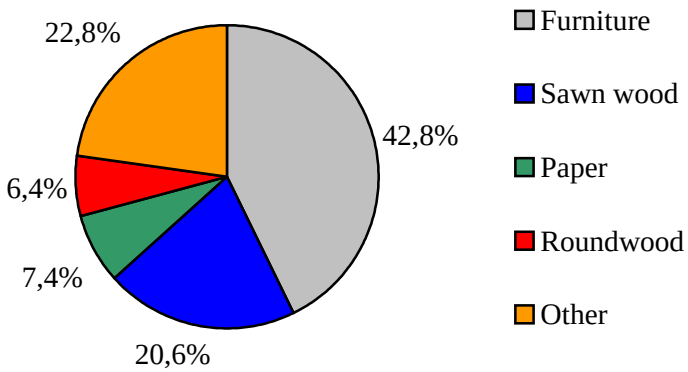


Figure 5. Export of wood production (2002)

Majority of logging is carried out by hundreds of private small contractor companies. Private contractor companies operate in both private and state forests. In 2003, they carried out 87% of harvesting and 37% of haulage work in state forests.

Most of the production manufactured in sawmills are competing in the national and international market. The majority of newly created sawmills and value added manufacturing units have been quite successful. Not all of sawmills operate at the same technical level, so that further investments are required. Managers are aware about the necessity to improve the process, but improvements are generally depending on the availability of new capital. Other companies have already made important investments and will continue doing so. The main factors influencing the competitiveness of Lithuanian wood industries are availability of relatively cheap raw material and labour.

During the last years increasing investments into new technologies are helping to maintain the growth of the sector. The sawmilling industry finds itself in an evolving stage, but needs consolidation, less fragmentation of production units, improved equipment, manufacture of higher value added products, access to other markets, better trained personnel. Total particleboard production is currently owned by the same Lithuanian holding. There are two particleboard plants, with a total production capacity of nearly 200,000 m³/year. Both particleboard factories operate with similar technology: flaker, hammermill, tumble dryers, refiners, aerodynamic continuous matt-forming. Recently both factories started production of laminated boards. The technology in general is of very good standard, even if it is not the most up-to-date one. Some value added is obtained by one of the companies, by cutting to size and adding a profile on the edge, which can be used, for example, as flooring boards for the export market.

In Lithuania only one enterprise produces plywood and three companies produce veneer-form pressed elements (bed slats, snow shovels, chair seats). There is no sliced veneer production in the country. There is no significant production of solid wood furniture, even though it is increasing. Paper industry also does not affect the wood market as paper and paperboard production is based on recovered fibre. There is the great variety of management forms in Lithuanian wood industries in each group by size. In general in bigger companies dominated stock companies, while in small enterprises family ownership (sole proprietorship) is common.

Educational background of owners varies a lot too, and there are many examples of successful companies where owners do not have wood-based education background. Lower level management staff often has wood based education background. Workers usually are trained within the company. In 2003 the sales of wood industry totalled 783 million euro and the net profit amounted to 32 million euro. Small profit margin could be explained as the outcome of continuously increasing investments in new and upgraded technologies in the industry. The number of profitable companies is in woodworking industry profitable companies account 68%, in paper industry - 61%, and in furniture industry - 71%. Capital investments in the wood and furniture industry have determined the growth of the industry's competitiveness. Investments amounting to 50 million euro were made annually since 2001. Annual capital investments in the furniture branch were 30 million euro, furniture – 14 million euro and in the paper and paper products branch 5 million euro. The flow of capital investments has speeded up the

development of new products, increased labour productivity, and improved the industry's competitiveness in international market (The Lithuanian 2002). In wood processing technology innovations are implemented most widely. Sawmills, wood-based panel mills are upgraded with advanced foreign technologies.

Among recently developed new products in Lithuania could be mentioned glue-laminates wood constructions, wood briquettes and pellets, euro pallets, wood chips. There is no special supporting system of innovations in forest sector in Lithuania. However, Lithuanian Innovation Centre helps to develop innovation in all economical branches.

Areas of their activity: technology transfer, raise awareness and innovation promotion, provision of information and technology broker services, high-tech entrepreneurship promotion. Cluster formation process is in initial stage in Lithuanian wood sector. The range of products and companies' activities create good preconditions for formation of clusters in wood industry. In spite of the fact that most of small and large companies in wood industry act independently, there already few examples of joint activities of groups of companies (Libra Group, SBA koncernas, Baltijos Baldu Grupe, Vakaru Medienos Grupe, Baltic American Concord). In several regions there are regional micro-clusters, e.g. in Kazlu Ruda – Marijampole region.

3.4. Policy framework and production conditions

Ministry of Economy is dealing with Industry related issues and it is responsible for implementation of Medium-term Industrial Development Policy and Its Implementation Strategy, which was approved by the Government of Lithuania in 2000. The Ministry of Economy is responsible for the co-ordination, monitoring and assessment of Small and Medium - Sized Business Development Strategy until the Year 2004 approved the Government of Lithuania in 2002.

Ministry of Environment is dealing with forestry related issues and it is responsible for implementation of Forestry Policy and Its Implementation Strategy, which was approved in 2002.

Association of forest industries "Lietuvos mediena" was established in 1993 as a voluntary organisation of the Lithuanian producers and traders of wood products. The Association implements and co-ordinates the tasks delegated to it by its members (currently 100) and represents their economic interests *vis-a-vis* the authorities of Lithuania and inter-industrial organisations.

Main reform policies - privatisation, liberalisation of prices and of international trade of wood products took place immediately after the regained independence in early-1990's. By mid-1990's most of wood industries were privatised. Non-existent foreign trade barriers and implementation of market prices created good preconditions for development of forest industries, even if the early transition period led to closure and bankruptcy of ineffective companies. The growth of wood industry outstrips the pace of recovery of whole Lithuanian economy.

There are no regional rural development institutions, which are specialised in wood industry for SMEs support. But there are possibilities for wood industry companies to use various support and advice from Lithuanian Development Agency for Small and Medium Sized Enterprises and different regional institutions, organisations, funds, e.g. Chamber of Trade, Industry and Crafts, County Administrations, Business Advisory Services Centres, 32 Information Centres, Credit unions, municipal SME Development Funds, loan incentives for SMEs offered by banks, etc.

There are two main wood industry related education institutions in Lithuania: Kaunas University of Technology (KTU) and Kaunas College (KC). KTU Facu1ty of Design and Technologies Department of Wood Technologies has studies for bachelor and master degree in wood products design, technology and engineering. KC has developed two programs higher non-university studies in the Industrial Technologies' and Design Department - the production of furniture and wood products and the construction and production of interior articles. The College qualifies the technologists and designers for the woodworking industry. There is established a re-qualifying centre for the woodworking industry specialists under the Industrial Technologies' and Design Department. The lecturers of the Department organise courses and consu1t about the sawmilling technologies and sawn wood grading.

Scientific research work related to woodworking industry is carried out by Kaunas University of Technology Faculty of Design and Technologies Department of Wood Technology. Research is done in wood strength, humidity, sawnwood yield and its optimisation, etc.

3.5. Conclusions: Supporting and limiting factors for enterprise development in wood processing industries and barriers to entrepreneurship

Supporting factors:

- Access to raw materials. Lithuania’s wood and furniture industry is based on local raw material resources. The lumbering branch still has potential and will be able to supply raw materials for the local industry and to maintain the export growth. Apart from the local resources of raw materials for the wood and furniture industry, Lithuania is close to the high quality and inexhaustible resources of Russia, especially it’s northern part. The availability of raw materials is not a limitation for the industry but rather an advantage showing the potential for the sector’s development.
- Advantageous location. Major European markets (Scandinavia, Germany, Poland etc.) are within a reasonable distance. The industry is currently exporting its products to these markets at insignificant transportation costs. Lithuania has a highly developed infrastructure of roadways and railways. The port of Klaipėda is ice-free and available year round. The inner transportation infrastructure is connected with external roads. Lithuania’s geographical position, due to the reasons above, could facilitate the future development of the wood and furniture industry..
- Possibilities to use EU grants. EU grants from structural funds are going to be used for innovations and business development in Lithuania. The following wood industry activities could be supported: establishment and development of SMEs, networks and clusters; development of new technologies and innovations; establishment of business centres, etc.

- Necessity to develop new business activities in rural areas as an alternative for agricultural production. 17.8% of total working persons are employed in agricultural sector.

Limiting factors and barriers for entrepreneurship in wood processing industry:
- The lack of investments: limited self-financing, high costs of credits, complicated procedure for getting credit.
- Low profitability of wood processing industry.
- Lack of innovation supporting and promotion system for wood processing industry.
- Undeveloped domestic market for local production. 22.5% of roundwood and 70% of sawn wood have been exported in 2002.

Possible policy implifications:
- Development of domestic wood market.
- Encouragement of small-sized and law quality wood use.

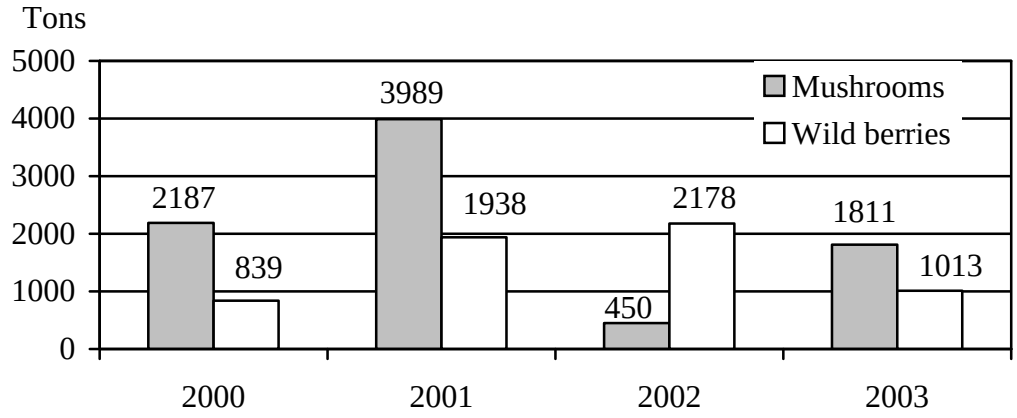
Annex C: Organisations studying wood processing industries and main publications and information sources.

Main publications and information sources on wood processing industries:
- Statistics Department – various publications, in Lithuanian and English, (http://www.std.lt).
- "Statistical yearbook of Forestry", published annually, in Lithuanian and English, published by "State Forest Survey Service" (http://www.lvmi.lt/vmt).
- "Timber economy" – monthly newsletter, in Lithuanian, published by association "Lietuvos mediena" (http://www.lietuvosmediena.lt).
- "VMT naujienos" – quarterly newsletter, in Lithuanian, published by „State Forest Survey Service" (http://www.lvmi.lt/vmt).
- "Lithuanian Timber Market statement" – annual report for UN ECE Timber Committee sessions, in English, prepared by "State Forest Survey Service" (available at: http://www.unece.org/trade/timber).

4. Non-wood forest products and services

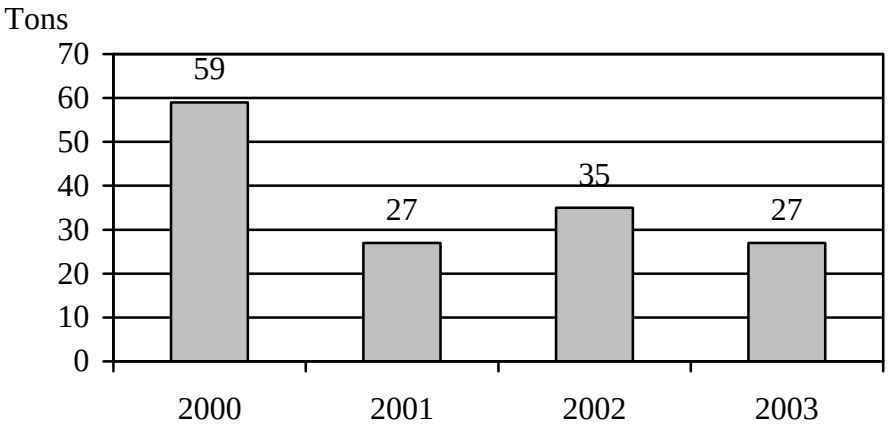
4.1. State of the art and historical development

Rural business provides non-wood products and services: gathering, processing and trading of forest fruits, mushrooms and medicinal herbs, hunting, countryside tourism. Forest services without market: recreation, carbon sequestration, biodiversity conservation, erosion control, water protection etc. Over the last decades market supply of mushrooms increased while the market supply of the wild berries changed slightly (Figure 6). Market supply of medicinal herbs decreased, because the import of medicinal herbs was more effective (Figure 7).



Source: Lithuanian Statistical Yearbook of Forestry, 2004.

Figure 6. Market supply of mushrooms and wild berries (Lithuania, 2000-2003)



Source: Lithuanian Statistical Yearbook of Forestry, 2004.

Figure 7. Market supply of medicinal herbs (Lithuania, 2000-2003)

Important income source for rural population are gathering of mushrooms, wild berries and development of countryside tourism. The part of mushrooms and wild berries are not sold, but is consumed for own needs. There is need for sociological survey about household consumption of mushrooms and wild berries in Lithuania. Importance of recreation of Lithuanian forests is increasing. According the Forest Act persons have the right to visit forests freely, except for reservation and special purpose objects (border zones, military objects or similar). Visiting persons can gather forest fruit, medicinal herbs and materials, except for the plant species, the list of which is approved by the Ministry of Environment, can collect nuts, berries and mushrooms, keep bees in state forests keeping them in hives and bee-coops. According to the survey data objectives of forest visitors are: mushrooms and wild berries gathering, walking, sunbathing, hunting, fishing (Riepšas 1997).

The wild game is under the state regulation in Lithuania. The total hunting area constitutes 4,178,362 hectares hunting season including 1,931,651 hectares of the forest area and 2,246,711 hectares of the fields, shrubs, waters. The total hunting area involves

897 hunting units, where are more than 30 thousand hunters. The number of the harvested game in 2002/2003 hunting season is indicated in the Table 7.

Table 7. Harvesting level in the last hunting seasons

Game species	**Harvested in**	
	2002/2003	**2001/2002**
Moose *Alces alces*	476	504
Red deer *Cervus elaphus*	833	1288
Fallow deer *Cervus dama*	10	23
Roe deer *Capreolus capreolus*	12,231	11,569
Wild boar *Sus scrofa*	10,843	10,300
Brown hare *Lepus europaeus*	11,606	8,346
Pine marten *Martes Martes*	831	473
Wolf *Canis lupus*	64	76
Red fox *Vulpes vulpes*	16,949	13,018
Racoon dog *Nyctereutes procynoides*	5,215	4,525
Beaver *Castor fiber*	5,630	3,907

The main information source on non-wood forest products and services is “Lithuanian statistical yearbook of forestry”. There is following information about multiple use of forests: area of forest plants used for gathering berries and herb raw; market supply for wild berries, mushrooms and medicinal plants; export of mushrooms and wild berries; hunting area, game population; number of hunted animals.

Lithuanian Forest Management and Inventory Institute periodically provides information about areas of wild berries and medicinal plants in forests. During forest inventory in 1978-1988 the assessment of these areas was performed. The State Protected Areas Service under the Ministry of Environment provides information about recreational facilities in state parks. Lithuanian Countryside Tourism Association publishes informational booklets about possibilities to have good and purposeful rest in farmsteads.

The main organisation, which constantly makes studies and analysis on non-wood forest products, is the Nature protection department of the Ministry of Environment. The department provides information about the market supply, import and export of mushrooms, wild fruit, berries, medicinal and technical plants and data of hunting and game assessment.

Most researches dealing with non-wood forest products and services were made in years 1970-1985: productivity of non-wood resources, peculiarities of their grows, main game ecology, its significance for forestry and the regulation of its number; recreational needs, reaction of forest ecosystem to recreational intensity, management of the recreational forest. Lithuanian Forest Research Institute implements ongoing research projects related to non-wood products and services. These projects consist research topics: interaction between wild animals and forests; recreational areas in afforestated abandoned agricultural land; pine stand reforestation in recreational forests; growth of forest stands in strict forest reserves; protected forest areas in Lithuania — analysis and harmonisation (COST E27); contribution of forests to mitigate greenhouse effect (COST E21).

4.2. Case studies of successful marketing strategies

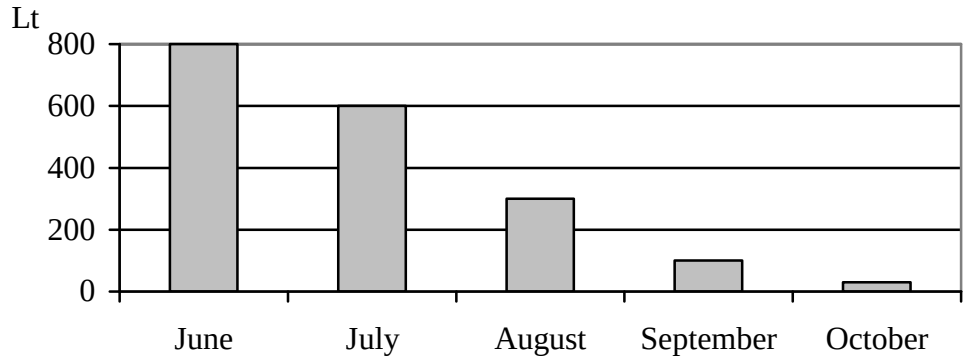
4.2.1. Mushrooms harvesting

Mushrooms gathering as a type of business consists following activities: mushrooms gathering, processing and products trade. In Lithuania about 20-30 species of mushrooms are used. The annual potential yield of mushrooms is about 21-29 thousand tons (Budriūnienė 1992). The yield of mushrooms uneven in different regions of Lithuania. Territory of Lithuania is divided into three regions by mushrooms richness: 1) southeast; 2) west; 3) central.

The mushroom's richest region is southeast, the least - central region. The data about total volume of gathered mushrooms is not available in Lithuania. During 2002 the mushrooms market supply consisted of 450 tons, 2001 - 3989 tons (Ministry 2004). According to the expert assessment, annual market supply consisted about 30% of total volume of gathered mushrooms that is about 1.5-12.9 tons. Mostly it is chanterelles (2001 – 77.3%, 2002 –93.9%) and boletus (2001 – 18.2%, 2002 – 4.0%). About 20-30 trade companies supply mushrooms in Lithuania. Mostly it is limited stock companies. All enterprises are SMEs. The average price of chanterelles is 8-15 Lt/kilogram. Mushrooms have been exported from Lithuania to 18 countries in 2002. The export reached 1.24 thousand tones. Mostly mushrooms have been exported to Germany – 758 tones; France – 528 tones; Austria – 219 tons; Sweden – 153 tones; Poland – 117 tones. The main exported species was chanterelle (68.7%). In 2002 import of mushrooms reached about 216 tons. Mostly mushrooms are imported from Russian Federation – 78.6 tones, Belarus – 54.2 tones and Latvia – 20.3 tones. Also mushrooms are imported from Germany, China, Ukraine and other countries. About 71.8% of total imported mushrooms are chanterelle (LR aplinkos ministerija 2003).

The company "Hesona", which is located in Grūtas village, developed this business very successful. Annually this company are processed and supplied to domestic market about 50% of purchased mushrooms volume. This company also are processed vegetables. Annual turnover of this company amount about 10-20 million Lt. Moreover hundreds of rural people are employed in this region.

The Forest Act and other legal regulations such as Regulation of mushroom's collection in Lithuania regulate mushrooms collection. Income of natural person is untaxed, if it is earned from collection of mushrooms, wild berries, nuts, and medicinal herbs. Forest covers a relatively large area of low-productivity land in Lithuania. Therefore the gathering, consumption and sale of mushrooms are an important additional income source for rural population farming on this land. Country people of southeast Lithuania have significant incomes from this source (Figure 8). This region is distinguished for its wood and rich mushrooms places (Batuleviciute 2002).



Note: average wage - 982 Lt/month (2001).
Figure 8. Monthly income of rural population earned from mushroom's collection in Varėna region (June-October, 2001)

Ravage of moss is the main environmental damage done by mushrooms collectors. The Regulation of mushroom's collection defines main mushrooms gathering rules but mushroom's collectors are not always following rules. Research, education, extension services related to the non-wood products entrepreneurship development is not existed in Lithuania. Barriers to entrepreneurship: high dependence of non-wood products volume on clime conditions, seasonality, demand only for two species of mushrooms: chantarelle and edible boletus, lack of information and education, mushrooms gathering is free in all types of forests. Research needs: resources study, consumers needs study, co-operation possibilities, market analysis.

4.2.2. The countryside tourism

The countryside tourism is become important activity for rural population, which could be a source of stable additional income and a part of the regional development especially in unfavourable for agriculture activity regions. The countryside tourism activity consists: farmstead for tourists lodge; providing services for special tourists paths; camping; museology; rent of bicycles, bouts and special tools for tourists (Lietuvos 2004a).

A part of these activities is dealing with forestry and forests. Mostly farmsteads are located near waters and forest areas. In 2001 over 200 farmsteads have been registered for providing countryside tourism services, while 2004 - 350 farmsteads. About 70.0 thousand tourists used the services of farmsteads during 2002. All countryside tourism farmsteads are ranged to four groups. Four "storks" signed farmstead providing the highest level of services, one "stork" - the lowest. The requirements for farmstead signed by one "stork": a night stay on hay in a born or in a modest farmstead; guests live independently, only a few services are provided.

The requirements for farmstead signed by two "storks": guests live in a farmstead in a summer cottage; common sanitary facilities, shower for all guests; guest rooms are cleaned; catering upon the agreement. The requirements for farmstead signed by three "storks": guests live in a farmstead separately from the hosts; double or three-place rooms; sanitary facilities, showers not in every room; a kitchen, dishes and sauna for guests.

The requirements for farmstead signed by four "storks": cosy and neat environment in the farmstead; single and double rooms with all conveniences, services, supply of various attractions, traditions of culinary heritage, organisation of festivities, seminars and conferences (Lietuvos 2004).

The farmstead activity is organised as personal enterprises. The business certificate is obligatory for providing of countryside tourism services. Mostly it is small-scale business. Average farmsteads have only 10 bedspace for tourists. Institution involved in the sector: the State Tourism Department under the Ministry of economy, Lithuanian Tourism Association; Lithuanian Countryside Tourism Association.

The main objectives of the State tourism department are: to evaluate the strategic planning of tourism activity; to offer proposals dealing with tourism policy and it's implementation for Government; to implement the National programme of tourism development; to co-ordinate the state institutions activity for tourism development, information and resources usage as well as assessment.

Lithuanian Countryside Tourism Association is non-governmental organisation The Association unites persons providing countryside tourism services. The main objective of this organisation is to unify countryside tourism services providers for solving their objectives and problems.

According to the legal acts the tax concessions are available for countryside tourism services providers if the 50% of total annual income was earned from agriculture activity. Moreover the compensation of bank interest of loan could be covered according to the regulation of the Ministry of Agriculture. Information dealing with the tourism in Lithuania is provided by the informational centres (35). Lithuanian Countryside Tourism Association provides information about farmsteads and countryside tourism services on the Internet.

In 2003 the case study "Tourism market development in Lithuania" was carried out by the Group of Business Management Technologies (Verslo 2004). The report of case study consists a chapter "Countryside tourism". Experts concluded that countryside tourism would develop faster than other types of tourism in Lithuania. Education of tourism specialists is organised by few institutions in Lithuania (Kaunas business college; Klaipeda Accounting school; Kaunas college; Vilnius co-operation college).

Special courses for entrepreneurs and advising are organised by the Countryside tourism Association. The educational material dealing with rural enterprise management, organising and planning, guide of managers, bookkeeping and taxes etc. for countryside tourism entrepreneurs is offered on the website of Association. Moreover the education programme of countryside tourism organising is already prepared and trainings for countryside tourism entrepreneurs organised (Lietuvos 2004a). Participants of trainings have a possibility to get a special certificate. Prices of room rent in farmstead vary from 15 Lt up to 125 Lt per night. The price level depends on quality of provided services.

The owners of farmstead perform roles of entrepreneurs, owners, and managers:

- Entrepreneur – organises the countryside tourism activity, gets profit from this activity and takes the benefit to society;
- Owner – has a property right to use resources for countryside tourism activity development and income earned from this activity;
- Manager – coordinator of countryside tourism activity in own farmstead, decision maker and implementer (Lietuvos 2004a).

Mostly the verbal agreements (contracts) are made for services providing between farmstead owners and tourists. The written agreements are recommended to made, because sometimes agreed prices and services quality are not kept.

The financial investments and other resources are needed for establishment of countryside tourism business. The main elements of countryside tourism activity: farmstead preparation for countryside tourism; infrastructure creation for services providing; services providing for tourists; relations between business partners; providing information for clients; booking and documentation of activity.

The deep integration is between countryside tourism activity and usage of non-wood products and services (mushrooms and wild berries gathering, hunting etc.). Barriers to entrepreneurship: payment for business licence, bad conditions of countryside roads, strict restriction in protected areas impending the countryside tourism development, low quality of services. Related research needs: analysis of forest significance for countryside development and integration with other forest enterprises.

4.2.3. Hunting

The total hunting area constitutes 4,178,362 hectares including 1,931,651 hectares of the forest area and 2,246,711 hectares of the fields, shrubs and waters. The total hunting area involves 897 hunting units, where are more than 30 thousand hunters – users of game resources. The number of the harvested game in 2002/2003 hunting season is indicated in the Table 7. Products of hunting:

- Venison and meat from hunted game (roe deer, red deer, moose, wild boar, brown hare, beaver, waterfowl)
- Trophy (antlers with or without skull cap, tusks, skulls, hoofs, bones)
- Furs, skins (fur game, ungulate skin, pelage)
- Game bristle, feather, fluff
- Perfumery raw
- Other small raw for household.

The Hunting Law and Hunted Rules as well as the Law of Wildlife define public relations concerned with game use and protection. Alive game animals are under the exclusive state proprietary. Hunted animals became the property and are at the disposal of the land users except a hunting trophy and variety venison that became property of the particular hunter who has hunted the certain game.

Game resources users:

- Natural persons: non-associated persons and associated members of different local hunter associations. The total number of the hunters is 29.3 thousand including 27,695 persons or 90.8% (by data 2003) hunters– members of the Lithuanian Association of Hunters and Fishers. 7,772 hunters or third of the total number of members are hunters of the higher category responsible for the game selection and culling. There are only 0.4% of hunter-women. Near 1,550 or 9.2% hunters are members of other Hunter organisations. The data on hunters are given and collected in the *Hunter Digest*, the main Hunter Data Base from Apr. 2004.
- Legal persons: hunting clubs, groups (units) and their associations (n=649 hunting clubs belonged to the Lithuanian Association of Hunters and Fishers), that in turn belong to 7 regional Environment Protection Departments. The hunter clubs and groups are public organisations following their statute, the Law of Public Organisations, and other legislative acts. 3,918 persons – members of the Association are extramural hunters. Hunting clubs keep hunted game production at their discretion; biological research institutions engaged in the game management and wildlife sciences, habitat conservation, nature-based tourism, which have been deputed to use game resources with scientific purposes by the Ministry of Environment.

Game production processors:

- Personal (families, personal enterprises);
- Joint-stock companies. The main venison processing company is Joint Stock Company "Viltlit" that has subsidiary companies in the different regions of the Lithuania.

Processing is mainly concentrated in the closed joint stock enterprises ("Viltlit" "~ 70%, "Utenos mėsa" etc. ~ 20%) and family & SMS (~10%).

Table 8. Prices for the fresh untreated game (Lt/ 1 kg, 2002/2003 season)

	I class	**II class**	**III class**
Roe deer	9 Lt (2.61 euro),	7 Lt (2.03 euro)	6 Lt (1.74 euro)
Red deer	4 Lt (1.16 euro)	3 Lt (0.87 euro)	2 Lt (0.58 euro)
Moose	4.5 Lt (1.30 euro)	3.5 Lt (1.01 euro)	
Wild boar	4 Lt (1.16 euro)	3 Lt (0.87 euro)	

2003 annual export constituted a venison as the follows: deer - 2 tons, moose – 9 tons, roe deer – 83 tons.

The General Forest Enterprise under the Ministry of Environment is the main coordinator of the professional hunting area (PHA) management and use forest enterprises are responsible for the organisation and implementation of PHA management, supervision and protection. The General Forest Enterprise also settles and revises the advisable tariffs for hunting taking into consideration external changes in hunting prices.

Local municipalities give the financial support for preventive measures while other activities as the development of hunting tourism, protection and increase of game

populations, management and supervision are supported by the income from organisation of hunting, venison sale, hunting facilities and other incomes from the main activity of forest enterprises. Special Personal Enterprises “Felis”, “Explore Baltija”, “Hubertus Baltic”, etc. organise and pursue both domestic and external hunting tourism. Countryside farmsteads (32) offer domestic hunting tourism facilities as a part of the countryside tourism.

The hunting profit is appropriate by the user status and share on the ground of valid legal acts. Hunting production (shot, captured alive or unalive animals, their parts, thrown antlers and other products of their vital activity as well as dead or injured animals that are found on the hunting area) owned by users of hunting area. Users dispose hunting production at their own discretion including personal use and selling.

In the mean time, respectively:

- Users of hunting areas pay a set annual fee for the use of game resources at stated period of the half-year on the ground of hunting area category depending on the habitat suitability to game (Categories I – VII, tariffs from maximum 1.8 Lt/ha (0.52 euro/ha) to minimum 0.1 Lt/ha (0.03 euro/ha)), Lt per hectare. In this case, the Environment Protection Fund of the local municipality gets 70% of the annual fee, and the Treasury accumulates the next 30% for the development programmes of the environment protection. The fee is decreased in the case of changes in the property relations and forbidding the hunting on the private land respectively. The most share not less than 70% of the cumulative fee is designed for the preventive measures that are necessary for forest/landowners, managers and users of hunting areas protecting forest/land against damage caused by game.
- Users of hunting areas also pay to the Regional Environment Protection Departments (REPD) for licences to hunt the certain game species, 1 Lt per one licence.
- Landowners, who have contractual agreements and permitted to hunt on their territory, are recompensed for the damage caused by game to forest and agricultural crops according to validate legal acts.
- Landowners, who have forbidden to hunt on their territory and made a veto request to the Commission of the HAU Formation of the local municipality within 1 month, are not recompensed.
- Landowners – hunters have right to form the hunting area unit on the condition that the hunting area unit is not less than 1,000 hectares. In the concrete, it is possible only in co-operation with the not few neighbours – landowners. Landowners – hunters dispose hunting area and hunting production at their own discretion. Licences are obtainable on the same way from the REPD taking into consideration that alive game are exclusive state property.
- Landowners – hunters have right to hunt on the hunting area units that cover their private lands under the agreement with all users of adjacent hunting area units.
- Manufacturers of the purchased hunting production dispose their production at their own discretion on the ground of the valid laws and regulations.
- Forest Enterprises managing the professional hunting areas, organise and implement measures of management, maintain and protect game populations and their habitats, protect forest against damage caused by game, collect and propagate experience, information and samples of the complex model forest- game management and

agriculture, development of the hunting tourism and hunting traditions. Forest Enterprises use the income of hunting organisation, sale of venison, hunting facilities as well as incomes from the main forest management activity for the development of hunting tourism and increase and improving game populations and habitats. Additionally, these users of game resources obtain the financial support for the forest protection against game from the local municipality. These hunting units are under the control and supervision of the General Forest Enterprise that is their constitutor.

Nature-based tourism including hunting tourism is rising as an important branch of the existing and developing village tourism (n= 32 countryside farmsteads). The hunting tourism is treated as the active consumptive branch that should be combined with non-consumptive passive branch such as game watching and photography and non-consumptive active one as the hiking and watching- photography tour.
Formation of the private professional hunting area initiates the development of hunting facilities, game farming and further processing and trading. The total private hunting area constitutes 11,416 hectares and has further uptrend.
Joint- stock company "Viltlit" is the main venison processing company while other large meat processing companies "Utenos mėsa", "Nematekas", "Agaras", "Krekenavos Agrofirma" contribute fractionally.

4.3. Conclusions: Supporting and limiting factors for enterprise development in non-wood forest products and services production and barriers to entrepreneurship

Supporting factors:
- Rich resources of non-wood products (mushrooms, wild berries, game meat etc.)
- Increasing the demand for non-wood products, hunting, countryside tourism.
- Activities dealing with non-wood products use are efficient and create the new workplaces in rural areas.

Limiting factors and barriers:
- High dependence of non-wood products volume on clime conditions
- Seasonality of non-wood products production
- Demand only for few species of non-wood products, e.g. mushrooms: chantarelle and edible boletus.
- Lack of information and education about non-wood products and services.
- Gathering of wild berries, fruits, mushrooms is free in all types of forests.

Main problems: intensive use of non-wood products; weak co-operation of SME's; lack of knowledge about production of non-wood products and services; limited financial resources; prevention of using rights NWFP's in private forest holdings. Research questions: NWFP's resources study; NWFP's market analysis; an analysis the role of innovation on non-wood forest products and services development; modelling of different forest products and forest function (multifunctionality); assessment of NWFP's value. Possible policy implifications:
- Strengthening establishment and development SME's producing non-wood products and services in rural areas.
- Encouragement of SME's co-operation.

5. Forests and ownership

5.1. State of the art and historical development

The total forested area has been steadily increasing, from 21.8% in 1938 to 31.3% in 2003. Furthermore, timber volume has increased. The growing stock volume increased from 158 million cubic meters in 1938 to 383 million cubic meters in 2003 (Ministry 2003). In Lithuania the private forests ownership dominated till 1920. Private forest owners owned about 65% of total forests area. 600.2 thousand hectares private forests have been transferred to the State Forest during 1919-1937. Since 1938 private forest constituted only 173 thousand hectares (about 16% of total forest land area). In 1940 part of private forests have been nationalised by Soviet Governance. Since 1950 the private forest ownership has been avoided in Lithuania. After the declaration of independence forest property rights have been restored.

5.2. Forest resources

The main characteristics of Lithuanian forest resources (01-01-2003): forest area –1951 thousand hectares, growing stock –382.6 million m³, the average volume – 196 m³ per hectare, the annual increment – 6.2 m³ per hectare. Forests are divided into strict reserves (1.6%), ecosystem protection forests (8.9%), recreational forests (3.9%), protective forests (15.2%) and commercial forests (70.4%). Forest fellings in strict reserves is forbidden. The trees in ecosystem protection and recreational forests, which reached the natural maturity, can be cut by non-clear cuttings. The stands final cutting ages in protected areas are higher than in commercial forests areas. Coniferous stands prevail in Lithuania (Table 9).

Table 9. Forest stands area and volume by tree species

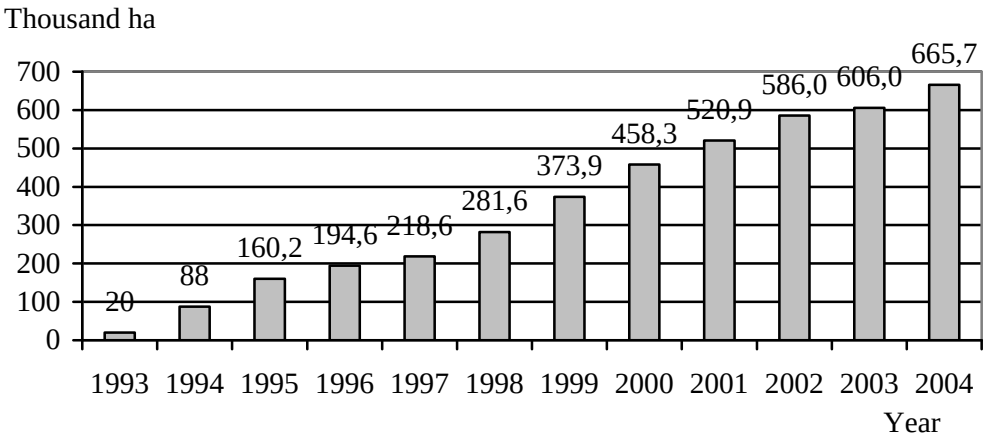
Tree species	**1000 ha**	**Mill. m³**
Pine	711.5	163.5
Spruce	445.3	85.1
Oak	35.7	6.8
Ash	51.4	8.5
Birch	392.2	65.7
Black alder	119.5	23.0
Aspen	57.3	12.4
Grey alder	122.0	15.2
Other	16.1	2.4
Total	1951,0	382.6

Source: Lithuanian statistical yearbook of forestry, 2003.

Afforestation of agricultural land during last five years: 3,626 hectares. It is 0.1% from total agricultural land (3,487 thousand hectares). Lithuania has a rich wood and non-wood recourses. It is supporting factor for enterprise development in the forest sector. Moreover large abandoned agriculture land areas could be afforested (about 200-300 thousand hectares). Limiting factor is a big amount of small-sized wood and no demand for such wood in Lithuania.

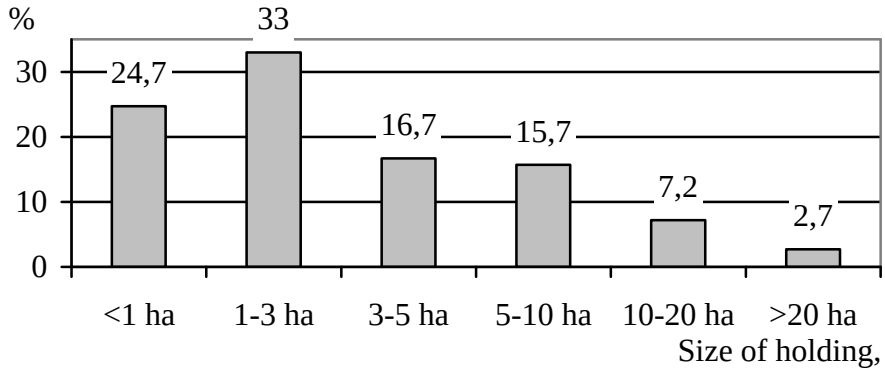
5.3. Forest ownership

The private forests constitute 222.2 thousand private forest owners and 665.7 thousand hectares (01-07-2004) (Figure 9).



Source: Department of Forests, Ministry of Environment.
Figure 9. Forest restitution in Lithuania (1993-2004)

This is 32.7% of total forest area small-scale forest holdings (1-5 hectares) prevail (Figure 10).



Source: State Forest Survey Service
Figure 10. Number and size of private forest holdings 01-01-2003

State forests occupy 67.8% of total forests area, of which 18.0% forests reserved for restitution. State forests are managed by 42 state forest enterprises and 4 national parks. Average area of state forests enterprise is 31.2 thousand hectares. The smallest state forest enterprise by area is 8.1 thousand hectares, the biggest - 52.7 thousand hectares. According to the Forest Act of the Lithuanian Republic, forests are divided into state and private. Every man has a right to collect and sel NWFP from state and private forests.

Ownership based factors supporting enterprise development factor are that increasing the area of private forests and obtained right of forests land purchasing by companies. Limiting factor is that the big area of forests land is reserved for restitution (18.0%). The owners of these forests are still unknown.

5.4. Main problems and research questions in forest resources and ownership for enterprise development in the forest sector

Problems in forest resources: no demand for small-sized and low quality wood; necessity to afforest big areas of agricultural land. Problems in ownership: slaw process of forest restitution and privatisation; about 18.9% forests are not used; restrictions of forests usage without compensations; state property of game in private forests; SFM implementation in small-scale forestry.

Main research questions: the analysis of private forests owner's problems and objectives; comparative analysis of state and private forestry; harmonisation of multifunctional forestry; small-sized wood utilisation for bio fuel.

References

Batulevičiūtė L. 2002.Grybavimas-alternatyvus verslas ir priemonė kaimo bendruomenės steigtis. Žemės ūkio mokslai. Nr. 4, p. 56-60.

Budriūnienė D. 1972. Lietuvos TSR miškų šalutinių augalinių produktų ištekliai. Kn.: Lietuvos TSR miškų ištekliai ir augimvietės. Vilnius, p. 103-198.

Dubauskas M., 2004.Privatus verslas daugeliui tik tolima svajonė. „Lietuvos rytas", Nr. 30 (696).

Lietuvos kaimo turizmo asociacija, 2004a. Informacija kaimo verslininkams. URL: http://www.atostogoskaime.lt

Lietuvos kaimo turizmo asociacija. 2004. Atostogos Lietuvos kaime. Kaunas. 175 p.

Lietuvos medienos pramonės įmonių asociacija „Lietuvos mediena". 2000. Lietuvos medienos pramonės vystymo strategija. 31 p.

Lietuvos miškų institutas. 2004. Urbanizuotų vartotojų paklausos ekonominis integravimas su kaimo miškininkyste. Tarpinė 2004 m. ataskaita. 64 p.

LR Aplinkos ministerija. Informacija apie laukinės augalijos išteklių naudojimas 2002 metais. 2003-05-20 raštas Nr. 11-2-3318.

Lietuvos Respublikos vyriausybė. 2000. Inovacijų verslo programa. URL: http://www.ukmin.lt/files/pramone/inovaciju/inovacijuversleprogramainternetui.doc.

Lietuvos ūkio ministerija. 2003. Lietuvos pramonės klasterių plėtros studija. 36 p. URL: http://www.ekm.lt.

Ministry of Environment, State Forest Survey Service, 2004. 2004. Lithuanian statistical yearbook of forestry, Kaunas, 112 p.

Mizaraitė D. 2001. Lietuvos privataus miškų ūkio raida (1991-2000 m.) ir jo įvertinimas. Daktaro disertacijos santrauka. Girionys – Kaunas. 51 p.

Ministry of Environment. 2003. Private forests in Lithuania. Vilnius. 6 p.

Statistics Lithuania. 2003. Statistical Yearbook of Lithuania. Vilnius. 65 p.

Statistics Lithuania. 2002. Natural resources and environment protection. Vilnius. 111 p.

Riepšas R. 1997. Rekreacinio miškų naudojimo optimizavimo ekologiniai pagrindai. Lietuvos miškininkystė /Raida ir perspektyvos/. Lietuvos mokslas, V tomas, 13-14 knygos,- p. 85-98.

The Lithuanian Development Agency. 2002. The wood and furniture industry in Lithuania. Vilnius. 43 p. URL: http://www.lda.lt/docs/wood.pdf.

Verslo valdymo technologijų grupė. 2004. Lietuvos turizmo rinkos apžvalga. URL: http://www.vvtg.lt

The Netherlands

Hoogstra, M.- Willems, A.
Marjanke HOOGSTRA
Wageningen University, Forest and Nature Conservation Policy, P.O. Box 47, 6700 AA Wageningen, The Netherlands, tel. +31-317-478021, fax +31-317-478005, e-mail: Marjanke.Hoogstra@wur.nl

Arno WILLEMS
Federation of Forest Support Groups, P.O. Box 8187, 6710 AD Ede, The Netherlands, tel. +31-318-672628, fax +31-318-672629, e-mail: A.Willems@bosgroepen.nl

Summary

In the Netherlands, all forestry can be considered to be small-scale forestry, irrespective of ownership category and holding size. Therefore, this paper describes current issues in forestry in the Netherlands. Special attention is given to the country's specific characteristics: great pressure on land from the large population, intensive use of different functions of forests, a high level of public awareness of environmental issues, much detail in the scale of forestry operations, and an intensive public debate on forestry. The planning and organization of Dutch forests requires a client-oriented, entrepreneurial, multidisciplinary, and skilled staff capable of dealing with a variety of interests and interest groups. Factors that inhibit this are:

- the increasing number of diverse demands and pressures on forests which often conflict;
- the high degree of organization in which almost every opinion or purpose is supported by a detailed network of associations, foundations and groups which pursue their aims in a continuous dialogue with each other;
- the increasing alienation of society from forest and nature, which has among others led to negative public reactions towards tree felling which in turn has influenced the harvesting of wood.
- a high diversity of forest owner types, with a increasing number of forest owners managing their forest from a hobby point of view;
- a lack of knowledge and experience and an attitude for entrepreneurship.
- the rather poorly developed forest chains, e.g. in recreation;
- the disappearance of the forest sector and the appearance of a nature sector (including forests) which makes forests and forest management less visible;
- the output-oriented subsidy system may prevent any further development of products/services by forest holdings;
- the diversity in owners and holding size combined with the wealth of the country has led to a large and increasing number of so-called "hobby forest owners", who manage their forest as a hobby;
- lack of knowledge and experience of forest owners, a lot of the (especially private) forest owners are male, relatively old and have a traditional lifestyle.

1. Consumption

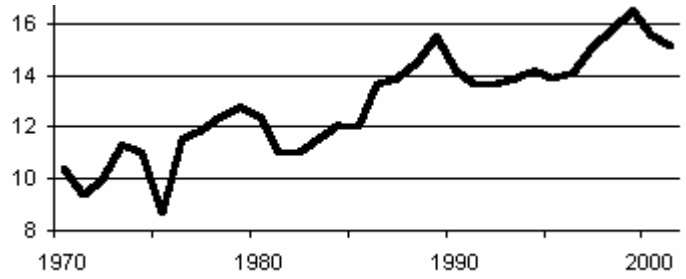
1.1. State of the art and historical development

At the end of the 19th century, the Dutch forests served only a limited number of functions: wood production, stabilisation of sand dunes and soil improvement. Additionally, for a small group of wealthy estate owners forests were a sign of prestige and important for hunting (Van Vliet, 1993; Oosterveld, 1997). Since the beginning of the 20th century forest functions have gradually diversified. Initially the nature function became more and more important (Van Koppen, 2002) and after WWII also the recreational and environmental functions of forests were acknowledged. At present the forests have a multiplicity of functions for Dutch society. The Long-term Forestry Plan of 1984 officially recognized the functions outdoor recreation, wood production, natural values and landscape quality (Ministerie van LNV, 1984). In the 1993 Forest Policy Plan environmental functions were added (Ministerie van LNV, 1993).

1.2. Forest products' and services consumption

Wood production

Wood production is one of the functions of the Dutch forests. Annually between 1.1 and 1.4 million m^3 of wood is harvested in the Netherlands. This is only 7-10% of the domestic wood consumption, imported from other European countries or from tropical countries (Probos, 2004). Sawn softwood imports for example come mainly from Europe, half of the sawn hardwood is imported from Malaysia. The Netherlands is nearly self-sufficient in paper production (FAO, 2004). Figure 1 gives an overview of the consumption of wood and wood products the last decennia. Figure 2 shows the consumption, production and trade per product.



Source: CBS and SBH, in Probos, 2004.

Figure 1. Consumption of wood and wood products in million m^3 from 1970-2000

NTFP's

Non-timber forest products only play a minor role; only Christmas tree production and horticultural greenery are of commercial interest. The collection of most non-timber forest products such as fruits or mushrooms are mainly recreational activities. Hunting provides on average only 7% of the income of forest owners; most Dutch people are not in favour of hunting (Schmidt et al., 2003).

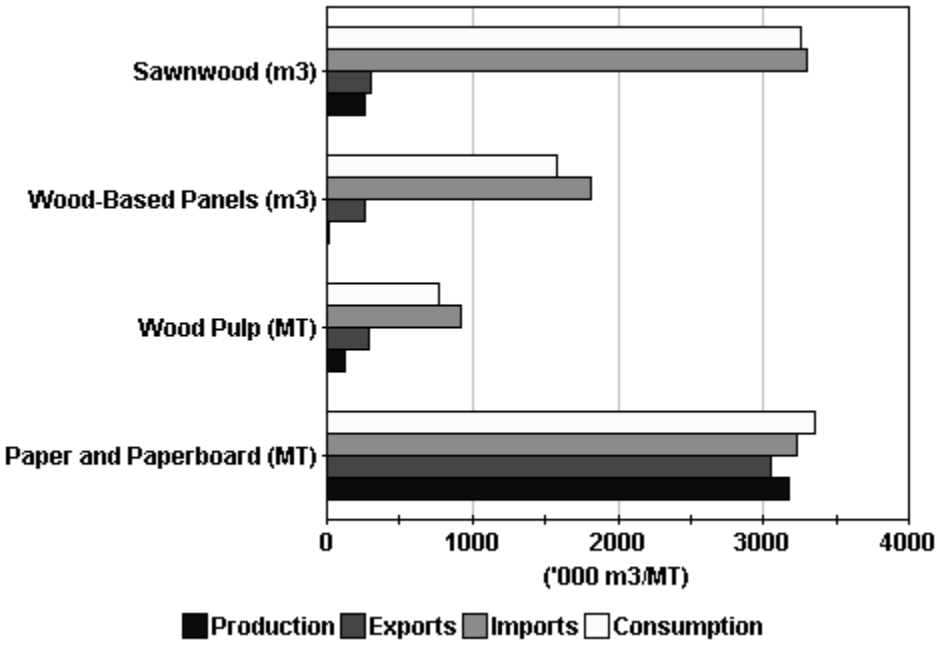


Figure 2. Consumption, production and trade in 2002 (FAO, 2004)

Recreation

Recreation is the most important active use of forest and nature in the Netherlands (CBS et al., 2003). The results of a national survey showed that the Dutch place a high value on the recreational function of forests. As a nation, at this moment around 200 million trips are made to the forest each year; an average of half a million a day. Three-quarters of the population go for a walk in the forests now and again, on average about twice a month. Older people and those who live close to the forest visit forests more frequently (Probos, 2004).

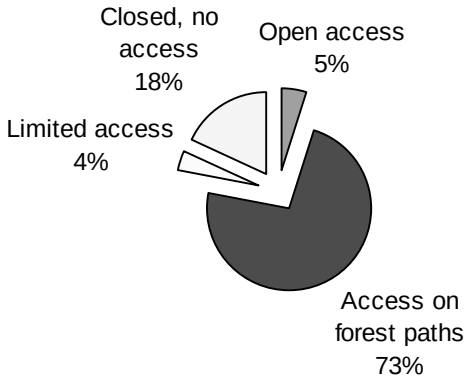
At this moment, about 82% of the forests are open to the public (Probos, 2004) (see Figure 3). A typical visitor goes to the forests to walk or cycle (90%). Other activities are nature research, jogging, walking the dog, sitting around and horse riding. Especially cycling has increased during the last years, the other activities remained the same. Visitors mainly see forests as places where nature can take its course (98%), where the air is purified (96%), and as a venue for recreation (87%). The most used facilities are footpaths, cycle tracks and parking places (CBS et al., 2003).

About 40% of the Dutch are of the opinion that there are not enough forests in their living environment. In the south-western part, in the western part and in the northern part of the Netherlands even 60% of the population feel that there should be more forests (CBS et al., 2003).

Nature

Nature functions of forests are highly valued. This is reflected by the fact that 25% of the total forest cover has a protected nature status and 14% of the non-protected forests are owned by private nature conservation organisations (Elands and Wiersum, 2003). The commitment of the Dutch population to nature (including forest) is determined

annually on the basis of (1) interviews and (2) statistics on the support of people to nature conservation, e.g. through membership of nature conservation organisations and voluntary work in nature conservation (Milieu- en Natuurplanbureau, 2003).



Source: Meetnet Functievervulling in Probos, 2004

Figure 3. Accessibility of Dutch forests

The interviews show that about 95% of the Dutch population considers the protection and conservation of (existing) nature as (very) important. About 75% supports also the development of new nature (CBS et al., 2003). Concerning the membership of the two largest Dutch nature conservation organisations (Natuurmonumenten and the Provincial Landscapes manage 16% of the forest area), after a period of growth the number has stabilized, with around 1 million persons being member of Natuurmonumenten and 250,000 persons having a membership of the Provincial Landscapes (Milieu- en Natuurplanbureau, 2003).

Volunteers are active in nature management (about 22,000 volunteers), nature education (about 16,000 volunteers), ecological monitoring and nature research (about 13,000 volunteers). The number of volunteers has stabilized during the last years (Milieu- en Natuurplanbureau, 2003).

Environmental functions

Forests fulfil different environmental functions, e.g. purification of water and air, shelter against wind and rain, provision of shadow and coolness. As regards carbon dioxide absorption, in 2000 the Dutch forests absorbed in total 68 million tonnes of carbon. Because of the annual net increment, this quantity has now grown by about 0,6 million tonnes. Per ha, the net sink is 2.2 tonnes of CO_2 per year. Another function of increasing importance is the improvement of the living environment of housing areas. In some areas, the vicinity of forests adds up to 10% to the value of real estate property, amounting to billions of guilders in total (Probos, 2004). The environmental functions of forests are increasingly acknowledged and sometimes also financially rewarded. For instance, recently electricity companies are occasionally funding afforestation as a means to sequester carbon-dioxide. Similarly, a water supply company has started a trial to compensate forest owners for switching from coniferous to deciduous species in order to decrease evaporation and thus to reduce parching (Filius & Roosenschoon, 1998).

1.3. Market demand for forest related products and services by urban population

The Netherlands are a small and densely populated country with a high level of urbanisation. Around 45% of the overall Dutch population lives inside the 20 main urban agglomeration (Elands and Wiersum, 2003). According to the OECD (2004) about 2/3 of the Dutch population lives in urban agglomerations, with an urbanisation grade of 90% in 2001. However, as all Dutch inhabitants can be typified as having an urban lifestyle, the whole population can be considered urban.

There is no information available on the specific demand for forest related products and services by the urban population. What is noticed is that people's attitudes to forests are predominantly shaped by the perception of forests as antipoles to urban areas characterized by naturalness and quietness (Elands and Wiersum, 2003).

1.4. Main problems and research questions in consumption for enterprise development

In the Netherlands, wood production plays a minor role. Although wood forms an important product consumed in large quantities by Dutch society, this is mainly imported from other European countries and from tropical countries. Although actions have been and are taken to stimulate Dutch wood production, the low prices and the weakly developed forest-wood chain combined with the negative public reactions from Dutch society towards tree felling have limited the amount of wood harvested from Dutch forests.

As regards the negative public reactions from a part of Dutch society towards tree felling, some people consider logging to be somehow wrong. This has to do with the increasing alienation of Dutch society from nature. At the same time, forest owners and forest managers have to deal with an increased social appreciation of forest combined with increased societal emancipation, meaning that peoples wishes and local initiatives play an increasing role in forest and nature conservation. Members of society call forest managers to account for their management. This has already led to several forestry conflicts in the Netherlands. This development indicates the need for forest managers to improve their skills in the area of communication, conflict handling, negotiation, etc.

The varied demands from different groups of forest users also have technical consequences for forests and forest management. There is, for instance a constant struggle for the space occupied by forests. Increased fragmentation of forests and consequent loss of nature value is a major concern. Other pressures are less threatening but have serious repercussions on forest management. Hunters for example want to maintain a high population of wildlife, while hunting is objected to by animal defence groups, thus affecting the practice of natural regeneration. So, whereas forest managers have to manage their forests towards an increasing number of functions, they also have to incorporate measures to counteract pressures.

Elands and Wiersum (2003) also observe the rather weak forest chains: "traditionally, the forest-wood chain is rather weakly developed" and "there is no forest-recreation chain with structural relations as a consequence of the government policy to subsidise forest owners for providing recreational facilities". These factors combined with the large influence of different NGO's (supported by a large electorate of members) on

policy setting as regards forest management, made Elands and Wiersum (2003) conclude that "social attitudes rather than market forces" are most influential in steering forest management in the Netherlands.

2. Small-scale forestry practises

In the Netherlands, all forestry can be considered to be small-scale forestry, irrespective of ownership category and holding size.

2.1. State of the art and historical development

At the end of the 19th century and the beginning of the 20th century, forest holdings managed their forest mainly from an economical point of view. Forests were mainly monocultures producing wood in order to gain a profit. Harvesting took place via the clear felling system (Probos, 2004). This system was supported by reforestation subsidies granted by the government (Schmidt et al., 2003). Gradually the view on the monoculture systems changed as it caused several difficulties, e.g. it delivered only one type of product and it was very sensitive to calamities as storm, fire and plagues. These factors combined with a decrease in wood prices and an increasing interest of society in the recreational and nature functions of forest made the forest sector think about other silvicultural systems (Probos, 2004). In the 1970's, the concept of multiple use was adopted in Dutch forestry. In the 1980's important changes in the silvicultural practice took place. The severe storms in the 1970's resulting in extensive areas of wind-blown stands were the last drop making the cup run over. The area of wind-blown stands was so large that immediate clearance and reforestation of all the stands was not possible. However, in many areas good natural regeneration took place. This proved that "natural regeneration was silviculturally possible as the ecological conditions had gradually evolved since the first plantations" (Schmidt et al., 2003). At the same time, specific silvicultural practices were developed to enhance the nature function of forest, e.g. the killing of trees by stripping a ring of the bark or the use of large grazing animals (Londo, 1991). As the "close to nature" forestry proved to be interesting for all the different stakeholders (forest managers, policy makers, nature conservationists, recreationists, etc.) the attention for this system increased. In the first half of the 1990's new silvicultural approach were adopted and developed, "Pro Silva" and "Integrated Forest Management" (*Geïntegreerd Bosbeheer*). Both systems are characterized by efforts to achieve a balanced combination of different forest functions, avoid risks and increase forest stability, use natural processes, and limit investments. In practice, they lead to increased use of natural regeneration, mixed stands, uneven-aged stands, and selective felling. Key-concepts of IFM are that both timber production, nature and recreation are pursued and that the use of natural processes is stimulated. It is estimated that at this moment about ¼ of the Dutch forest owners/managers apply IFM. An information program is established by the Ministry of Agriculture, Nature Management and Fisheries to promote IFM. At the end of the program (in 2005) at least 30% of the Dutch forest managers should apply IFM. This percentage should be extended to 70% in 2020 (Schulting and De Wolf, 2004).

2.2. Small-scale forest holdings

Table 5 and Table 6 show the forest area's distribution per ownership category and holding size class. The characteristics of the most important categories of owners,

- Staatsbosbeheer,
- municipalities,
- nature conservation organisations,
- private forest owners,

are described in the following.

(1) Staatsbosbeheer

At present, half of the Dutch forests are publicly owned. About 37% of this area is managed by Staatsbosbeheer (the National Forest Service) (Probos, 2004). Staatsbosbeheer is the governmental organisation managing the natural heritage in the Netherlands. Staatsbosbeheer used to be a state company, but is now an independent administrative body whose principal is the Ministry of Agriculture, Nature Management and Food Quality. Since Staatsbosbeheer's independence, annual agreements have been made with the ministry which list the objectives and the price at which these are to be realised. Besides agreements about management, agreements are also made as regards products and services in the field of information, education and socialisation. Staatsbosbeheer annually reports to the Ministry of LNV and to the parliament (Staatsbosbeheer, 2004).

(2) Municipalities

Municipalities own and manage about 16% of Dutch forests. Most of these forest are multifunctional, with a focus on nature and recreation. Because of the small size of some of the areas, a part of the municipalities has contracted out the management of their forests to the forestry groups or to other forest owners as Staatsbosbeheer and the Provincial Landscapes.

(3) Natuurmonumenten & Provincial Landscapes

About 16% of the Dutch forest area is owned and managed by nature conservation organizations as Natuurmonumenten and the Provincial Landscapes (Probos, 2004). Natuurmonumenten is the largest of these organizations with around 946,000 members, managing 88,398 ha of nature area (including forest areas). Natuurmonumenten is founded in 1905 and buys and manages nature areas in order to protect nature and cultural history. Main income sources for Natuurmonumenten are subsidies from the government, private funding and a National Lottery (Natuurmonumenten, 2004).

The 12 Provincial Landscapes manage around 90,000 ha of forest and nature area, supported by approximately 225,000 members. The Landscapes have been founded in the 20's and 30's and focus on the conservation, management and development of nature on a provincial and local level (Landschappen, 2004).

(4) Private forest owners

Private owners account for about 1/3 of the total forest area and can be found in all size groups. Two groups can be distinguished, owners with (equal to or) more than 5 ha forest land and owners with less than 5 ha of forest land. The latter group is not registered and exact information about this group is not available. Considering the private owners with more than (or equal to) 5 ha, Table 1 gives an overview of the average cost and benefits for all private forest holdings. The table shows that forest owners depend to a large extent on subsidies: in 2002 56% of the income was from subsidies. Only 21% were related to the wood production function.

Table 1: Average cost and benefits (Euro per ha) for all forest holdings with areas larger than 5 ha

	2000	**20001**	**2002**
Benefits	191	164	188
Sales of wood	45	42	39
Subsidies 'Programma Beheer'	67	71	69
Other subsidies	44	16	37
Hunting	12	11	11
Other (e.g. Christmas trees)	23	24	31
Cost	251	220	261
Overhead	73	68	75
Labour	38	36	39
Third parties	76	51	78
Production	20	18	18
Insurances	29	31	34
Other	16	16	18
Result	-59	-56	-73

Source: Berger et al. 2003

2.3. Small-scale forestry practices

As stated in 2.1. recently new forest management concepts have been introduced in the Netherlands. The Integrated Forest Management approach has been enthusiastically welcomed by a large part of the forest sector. The aim of the IFM approach is a better fulfilment of forest functions by integration the different functions (Filius, 1996). IFM is a form of management which tries to use natural processes as much as possible leading to uneven-aged forests with a mix of species, natural regeneration and small-scale structure.

The basic conditions of IFM are (Province of Gelderland, s.a.):

- small-scale felling where possible (not more than 30 ares);
- natural regeneration where possible;
- more horizontal and vertical structure (clearings, forest floor vegetation, brush and bushes, various stages of development in close proximity to one another);
- mixing with indigenous species (30%);
- large proportion of standing or falling dead trees, preferable thick (5% of timber stock);
- old forests with substantial old trees (60 cm or more).

Another management concept that has come forward in the Netherlands is the Pro Silva movement. Pro Silva aims at timber production in a more natural way; the ecological

function is stimulated in order to serve the timber production function (Filius, 1996). Although both systems are still being developed, they are already widely used by the National Forest Service, provincial, communal and private forest owners. One of their attractive features is that they require less investment than the clearcut system and the replanting systems they replace (Oosterveld, 1997).

2.4. Policy framework and production conditions

The involvement of the Dutch government with forestry starts at the end of the 19th century. The social and economic benefits of forests became gradually acknowledged and there was a growing support for government action in sustaining forest resources. Through the National Forest Service (founded in 1899) public money was used for the purchase of forest and nature reserves and for the afforestation of unproductive land. Additionally, financial support and advice was given to public bodies for similar activities. In 1922 the first Forest Law was enacted. This law safeguarded the forest land base and protected the natural beauty of forests and woodlands. Fiscal measures were taken to support private forest enterprises and afforested country estates (Schmidt et al., 2003).

In the 20th century gradually recreation and nature became more and more important functions of forests. The closure of the coal mining industry, which was a major outlet for inland timber, meant a detoriation of the financial situation of forest owners. The Industrial Board for Forestry urged the government to come with a more regular support to forest owners. Moreover, the board presented some thorough proposals for a Dutch forestry strategy, putting forestry firmly on the political agenda. As a result, in 1977 the Ministry of Agriculture and Fisheries issued a sector study on forests and forestry as a contribution to the national rural planning debate (Ministerie van Landbouw en Visserij, 1977).

In 1984, a major national forestry policy statement was published by the Ministry of Agriculture, Nature Management and Fisheries (in 1990 the name of the ministry was changed to include nature management): the Long Term Forestry Plan. This plan was a reaction on the sector study and reflected society's understanding of how to deal with forestry. The document was followed by the National Forest Policy Plan of 1993 which was based on the results of the evaluation of the Long Term Forestry Plan (Schmidt et al., 2003).

The most recently policy framework as regards Dutch forests is formulated in the document "Nature for People, People for Nature", published by the Ministry of Agriculture, Nature Management and Fisheries in 2000. This document integrates all issues relating to nature, forests and landscape. In this plan, forests in the Netherlands are mainly considered from a nature oriented perspective. The most important policy objectives for forests are (Ministerie van LNV, 2000):

- protection of the forests;
- fulfilment of as many function possibly and meeting the societal demands;
- afforestation;
- more natural forests.

The tools for implementation of the policy plans fall within three major categories:
- legal instruments;
- financial instruments;
- communicative framework.

Legal instruments

The most important legal instruments of Dutch forest policy include (Elands and Wiersum, 2003):
- The Forest Law: influential in the conservation of existing forest areas, it ensures that no forest area is lost by stipulating the obligation to reforest cut forest areas.
- The Nature Protection Act: aims at stimulating nature and landscape protection through acquisition and management obligations.
- Estates act: stimulates forest management and afforestation on estates to ensure aesthetic and recreations values.
- Flora and Fauna Law: aims at the protection of plant and animal species by (1) forbidding practices that are harmful for protected animals or plants and by (2) designating specific areas/objects as protected.
- The Land Use Planning Act: stipulates regulations concerning land use planning, including measures for land-use zoning for forestry, nature, outdoor recreation and cultural history.

Financial instruments

The management of forest areas in the Netherlands depends to a certain extent on public financing. In the Netherlands, about 50-60% of the total revenues of private forestry enterprises are accounted for by subsidies (Blum and Schanz, 2002; Blum and Hoogstra, 2004) (see Table 1).

In 2000, the Dutch subsidy system changed from an input oriented scheme to an output oriented scheme. Input-oriented refers to the public financial support of forest enterprises justified by the assumption of a corresponding stream of societal benefits from forestry to society. Output-oriented refers to defined payments for specified beneficial outputs of forestry (goods and services) by use of public budgets (Blum and Hoogstra, 2004). The new subsidy scheme (the so-called management programme) is a performance-related subsidy for the management of (agricultural) nature, forests and landscape elements and aims at (Hoogstra and Van Blitterswijk, 2002; Blum and Hoogstra, 2004):
- development of a national network for forest and nature areas;
- further integration of the management of forests, nature and landscape;
- stimulation of both agricultural nature management and nature management;
- stimulation of different types of forest and nature owners/managers.

Subsidies are granted for fixed nature conservation targets which have been set by the government. These targets specify the quality criteria to be met by the owner in order to receive the grant. The owner is free to deploy his own expertise in order to achieve the target (Hoogstra and Van Blitterswijk, 2002).

Network instruments

Network instruments include education, research and advice, assisting forest owners and the forestry sector at large.

2.5. Supporting and limiting factors for enterprise development in small-scale forestry and barriers to entrepreneurship

In the Netherlands, one can see a gradual disappearance of the forest sector, especially on the national level (Verbij, 2004). Due to the multifunctional approach in landscape, forestry is increasingly "incorporated within the broader context of the social appreciation for nature conservation" (Schmidt et al., 2003). This is demonstrated by the recent policy framework "Nature for People, People for Nature", which integrates all issues relating to nature, forests and landscape. In this plan, forests in the Netherlands are mainly considered from a nature oriented perspective.

Subsidies form the most important income source for (private) forest owners. However, these subsidies may prevent any further development of products/services by forest holdings. For example, the government policy to subsidise forest owners for providing recreational facilities has prevented a further development of the forestry-recreation chain in the past.

A supporting factor is the tax-situation for forest holdings. Forest holdings in the Netherlands do not have to pay income tax for their holding. This does not only apply to the wood production function but also for other products and services developed within a holding.

3. Forests and ownership

3.1. State of the art and historical development

Forest (*bos*) is defined as a land area covered with trees or bushes with an area of at least 0.5 ha and a minimum width of 30 m (Anonymous, 1995). The Netherlands currently have a total forested area of 339,000 ha (about 10% of its land area, see Table 2). This is approximately 200 m^2 of forest per person.

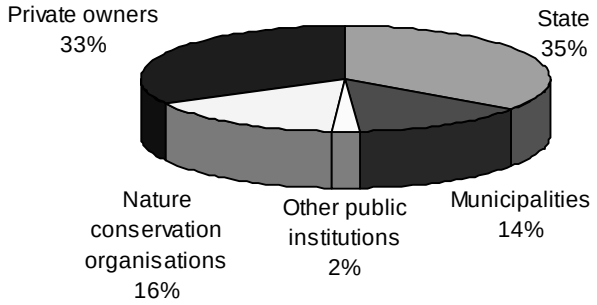
Table 2. Land use in the Netherlands (CBS, 2000)

Land use categories	
Agriculture	56%
Infrastructure and buildings	11%
Water	17%
Nature	3%
Forest	10%
Recreation areas	2%
Remaining	1%

Over the past 170 years, the total area of forest in the Netherlands has grown by more than 90% (Natuur Compendium 2003, 2003). In 1900, only 3-4% of the Netherlands was forest.

The ownership of the Dutch forests is rather diverse, partly for historical reasons. Until the end of the 19th century most of the forests were private property. Increasing

industrialization caused an increasing demand for high quality wood. Forestry adapted to this development and investments in forestry were attractive for both public and private money. Uncultivated areas were afforested both by the state (National Forest Service) and by private persons. At the beginning of the 20th century nature conservation started to rise and the first nature conservation organizations were founded. Some of these organizations also purchased forests. From the 1960's, a falling demand for timber combined with increasing cost for recreation and nature conservation caused that the management of forests was not longer an attractive proposition. Inheritance taxes were sometimes so high that owners preferred to sell their property to the National Forest Service or to one of the nature conservation organizations. This situation lasted until the early 1990s (Al en Kuiper, 2003).



Source: Meetnet Functievervulling Bos in Probos, 2004

Figure 4. Forest ownership in the Netherlands

At this moment about 120,000 ha of the total forest area (33%) is in private hands. Half of this area consists of forest areas of 5 ha or less, owned by approximately 30,000-40,000 private owners. About 50% of the forest area is the property of public bodies, e.g. state, municipalities and other public authorities. The remaining 16% is owned by nature conservation organizations (Meetnet Functievervulling Bos in Probos, 2004). Figure 4 illustrates the ownership situation.

3.2. Forest resources

Although forests have always been the natural vegetation in most parts of the country, there is in fact no natural forest left, the last having been felled in 1868. Virtually all the current woodland has been planted by man, with only a small percentage resulting from spontaneous regeneration (Al and Kuiper, 2000).

More than half of the Dutch forests (57%) have coniferous trees as main tree species, mostly Scots pine, Douglas fir, larch and Norway spruce. The remaining area consists of stands with deciduous trees (oak, beech, birch and poplar) as main tree species. About 1/3 of the forest area is mixed forest. Table 3 gives an overview of the areas of deciduous, coniferous and mixed forests (based on the main tree species). When comparing the current areas with the situation 20 years ago, it can be concluded that the area of mixed deciduous/coniferous forests and mixed deciduous forests have increased, while the area of (un)mixed coniferous forests has decreased. The reason is that more and more endemic broadleaved trees are favored and coniferous forests are succeeded by deciduous forests (Probos, 2004).

Table 3. Areas of deciduous, coniferous and mixed forests

Type of forest	Hectares	Percentage
Unmixed deciduous forest (<20%)	64,385	21.8%
Mixed deciduous forest	44,240	15.0%
Deciduous forest mixed with conifers	20,935	7.1%
Unmixed coniferous forest (<20%)	88,875	30.1%
Mixed coniferous forest	16,985	5.7%
Coniferous forest mixed with deciduous trees	42,265	14.3%
Open/young forest	17,775	6.0%
Total	295,460	100%

Source: Meetnet Functievervulling Bos in Probos, 2004

Over the last 20 years, not only the composition (tree species) of the Dutch forests changed, also the structure altered: Dutch woodlands grow older. Surveys of tree diameters clearly show this (see Table 4).

Table 4. Tree diameters during the last 20 years (Probos, 2004)

Maximum dbh	1984	1990	1994	2002
20-40 cm	136,796	136,393	135,952	116,639
40-60 cm	44,481	54,695	63,513	83,257
>60 cm	7,901	9,480	11,747	20,069

The standing stock in the Netherlands amounts to more than 58 million m^3 (or 198 m^3 per ha). In 1992 these figures were 48 million m^3 of standing stock, with 161 m^3 per ha. This increase has to do with a shift in the focus of forest managers: recreation and nature has become more and more important and the application of the IFM system has lead to longer rotations and an increased mean age (Ministerie van LNV, 2003). It is expected that the increase will continue the coming years.

As regards the macro-economic significance of Dutch forests, the number of people working directly or indirectly in the production, harvesting and processing of forest products and services is 42,500. For forest holdings and direct suppliers this is equal to 1 job per 200 m^3 harvested wood. For the whole chain, this is 1 job per 300 m3 harvested wood. The total turnover of the forest and timber sector is around 5 billion euro. However, as 90% of the wood is imported, the part of the total turnover that is directly related to the harvest and processing of native wood is about 230 million euro (Probos, 2004).

3.3. Forest ownership

Although forests are officially defined as having a minimum size of 0.5 ha, for practical policy purposes 5 ha is often considered to be a minimum size. For instance, only holdings with areas above 5 ha are registered by the Dutch Industrial Forestry Board ("Bosschap"). Therefore, the exact number of Dutch forest holdings (including holdings with 5 ha or less) is unknown. Detailed information is available about the ownership situation of holdings of 5 ha or more (see Table 5, Table 6).

In order to support forest owners who not always have the necessary time, expertise and experience to manage their property themselves, so-called Forest Support Groups have been established. A Forest Support Group is a co-operative with the objective to promote the interests of its members. Among the members are private owners, nature conservation organizations and municipalities. Activities include the management of forest areas, the sale of timber, support in subsidy applications, provision of information. The Forest Support Groups are regional groups with an umbrella organization which has contacts with the government, research institutes and major consumers of timber. At this moment, the Forest Support Groups have in total 1100 members, representing about 196,000 ha forest and nature area.

3.4. Main problems and research questions in forest resources and ownership for enterprise development in the forest sector

One of the limiting factors on entrepreneurship in the Netherlands is the diversity in owners and holding size combined with the wealth of the country. A large and increasing number of forest owners are so-called “hobby owners”, where forestry is not seen as a business which should provide an income. These owners are not interested in enterprise development as their forest is a leisure activity, sometimes even an extension of their garden (Hoogstra and Flier, 2004).

For other owners, the management of multifunctional forests requires also a client-oriented, entrepreneurial, multidisciplinary, and skilled staff capable of dealing with a variety of interest groups. The question is if Dutch forest managers have this knowledge and experience. A lot of the (especially private) forest owners are male, relatively old and have a traditional lifestyle.

Table 5. Type of owners related to forest size (size > 5 ha) (Bosschap, 2003)

	Size categories (hectares)							
	5-25	**26-50**	**51-100**	**101-250**	**251-500**	**501-1000**	**> 1000**	**Total**
Private owners	896	170	121	62	25	11	2	1287
Municipalities	99	40	46	54	29	14	6	288
Provinces	2	1	2	4	1	1	0	11
National Forest Service	0	0	0	0	0	0	1	1
State (other)	4	1	1	1	0	0	4	11
Water authorities	5	2	2	4	0	0	0	13
Nature conservation org.	1	0	2	1	1	0	8	13
Corporations, associations	82	28	14	10	1	4	3	142
Recreation boards	7	5	8	4	1	0	0	25
Water companies	3	0	2	0	3	0	2	10
Total	1099	247	198	140	61	30	26	1801

Table 6. Type of owners related to forest size (size > 5 ha) (Bosschap, 2003)

	Size categories (hectares)							
	5-25	**26-50**	**51-100**	**101-250**	**251-500**	**501-1000**	**> 1000**	**Total**
Private owners	10404	6124	8387	9033	8540	7218	3004	52710
Municipalities	1433	1510	3117	8528	10169	8665	8868	42290
Provinces	32	47	159	659	251	550	0	1698
National Forest Service	0	0	0	0	0	0	85471	85471
State (other)	46	29	80	222	0	0	21580	21957
Water authorities	80	96	167	608	0	0	0	951
Nature conservation org.	17	0	185	182	348	0	45201	45933
Corporations, associations	1067	1047	919	1614	252	2841	5119	12859
Recreation boards	88	165	570	700	252	0	0	1775
Water companies	55	0	148	0	980	0	2723	3906
Total	13222	9018	13732	21546	20792	19274	171966	269550

Bibliography

Berger, E.P., J. Luijt en M.J. Voskuilen, 2003. Bedrijfsuitkomsten in the Nederlandse particuliere bosbouw over 2002. *Financial results of Dutch private forest owners in 2002*. Den Haag: Landbouw Economisch Instituut. In Dutch.

Blum, A. and M.A. Hoogstra, 2004. Das 'programma Beheer' - von der flächenorientierten zur ergebnisorientierten finanziellen Förderung. In: *Forst und Holz*,

Centraal Bureau voor de Statistiek, Rijksinstituut voor Volksgezondheid en Milieu, Stichting Dienst Landbouwkundig Onderzoek, 2003. *Natuurcompendium 2003: de natuur in cijfers. Nature compendium 2003: nature in figures.* Voorburg, etc.: Centraal Bureau voor de Statistiek, etc. In Dutch.

Elands, B.H.M. and K.F. Wiersum, 2003. *Forestry and rural development in the Netherlands. Research results and policy implications of case studies in Ede and Stadskanaal.* Wageningen: Wageningen University. Forest and Nature Conservation Policy Group. Nature/Forest in society, report 2003-03.

FAO, 2004. FAO forestry. Country profiles - trade and statistics. *http://www.fao.org/forestry/foris/webview/forestry2/index.jsp?siteId=4961&sitetreeId=22052&langId=1&geoId=140* Accessed 27 September 2004.

Filius, A.M., 1996. Integrated Forest Management: The Old Wine of Multiple Use Management in a New Skin? In: *Journal of Forest Economics*, vol. 2, no. 3, p. 203-204.

Filius, A.M. and O.R. Roosenschoon, 1998. Tree species conversion to diminish forest's water use – financial consequences of a controversial forest management practice in the Netherlands. In: *Journal of Forest Economics*, 4, p. 85-101.

Milieu- en Natuurplanbureau, 2003. *Natuurbalans 2003. State of nature 2003*. Bilthoven: Rijksinstituuut voor Volksgezondheid en Milieu.

Hoogstra, M.A. and H. van Blitterswijk, 2002. Financial Forestry Policy Instruments in the Netherlands - Two examples. In: Ottisch, A.; Tikkanen, I.; Riera, P. (eds). *Financial Instruments of Forest Policy*. Joensuu: European Forest Institute. EFI Proceedings no 42

Hoogstra, M.A. and D. Flier. Kleine boseigenaren in Nederland. Leefstijlen en beheer. In: *Vakblad Natuur, Bos en Landschap*, vol. 1, no. 4, p 21-24.

Konijnendijk, C.C., 1997. Urban forestry policy-making in the Netherlands: a matter of shared responsibility. In: I. Tikkanen, P. Glück and B. Solberg (eds.). *Review of forest policy issues and policy processes*. Joensuu: European Forest Institute. EFI proceedings 12, p. 51-58.

Londo, G., 1991. *Natuurtechnisch Bosbeheer. Nature technical forest management.* Wageningen: Pudoc. Natuurbeheer in Nederland vol. 4. In Dutch.

Mantau, U., M. Merlo, W. Sekot and B. Welcker, 2001. *Recreation and Environmental Markets for Forest Enterprises*. Wallingford: CABI Publishing.

Ministerie van Landbouw, Natuurbeheer en Visserij, 1984. *Meerjarenplan Bosbouw. Long Term Forestry Plan.* 's-Gravenhage: Ministerie van Landbouw, Natuurbeheer en Visserij. In Dutch.

Ministerie van Landbouw, Natuurbeheer en Visserij, 1993. *Bosbeleidsplan: regeringsbeslissing. Forest Policy Plan.* 's-Gravenhage: Ministerie van Landbouw, Natuurbeheer en Visserij. In Dutch.

Natuurmonumenten, 2004. Natuurmonumenten – jaarverslag. http*://www.natuurmonumenten.nl/extra/downloads/jv_nm_2003.pdf* Accessed October 2004.

Oosterveld, H.R., 1997. *Forests in densely populated areas: forest management in a complex society, the Dutch case*. Antalya: XI World Forestry Congress.

Probos, 2004. Nederlands Bos in Beeld – digitaal. Dutch forest in the picture – digital. *http://www.probos.net/bosdigitaal/* Accessed: September 2004.

Province of Gelderland, s.a. *Forestry and Nature. Integrated Forest Management Project*. S. n.: Province of Gelderland.

Schmidt, P., E. Kuiler, F. Wiersum, B. Filius and S. van Bommel, 2003. The Netherlands. *http://gis.joensuu.fi/silva/News/Files/Publications/Updates/Netherlands% 20Update.pdf* Accessed September 2004.

Schulting, R. and R. de Wolf, 2004. *Enquêteresultaten vooronderzoek. Communicatieproject Geïntegreerd Bosbeheer. Houding en ervaring van Nederlandse bosbeheerders en boseigenaren ten aanzien van geïntegreerd bosbeheer. Results of interviews Informationproject Integrated Forest Management. Attitudes and experiences of Dutch forest managers and forest owners as regards Integrated Forest Management*. Goor: Eelerwoude Ingenieursbureau. CGB-Rapport 1. In Dutch.

Staatsbosbeheer, 2004. Staatsbosbeheer. *http://www.staatsbosbeheer.nl/* Accessed October 2004.

Van Koppen, K., 2002. *Echte natuur: een sociaaltheoretisch onderzoek naar natuurwaardering en natuurbescherming in de moderne samenleving. Real nature: a social-theoretical research on nature valuation and nature protection in the modern society*. S.l.: s.n. In Dutch.

Van Vliet, C.J.M., 1993. Country reports: Netherlands. In: G. Beaufoy (ed.). *Using EC measures to promote multipurpose forestry. A report to the Countryside Commission from IEEP. Volume II.* London: Institute for European Environmental Policy. p. 25-36.

Verbij, E.E.M., 2004. *The quest for inter-sectoral coordination in light of evolving policy structures*. Paper for The international symposium: The evaluation of forest policies and programmes, Epinal, 27 June – 3 July 2004. To be published.

Annex A: Organisations studying forest products' consumption and main publications and information sources.

- Centraal Bureau voor de Statistiek (Statistics Netherlands)
  http://www.cbs.nl/en
- FAO Forestry
  http://www.fao.org/forestry/index.jsp
- Pro-forest Foundation (Stichting Probos)
  http://www.probos.net/index.php?cat=home&top=english&frames=
- Wageningen University and Research Centre
  - Forest and Nature Conservation Policy Group
    http://www.dow.wur.nl/UK/cl/org/fnp
  - Socio-Spatial Analysis Group
    http://www.dow.wur.nl/UK/cl/org/sal/
  - Alterra - Research Institute for the Green Living Environment
    http://www.alterra.wur.nl/UK/Home.htm
  - Agricultural Economics Research Institute LEI
    http://www.lei.nl/uk/
- Leisure Innovation Centre (Stichting Recreatie)
  http://www.stichting-recreatie.nl/english/index.html
- Association for Inland Wood (Algemene Vereniging Inlands Hout)
  http://www.avih.nl/ (only in Dutch)
- Wood Centre (Centrum Hout)
  http://www.centrum-hout.nl/
- Face Foundation (Stichting Face)
  http://www.stichtingface.nl/
- Milieu- en Natuurplanbureau (Environmental Assessment Agency)
  http://www.rivm.nl/en/overrivm/Milieu_en_Natuurplanbureau.jsp
- Rijksinstituut voor Volksgezondheid en Milieu (Research for Man and Environment)
  http://www.rivm.nl/en/
- Staatsbosbeheer (National Forest Service)
  http://www.staatsbosbeheer.nl/pagina.asp?id={0913CA5D-27E1-4A98-804A-92A9C704AFDA}

Annex B: Organisations studying small-scale forestry and main publications and information sources.

- Pro-forest Foundation (Stichting Probos)
  http://www.probos.net/index.php?cat=home&top=english&frames=
- Wageningen University and Research Centre
  - Forest and Nature Conservation Policy Group
    http://www.dow.wur.nl/UK/cl/org/fnp
  - Alterra - Research Institute for the Green Living Environment
    http://www.alterra.wur.nl/UK/Home.htm
  - Agricultural Economics Research Institute LEI
    http://www.lei.nl/uk/
- Milieu- en Natuurplanbureau (Environmental Assessment Agency)
  http://www.rivm.nl/en/overrivm/Milieu_en_Natuurplanbureau.jsp
- Rijksinstituut voor Volksgezondheid en Milieu (Research for Man and Environment)
  http://www.rivm.nl/en/
- Staatsbosbeheer (National Forest Service)
  http://www.staatsbosbeheer.nl/pagina.asp?id={0913CA5D-27E1-4A98-804A-92A9C704AFDA}
- Ministerie van Landbouw, Natuurbeheer en Voedselkwaliteit (Ministry of Agriculture, Nature management and Food Quality)
  http://www9.minlnv.nl/servlet/page?_pageid=163&_dad=portal30&_schema=PORTAL30
- Federation of Forest Support Groups (Unie van Bosgroepen)
  http://www.bosgroepen.nl/ *In Dutch*
- Federatie Particulier Grondbezit (Association for Private Landownership)
  http://www.grondbezit.nl/ *In Dutch*
- Natuurmonumenten
  http://www.natuurmonumenten.nl/ *In Dutch*
- Provinciale Landschappen (Provincial Landscapes)
  http://www.landschappen.nl/ *In Dutch*

Norway

Lunnan, A. - Barstad, J. - Mitchell-Banks, P. - Nyrud, Q. A. - Størdal, S. - Vennesland, B.

Anders LUNNAN,
Skogforsk, Høgskoleveien 12, 1432 Ås, Norway.
Phone: + 4764947500. E-mail: anders.lunnan@skogforsk.no

Johan BARSTAD,
Møreforsking Volda, Postboks 325, 6101 Volda, Norway.
Phone: + 47 70075212, Fax : +47 70075201, Mobile : +47 92037327, E-mail: jb@hivolda.no

Paul MITCHELL-BANKS,
Møreforsking Volda, Postboks 325, 6101 Volda, Norway.
Phone: + 47 70075229, Fax : +47 70075201, Mobile : +47 47076094 E-mail: pmb@hivolda.no

Anders Quale NYRUD,
Dep. of Ecology and Natural Resource Management, Box 5003, 1432 Ås, Norway.
E-mail: anders.qvale.nyrud@ina.nlh.no

Ståle STØRDAL,
Eastern Norway Research Institute. Boks, 2626 Lillehammer, Norway.
Phone: +47 61265716, Fax: +47 61254165, Email: ss@ostforsk.no

Birger Vennesland,
Skogforsk, Høgskoleveien 12, 1432 Ås, Norway.
Phone: + 47 64947500. E-mail: birger.vennesland@skogforsk.no

Summary

Up to ca. 1960, the forest sector was the largest export sector in Norway. Since then its importance has decreased, until in 2003 the export value totalled only 2.5% of the export sector. The import of forest products constituted a relatively higher share of the total import value than the export (about 3.3%). Pulp and paper, mainly newsprint, is the most important export product. The annual cut has declined 30 per cent over the last decade and in 2003 totalled about 7.5 million cubic metres. The reasons for this decline are not fully understood, but changes in ownership structure, low unemployment rates and good job opportunities outside of the forest sector and the abolition of cost-share programs are certainly some of the explanation. Private non industrial owners own 78.5% of the forest area and the average size of a forest property is 57 hectares. Almost all fellings are certified, and there is an intensive ongoing debate on the need for protection of a larger forest area. There is a large potential for developing non-wood products and services, and the forest owners association have companies and organisations dealing with this. There is a demand from both domestic and foreign customers for non-wood products and services but the co-operation with the domestic tourist industry still has to be improved to co-ordinate this effectively.

There is a weak entrepreneurship culture in the forest products industry, with a few regional exceptions. The culture is mainly production oriented and market competence and international orientation is needed. Compared with other industries in Norway the level of education is low in the forest products industry. A large public program was

started in 2002 to stimulate innovation and competence building activities in the forest products sector.

1. Consumption

1.1. State of the art knowledge and historical development

Norway has long traditions for using wood as the main material for construction. There is a total of 1,387,000 residential buildings in Norway. 79% of these are detached houses, of which more than 90% of them are built exclusively of wood. Houses with two dwelling units constitute 9% of all residential buildings, the same percentage as the category 'semi-detached' houses and houses with three or four dwellings". Wood is also to a large degree used in other kinds of buildings than residential houses.

There are considerable research efforts aiming at the use of wood for new purposes. One success story is the new use of laminated wood by the Moelven Group). The largest wooden bridge (the 182 metre long Flisa Bridge (Article on Flisa Bridge construction, Photo of Flisa Bridge under construction, Photos of other wooden Norwegian bridges including Flisa Bridge) the "Vikingskipet" (Viking Ship) speed skating arena built for the Olympic Games in 1994 (Photo revealing design to look like the bottom of a Viking Longboat) and the new Oslo Airport at Gardermoen (Some photos of Gardermoen and its wooden elements) are all examples of implementation of this new technology. There are relatively large research programs going on aiming at the increased use of wood for building purposes, in the fishing industry and other applications.

Considering non-wood products and services (NWFP&S), they traditionally used to be important in Norwegian society. In the farming communities grazing, the collection of fodder etc. constituted a significant part of input to the farms. The picking of berries and mosses were used as a means for monetary income into for the farming households as well as contributing to the household livelihood. As Norwegian society in general and farming households have evolved from an agrarian livelihood to more urban lifestyles, the NWFP&S, apart from hunting and fishing, gradually lost their importance. Today we can observe an increased interest in NWFP&S, as they are considered a possible vehicle of increasing rural economic activity.

1.2 Forest products' and services consumption

There are some 369,000 holiday homes in Norway, most of them owned by urban residents, and almost all of which are built from wood. The annual growth rate in the number of holiday homes over the last decade has been 2-3%. The trend for holiday homes is of growth in size with some of them being quite luxurious. The fastest growth is found around the ski resorts. A large number of the holiday homes are built from logs, which over the last decade has created a new rural-based industry. This industry is, however, quite labour intensive and there is considerable competition from low cost countries. Some Norwegian companies have also outsourced some of their activities to Latvia and Lithuania.

Several authors have been estimating the value of moose hunting in Norway. Henriksen and Storaas (1999) make a review of these studies and find that the yearly economic value of moose hunting is in the range of 60 million euros. Traditionally there has been

a conflict between urban and rural population concerning hunting and fishing. In many communities the local population pays less for hunting and fishing than hunters from the cities and towns. Gradually commercialisation of hunting and fishing is becoming more accepted as a rural industry.
Annual statistics on the total fellings are published yearly by Statistics Norway and roundwood balances and forecasts are published by the Norwegian Institute of Land Inventory (NIJOS). Statistics on home consumption at the farms and statistics on consumption of fuelwood is available but are not very reliable. Statistics on the export/import and consumption of forest products are also available. There are no statistics available about urban/rural consumption of forest products.

1.3. Summarize what are the main problems and research questions in consumption for enterprise development in the forest sector (incl. Wood processing, non-wood utilisation and services)

Some challenges:

- Consumer preferences for wood products versus the major substitutes. There are some studies available, but consumer tastes are changing. This could also include a monitoring system for consumer preferences. One way of studying this would be the use of experiments, which are widely used when studying preferences for food. Another is future forecasting and trend-analysis as is common in general consumer-studies
- Establishment of a better statistical database which can be used when new businesses make their market plans, this concerns both wood and non-wood forest products
- Co-operation between architects, engineers and economists in studying the competitiveness of wood as a raw material for different uses
- Market studies of the demand for non-wood products, both domestic and international customers
- Need for increased co-operation between the research institutes and universities in Norway
- Partnerships between timber based and non-timber based forest users

1.4 Annex to PART A: Organisations studying forest products' consumption and their speciality. Main publications and information sources on forest products' consumption in the country.

There are not many organisations that specialise in studies on forest products consumption. The Norwegian University of Life Sciences (previously known as the Agricultural University of Norway), Department of Natural Resource Management Available only in Norwegian provides research related to their M.Sc. program on Forest Industrial Economics. Some other research institutions have some single projects related to this topic. Statistisk sentralbyrå (Statistics Norway) has some data available but has not done any studies on this topic as an organisation. Some industrial organisations have some relevant activity going on, such as Treindustrien (The Norwegian Sawmill Industries Association, *some English available*) and Trefokus)Wood Focus Norway, *available only in Norwegian*).

2. Small-scale forestry practises[1]

2.1. State of the art and historical development

Small-scale forestry in Norway, as well as the domestic forest sector in general, is undergoing a significant transition attempting to achieve a greater degree of capability in adjusting to the new conditions. The structure with many small and fragmented properties is challenging both to the development of forest policy and to practical forestry as well as to research priorities. The real price of timber today is only half of what it was in the 1950's. The last decades generally have demonstrated decreasing activity in forestry, and investments in forest roads and silvicultural activities. The state of forest ownership has shown to be in transition: fewer owners combine forestry and agricultural production; larger forest properties tend to harvest more often than smaller ones; and an increasing number of the forest owners work and live away from their properties. A significant development was reached in 1996 when on the average farm, earnings from work outside the farm became more important than net income from the farm itself. In sum these developments put new demands on small-scale forestry practices in Norway.

2.2. Small-scale forest holding

There are approximately 120,000 forest properties in Norway that are potential suppliers of timber, a number that has been fairly stable over the last decades. Most of them are small, non-industrial farm woodlots. The average size of the productive forest area in the forest properties is 57 hectares. However, more than half the number of properties hold less than 25 hectares of productive forestland, and they constitute just over a tenth of the total productive forest area. Only one per cent of the forest owners owned more than 500 hectares of productive forest, while all of these areas made up almost a third of the productive forest area in Norway.

44 per cent of all forest owners also farmed in 1999, and they owned 43 per cent of the productive forest area in Norway. The number of combined farm-forest owners has dropped in the last 20 years, while the overall number of forest owners has remained fairly constant. The drop in the number of combined farm-forest owners indicates a decrease in active forestry for these areas as historically the forestry activities and farming have been closely linked.

Table 1. Number of forest properties and the share of farm-forests (Statistics Norway, 2001).

	1979	**1989**	**1999**
Forest properties (>2,5ha), total	120,930	125,522	120,471
Forest properties with agricultural area in use. (%)	62%	53%	44%

[1] As will be revealed non-industrial landowners, often in combination with agricultural production, own most of the forest properties in Norway. Statistics for harvesting, investments etc. do not distinguish between ownership groups. But since farm-forestry is so common the figures for development in forestry will be almost fully compatible to small-scale forestry practices.

Non-industrial private forest owners (NIPFs), including farm forests, hold 97% of the forest properties while they own 78% of the forest area. The size and structure of the NIPF holdings have been stable the last decades and forestry in combination with agriculture has traditionally been important for the economy in farms.

Table 2. Number and size of forest properties divided in ownership groups, 1989

	Properties		**Forest area**	
	number	**share of total**	**thousand hectares**	**share of total**
Private non-industrial owners	122,236	97.4%	5,502	78.5%
Company owned	1,393	1.1%	424	6.0%
Governmental	1,162	0.9%	831	11.8%
Others	731	0.6%	256	3.6%
Total	125,522	100.0%	7,012	100.0%

Source: Statistics Norway, 2004.

Table 3. Distribution of forest properties after size class, 1967-1989.

	Total	**2.5-24.9 ha**	**25-99.9 ha**	**100-499.9 ha**	**500 ha >**
1967	128,337	81,488	36,025	9,638	1,186
1979	120,930	71,757	37,125	10,856	1,192
1989	125,522	72,485	40,004	11,817	1,216

Source: Statistics Norway, 2004.

Forest owners who also farm have an average of 4.4 fewer hectares of productive forest area than pure forest owners, but with major differences among the counties. On the other hand, in half the counties, combined farmer-forest owners have more productive forest than pure forest owners. There is a correlation between the size of the forest area and farming area in production among combined farmer-forest owners, so that forest owners who farmed lots of land owned a considerable amount of forest and vice versa. Combined farmer-forest owners logged more often than forest owners who did not farm. On a national basis, combined farmer-forest owners accounted for half the quantity cut for sale. Large forest properties were logged more often than small ones (Statistics Norway, 2001).

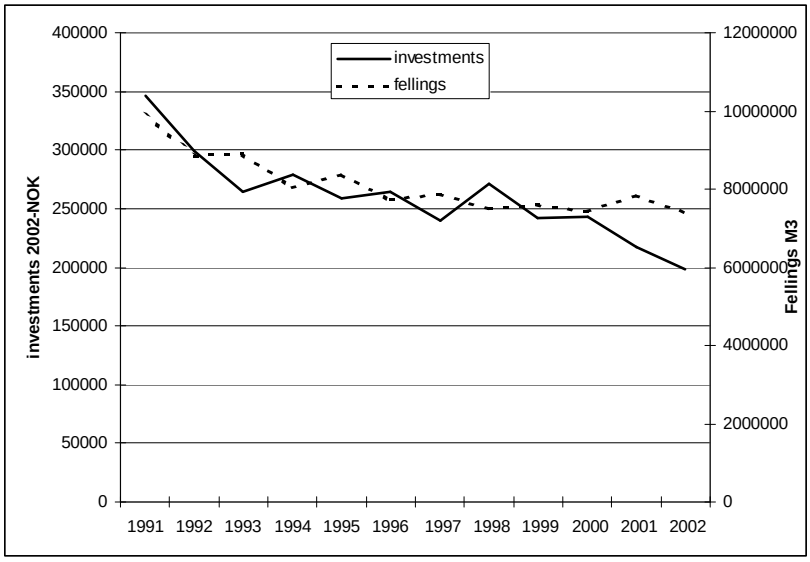
2.3. Small-scale forestry practices

Forestry in Norway faces huge challenges; its share of the gross domestic product has declined significantly over the last decades and now accounts for only 0.2% to the national economy. Approximately 5,500 persons are employed in forestry. With our farm-forest structure, there is also a significant amount of self-employed labour contributed by the farmers (estimated to be 2,200 man-years in 2002/2003[2]). That gives a total of 7,700, some 0.35% of the total employment.

Contrary to the experience in neighbouring countries, the total industrial fellings in Norway (fuelwood and home consumption at the farms excluded), have declined approximately 30% over the last decade and reaching 7.5 million cubic metres in 2002

[2] http://www.ssb.no/emner/10/04/10/lu/tab-2004-05-07-02.html

(Statistics Norway, 2003a). The distribution of species is 77% Norway spruce, 22% Scots pine and 1% non-coniferous species. Contrary to the developments in domestic cut and exports, imports of timber have increased from 1 million cubic metres to 3 million cubic metres during the same period. The total domestic consumption of timber has consequently been much more stable.



(Statistics Norway, 2004).

Figure 1. Developments in total fellings and investments 1991-2002

As Figure 1. shows, a corresponding drop in forestry investments has followed the drop in harvesting. In 2002, there were 26 million euros invested in silvicultural activities, reforestation and drainage. About 16,000 hectares were planted and 8,300 hectares of ground were prepared (Statistics Norway, 2003b). The regulation for forest drainage support has been changed because of the discussion of possible negatively environmental effects of bog drainage. As an effect the extent of forest drainage has declined sharply. In 2002, only 390 hectares were drained, which accounts for a mere 4 per cent of the area drained in 1988 (Rogstad 2003). The drop in investment in silviculture has continued in 2003, the main reason being that cost-share programs to support silvicultural investment were abandoned.

An increasing share of the forest area is no longer subject to active forest management. Just about half of the forest area is now managed with economic profits from harvesting as the objective. The other half is forests that are not suitable for commercial forestry either for biological or economic reasons. To some extent declining timber prices can be outweighed by more efficient harvesting, i.e. an increasing share of the harvests conducted mechanically by others than the owner herself. In the past, the forest owner conducted fellings on the NIPF holdings, but today an increasing share of the fellings are outsourced and conducted mechanically. The 1999 farm census (Statistics Norway, 2001), showed that the forest owners accounted for only 16 per cent of fellings and 18 per cent of hauling. 78 per cent of the timber sold was cut and hauled by forest contractors. The use of harvesters is more common on larger than on smaller properties. Commonly the fellings are clear-cuts with an average size of approximately 1.5 ha. Lately there has been an increased interest in closed-form fellings. Regeneration and

silviculture activities are conducted manually either by the owner or outsourced to others.

Concerns over impacts of the far larger and more powerful forest industry firms led to the establishment of regional forest owners' associations (FOA's) in Norway at the end of the 19th Century. During the first decades the FOA's amalgamated into 19 independent associations. Their main task was to conduct price negotiations with the purchasers, but they also had a significant role in exploiting economics of scale in brokering timber from the small wood lots held by their members. Most forest owners are members of one of the remaining 9 regional associations under the Norwegian Forest Owners Federation. These associations conduct timber sales, consulting activities and forest planning for their members. The significance of the forest owners' cooperative in Norway is illustrated by the fact that three-quarters of the industrial roundwood in Norway today is brokered by the 9 regional FOA's (Størdal, 2004).

There also exist some direct sales to the industry, as well as a few independent brokers. One of the independent brokers is Norskog, which actually also is an FOA that traditionally organized the larger, industrial forest owners, and is thus not a part of the Norwegian agricultural cooperative system. Most timber is sold cut-in-length (logs of specific lengths) by the forest owner. The chronology in the FOA/forest industry price negotiations is that prices are set for different seasons each year (e.g., winter, summer and fall). The FOA informs their members of the outcome, which for sawlogs depends on a price matrix consisting of stem diameter and log length for various grades. A forest owner notifies the FOA of his planned harvesting schedules, which in turn plans transportation and distribution of timber to the mills. The FOA pays the forest owner according to the price matrix, and according to various bonus arrangements.

The Norwegian Agricultural Economics Research Institute's annual account statistics for agriculture (Rogstad 2003) shows that for the farms included in the separate forestry statistics (About 200 properties out of 1000 participating farms), forest income represented 18 per cent of the total net farm income from both forestry and agriculture in 2001. However, the forestry's share of the average household income is only 2 per cent. Even in Eastern Norway, where forestry is relatively important, forestry accounts for only 4 per cent of the total household income for the average property. This means that income from outside the property has become increasingly more important.

Since an increasing share of the forest area is becoming marginal for economic forestry, goods other than wood and fibre have received attention. Some of these goods might be exploited by single owners or by an association of owners. For many of the owners, game and fish resources have become a significant source of income, often combined with offering accommodation and other kinds of arrangements. In many districts the combination of management of deer-game and forest management has not been optimal, especially if one takes grazing damage on young forest stands into account. Moreover, a significant part of the goods related to forests are collective goods like landscape or eco-systems values. Wood for bio-energy purposes will probably be more important in the years to come as well as production of Christmas trees which has turned out to be profitable for an increasing number of forest owners.

Small-scale forestry manages a great number of environmental values. Large numbers of the 'red-listed' species are found in these areas. In connection to the 'Living Forests' project, there was established a consensus on a number of standards for sustainable forestry that were implemented into certification systems. Certification demands good documentation and this is a challenge for small-scale forestry with 120,000 owners where the rotation time is 70-150 years. Further a debate is ongoing concerning the need for and the extent of forest protection. The environmental NGO's claim a need for a 5-15 fold increase of protected areas and that the harvesting in non-protected forests mainly shall be done as closed-form harvesting, i.e. not clear-cutting.

2.4. Policy framework and production conditions

In Norway there are basically three policy levels:

- The national level (Ministry of Agriculture)
- The regional level (County governor)
- The local level (Municipality forester).

The Ministry of Agriculture is responsible for the general forest policy, regulations and the forestry Act. In addition the Ministry of Environment is responsible for certain conservation acts that influence forestry activities.

The County governor has an agricultural division, which has a special responsibility to ensure a sustainable long-term management of the forest as a resource for profitable industries; an infrastructure that allows for effective harvesting; and environmental considerations. The Governor shall co-operate with forest owners and others to encourage small-scale, wood based industries. The Governor helps municipalities in areas like forest road planning, silviculture and environmental questions. Coordinating forestry planning in the county, managing the forest taxation, state grants and supervision.

The Municipality forester is responsible for implementing the state policy at the municipality level and is responsible for contact with the forest owners. A change is planned so the municipality will have a significantly more important role in implementing the forest policy in the years to come, i.e. in distributing state grants on the basis of the municipality's own criteria and priorities.

The forest policy was last revised in 1998 in a White paper to the Storting (Norwegian Parliament). (Stortingsmelding nr.17 [1998-1999]). Here the government presented the guidelines for a comprehensive forest policy for forestry and the forest industry. The government emphasised both forestry's role as an income generator and that forests also play an important role in the conservation of biodiversity, for recreation purposes and thus contribute positively to human health and well-being.

State subsidies and the Forest Trust Fund give the main policy incentives. Traditionally, priority has been given to support silviculture, road construction and forest management schemes. The state subsidies have been reduced over the last years and in 2003 the forestry received about NOK 286 million in public subsidies, corresponding to approximately 12 percent of the gross timber value (Rogstad, 2003). A dedicated programme aiming at supporting value creation from timber utilisation and processing

was launched in 2000. This programme was given NOK 36 million in 2003 from State grants. Silvicultural activities were allocated NOK 14 million in 2003. These subsidies are now being phased out and replaced with more favourable rules for the usage of the Forest Trust Fund. The forest owners are obliged to set aside between 4 and 40 per cent of the income from timber sales. If the withdrawn funds are used for silvicultural measures, up to 60 per cent of the sum remains free of tax.

Sales of agricultural and forest properties are strongly regulated in Norway. The authorities must approve prices and new owners of properties larger than 10 hectares (until 2004: 2.5 hectares). In addition there are regulations that favour transactions within the family and also certain regulations prohibit selling out parts of the property. The regulations for property transaction have been heavily criticised for cementing the structure of the properties and giving no incentives for innovation.

2.5. Supporting and limiting factors for enterprise development in small-scale forestry and barriers to entrepreneurship

Supporting factors

- A dedicated 'value–creation programme' for forest-based industries has been launched
- Increased attention toward non-wood forest products such as recreation, hunting and fishing, but also new and increased demand from 'second-home' living and cabins. These factors can be a source of future income on the forest properties
- Start-up subsidies and cheap loans from Innovation Norway.

Limiting factors

- Forestry income is becoming marginal to the landowners
- The level of conflict between commercial and multiple-use forestry has become more intense
- The regulation of property transactions is very restrictive to the property structure
- Forestry activities are followed by a number of governmental (nature conservation) and non-governmental regulations (certification)

Annex B: Organisations studying small-scale forestry and main publications and information sources.

Research in forestry is provided by a range of universities and institutions.

- Besides providing research, Universitetet for miljø- og biovitenskap, Institutt for naturforvaltning (Norwegian University of Life Sciences, Department of Natural Resource Management) is the only institution providing teaching at the Masters and Doctoral levels. The university (UMB) provides research related to all aspects of forestry.
- Bachelor level education is provided by Høgskolen I Hedmark (Hedmark College) and Høgskolen I Nord-Trøndelag (Nord-Trondelag University College)
- The leading research institute in areas related to forestry is Skogforsk (Norwegian Forest Research Institute), which is an autonomous institute under the Ministry of Agriculture. Skogforsk aims to strengthen the scientific basis for the management of forest resources, the creation of wealth from forests and countermeasures against environmental problems in forests.

- The Norsk institutt for jord- og skogkartlegging, NIJOS (Norwegian Institute of Land Inventory) is Norway's major supplier of data on soil, forest, outfield and landscape resources. The information supplied by NIJOS is vital for agriculture, forestry and other land-based enterprises, as well as for land-use and environmental management. NIJOS provides basic, unbiased biological and environmental data, which is required in order to ensure the sustainable utilization of our natural resources. NIJOS is an independent, public institute under the Norwegian Ministry of Agriculture.
- There are also a number of regional research institutions, of which Østlandsforsking (Eastern Norway Research Institute), Møreforsking Volda (Møre Research Volda) and Bygdeforskning (Centre for Rural Research) are some relevant examples.
- Skogbrukets Kursinstitutt (Forestry Extension Institute) provides extension services and training related to forestry. In general the role of national state forest services in providing extension services, training education and research is generally good.
- The main publications are the journals *Norsk Skogbruk* *(Available only in Norwegian Only)* that is published by Det norske Skogselskap (The Norwegian Forestry Society, *website only in Norwegian*) and *Skogeieren* (*Available only in Norwegian*) published by the Norges Skogeierforbund (The Norwegian Forest Owners Federation).
- In addition there are a number of websites where various information (largely directed at forest owners) on Norwegian forestry can be obtained (e.g., www.skogsnorge.no, www.skoginfo.no, www.skog.no)

3. Wood processing industries

3.1 State of the art

Norwegian wood processing industries comprise primary processing activities such as sawmilling, pulp and paper production and the manufacturing of wood panels as well as secondary processing such as millwork, wood working and construction. Value added in primary processing is limited.

The wood processing industries historically have contributed substantially to the domestic economy. After abolishing exclusive timber concessions and sawmilling privileges in the nineteenth century, investments in Norwegian wood processing industry soared, and the sawmilling industry grew rapidly making Norway one of the dominant European sawnwood exporters. The relative importance of the wood processing industries has declined after the Second World War – in particular after the commencement of income from offshore natural gas and oil resources. In 2001 the total domestic output value from primary and secondary wood processing was approximately five percent of GDP. Wood processing industries have, however, remained important in some regional economies.

Research institutions

Research related to entrepreneurship and small scale industries in the forest sector does not have a long tradition in Norway. Three institutions have dominated Norwegian forest research: The Norwegian University of Life Sciences (UMB), the Norwegian Forest Research Institute (SKOGFORSK) and the Norwegian Institute of Land Inventory (NIJOS). Research has mainly focused on silviculture, forest inventory, forest economics, forest operations and wood technology.

Topics related to wood technology, industrial processing, construction and engineering have also been addressed at Norges teknisk-naturvitenskapelige universitet (The Norwegian University of Science and Technology, NTNU). NTNU has a strong program in construction and architecture, and are coordinating all efforts on wooden construction in TRESENTERET (Only available in Norwegian). Both the wood processing and the pulp and paper industries have established their own research organisations Norsk treteknisk institutt, NTI (Norwegian Institute of Wood Technology, *some English available*) and Papirindustriens forskningsinstitutt, PFI (Only available in Norwegian), and recently regional research centers Østlandsforskning (Eastern Norway Research Institute) and Møreforsking Volda (Møre Research Volda) have contributed to the forest research.

Research questions

Research questions related to the Norwegian wood processing industries and small and medium sized businesses are main issues:

- Business structure; size, economies of scale, raw material procurement, production efficiency
- Location: competitiveness of domestic industry, investments abroad
- Networks: the Norwegian forest cluster, logistics and business environment, technical know-how and entrepreneurial networks
- Competence, educational facilities: relevant programs in education at different levels
- Innovation: investment in research and product development, product development and design: adapt products to markets, ability to implement business ideas
- Niche strategies: development of business opportunities directed towards small defined market segments

3.2 General information on wood processing industries in the country

The lumber industry developed into the most important export industry in Norway around 1500 AD with England being the most important market. The King gave privileges to some business men in the towns and the forest owners were not allowed to saw timber for export purposes. This policy lasted till about 1850, when England introduced an import tax on Norwegian lumber to protect the lumber from Canada, Lumber mills went bankrupt, the King abolished the privileges and many new sawmills were established. The sawmilling industry remained small-scale with many owners until only the last 20-30 years, where there has been a rapid structural development. For some years now, the largest part of the market has consisted of only 3-4 groups, some of them international, these mills concentrate on both export and on large domestic customers. A smaller part of the marked, dominated by SME's, concentrate on niche markets and local and regional markets.

There are no studies of entrepreneurship and the wage earner's culture in the wood processing industry in Norway other than some historical works and novels. Historically the wage earner's culture has been very strong in both the saw-milling and the pulp and paper industry. The labour party has always been very strong in places dominated by forest industries. The small firms in the wood processing industry in the countryside are a bit different, here the owner is mostly taking part in the production process and there is no big difference between the owner and the workers. There are no examples of

labour co-ops in this industry in Norway, but the forest owners associations have from time to time been important industrial owners.

There are few examples of fast growing innovative firms in this sector. The sector is known to have a low innovative activity (Jacobsen et al 2001). Industrial clusters can be found in the furniture industry in the Sunnmøre Region (approximately the southern and western 40% of Møre og Romsdal County) in Western Norway. In this area there is limited forestry and a strong fisherman culture. No good explanations for the Sunnmøre Region cluster exist but one hypothesis is the fishermen started furniture production in times with low fishery activity.

3.3 Structure of wood processing industries

Including millwork, furniture and fixtures and construction, the total production value of the wood processing industries account for approximately NOK 76 billion, approximately 5% of the gross domestic product,

Table 4. Production, value added, and employment in the forest sector in 2001. Values in million NOK, employed persons in 1000 persons. Source: Statistics Norway (SN), National accounts.

	Gross Product	Compensation of Employees	Operating Results	Fixed Assets	Export	Import	Employed Persons[1)]
Sawmilling and wood processing industry	6,573	4,142	623	8,690	2,824	6,025	15.5
Pulp, paper and paper products	7,369	3,600	987	22,020	14,020	7,022	9.9
Furniture and fixtures	5,755	3,600	1,188		4,651	10,567	14.8
Construction	56,710	42,229	15,144		—	—	135.8
Total Wood Processing Industries	76,407	53,571	17,942	147,920	295,840	591,680	176.0
Total Mainland Norway	1,526,232	677,825	429,187	3,743,194	698,876	441,869	2,315.5

Note: 1) in thousand

Primary processing

The primary wood processing industry produces a wide range of products, cf. Table 5. The pulp and paper industry and sawmilling dominates the domestic primary wood processing industries. Pulp mills are large industrial units located in, or in the vicinity of urban areas. Pulp and paper production is capital-intensive and the business concentrates on capacity and quality rather than value added. The pulp and paper manufacturers depend on large timber procurement areas and imports.

The size of Norwegian sawmills varies considerably, reflecting the fact that goals and production strategies are diverse. Mills are located throughout the forested regions; there are both large mills focusing on capacity and product homogeneity (quality) as well as medium sized and small mills, focusing on product quality, niche strategies and

customised production. Most commercial sawmills use roundwood of local origin. Production of wood based panels is of minor importance.

Table 5. Quantity produced and production value, processed wood products (2001).

Commodity	Unit	Quantity	Value
Wood chips or particles	kg	..	236,500
Wood waste and scrap (including agglomerated), sawdust	kg	..	131,927
Poles	m^3	16,443	50,572
Sawn wood	m^3	..	1,854,283
Other wood	m^3	..	497,908
Planed wood	m^3	1,015,305	2,053,141
Plywood	m^3	..	82,178
Particle boards	m^3	3,876,065	1,168,006
Pulpwood and pulp of other fibrous cellulosic material	kg*	728,428,000	2,829,580
Paper and paperboard	kg	2,321,204,870	11,230,035
Of which :			
Graphic paper, paperboard	kg	596,899,000	3,144,070
Cellulose wadding, crepe paper, tissues, other paper stock for household, kraftliner, kraft paper, fluting paper	kg	332,227,570	1,276,600
Sulphite wrapping paper, paper and paperboard based on waste paper, felt paper and paperboard, filter paper and paperboard	kg	145,202,850	558,070
Other paper and paperboard, paper and paperboard coated with wax, oil, plastics; paper laminated with bitumen; self-copy paper	kg	46,947,650	439,077

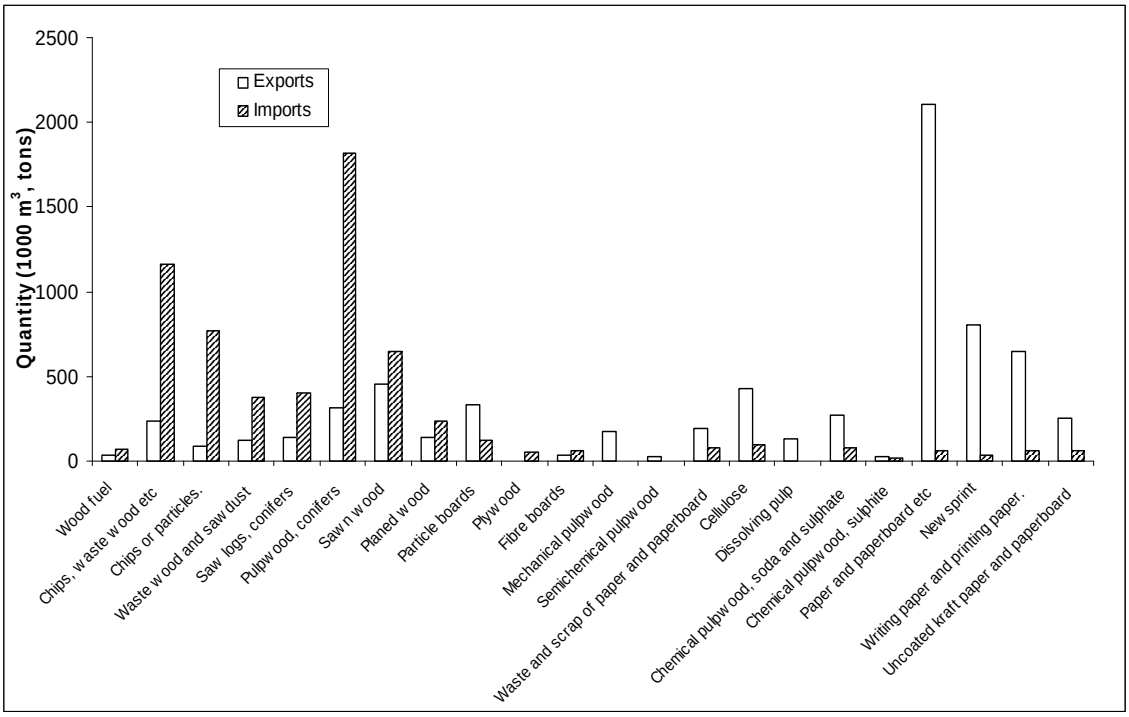
* Converted to weight with 10 per cent water.
Source: Statistics Norway (SN), National accounts

Table 6 reports economic activity in the primary wood processing industries, value added is mainly from sawmilling and pulp and paper. Products from the pulp and paper and wood based panels industries are exported, while Norway is a net importer of sawnwood, cf. Figure 2.

Table 6. Descriptive statistics, wood processing industries (2001).

	No. Firms	No. Employed	Wages (including social costs)	Total sales, turnover	Production value	Value added (market prices)	Gross investments
Sawmilling and planing	296	4,365	1,258,501	8,148,956	8,042,506	2,640,564	235,144
Plywood, fibre- and particleboard	29	1,477	481,736	2,042,633	2,019,856	522,931	50,502
Wooden packaging	51	376	92,210	404,055	393,147	122,120	10,879
Other processed wood	89	510	122,613	366,990	335,696	160,618	17,846
Pulp, paper and cardboard	33	5,664	2,335,288	16,391,388	16,429,235	5,632,793	580,769
Items made from paper and cardboard	62	3,083	1,093,484	4,457,271	4,196,470	1,449,129	120,334
Total wood processing	560	15,475	5,383,832	31,811,293	31,416,910	10,528,155	1,015,474

Source: Statistics Norway (SN), National accounts.



Source: Statistics Norway (SN), National accounts.

Figure 2. Imports and exports of processed wood products (2001).

Secondary processing

Construction dominates the secondary processing (refer to Table 7) the construction sector is therefore the largest domestic consumer of lumber and wood-based panels. Due to tradition and customer preferences, Norwegian housings are usually constructed from wood. It should be noted that the numbers reported for construction refers to all construction activity, both wooden and non-wooden constructions. A substantial amount of the inputs used in the construction sector are imported.

Prefabricated housing, millwork and manufacture of furniture and fixtures are the dominant wood consuming industries (refer to Table 7). Prefabricated housing and millwork are important due to the preferences for wooden housing. The production of wooden furniture and household effects has a long tradition in Norway. Even though traditional woodworking was based on handcraftsmanship, a commercial furniture industry was established during the twentieth century. The furniture industry includes firms making both wooden and non-wooden furniture. Production of wooden households' effects and handicrafts is still conducted, but the economic importance of such activities is limited.

Table 7. Descriptive statistics, furniture manufacture and construction (2001). Includes non-wood inputs.

	No. Firms	No. Employed	Wages (including social costs)	Total sales, turnover	Production value	Value added (market prices)	Gross investments
Prefabricated houses and millwork	484	7,581	2,135,312	8,368,119	7,975,665	2,685,710	195,325
Furniture for housing	144	4,039	1,131,469	4,192,471	4,053,007	1,432,175	109,942
Furniture for offices and shops	75	997	312,051	974,947	933,476	403,259	48,517
Furniture for kitchens	97	1,541	434,172	1,757,850	1,579,259	560,405	18,049
Other furniture	179	2,480	659,950	2,577,019	2,424,230	712,286	108,910
Buildings and multi-storey constructions	11,099	48,105	14,005,800	62,246,700	62,211,500		1,080,200
Roofing	1,084	3,819	1,013.3	3,283.4	3,267		111.1
Total furniture and construction	13,162	68,562	4,687,983	17,935,946	3,267	5,793,835	481,937

Source: Statistics Norway (SN), National accounts

3.4 SME wood processing industries practices

Currently there is no information available on share of wood used by Small and Medium Sized Enterprise (SME). There is also no information available on SME's practices. There are some case studies from certain regions available. They show a large variation within the industry. Most SME's seem to focus on local and regional markets and on survival and not on growth, they are product and not market oriented and they use very little resources on innovation and product development. Most of the workers are unskilled, the salaries mostly low, and the employees do not recommend this type of work to their children. The management is mostly not very professional, and innovation is mostly done as an evening and weekend activity. But at the same time the people working there enjoy their work and seem to be satisfied with their situation.

We think this quite negative characteristic of the wood processing industry applies to most of the SME's in this industry. There are, however, some new firms which seem to have better profitability, more professional management and growth aspirations. In one study those firms were found to have clear goals (a written business plan) and also good co-operation with their customers.

There are some formal networks. Those networks that seem to work well are those that originated based on a need from the actors themselves. One example is Norsk Bygdesag Forening (The Organisation of Rural Sawmills, *available only in Norwegian*). This organisation has 431 members all over Norway and supplies the members with very relevant services. Networks that are created by public authorities seem to exist for as long as they get public sponsorship, after that the activity decreases.

In Norway there is statistics available on new enterprise formation generally, but not specifically for our industries. Case study evidence, however, indicates that the business turbulence is relatively low and the same applies to the rate of formation of new businesses.

3.5 Policy framework and production conditions

The policy framework related to research, education and training has become more business oriented, and now has a stronger focus on entrepreneurship and business development. For example, the Norwegian Ministry of Agriculture has established Treprogrammet (*Available only in Norwegian*), a public fund devoted to business development in the domestic forest sector. Effort has also been directed towards developing educational programs that are relevant for commercial forestry and forest industries. At UMB a masters program in Forestry Business is established and a program focusing on regional economies and nature based value creation is currently under development.

At the business level, efforts are made to facilitating the establishment and success of small scale forest industries, i.e. through earmarked transfers to regional business. The political impact of the forest sector and small scale industries is, however, limited. Family-ownership is common, and the Forest Owners' Organisations have made strategic investments in wood processing industry. Large forest industry receives less public economic support. Capital is usually provided by private (and institutional) investors. The large forest processing enterprises can, to a certain extent, influence policymaking and political decision making power, mainly because of its regional importance.

3.6 Annex to part C: Organisations studying wood processing and their speciality. Main publications and information sources on wood processing industries in the country

There are a number of organisations that study aspects related to wood processing:

- Norsk Treteknisk Institutt (The Norwegian Institute for Wood Technology) is a research institute owned by the saw-milling and woodworking industry.
- Universitetet for miljø- og biovitenskap, Institutt for naturforvaltning (Norwegian University of Life Sciences, Department of Natural Resource Management) and Skogforsk (Norwegian Forest Research Institute), both have a significant activity and co-operates with the Norsk treteknisk institutt, NTI (Norwegian Institute of Wood Technology, *some English available*) in the umbrella organisation Treforsk, *available only in Norwegian* .
- Norges teknisk-naturvitenskapelige universitet (The Norwegian University of Science and Technology, NTNU) in Trondheim has a Wood research centre and Innovasjon Norge Innovation Norway, *limited English availability* has a large Research and Development program on wood-based value creation.
- The business schools in Bergen and Oslo have also had some studies of aspects of the wood processing industry and its competitiveness in Norway.
- Some regional research institutes have some research activity too.

4. Non-wood forest products and services

4.1. General information on forest related non-wood products and services in the country.

Non-wood products (and services) were traditionally an important part of the general livelihood for Norwegian farmers and were harvested for use at home. Grazing, collecting grass and leaves for fodder, berry picking, hunting and fishing, cutting peat for heating and cooking, and various plants/trees had their uses in traditional medicine.

During the 20th century the Norwegian society experienced major changes that to a large degree have affected the traditional use of these non-wood products and services. The large-scale afforestation of (western) Norway and the intensive use of infield crops as a substitute for the extensive use of outfields-grazing, along with the general trends such as industrialisation, urbanisation and a general increase in wealth, rendered the various out-field and forest activities relatively unprofitable. The historical 'Everyman's right' to access and use of most non-wood resources serves as an obstacle to the establishment of commercial resource use but perhaps also serves to prevent the dangers of commercial over-exploitation.

These societal, economic and environmental changes also led to increased numbers and ranges of large mammals like moose (*Elg, Alces alces*), deer (*Hjort, cervus elaphus*), reindeer (*Villrein, Rangifer tarandus*) etc., and this led to increased hunting. Hunting is excluded from the everyman's right and thus can be viewed as having economic potential for the landowner. The marketing of meat, hunting rights and complete packages for travel, accommodation and hunting all are potentially economically viable.

Today there is again a focus on non-wood activities in Norway. This results from both national and local efforts attempting to countermeasure the decrease in local-based economic activities, rural out-migration etc. New niche opportunities, such as some non wood-products, and especially services, are viewed as potential vehicles for creating rural economic development.

NWFP&S definition, classification and relevance in rural economies

1. Biological products:

Hazelnuts:

(*Hassel, Corylus avellana*) were traditionally a marketed product. Due to the general climate in Norway, they were grown only in southern parts and some 'pockets' along the coast (e.g. Innerdalen in Møre og Romsdal). There is no longer any commercial activity in this field.

Bark:

Bark, especially from birch (*Bjørk, Betula spp.*) was collected for various usages. The main use of the birch bark was to use it as the underlying layer beneath sod or grass roofs that historically were extensively used in Norwegian rural housing. Bark was also collected for use in various handcrafted products, baskets, etc. Bark today is of negligible commercial value, but the skills of using it are kept alive by voluntary efforts in local societies.

Branches, roots and seedlings:
As for bark, these were also collected for various uses in handicrafts. There can be observed an increased attention to such commodities today, but mostly for hobbies etc. No commercial importance.

Berries:
Berry-picking was an important non-wood product at the farm household level, first and foremost for self-consumption, but also to some degree for commercial exploitation. Today the commercial activity is mainly connected to Northern Norway where cloudberries (*Molte, Rubus chamaemorus)* are picked for sale (the commercial picking of cloudberries is by law exempted from the everyman's right in Northern Norway)

Herbs:
Herbs have been used in local medicine and for assisting in death. Currently herbs have little commercial value but do offer potential for future pharmaceutical development as well as for niche products, soap, perfume etc.

Grass and fodder:
This was the most important component in traditional Norwegian society. The right to extensive summer grazing and gathering of fodder from the out-fields were an important part of farm activities up until the 1930's. Since then it has lost much of its significance for cattle but remains a major activity for handling sheep and goat grazing. The Norwegian society experiences a conflict of interest regarding this grazing, as it conflicts with the re-introduction of carnivores such as wolves and bears.

Greeneries (For florists and decorators):
We have seen an evolving market for this, as there is an increased demand for various greeneries to be used for decorative purposes. According to estimates from Norsk Pyntegrønt (*Available only in Norwegian*), the Norwegian annual consumption is approximately 800,000 kg, of which the domestic production amounts to some 250,000 kg.

Moss and Lichen:
Moss and lichen were used in traditional society for animal fodder, for building insulation and so on. Today they still are important as food for the domesticated reindeer herds of the Sámi people. There is minor consumption in connection with greeneries but no comprehensive overview exists of this use.

Mushrooms:
Mushrooms or fungi of any kind have never been an important part of Norwegian cuisine. The use of mushrooms is generally considered to be practised by urban and higher educated people and thus, the typical mushroom picker will not be amongst the forest-owners or the local population. Despite this, we see increased mushroom picking for self-consumption under everyman's right. There are a few attempts of commercial usage of mushrooms (Norsopp, (Available only in Norwegian) as an example).

Honey, Beeswax:
Beekeeping has been a traditional activity in Norway although never on a large scale. In total some 5,000 people in Norway are involved in honey production, with only half being involved commercially. The yearly average production has been approximately 780,000 kg. The national cooperative for honey-producers Honningcentralen AL (only in Norwegian) has 10 employees and an annual turnover of 6 million euro.

Christmas trees:
Norway has approximately two million households and traditionally virtually every household has to have a Christmas tree. This was traditionally a side-activity for forest-owners, using thinnings etc. to supply the market. Recently, Christmas trees are increasingly being considered a 'crop'. This is a highly competitive market especially with regards to imported Danish trees. Also, in local rural areas, there have been problems with marketing (as the trees are grown rurally and often far from the population centres), quality control etc. Despite these challenges, the sector is considered a promising one with increased growth anticipated. Perhaps the greatest opportunity may be in the periurban areas where the cutting of the Christmas trees can be marketed as an 'adventure', so you sell the experience of getting the tree as well as the tree itself. The annual consumption amounts to some 2 million trees. If we correct for the use of plastic trees and trees cut from people's own forests, the total market is around 1.6 million trees, out of which some 400,000 are imported.

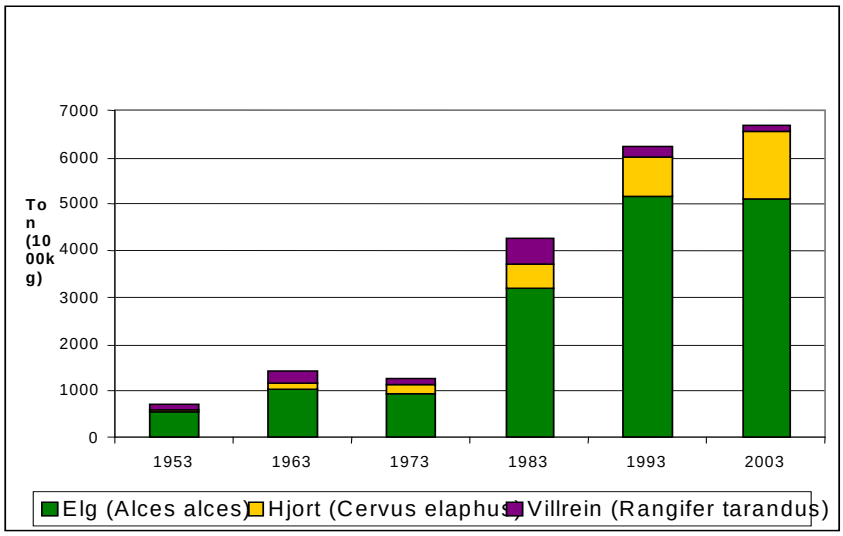
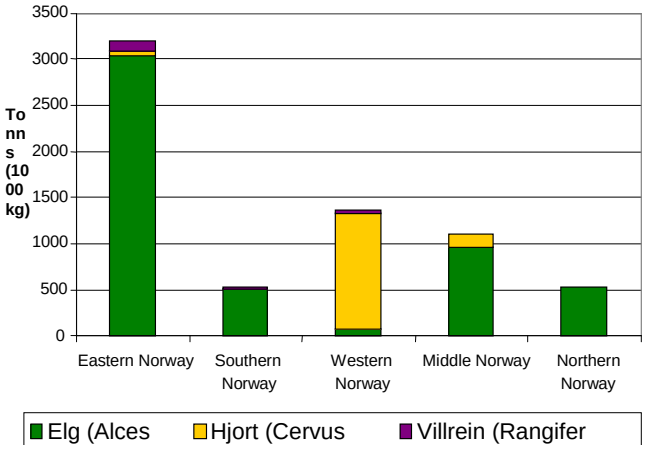


Figure 1 Big game hunting, dressed meat weight, 1953 - 2003, 10 year intervals

Hunting and fishing:
In its various forms, this is the largest activity. As mentioned earlier, one of the effects we've had from the restructuring of Norway into an urban society has been increased ranges and populations for the larger wild animals such as moose and deer. One result of this can be seen in Figure 1 showing the increase. The total volume has increased from ca 700 tons (in the '50s) up to almost 70,000 tons today.



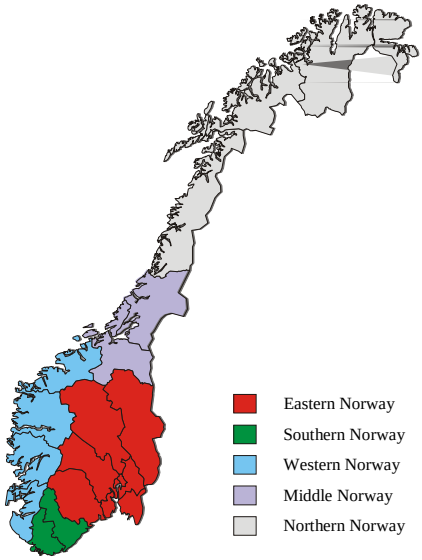


Figure 2 Big game hunting, distributed by regions 2003. Figure 3 Norway's Regions

The second graph shows how hunting of the various species is distributed around the country. Eastern Norway being the main region and moose being the main species.
Deer is almost exclusively hunted in western Norway. Reindeer is also mainly hunted in the mountainous areas in eastern Norway. The production of domesticated reindeer by the Sami people is not included in this statistic.

The right to use of the resource is exclusively connected to ownership of land (forest or other kinds of outfield), and it has evolved from a way of getting meat for the household into a commercial and marketable product that in many cases has higher value for the forest owner than what can be gained from traditional forest products. The total value of hunting is hard to estimate, as we have no good system for gathering information about the sale of hunting rights, lodging, food, transportation etc. When we calculate the first hand value of the dressed meat alone, using a standard number of 50 NOK/Kg, the meat value, using this primitive evaluation approach amounted to 360 million NOK in 2001 (44 million euro).

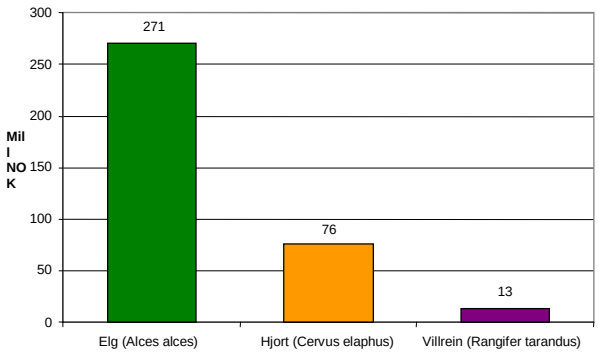


Figure 4 Estimated value of meat, 2001

The corresponding value to forest owners from logging was 2.8 billion NOK. From this we learn that the total value from hunting is significant, compared to the value from timber.

4.2. Services

4.2.1. Services with a market

As a consequence of the everyman's right and Norwegian traditions, developing such services has proved difficult. Access to forestlands is free, so is the use of forest roads for cycling, trekking etc. The most successful stories can be found around hunting and fishing, as those are excluded from everyman's right and are exclusive to the owners (be that private individuals, groups, communities or the state). There is a growing interest concerning the potential to develop such services, and they are generally considered to have a large economic potential

There are several problems or obstacles with the largest being a multitude of small, individual owners (actors) which makes it difficult to market integrated (packaged) products. There is little tradition for producing up/downstream products, like accommodation, transportation, etc. Still this is being attempted, e.g. through the forest owners associations, where owners pool together to create larger, more stable production units.

It is also the subject of attention for various public actors on local, regional and national levels, where the challenge is being attacked from many sides (education, training, financing, marketing, etc.)

4.2.2. Services without market

Norway's government and forest owners, along with most other countries are investigating how to best utilise the multiple economic opportunities of the forest. Sustainable management to secure biodiversity, prevent erosion, and support/promote the preservation/development of cultural landscapes etc.

The problem is that there is no easily accessible 'market' for such services. If the owner manages for such objectives there are no automatic market mechanisms that will ensure compensation for his/her efforts; no easy way of getting paid for the value of the service.

Norwegian society has always viewed outdoor activities as positive and healthy. Sunday walks in the forest for the whole family, the use of forests by school classes as part of the education, spending holidays in cabins and lodges, fishing and hunting. This is a part of how we Norwegians tend to look upon ourselves, and mostly these activities have been non-marketable and within the scope of the everyman's right.

In later years such voluntary forest related exercise activities have declined with a simultaneous increase of more individually based, commercially orientated products (instead of taking exercise by wandering in the forest it is taken at a gym or club). At the same time we've had a general acknowledgement that everybody has to take a larger responsibility for their own health and well-being and to use regular exercise as a tool to increase their health.

Property rights regulation system (access)

Three quarters of Norwegian forest lands are in private ownership, the major part owned by farmers (full time, part time or former). In general there is no difference between these and the public owned land in relation to public access and the use of most non-wood products and services for personal use. This is founded on the everyman's right that is remains strong in Norway. There is in preparation an update of laws and regulation for outdoor activities, where the general trend rather is to broaden the scope for this right than to narrow it down. Regarding the potential use of NWFP&S commercially, this can be viewed as an obstacle for local-based exploitation, as it secures the same availability for everybody.

Formally the everyman's right is restricted to non-commercial usage. This is not contested in the update; rather it has and has had a broad interpretation. In recent years we have had a few examples of people being charged for picking berries and mosses illegally as they had been considered as doing it for commercial aspects, not for their own consumption, without acquiring permission from the landowners.

One of the obstacles for increased local activities is that indirect commercial effects are hard to regulate. A commercial tour-operator might have contracts with hotels; transporters etc, and thus sell a product like trekking without any need to involve local forest owners to get access to the area. In this respect there exists a substantial subsidising from the owners to various commercial actors

4.2.3. List of statistical information sources

There has been little attempt to really measure the value of Norwegian NWFP&S industry. There has been published a national report "Strategisk plan Næringsutvikling i utmark" that was partly made by the Ministry of Agriculture and partly by the organisation Innovasjon Norge (Innovation Norway, mainly in Norwegian). In this report there were some suggestions made of how to measure the value of NWFP&S in Norway. Their 'guesstimate' is 8.1 billion Euro/year, but the reliability of this number can be questioned. Otherwise, there is not too much 'out there' that is really reliable when comes to measure the real contribution of NWFP&S in a local economy.

4.2.4. National and local organisations studying NWFPS.

There are several organisations studying NWFP&S in Norway. The Norwegian University of Life Sciences (Previously known as the Agriculture University of Norway NLH, Some English) together with Skogorsk (The Norwegian Forest Research Institute, Some English) are the leading institutions of research related to the topic of NWFPS.

There are also some activities related to regional research institutions like Møreforsking (www.moreforsk.no), Telemarksforsking (Telemark Research Institute, some English), and Østlandsforskning (Eastern Norway Research Institute, some English). Also Norsk institutt for naturforskning (Norwegian Institute for Nature Research, Some English) has contributed in the field of NWFPS. Norges Skogeierforbund (The Forest Owners Association of Norway) is carrying out a project in the field of increasing income to the forest owner through the utilizing of out-fields.

The common way of looking at the value-added aspect regarding the utilisation of out-fields in the context of rural development is through the perspective of the land/forest owner as the entrepreneur. At present there is some work going on at Skogforsk (Norwegian Forest Research Institute, some English) that is focusing on how to involve more than just the landowner in such activities. Part of the thinking behind the work is that we can only reach a marginal part of the potential that is in the market when only looking at the forest owner as an entrepreneur. We should look at all institutions involving in a local innovation system to reach the goal of local economic development based on resources from the outlying field.

4.3. Case study:

An interesting case in Norway is the "Norsk bygdeturismelag" (NBT - The association for rural tourism in Norway). NBT is an umbrella organisation for 13 regional NBT's all over Norway. We are presenting the division of the NBT in Southern Norway - "Norsk Bygdeturismelag Sørlandet" (NBT-S) - that was established in 1996. The purpose of the association was to establish an independent trade organisation that should take care of the micro enterprises in the field of tourist industry in the region. Main product of the micro enterprises involving in the association is overnight stop, food and drink and activities in an atmosphere of rural Norway.

NBT-S is representing 30 micro enterprises. Despite that the members of the NBT-S is representing a marginal part of the total supply of the experience industry in Southern Norway, each of the micro enterprises is relatively important in the local community where they are situated. All of the micro enterprises involving in the NBT-S are one-man firms related to the utilisation of resources connected to a farm. All of the enterprises are situated in rural areas.

Many of these enterprises are supported by the rural development support scheme in Norway (RDSS). The purpose of the RDSS is to support local economic development with the basis of human resources and the natural resources connected to a farm. The RDSS has been evaluated by many agencies, both at National as well as local level, in purpose of making the support scheme more efficient. Today the RDSS is controlling 500 million NOK (60 million euro) each year in purpose of the creation of new jobs in rural Norway. However, one might assume there is need for more information and knowledge around the use of public money going into such activities as the RDSS in Norway (Vennesland 2004).

Annual sales of each member of the NBT-S are about 400,000 NOK pr. Year (50.000 euro).
An interesting task regarding the members of the NBT-S is that it is the landowner him or her self that is the owner (and very often the worker) in the micro enterprise themselves.

When analysing the NBT-S there is no real innovative productions. The best one can find is an adoption of known packages of products and markets.

The members of the NBT-S are seen as a part of the total supply of tourist industry in Southern Norway.

There are some areas showing better results than other areas in the production of NWFS like what we see in NBT-S. However, there has been no attempt to investigate such relationships. This could be an interesting topic in further research related to the topic.

References

Henriksen, H. & Storaas, T. 1999. Elg som en økonomisk ressurs – en kunnskapsoversikt. Hedmark College. 38 pp.

Rogstad, B (eds). 2003. Norwegian Agricuture. Status and Trends 2003. Norwegian Agricultural Economics Research Institute, Oslo. 142 pp.

Statistics Norway 2001. 1999 Census of Agriculture, final figures. http://www.ssb.no/english/subjects/10/04/10/jt1999_en/

Statistics Norway, 2003a. Commercial roundwood removals. Preliminary figures, 2002. http://www.ssb.no/english/subjects/10/04/20/skogav_en/

Statistics Norway, 2003b. Silviculture, 2002. http://www.ssb.no/english/subjects/10/04/20/skogkultur_en/

Statistics Norway, 2004. Forestry Statistics. http://www.ssb.no/english/subjects/10/04/20/

Størdal, S. 2004. Impacts of the European Economic Area Agreement on the structure and concentration of roundwood sales in Norway. Forest Policy and Economics 6: 49-62.

Vennesland, B. 2004. Social capital and rural economic development, with relevance for the utilisation of forest resources. Doctor Scientiarum theses 2004:2. Agricultural University of Norway.

Poland

Zając, S. et al.

Stanisław ZAJĄC, Piotr GOŁOS, Katarzyna LASKOWSKA
Forest Research Institute, Forest Economic and Policy Department,
ul Bitwy Warszawskiej 1920r. Nr 3, 00-973 Warszawa, Poland, Tel,/fax.: +48 22 822 49 37;
E-mail: s.zajac@ibles.waw.pl , p.golos@ibles.waw.pl , k.laskowska@ibles.waw.pl

Włodzimierz ADAMCZYK,
Ministry of Environment, ul. Wawelska 52/54 , 00-922 Warszawa
Tel: +48 22579 25 74; E-mail: wlodzimierz.adamczyk@mos.gov.pl

Bohdan CZEMKO
Polish Chamber of Wood Industry in Poznań, ul. Winiarska 1, 60-654 Poznań
Tel. (+48) 61 849-24-00, Fax. (+48) 61 822-43-72, E-mail: pigpd@drewno.pl

Krzysztof JODŁOWSKI, Michał KALINOWSKI
Forest Research Institute, Forest Use Department, ul Bitwy Warszawskiej 1920r. Nr 3, 00-973 Warszawa, Poland, Tel.: +48 22 7150341; Fax: +48 22 7150313;
E-mail: k.jodlowski@ibles.waw.pl, m.kalinowski@ibles.waw.pl

Wojciech LIS,
Agricultural University in Poznań, ul. Wojska Polskiego 28, 60-637 Poznań
Tel./fax +48 61 848 70 98, E-mail: wlis@woodcock.au.poznan.pl

Paweł STANISZEWSKI, Dariusz ZASTOCKI, Emilia JANECZKO
Warsaw Agricultural University, ul. Nowoursynowska 166, 02-787 Warszawa
Tel: +48 22 593 81 38 E-mail: staniszewski@delta.sggw.waw.pl, zastocki@delta.sggw.waw.pl, janeczkoe@delta.sggw.waw.pl

Summary

1989 was a breakthrough for the entire forest services sector and forest product processing in Poland, after which significant ownership and structural changes have occurred. Apart from and, frequently, in place of some scores of large companies, a significant number of small and medium-sized firms have emerged.

Development of entrepreneurship in the Polish forestry sector is determined by the following:

- Ownership structure of resources – nearly 80% of forests remain under the administration of the National Forest Holding “State Forests”.
- High fragmentation of private forest ownership. Forest area per owner is 1.24 ha.
- Domination of Polish timber market by one supplier of round wood. Timber harvesting in State Forests accounts for about 95% of total domestic harvest.
- Self-sufficiency of Polish timber market - nearly all harvested timber is used by the home market. Imports and exports remain on a similar level (1-2%) and practically do not affect timber balance. This applies to a great extent to non-wood forest products.
- Significant dispersion of the sawmill industry with a large and ever changing number of small and very small enterprises featuring a small scale of production
- High percentage of gray economy in services and processing industry.

- In rural areas, the entrepreneurial sector is a very important source of living and revenues.

Little research has been carried out on entrepreneurship and consumer studies in the forest products sector. Also lack of complete statistical data on the market which is in the making and undergoes transformations creates a problem.

1. Consumption

1.1. State of the art and historical development

There are two major factors that influence the development of the timber sector's potential in Poland: availability of raw material resources and demand for timber products.

Polish timber market is relatively self-sufficient. Nearly all the harvested timber is used by the home market, while imports and exports remain, according to the official statistics, on a similar level and do not exceed 1-2% of the timber consumed by Polish economy. The National Forests Holding "State Forests" is the main supplier of timber to the home market with its 26-28 million cubic meters, which corresponds to 95% of domestic harvest. While private forests cover nearly 20% of total forest area in Poland, they are not an essential source of round wood. High fragmentation of private forest ownership (average private forest area is roughly 1 ha) practically makes it impossible to assure homogeneity and continuity of supplies. However, the existence of one large timber supplier arouses suspicion of it exercising a too strong influence on the domestic market. Besides, large recipients, referred to as strategic, are, in the opinion of small and medium-sized sawmill enterprises, being treated on preferential terms.

The internal timber market balance situation in Poland may soon become unsteady. Over the past two years (2003-2004) a significant increase in the demand for raw material has been observed while the possibility of meeting this demand by the national timber base has become ever worse.

The socio-economic and systemic transformations which started in Poland in 1989 have resulted in a dynamic increase in the number of entities operating in the timber market, particularly in the sawmill industry and furniture making. The sudden growth in the number of economic entities operating in the same market segments has entailed higher supply of products in Poland. Given the rather poor demand potential of the domestic market, more and more Polish firms extend their operations to foreign markets. It results not only from the saturation of the domestic market that significantly reduces the sale of products in Poland, but also from the possibility to obtain higher prices in foreign markets and higher certainty of receiving payments for the delivered goods or services.

Polish timber market belongs to dispersed sectors, with the exception of wood-based panels industry and, partially, the furniture industry. Sawmills and, to a great extent, also the furniture-and upholstery-making factories are located in small towns and rural areas. They are very frequently the only employers in the area; their collapse entails rapid unemployment growth. However, setting up new wood-processing factories in these areas requires significant financial outlays.

1989 was a breakthrough also for the non-wood products and forest services. That year, large monopolist groups ceased to exist and operate and were replaced by the diversified private sector. At the beginning of 1990's, tapping of resin, for decades one of the main non-wood products, was abandoned as a result of profitability decline. Like in other countries, other forest services (tourism, recreation) are becoming more and more important. Also the food industry – purchase and processing of berries and mushrooms, gain importance. Many modern companies deal in this sector. Some of them are exporters.

1.2. Forest products' and services consumption

Poland's population as of 1 December 2003 amounted to 38.2 million. For several years this number has been decreasing as a result of negative demographic growth and, to a lesser extent, negative migration balance.

Urban population stated as a percentage of total population of the country (urbanization ratio) as of 31 December 2003 remained at 61.6%. The period of several decades that followed the end of the war saw a distinct increase of this ratio, from 31.8% in 1946 to 57.5% in 1978. At the end of the 1980's and in the 1990's, this process halted. In 1990 it was 61.4% in 2002- 61.8%. Between 2002-2003 a slight downturn was noted . This phenomenon is typical for most of the European countries. In Poland, it is the result of the impact of two factors: higher decline of the demographic growth ratio in towns and villages and decline of the positive balance of migration from villages to towns.

Gross Domestic Product After the economic downturn in 2001-2002, GDP grew in 2003 by 3.8%, and the forecasts by experts for 2004 are optimistic, as they foresee a 5-6% growth of GDP. The value of GDP per capita in 2000-2002 was estimated at the current (24 September 2004) official mean rate of exchange at USD 5,574 or EUR 4,540.

Composition of household expenses in 2002 was as follows (from highest to lowest): the rent and energy supply 24.6%, food and beverages 20.3%, transport 10.6%, recreation and culture 7.0%, alcoholic drinks and tobacco products 6.5%, health 4.7%, appliances and furnishings and running a household 4.5%, clothing and footwear 4.5%, communications 3.2%, restaurants and hotels 3.0%, education 1.5%, other goods and services 9.6%. The rent and energy supply, communications, health and education have shown the highest rate of growth over the past two years.

Age structure in Poland. In 2003, people in pre-productive age accounted for 21.9%, in productive age-62.9%, in post-productive age-15.2% of Poland's total population. A decline in the size of pre-productive age population is observed as a result of low natural increase (baby-bust). At the same time, a very high increase in the productive-age population is noted. It is one of the highest in Europe. However, Poland has Europe's lowest employment ratio in the productive age population category. In 2003, it was 51.7% with the unemployment rate exceeding 20%. The population ageing process is progressing as a result of baby bust and average lifespan growth.

Taking national consumption into consideration, the following factors may have impact on the development of enterprises in the forestry sector:

- Halting of the country's population growth; population ageing .
- Halting of the urban population percentage growth, or even decline over the past two years.
- High rate of growth of expenses for the use of a flat and for energy carriers in the structure of household expenses
- Improvement of the country's economic growth indicators in 2003 and very good prospects for the upcoming years.

1.3. Market demand for forest related products and services by urban population

Individual sectors of the wood-processing industry, like the timber industry and the pulp industry, are the main market for the domestic raw wood. The main directions of raw wood-processing include sawing, chipping and round form. The foreign buyers' requirement has little impact on the raw materials market in Poland.

In the period of 1999-2003, global consumption of raw wood (domestic + exports) was between 24,8 and 30.6 million m^3. Demand on medium-sized timber was dominant. Specifically high demand on this assortment started in 2001. The analysis of raw wood consumption shows that consumption of large-sized timber declined from 45.5% to 39.4% in favor of medium-sized timber which grew from 50.7% to 56.7%. It also should be noted that after the falling consumption of small-sized timber in the first four years of the period under study, 2003 saw its growth to 3.9%.

Manufacturers of sawnwood are the dominant consumers of raw wood (large-sized timber and, to a greater and greater degree, medium-sized timber). In the period of 1999-2003, 13.5-17.1 million m^3 of raw wood was used for the production of these materials. During that time, 5.3-6.5 million m^3 of raw wood went to wood-based panels manufacturers and 4.2-4.5 m^3 to fiber pulp production. Due to the restructuring of the hard-coal industry and the falling mining production, there has been reduced market demand on the pitwood designed for mines. On the other hand, the fuel wood and small timber market is practically balanced. Fuel wood is used primarily for energy purposes and partially for the production of pallets, while small timber – basically for energy purposes.

A huge progress in production technology and assortment structure occurred in the wood-based panels industry thanks to complete privatization and significant involvement of foreign capital. It resulted in the manufacture of new products (MDF boards and OSB boards). For years, Poland is Europe's biggest producer of fiber boards and ranks among the first ten in the production of particle boards.

The furniture industry, basically privatized, is a sector featuring the highest production rate. Solid wood, mainly for housing purposes, prevail in the production structure. Exports play a very important role in this sector. It stimulates the development of technology and pattern designing. This sector is very modern thanks to the involvement of foreign capital.

The domestic sawmill industry has only partially utilized the possibilities created by the economic system transformation. Hence, its difficult financial situation. It makes it impossible to modernize sawmills and to apply state-of-the-art timber sawing and drying technologies. Commercial sawnwood is the primary assortment of production.

In the pulp and paper industry, the privatization process has been completed. Thanks to foreign investments, this industry has the world's leading, modern pulp and paper production technology.

Tables 1 and 2 and Figure 1 show data on the production, exports, imports and consumption of timber and wood-based products. It should be noted that consumption of timber products *per capita* in Poland is very low in comparison with other European countries. There are practically no data on the current market studies concerning demand on timber. However, taking into consideration the dynamic growth of furniture and wood-based panels exports, there are many signs showing that it can now significantly exceed the possibilities of the domestic raw wood material base.

Problematic is also determination of at least approximate number of economic entities operating in the wood-processing industry. Official statistics include businesses with over 49 employees, while most of the economic entities in the sawmill industry are small or very small firms employing less than 9 people.

Table 1. Manufacture of forest products 1994-2002

	Units x1000	**1994**	**1995**	**1996**	**1997**	**1998**	**1999**	**2000**	**2001**	**2002**
Roundwood	Cum	18776	20350	20286	21731	23107	24268	26025	25016	27137
Industrial Roundwood	Cum	16711	18939	18823	20193	21793	22842	24489	23375	24995
Sawlogs and Veneer Logs	Cum	9268	9337	9343	9875	10147	10946	11609	10393	10620
Pulpwood and Particles	Cum	6477	7329	7284	8269	0	0	0	0	0
Other Indust Roundwd	Cum	966	2273	2196	2049	2349	1995	1892	1676	1775
Wood Fuel	Cum	2065	1411	1463	1538	1314	1426	1536	1641	2142
Wood Residues	Cum	1950	485	513	689	1024	1312	1691	1807	1960
Sawnwood	Cum	5300	3842	3747	4214	4320	4137	4262	3083	3180
Sawnwood (C)	Cum	4500	3065	2856	3450	3538	3349	3532	2478	2574
Sawnwood (NC)	Cum	800	777	891	764	782	788	730	605	606
Wood-Based Panels	Cum	1987	2434	2653	3167	3809	4036	4615	4598	4894
Veneer Sheets	Cum	12	36	39	42	45	48	58	68	72
Plywood	Cum	124	164	173	226	178	223	261	242	261
Particle Board	Cum	1336	1584	1788	2118	2474	2616	3031	2937	3111
Fiberboard	Cum	515	650	653	781	1112	1149	1265	1351	1450
Wood Pulp	Mt	842	879	877	884	954	912	994	977	1025
Mechanical Wood Pulp	Mt	98	112	101	99	113	126	103	99	102
Semi-Chemical Wood Pulp	Mt	100	96	88	78	95	85	140	125	139
Chemical Wood Pulp	Mt	599	625	645	664	722	698	751	753	784
Dissolving Wood Pulp	Mt	45	46	43	43	24	3	0	0	0
Other Fibre Pulp	Mt	1	0	0	0	0	0	0	0	0
Recovered Paper	Mt	169	437	535	688	663	717	778	815	874
Paper and Paperboard	Mt	1326	1477	1528	1660	1718	1839	1934	2086	2342
Newsprint	Mt	68	95	86	80	92	149	211	211	217
Printing +Writing Paper	Mt	336	389	431	485	502	518	379	548	516
Other Paper +Paperboard	Mt	922	993	1011	1095	1124	1172	1344	1327	1609

Source: Web site FAO Forestry

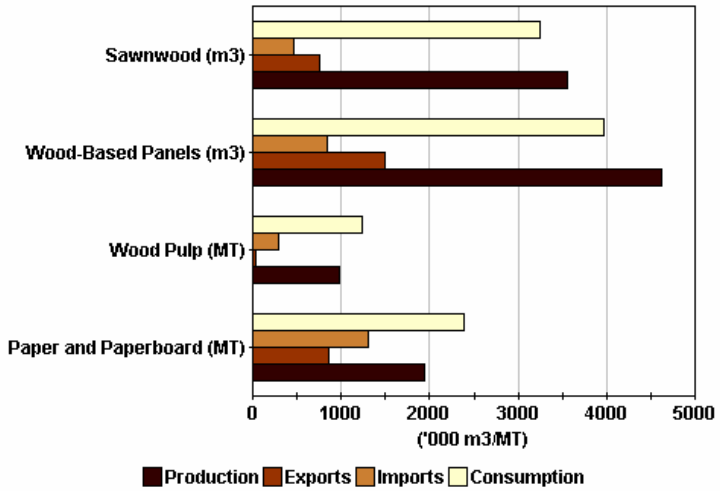


Figure 1. Manufacture, Trade and Consumption of Forest Products in 2002

Table 2. Trade of Forest Products in 2002

		Import		Export		Production	Consumption
	Units	Quantity thousand	million $US	Quantity thousand	million $US	Quantity thousand	Quantity thousand
Sawnwood	Cum	495.8	84.6	788.6	138.0	3180.0	2887.2
Sawnwood (C)	Cum	257.1	30.8	560.7	73.5	2574.0	2270.4
Sawnwood (NC)	Cum	238.7	53.8	227.9	64.5	606.0	616.8
Wood-Based Panels	Cum	946.3	239.1	1609.8	392.7	4894.0	4230.5
Veneer Sheets	Cum	21.6	33.9	16.2	30.1	72.0	77.4
Plywood	Cum	75.4	34.9	137.5	77.1	261.0	198.9
Particle Board	Cum	553.9	65.8	728.6	123.9	3111.0	2936.3
Fibreboard	Cum	295.4	104.5	727.5	161.6	1450.0	1017.9
Wood Pulp	Mt	367.4	163.5	28.5	11.0	1025.0	1363.9
Mechanical Wood Pulp	Mt	0.9	0.4	0.0	0.0	102.0	102.9
Semi-Chemical Wood Pulp	Mt	5.0	1.9	0.0	0.0	139.0	144.0
Chemical Wood Pulp	Mt	359.4	160.0	28.5	11.0	784.0	1114.9
Dissolving Wood Pulp	Mt	2.1	1.2	0.0	0.0	0.0	2.1
Paper and Paperboard	Mt	1475.0	1045.0	1124.8	688.9	2341.9	2692.1
Newsprint	Mt	63.8	33.4	95.0	35.2	217.0	185.8
Printing + Writing Paper	Mt	575.2	439.2	317.0	265.1	516.0	774.2
Other Paper +Paperboard	Mt	836.0	572.4	712.8	388.6	1608.9	1732.1
Roundwood	Cum	726.6	30.6	723.3	39.4	27137.0	27140.3
Industrial Roundwood	Cum	726.4	30.5	676.4	36.6	24995.0	25045.0
Wood Fuel	Cum	0.2	0.1	46.9	2.8	2142.0	2095.3
Wood Residues	Cum	1.8	0.3	104.5	7.4	1960.0	1857.3
Other Fibre Pulp	Mt	4.4	2.9	0.0	0.0	0.0	4.4
Recovered Paper	Mt	28.7	2900	59.4	6.8	874.0	843.3

Source: Web site FAO Forestry

Unfortunately, due to the lack of data, in most of the cases it is not possible to estimate non-wood product consumption by common methods. There are no data on imports and/or exports for most of the categories. Complete data for the period of 1999-2001 are published by GUS with regard to forest berries and fruits (Table 3).

Table 3. Consumption of forest berries and fruits

Years	Units	Import		Export		Production	Consumption
		Quantity	$US (x1000)	Quantity	$US (x1000)	Quantity	Quantity
1999	tons	1760	1737	1600	2457	11280	11440
2000	tons	2689	3818	1947	2878	10127	10869
2001	tons	2057	1317	1239	2444	8745	9563
2002	tons	3438	2354	2454	4096	15062	16046

1.4. Main problems and research questions in consumption for enterprise development

Lack of statistical information, particularly related to private sector.
Wide-range wood substitution and competition, especially on the part of grey economy which brought about a decline in price of sawnwood and other wood products.
High fragmentation of private forests.
Lack of market analyses with the account especially taken of the demand (consumers).
High timber price and supply-related problems.
Low income level of the population in comparison with timber products. Increasing costs of flat use and energy carriers in the total household expenses.
Lack of co-ordinated promotional actions in favour of timber products, business slump in the mass-scale housing industry, lack of instruments to augment the availability of flats.
Lack of research and knowledge about the developing area of non-wood forest services.

Annex A: Organisations studying forest products' consumption and main publications and information sources.

Agricultural University of Cracov. Faculty of Forestry.
Al. 29 Listopada 46, 31-425 Kraków
tel, fax: (48 12) 411-97-15
e-mail: wles@ar.krakow.pl
http://www.ar.krakow.pl
The August Cieszkowski Agricultural University of Poznań, Faculty of Forestry.
ul. Wojska Polskiego 28, 60-637 Poznań
tel./faks +48/61/848 7098"
dziekles@au.poznan.pl
http://www.au.poznan.pl

Warsaw Agricultural University, Faculty of Forestry.
ul. Nowoursynowska 159 02-776 Warszawa, Poland
phone 843-90-41 ext. 38010
e-mail: les_dziekan@sggw.waw.pl
http://www.sggw.waw.pl

Forest Research Institute in Warsaw
Bitwy Warszawskiej 1920r. Street, No 3; 00-973 Warsaw, Poland
Tel. (+48 22) 822 32 01, (En) (+48 22) 823 45 65, fax (+48 22) 822 49 35, or fax (+48 22) 822 92 38 ibl@ibles.waw.pl
http://www.ibles.waw.pl

Wood Technology Institute
ul. Winiarska 1 60-654 Poznań
tel. (+48) 61 849-24-00, fax. (+48) 61 822-43-72
e-mail: office@itd.poznan.pl
http://www.itd.poznan.pl/

Publications
FAO Statistical Databases.

Lesnictwo 2003. GUS, Warszawa

Raport o stanie lasów w Polsce 2003. Centrum Informacyjne Lasów Państwowych. Warszawa 2004.

Państwowe Gospodarstwo Leśne „Lasy Państwowe" Raport roczny 2003, Centrum Informacyjne Lasów Państwowych, Warszawa 2004.

Rocznik statystyczny przemysłu 2003. GUS, Warszawa

Rocznik statystyczny. Roczniki 1992-2003. GUS ,Warszawa.

Szostak A., Bidzińska G., Ratajczak E. 2004: Dianoza zużycia surowca drzewnego w Polsce i prognoza zapotrzebowania do roku 2020. Cz. 1. Określenie rozmiarów zużycia drewna przez podstawowe branże krajowego przemysłu w latach 1999-2003. Maszynopis. Instytut Technologii Drewna, Poznan.

2. Small-scale forestry practises

2.1. State of the art and historical development

Because of high fragmentation of forests and relatively small forest coverage, as well as few organised forms of its activity, the private forest sector has yet not been the subject of detailed studies. To a small extent, it is the subject of monitoring – for public statistics. Data on private forest holdings being part of rural farms are gathered during Farm Censuses (the recent one held in 2002). Apart from the general data concerning forest area, the level of timber harvest or the number of forest owners, there is no detailed information about economic importance of private forests.

The share of private forest area in total forest area in Poland is, at present, 16.8%, and of natural persons' forests – 15.7%. The share of private forests in the country's forest cover amounts to 5.2%.

2.2. Small-scale forest holding

a) The historical conditions of development of private forest property have led to a situation that there is no tradition in Poland for forest owners to form associations. The first associations of forest owners were formed in 2002. However, there have been so called land communities operating on 68 thousand ha in Poland (see Table 4). One of the largest and best run land associations is Wspólnota Lesna Uprawnionych 8 Wsi in Witów, composed of 8 villages, operating over the area of nearly 3,100 ha of forests.

Up to now there are almost 1,600 land communities in Poland.

b) As per the status at the end of 2003, there have been only 4 associations of private forest owners in Poland. The exact area of the forests owned by them is unknown, however it by no means exceeds 500 ha.

c) Lack of calculations concerning private forests. The total share of forestry in GDP amounted to 0.34% in 2002 (from GUS data). Basing on the volume of harvested merchantable timber it can only be estimated that the share of private forests in GDP does not exceed 0.02%.

d) From the available data on private forest owners, only their education status and age are known (see Tables 4 and 5). Other sociological data are missing.

Table 4. Education status of private forest owners

	Education level in % total	
	forest area	number of forest holdings
university	5.5	4.0
post-secondary	1.4	1.5
secondary vocational	17.8	16.9
secondary	2.5	2.6
primary vocational	35.8	36.1
primary completed	34.4	35.8
primary not completed	2.5	3.0
unknown	0.1	0.1
total	1,037,547 hectares	773,188 holdings

Table 5. Age of the forest owners

	Age of the user in % total	
	forest area	number of forest holdings
up to 25 years	3.1	2.9
25 - 34	15.7	15.2
35 - 44	28.6	27.4
45 - 64	42.6	42.5
65 and older	10.0	12.1
unknown	0.0	0.0
Total (absolute values [ha/owner])	1,037,547	773,188

e) In 2001, 1153 thousand cubic meters of merchantable timber were harvested in private forests, which accounts for 4.6% of total merchantable timber harvested in Poland (from GUS data).

f) Non-wood products harvested in private forests should include, like in the case of state forests, forest floor fruit and mushroom, ornamental and Christmas trees. However, there are not even rough estimations of the volume and value of non-wood products harvested in private forests. The volume and value of forest floor products is estimated proportionally to the share of private forest area in total forest area and can amount to 1,887 tons of berries, forest floor fruit and fresh mushroom worth PLN 8.309 thousand. With reference to 1 ha of forest area, we have 1.30 kg of forest floor products per ha worth PLN 6. It is noteworthy, that the purchase of forest floor products is very strongly differentiated regionally (see Table 6.) and in spite of its low estimate values, it is of great importance for the inhabitants of rural areas as their additional, seasonal source of income.

g) It is hard to determine the significance of private forestry for tourism and recreation, first of all due to the high fragmentation of holdings . For sure, forests are a great attraction for agro-tourist farms. The importance of private forests in this context can be seen as of ***low significance***.
h) 16 regions (provinces) are strongly differentiated in terms of private forest resources (see Tables 6 and 7). Geographical distribution of private forests is uneven. Much more private forests are in the eastern and southern parts of Poland than in the western part. In the: Małopolskie, Mazowieckie, Lubelskie and Podlaskie Provinces there are as many as 914.4 thousand ha of private forests, which account for 59.2% of the total area of private forests in Poland.
i) No privatisation/restitution of forests is being conducted in Poland.

Table 6. Characterisation of private forests

Province (Voivodship)	**Number of private forest holdings**	**Harvest level of merchantable timber [‘000 m^3]**	**Total afforestation in individual farms in 1992-2000**	**Volume and value of forest floor products purchased in 2001 r.**	
	2002	**2001**		**tones**	**‘000 PLN**
1	**2**	**5**	**3**	**4**	**5**
Poland	**838,608**	**1153.2**	**77,393**	**12,021.0**	**52,925.2**
Dolnośląskie	12,956	10.7	1,856	90.0	535.9
Kujawsko-Pomorskie	16,615	32.2	3,289	267.0	919.0
Lubelskie	130,841	192.4	7,188	2,945.0	6,894.8
Lubuskie	5,022	12.3	668	260.0	1,545.2
Łódzkie	73,988	75.8	9,001	198.0	694.8
Małopolskie	120,699	198.3	4,207	130.0	512.3
Mazowieckie	147,375	126.1	13,673	962.0	4,255.3
Opolskie	7,917	9.8	415	0.0	0.0
Podkarpackie	83,225	100.5	7,878	635.0	1,229.8
Podlaskie	66,202	84.5	5,960	1,312.0	7,902.2
Pomorskie	16,746	64.9	3,563	1,744.0	7,280.7
Śląskie	47,201	85.2	2,738	27.0	123.6
Świętokrzyskie	54,180	61.7	5,493	374.0	975.4
Warmińsko-Mazurskie	15,869	35.9	3,631	273.0	883.1
Wielkopolskie	33,276	54.4	6,822	1,759.0	16,097.9
Zachodniopomorskie	6,496	8.5	1,010	1,045.0	3,075.2

Table 7. Forest areas in Poland by provinces (as of 31.12.2001 according to GUS - Central Statistical Office)

Province (Voivodship)	Area of forests		Area of private forests, incl.:			Share of private forests
	total	private	natural persons	land associations	other *	
	1000 ha		ha			%
Poland	**9088.5**	**1544.9**	**1,447,464**	**68,194**	**29,279**	**16.8**
Dolnośląskie	579.6	12.8	11,311	0	1,459	2.1
Kujawsko-Pomorskie	416.5	43.0	40,842	565	1,609	9.8
Lubelskie	565.5	214.2	203,642	9,568	1,004	37.2
Lubuskie	693.6	7.8	6942	5	854	1.1
Łódzkie	380.8	119.9	112,887	6,256	749	31.1
Malopolskie	434.2	185.9	167,159	14,548	4,221	42.8
Mazowieckie	793.6	329.2	315,766	10,327	3,062	40.9
Opolskie	253.0	10.6	9566	5	988	4.2
Podkarpackie	661.3	95.0	84,961	7,585	2,479	14.2
Podlaskie	605.6	185.1	179,555	4,290	1,262	30.5
Pomorskie	667.4	67.5	65,936	45	1,488	10.0
Śląskie	397.8	76.8	68,146	7,184	1,454	19.3
Świętokrzyskie	320.7	79.4	71,851	6,965	695	24.7
Warmińsko-Mazurskie	736.0	33.8	31,635	105	2,038	4.4
Wielkopolskie	772.4	75.1	70,653	746	3,681	9.4
Zachodniopomorskie	810.3	8.8	6612	0	2,236	1.0

*co-operatives, churches, private firms, voluntary organisations

2.3. Small-scale forestry practices

a) Small-size forestry with the average forest holding area of 1.43 ha is dominant. Forests are, to a great extent, part of agricultural farms. Forest economy, if such exists, is most frequently focused on timber production. Because of a small average farm area, recreation and non-wood products are of no significance.

b) There is an association of private forests with agriculture as a result of allocation of a large area of farmland, excluded from agricultural production, for afforestation, as well as due to the fact that a forest frequently is part of a rural farm, being a source of wood for household purposes.

c) The extent of works carried out in private forests is shown in Table 8. In private forests, simplified forest management plans are being drawn up. They are the main source of information about the condition of these forests. This simplification (of plans) is considerable in comparison with the State Treasury's forests and concerns mainly the scope of forest inventory and the precision of determining the individual components of forest appraisal. In private forests, no soil-site-related works are being carried out, estimation methods are being used to determine stand volume, the scope of the described forest appraisal components is lower than in the State Treasury's forests, the activities undertaken to identify protective forests and forests in damage zone are minimal (no such a possibility has practically existed until 1991). The carried out large-scale inventory (including health and sanitary condition of forests, damage caused by game, damage zones) did not cover private forests. We should add to this the lack or loss of validity of forest management plans (see Table 9) on part of this ownership category forest areas. Annual updating of forest area and volume by dominant species and age classes is not being

conducted for private forests. The statistical data concerning management activities performed are just approximations.

Table 8. The scope of basic activities in private forests in 2002

Province (Voivodship)	Private forests	Management activity in ha			
		Reforestation	Afforestation	Forest tending	Timber harvesting
Poland	**1544.8**	**2886**	**11315**	**16241**	**1,153,236**
Dolnośląskie	12.8	53	214	127	10,658
Kujawsko-Pomorskie	43.0	120	470	960	32,197
Lubelskie	214.2	238	1328	2761	192,377
Lubuskie	7.8	32	27	142	12,342
Łódzkie	119.9	167	1347	1463	75,810
Malopolskie	185.9	520	664	2139	198,301
Mazowieckie	329.2	469	2416	2191	126,110
Opolskie	10.6	30	102	147	9,752
Podkarpackie	95.0	268	633	1676	100,538
Podlaskie	185.1	238	781	862	84,519
Pomorskie	67.5	225	358	921	64,906
Śląskie	76.8	178	176	377	85,234
Świętokrzyskie	79.4	109	972	505	61,671
Warmińsko-Mazurskie	33.8	92	860	797	35,869
Wielkopolskie	75.1	141	962	1153	54,437
Zachodniopomorskie	8.8	6	5	20	8,515

Table 9. The share of forests possessing updated management plans and recognised as protective in 2002

Province (Voivodship)	Private forests in thousand ha	% of forests possessing updated management plans	% forests qualified as protective
Poland	1544.9	65.7	5.3
Dolnośląskie	12.8	86.7	5.4
Kujawsko-Pomorskie	43.0	94.3	2.8
Lubelskie	214.2	59.6	0.4
Lubuskie	7.8	85.8	1.2
Łódzkie	119.9	90.3	0.4
Malopolskie	185.9	51.7	8.6
Mazowieckie	329.2	50.8	6.5
Opolskie	10.6	85.2	14.8
Podkarpackie	95.0	77.8	10.5
Podlaskie	185.1	72.1	5.7
Pomorskie	67.5	78.7	0.5
Śląskie	76.8	51.7	20.1
Świętokrzyskie	79.4	78.9	2.2
Warmińsko-Mazurskie	33.8	46.1	1.0
Wielkopolskie	75.1	85.8	1.2
Zachodniopomorskie	8.8	61.4	2.9

d) Data will be available on the basis of random sampling of forest holdings by the end of 2004.

e) Examples of forest associations: Słopnickie Association of Private Forest Owners (25 ha, 17 members, fee PLN 1/month), Zawojskie Association of Private Forest Owners (150 ha, 70 members, fee PLN 3/month).

f) All the data presented below are based on the research carried out in 2004 in private forest farms on a representative random sample of 520 agricultural farms with forests. For information about the volume of consumed timber for farmers' own needs – see g)

g) While trying to determine the annual costs (in 2003) encumbering forest management, a total of cost components was calculated, such as: purchase of materials and energy, as well as taxes and fees (Table 10). Such cost components were determined for 237 farms for a total value of PLN 96,116. The farms had 1,114 ha of forests and harvested 6,610 m^3 of wood in the period between 2001-2003. The burden per unit of area and harvested timber was PLN 86/ha and PLN 43/m^3

Table 7. Cost structure of surveyed forest farms in 2004.

Expense category in 2003	**Value of expenses [PLN]**	**number of farms**
- purchase of forest lands	5,900	5
- lease of forest lands	2,442	4
- purchase of machinery and equipment (e.g. sawing machines, brushcutters, etc)	81,755	78
- purchase of materials and energy (e.g. purchase of seedlings, pesticides)	88,067	258
- fees for hired labor in forests (remuneration for the persons working in forests – soil preparation, haulage of timber from forests, aforestation and tending treatments)	21,911	39
- taxes and fees (forest tax, land classification fee, etc.)	41,222	445

The amount of revenues from the sale of timber raw material in 34 farms reached nearly PLN 70 thousand. Nearly 806 m^3 of timber were harvested in these farms in 2003. The average unit price per m^3 of timber was PLN 86 per $m^{3.}$ The sale of timber was for each of the 34 farms a source of revenue valued at PLN 2,058 on average. The revenues thus obtained oscillated from PLN 100 to 10 thousand. Revenues from the sale of timber raw material of 34 farms was generated on the area of 287 ha of forests - each hectare of forest generated revenue of PLN 243 (Table 11).

The value of timber raw material used for individual needs of farm owners valued at PLN 365 thousand was nearly five-fold higher than the value of sold timber. The value of timber used first of all for the needs of a farm and as fuel was estimated by 360 farms – the average value of timber raw material used for a farm's own needs amounted to PLN 1.015. The volume of the timber harvested in 2003 amounted to 4,052 m^3. The value of one cubic meter used in the surveyed farms was estimated by the polled persons at PLN 90. Those farms which estimated the value of timber used for their own needs operate on the area of 1,445 ha of forest.

Table 11. The value and structure of revenues from the sale and from the use of timber for farms' own needs

Source of revenues in 2003	**Value of revenues [zł]**	**N**	**% of revenues**
- from the sale of felled wood or growing stock	70,000	34	15.57
- estimated value of felled wood in the owned forest used for household needs (fuel, construction, etc.)	365,470	360	81.28
- in the form of a money equivalent for forest management	14,180	6	3.15
total	449,650	400	100.00

h) See above.

i) The percentage of revenues related to forest management and wood-processing is not insignificant. Revenues from the sale of timber account for 1.5% of **total** value of revenues, while those related to the sale of timber from one's own forest, not in round but processed form, account for merely 0.2% of that value (Table 12).

Table 12. Revenue structure of agricultural-forest farm

Revenue structure in 2003	**[%] of total revenues**	**N**	**% of a sample**
- running an agricultural farm	31.8	277	53.26
- sale of timber from one's own forest	1.5	37	7.11
- sale of processed timber (boards, stakes, pallets, etc.) from one's own forest	0.2	7	1.35
- hired labor, old age and disability pensions	44.4	279	53.65
- other sources (to be named).	22.1	150	28.85
-total	100%	-	-

j) Lack of information.

k) Farmers' communities occur in 396 communes; among 1,632 which turned in the completed questionnaires (there is a total number of 2,467 communes in the country) there are 1.316 agro-forest communities with a total area of 76,606 ha, including 40,447 ha of forests.

l) A great part of the surveyed farms declared performance of harvesting works and haulage of timber from their forests by their own means, with the help of their families. In the case of wood felling – 413 persons were questioned, in the case of haulage – 405 persons (Table 13).

Table 13. Family and neighbour assistance in felling and haulage of wood from forests in the surveyed agricultural-forest farms in 2004.

activity	**felling**	**haulage**
I do it myself with the assistance of my family	413	405
I do it myself with the assistance of my neighbors	20	23
I hire labor against payment	25	29

2.4. Policy framework and production conditions

a) Institutions

- Ministry of the Environment,
- State Forests National Forest Holding,
- National Fund for Environmental Protection and Water Management,
- Provincial Funds for Environmental Protection and Water Management.

Legal acts

- Act of 29 June 1963 on land communities management (Dz. U. No. 28, item. 169);
- Land Survey and Cartographic Law Act of 17 May 1989 (Dz. U. No. 30, item 163 with further amendments);
- Act of 7 April 1989 concerning associations (Dz. U. No. 20, item 104);
- Forest Act of 28 September 1991 (consolidated text Dz. U. of 2000 No. 56 item 679 with further amendments);
- Act of 16 October 1991 on nature conservation (Dz. U. No. 114, item 492);
- Act of 3 February 1995 on the protection of agricultural and forest land (Dz. U. No. 16, item 78);
- Environment protection Law Act of 27 April 2001 (Dz. U. No. 62, item 627);

Regulations:

- of the Minister of the Environment of 28 December 1998 on detailed principles of preparing forest management plan, simplified forest management plan and forest inventory (Dz. U. z 1999 No. 3, poz.16);
- of the Minister of the Environment of 24 February 1998 on detailed principles of timber marking, the patterns of marking equipment and of their use, as well as samples of documents concerning the legality of harvest (Dz. U. No. 36, item 201 z 1998 with further amendments);
- of the Minister of the Environment and the Minister for Internal Affairs and Administration of 16 August 1999 on detailed principles of protection against forest fires (Dz. U. No. 73, item 824 z 1999).

a) Legal instruments:

- Forest Act of 28 September 1991 (Dz.U. No. 101, item 444 with further amendments),
- Act of 16 October 1991 on nature conservation (Dz. U. No. 114, item 492);
- Act of 3 February 1995 on protection of agricultural and forest land (Dz. U. No. 16, item 78);

b) Economic instruments – financial and expert support:

- protective measures against the occurrence of harmful biotic agents to a degree that threatens the sustainability of forest (at the expense of forest districts staying within the organisational structure of the State Forests),
- management and protection of forests connected with the renewal and restructuring of a stand in the case of forest damage arising as a result of the impact of industrial gases and dusts, or natural disaster caused by fires and other biotic and abiotic threatening the sustainability of forests (the costs are covered from the State budget),
- coverage, in part or in full, the expenses for the afforestation of land (financed from the State budget),

- cash equivalent for afforestation of post-agricultural land (financed from the State budget),
- preparation of simplified management plans or inventory of forest resources (financed from the State budget),
- in specially-justified cases seedlings of forest trees and shrubs are available free of charge for land afforestation (seedlings are delivered by appropriate forest districts staying within the organisational structure of the State Forests),
- stands up to 40 years are exempt from the forest tax,
- forest tax reduction: protective forests, forests included in nature reserves and National Parks;

c) Ministry of the Environment, Ministry of Agriculture and Rural Development, State Forests National Forest Holding, National Fund and Provincial Funds for Environmental Protection and Water Management.
d) The institute focusing on research of forest environment is the Forest Research Institute in Warsaw. Other institutes carrying out research in this field are: the Institute of Environmental Protection, Institute of Dendrology PAS (Polish Academy of Sciences) in Kórnik, Institute of Ecology PAS in Dziekanów Leśny, Institute of Botany PAS, Mammal Research Institute PAS in Białowieża. Besides worth mentioning are three Forest Departments: Warsaw Agricultural University (SGGW), Agricultural University of Poznań and Agricultural University of Cracow.
e) State Forests National Forest Holding (Promotional Forest Complexes (PFC), Forest Culture Centre in Gołuchów), Agricultural Consultation Centres (ACC), forest secondary schools and universities (forest technical schools, Warsaw Agricultural University (SGGW), Agricultural University of Poznań and Agricultural University of Cracow).
f) State Forests National Forest Holding, National Fund and Provincial Funds for Environmental Protection and Water Management.
g) Act of 28 September 1991 defines the scope and ways of carrying out the supervision. The management of forests that are not the property of the State Treasury is under the supervision of county governors and, to a lesser degree, of Provincial governors. At the same time possibilities have been created to exercise on their behalf some elements of the supervision over forests by chief foresters of forests districts and directors of Regional Directorates of the State Forests.

Pursuant to the Forest Act the above mentioned supervision organs are authorised to exercise rules of law by way of:
1) issuing normative acts concerning:
- ordering protective actions to be carried out in the country,

2) issuing administrative decisions concerning:
- approval of simplified management plans,
- appropriating funds to cover expenses of restructuring of stands arising as a result of the impact of industrial gases and dusts (in the case in which it is not possible to determine the agent responsible for forest damage) or natural disaster,
- transformation of a stand into farmland,
- the ways of dealing the comments on the draft simplified management plan raised by forest owners,

- harvesting of timber which are not in compliance with the simplified management plan,
- ordering to perform the tasks included in the simplified management if a forest owner fails to perform them in the set time,
- determining the scope of tasks in the field of tree cutting, reintroduction of forest vegetation (plantations), stand conversion, tending and protection of forests including protection against fires in forests for which simplified management plans have not been drawn up and in forest complexes of an area up to 10 ha.

3. Wood-processing industries

3.1. State of the art and historical development

The social-economic and political system transformations initiated in our country in 1989 have had a great influence on the changes in the structure of Polish industry and the condition of industrial plants in the new economic realities. In addition to some scores of big incumbent companies, a large number of new small enterprises with a few employees are being set up. Not less dynamic is the development of the sector of middle-sized enterprises in terms of turnover and number of employees.

Nearly 60.5 thousand enterprises were operating in the wood-processing, as well as the pulp and paper industries at the beginning of the 1990's, of which 29.1 thousand- in the wood and wood products industry, 21.2 thousand – in the furniture industry and 2,138 in the pulp and paper industry. It should be noted that a great part of these firms underwent liquidation in a very short time, or changed their production profile, or even their business profile, transforming into service providers or commercial firms. It is hard to precisely determine the total number of business entities processing wood. According to the Central Statistical Office (GUS), there were over 59,400 such entities (including natural persons conducting business) in 2002. Small enterprises (with up to 49 employees) accounted for 99.6% of the total number of wood-processing firms, and the percentage of employees in those firms was 38%. There were 690 entities with over 49 employees which operated in the wood-processing industry in 2002. 326 enterprises were registered in the wood and wood products industry. Furniture production was carried out by 364 enterprises. The total number of employees in the wood-processing industry in 2002 amounted to 143.1 thousand. See Table 14.

In the wood -processing industry, furniture making dominates, with sold production and employment amounting to 57% and 61%, respectively. Next come the following sectors as a percentage in sold production: wood-based panels - (19.3%) and construction joinery - (11.3%). In terms of number of employees, construction joinery and the sawmill industry have a great part, with (12.4 %) and (10.8%), respectively.
Polish wood-processing industry, particularly the sawmill sector, is based on local timber resources and is located in the vicinity of larger forest complexes. The analysis of the regional distribution of sawnwood producers shows that it is concentrated mainly in northern-western Poland.

Table 14. Characteristics of the wood-processing industry in Poland

Specification	**Number of business entities**	**Production**	**Employment**
	593761	PLN 20,4 billion[1]=	143,100 persons[2] =
Wood industry, incl.:		100.0 %	100.0 %
- Sawmilling industry	7 167	6,8	10,7
- Wood-based panels industry	337	19,3	8,0
- Wood construction joinery	16 558	11,3	12,4
- Packaging industry	3 837	1,8	2,8
- Furniture industry	21 343	57,4	61,3
- Others	10 134	3,4	4,8

[1] business entities registered in the REGON system in 2001 in which, according to GUS, about 40% of the information can be out of date (GUS does not monitor the fulfilment of the obligation to update the information in the event of liquidation or change of business profile)
[2] value of sold production and average employment in the firms with 49 employees
Source: a study by Institute of Wood Technology on the basis of GUS data

The wood-processing industry belongs to important sectors of Polish economy. While its share in Gross Domestic Product is about 2%, it employs over 6% of the total number of staff in the industry.

Unfortunately, description of small enterprises in the wood-processing industry is very difficult because of the lack of precise statistical data. Generally available, precise statistical data pertain to enterprises with over 49 employees which, however, account for no more than 0.4%.

3.2. Wood processing industries

Polish **sawmilling industry** belongs to the dispersed sectors, with its numerous, ever changing group of small and very small entities in which production scale is rather low. It is hard to specify precisely the number of sawnwood manufacturers in Poland. According to REGON (status as of 2003), the number of entities in this sector is 8.768. However, the actual number of manufacturers of sawnwood – the main product of the sector – whose operation is rather stable, is 1,100-1,200, of which only 15% have over 49 employees.

According to other sources, 3,091 entities deal with sawing. About 50% of them are handicrafts enterprises, processing less than 1 thousand m^3 of raw material annually. About 1,390 entities, or 45%, are small firms sawing from 1 thousand to 10 thousand m^3 of raw material. 151 plants (5% of total number) saw over 10 thousand m^3 of raw material annually, of which 12 entities are large enterprises processing over 50 thousand m^3 of round wood annually (totally about 20% of total mass). Manufacturers sawing up to 10 thousand m^3 of raw material annually (about 95% of operating firms) purchase about 52% of sold raw material mass, the others (5% of firms) – 48%.

At this point, it should be stated that the number of receivers of round wood could be bigger if we add the manufacturers of goods such as pallets or equipment for gardens. Here, we have a large group of manufacturers processing round wood which is usually

thinner than that purchased by typical sawmills. This group encompasses about 2.5 thousand firms. 25 of them reach the output largely exceeding 50 thousand cubic meters per year. The importance of this segment is reflected in the fact that it processes about 5 million cubic meters of paper wood.

Like in many European countries, the **wood-based panels industry** in Poland features high concentration of the production potential. The manufacturing of wood-based panels, including particleboards, fibreboards and ply wood, is concentrated in a dozen or so bigger plants which all account for 98% of total internal production of these goods. The volume of production of wood-based panels in Poland between 1995 and 2002 is shown in Table 15.

Table 15. The wood-based panels industry in the years 1995- 2002

	Production in thousand m^3							
	Years							
Products	1995	1996	1997	1998	1999	2000	2001	2002
Particleboards	1584	1788	2118	2474	2616	3031	2937	3052
Fibreboards	482	457	487	475	447	497.2	501	550
Insulating boards	186	172	177	186	198	239.2	259	307
Hardboards	296	285	310	289	249	258	242	243
MDF	168	196	294	637	702	768	850	1250
ply wood	164	173	226	178	223	261	242	270
Total	2398	2614	3125	3764	3988	4557.2	4530	5122

Source: GUS

The dynamic development of the production of wood-based panels has been caused by the growing demand for the panels on the home and foreign markets. Poland is a significant supplier of wood-based panels to the European market. Their export in 2002 amounted to 1.6 million cubic meters. About 37% of exported particleboards are OSB boards**.** The share of exports in the production of particleboards is about 22%, while of fibreboards - over 42%.

The products made of wood-based panels in Poland are to a great extent exported. There is a great potential for the development of production and consumption of wood-based panels in Poland.

After a deep technological reconstruction in the **furniture industry** in the 1990's, this sector features a significant growth rate, a high share of exports in the value of sold products and a high level of advancement of the privatisation processes. About 95% of firms are private businesses. The furniture-making industry is one of the most dynamic sectors of Polish economy.

The furniture industry sells about 70% of its products to foreign countries. Therefore, export decides about the economic situation of this sector more than internal demand. The production growth in the furniture sector in recent years has been of the order of 5-6% on average.

The furniture industry sector in Poland is to a great extent concentrated. The twelve largest Polish plants manufacture about 60% of Polish furniture.

Foreign trade plays a significant role in the wood-processing industry, and the export of wood products, particularly of furniture, is of crucial importance for the development of the entire economy. The role of the import of timber products is relatively small for the Polish market – see Table 16.

Table 16. Foreign trade in wood products between 1999 and 2002

Billion PLN

Specification	**Exports**				**Imports**			
	1999	2000	2001	2002	1999	2000	2001	2002
Wood products	11,2	13,3	13,7	15,7	2,9	3,2	3,3	3,6
Dynamics %	-	118,8	103,0	114,6	-	110,3	103,1	109,1
incl:								
Furniture	7,6	9,3	9,9	11,4	1,5	1,6	1,6	1,7
Dynamics %	-	112,4	106,5	115,2	-	106,7	100,0	106,3

[x] previous year = 100%

Source: a study by Institute of Wood Technology on the basis of GUS data

Furniture is the main commodity group in Polish exports. In 2002, furniture accounted for nearly 7% of their value. As far as other timber products are concerned, wood-based panels, mainly particle and insulating boards, play a crucial role in exports (Table 17).

Table 17. Wood products sector in Polish foreign trade

%

Specification	**Share of timber sector products:**							
	Total exports from Poland				Total imports to Poland			
	1999	2000	2001	2002	1999	2000	2001	2002
Wood products industry	3.3	3.0	2.5	2.7	0.8	0.8	0.8	0.8
incl:								
Sawmilling industry	1.1	1.0	0.7	0.7	0.2	0.2	0.2	0.2
Wood-based panels industry	1.0	1.0	0.9	1.0	0.4	0.4	0.4	0.4
Wood construction joinery and carpentry products for the building industry	0.6	0.6	0.5	0.6	0.1	0.1	0.1	0.1
Wood packaging industry	0.3	0.2	0.2	0.2	0.0	0.0	0.0	0.0
Other wood products industry	0.3	0.2	0.2	0.2	0.1	0.1	0.1	0.1
Furniture industry	7.0	6.7	6.7	6.8	0.8	0.8	0.8	0.8
Total wood-processing industry	10.3	9.7	9.2	9.5	1.6	1.5	1.6	1.6

Note: due to the lack of correspondence between the classification systems in the sphere of production and foreign trade, the value of the export and import of products by sector was estimated according to PKWiU in compliance with Polish Combined Nomenclature of Foreign Trade (PCN), with the exclusion of raw timber.

Source: a study by Institute of Wood Technology on the basis of GUS data

As a result of the economic-organisational changes in forest economy in Poland, a dynamic development of the private services sector has taken place. The emergence of private **forest enterprises (contractors)** conducting business on their own was taking place in two ways. The first one was the initiative of the people wanting to set up a private enterprise, the second was the result of a pressure exercised by the administration on the workers leaving Forest District Inspectorates to set up their own, private enterprises and provide services for a Forest District. This has led to the emergence of a large number of small enterprises employing up to 5 persons.

Generally, between 1992 and 1999 changes in the number of employees were accompanied by the deep changes in the employment structure - the share of supervisory staff in the employment structure doubled, while the number of permanent employees halved. In a move to cut business costs, it is a common practice that private forest firms employ subcontractors. Subcontractors are one-person firms with registered business. Being independent economic entities, they pay all the fees and duties resulting from their business activity. Frequently, in one-person firms whole families work for one person. In multiple-person firms there are cases of illegal employment of a larger number of persons nowhere registered. The number of multiple-person firms has been dramatically reduced with a simultaneous increase in the number of seasonal staff.

3.3. Wood processing industries practices

In 2001, out of a total number of 59.4 thousand entities, 99.8% conducted business in the private sector. There is lack of data concerning the volume of timber (harvested in Poland) processed by small and medium-sized enterprises. It is known, however, that small enterprises with up to 49 employees accounted for 37 % of total number of sales of the wood-processing industry.

Contractors harvest about 95% of total wood harvested in Poland. The number of such firms is estimated at about 8 thousand, of which 50% are one-man firms. As far as the other firms are concerned, most are enterprises with 2-5 employees. It is a common practice that firms hire temporary staff seasonally, or even illegally. Contractors are underinvested. Their main equipment is still a chain saw and a farm tractor, in most cases without additional equipment.

In terms of sold production and number of employees, the following sectors are of the greatest importance: furniture-making – 51% and 53%, wood-based panels –15% and 6%, construction joinery - 14% and 15%, and the sawmill industry - 12% and 16%, respectively.

1993 was a breakthrough year for the Polish wood-processing industry, including the furniture industry. After the phase of economic breakdown, the share of its production in terms of value in total industrial output has gradually increased. In 2000, it stood at 5.8% for business entities with over 9 employees and 5.2% for entities employing more than 49 persons (see Table 18).

Table 18. Wood-processing industry as a percentage of total industry sold production in Poland between 1993 and 2002

%

Specification	1993	1995	1999	2000	2001	2002
The share of wood industry (including furniture industry) in total industrial output						
In business entities:						
a/ with over 9 employees	3.7	4.6	5.9	5.8	5.7	5.8
b/ with over 49 employees	2.9	3.7	5.1	5.2	5.0	5.1

Note: for years 1993 and 1995 the data refer to business entities employing: a/ more than 5 persons; b/ more than 50 persons

Source: Strategy for wood industry up to 2006. MGPiPS. Warsaw 2003

In 2002, the production potential of the wood-processing industry (including the furniture industry) featured a 9.5 per cent share in the export of goods (excluding the export of timber). It should be stated that the economic situation of the wood industry (including the furniture industry) has recently been relatively better compared to the whole industry (see Table 19).

Table 19. Net profitability of wood industry compared to the total industry output in the years 1997-2002

%

Specification	1997	1998	1999	2000	2001	2002	2003[1]
Industry	1.9	0.4	-0.6	0.3	-0.3	0.2	2.4
Processing industry	2.3	1.2	0.1	0.7	-0.4	0.3	2.6
Wood products	2.9	0.5	-0.2	2.0	-0.2	1.4	1.7
Incl.:							
Sawmill products	-1.3	-2.5	-1.6	-1.3	-3.7	-1.0	2.8
Wood-based panels	2.9	-1.2	-3.1	3.6	1.3	2.7	1.1
Wood construction joinery	6.5	5.4	4.6	3.5	1.0	0.8	-0.6
Furniture production	3.1	2.4	2.8	1.2	0.7	2.9	4.2

Notes: 1: first half of 2003.

: in 1997-1998 - business entities employing more than 50 persons, in 1999-2002 more than 49 persons

Source: Szczawińska E. 2003: Możliwości rozwoju małych i średnich przedsiębiorstw przemysłu drzewnego w Polsce [Development potential of small- and medium-size firms in the wood industry sector in Poland]. Conference materials „Leśna przedsiębiorczość", Sękocin 2003

Industrial competitiveness is strongly associated with the state-of-the art products largely reflecting the level of technological advancement of factory equipment and systems, as well as production innovation degree. The new and upgraded products whose manufacture started in 1999-2001 account for 7% of the value of sold production of timber goods and about 24% of sold production in furniture making (Table 20). The downturn in the timber sector has been significant in recent years, while in the furniture sector, after the slowdown in 1998-2000, significant growth, the highest since 1995, was noted.

Table 20. Sold production of new and upgraded products stated as a percentage of total sold production in the wood-processing industry in 1995-2001.

Current prices

Specification	Products whose production started				
	1995-1997	1996-1998	1997-1999	1998-2000	1999-2001
	in % of sold production				
Industry	20.1	20.0	21.3	16.4	18.0
Processing industry:	20.9	22.4	24.7	18.5	20.8
Wood products production	21.4	25.2	23.5	14.0	7.3
Furniture production (incl. other sectors)	16.8	15.3	17.8	10.6	23.6

Notes: in 1996 – 1998 in business entities employing more than 50 persons
in 1999-2001 in business entities employing more than 49 persons
Source: a study by Institute of Wood Technology on the basis of GUS data.

3.4. Policy framework and production conditions

The period after 1989 saw crucial changes in the mechanisms of state functioning in Poland. The first fundamental change was restoration of local governments in rural districts in 1990. Next came the self-governmental and administrative reform introduced on 1 January 1999. On its basis, the number of provinces were reduced from 49 to 16 and the intermediate level between province and commune was introduced. One of the assumptions of the reform was to delegate part of the central level's tasks, that is the responsibility for economic development and regional policy, to the provincial (regional) level. On the other hand, the Government was responsible for strategic functions (co-creation and implementation of State Policy, creation of administrative regulations) and supervisory functions (supervision of agencies and bodies).

Practically, there is no institution that might create a coherent policy for the entire timber sector. There is the Polish Economic Chamber of the Wood-processing industry, however it associates in fact firms operating in the sawmill industry. Nevertheless, we should remember about the Polish Agency for Enterprise Development set up in 2001 which is a very important instrument of the state policy in the area of support for the small and medium-sized enterprises sector.

The main reforms which took place after 1989 include privatisation and re-privatisation process which also extended to the wood-processing industry. At present, no more than 0.2% of firms operating in this sector are state enterprises.

No policy exists concerning exclusively the wood-processing industry. The Sectoral Operational Program "Company Competitiveness Growth" is one of seven operational programs which are being implemented in Poland under the national strategy included in the National Development Plan 2004 – 2006. The program sets the goals, priorities and actions pertaining to the implementation of the policy in favour of development of entrepreneurship and innovation , with a focus on the small and medium-sized enterprises. The main goal of the program, defined as improvement of Polish economy's competitive position, will be fulfilled through implementation of nine actions co-financed by the European Regional Development Fund. Four of them will be implemented by the Polish Agency for Enterprise Development . Unfortunately, as a

result of incorrect interpretation of the regulations, forest contractors have been excluded from this program.

For all the organisational units of State Forests and the forests not belonging to the State Treasury, as well as the forests included in the State Treasury Agricultural Property Resources, forest management plans including, among others, the volume of timber to be harvested, are being drawn up.

An Integrated Regional Development Operational Plan (ZPORR) is being prepared for the period of 2004-2006. It's aim is, among others, to create the conditions for growth of competitiveness between regions, counteract marginalisation of some areas and foster economic, social and territorial cohesion. ZPORR is directed at, among others, local governments and micro-enterprises, as well as people just staring business activity.
The main institutions conducting research in the wood-processing industry include: The Wood Technology Institute and higher education establishments (forest faculties, wood technology faculties, economics faculties).

Higher education in forestry and forest industry is provided by 3 forest and 2 wood technology faculties. Secondary education is offered by forest high schools, as well as wood-processing colleges and high schools.

Practically there are no institutions providing training and consulting for the wood-processing industry. The Educational Center for Forest Entrepreneurs organising courses in forest management and legal-economic issues is the only exception.

3.5. Conclusions: Supporting and limiting factors for enterprise development in wood processing industries and barriers to entrepreneurship

The importance of small and medium-sized enterprises is analysed from the point of view of the provided economic and social benefits. The most frequently mentioned effects include: production, employment, regional decentralisation and capital mobilisation. The better production effect of the capital invested in small and medium-sized firms rather than in big enterprises results from the more effective utilisation of the capital in those firms. In the event of small firms, an effect of regional decentralisation takes place. It consists in the local nature of firms which are flexible while selecting a location and at the same time contain the migration of people in the productive age from villages and small towns to large city agglomerations.

The major barriers to the development of small and medium-sized wood-processing enterprises include:

- Insufficient own financial resources. As a result of low profitability of most of the sectors of the wood-processing industry, their financing with own capital is very difficult. In the opinion of many enterprises, cost of a bank credit is too high in relation to the reached profitability.
- Cost of purchase of timber raw material. This is of special significance in the saw milling sector where it reaches the level of 50-55% of total costs. In the past two years, the rate of growth of sawnwood and sawn semi-products was lower than the rate of growth of average timber prices.

- Low internal demand (on the home market) caused to a great extent by low income level of the population, slump in the housing sector, substitution of wooden products, or lack of efficient promotion of wooden products.
- Low level of the applied production technologies resulting from financial weakness, as well as by the specifics of some sectors.
- Legal regulations making it impossible to recover receivables.
- Lack of sufficient management and marketing knowledge.
- Lack of sufficient knowledge of company management/business administration.
- Lack of sufficient knowledge of technologies useful for company development.
- Lack of ideas about new products.

Annex C: Organisations studying wood processing industries and main publications and information sources.

- Central Statistical Office (GUS)
- Ministry of Economy and Labour
- Institute of Wood Technology
- Agricultural University in Poznan, Faculty of Wood Technology
- The Polish Economic Chamber of Wood Industry
- The Forest Research Institute

Publications:

Bałtowski M. 2002: Przekształcenia własnościowe przedsiębiorstw w Polsce. PWN, Warszawa.

Biuletyn Statystyczny 2002 nr 12, GUS Warszawa

Czemko B.: Przemysł tartaczny na rozdrożu. www.drewno.net

Gałecka A., Ratajczak E. 2000: Miejsce sektora małych i średnich przedsiębiorstw w przemyśle drzewnym i meblarskim. Przemysł Drzewny 5 s. 1-4

Informacja o udziale inwestorów zagranicznych w procesie prywatyzacji polskiej gospodarki w latach 1990 – 2002. Raport Ministerstwa Skarbu Państwa, Warszawa

Kocel J. 1995: Bariery rozwoju prywatnej przedsiębiorczości w leśnictwie. Sylwan R.139 nr 4 s. 79-86

Kocel J. 2000: Wpływ prywatyzacji działalności gospodarczej nadleśnictw na przemiany ekonomiczno-organizacyjne w gospodarce leśnej Polski w latach 1989-1996.

Kocel J. 2002: Stan uwarunkowania rozwoju prywatnego sektora usług leśnych w Polsce. Pr. IBL, Ser. A nr 931-936 -25. il. bibliogr. 31 poz. sum.

Lis W. 2001: Miejsce i rola małych i średnich przedsiębiorstw przemysłu drzewnego po wejściu do Unii Europejskiej. Prezentacja. Poznańskie Dni Nauki i Sztuki. IV edycja. Poznań 17-20.10.2001.

Lis W. 2003: External factors restrictive the crisis in Polish enterprises of wood industry. Referat i prezentacja na „Międzynarodowej konferencji naukowej pt.: Materials economy management in wood industry enterprise in perspective of

integration with European Union - ECONOMIC FORUM ‘2003”. Laski k. Kępna, 16 - 18.09.2003, s. 7

Lis W., Ochman - Nowicka J. 2004: Znaczenie eksportu dla polskiego meblarstwa. „Przemysł Drzewny” 3, s. 11 – 14

Lis W., Tabert M., Popyk W. 2001: System ekonomicznych i technologicznych warunków wspierania rozwoju małych i średnich przedsiębiorstw przemysłu drzewnego w Polsce na tle wymagań Unii Europejskiej. AR Poznań

Lis W., Popyk W. 2001: Niektóre aspekty funkcjonowania małych i średnich przedsiębiorstw przemysłu drzewnego w Polsce. Wood&Paper Revier 1

Lis W., Tabert M. 2002: The outer support of small and medium companies of the wood industry. „Intercathedra” - Annual Bulletin of Plant - Economic Departments of the European Wood Technology University Studies, No 18, s. 37 – 44

Lis W., Popyk W. 2003: Efektywność eksportu w polskich przedsiębiorstwach meblarskich. „Intercathedra” - Annual Bulletin of Plant - Economic Departments of the European Wood Technology University Studies, No 19, s. 77 – 82

Lis W. 2004: Czynniki zewnętrzne ograniczające kryzys w polskich przedsiębiorstwach przemysłu drzewnego. External factors restrictive the crisis in Polish enterprises of wood industry. Referat i prezentacja na „Międzynarodowej Konferencji Naukowej pt.: Zarządzanie kryzysowe przedsiębiorstwem przemysłu drzewnego w warunkach integracji z Unią Europejską – Materials economy management in wood industry enterprise in perspective of integration with European Union - ECONOMIC FORUM ‘2004”. Laski k. Kępna, 16 - 18.09.2004, s. 7.

Lis W., Kaputa V. 2004: Sektor leśno – drzewny w Polsce na tle Unii Europejskiej. „Intercathedra” No 20, Annual Bulletin of Plant - Economic Departments of the European Wood Technology University Studies. Poznań, s. 79 – 82

Lis W. 2004: Processes of privatisation in Polish wood industry. W monografii pt.: “The growth and development in forestry and wood industry. Chapter 2. Management”. International Association for Technology – Management - Wood. University of Zagreb, Faculty of Forestry. Zagreb, Croatia, Scientific book, s. 59 – 66.

Produkcja najważniejszych wyrobów przemysłowych I-XII 2002. GUS, Warszawa

Prywatyzacja działalności gospodarczej Nadleśnictw. Wytyczne ramowe Dyrekcji Generalnej Lasów Państwowych, Warszawa 1995

Prywatyzacja prac leśnych. Wytyczne ramowe Dyrekcji Generalnej Lasów Państwowych, Warszawa 1991

Prywatyzacja przedsiębiorstw państwowych. Roczniki 1992-2003. GUS, Warszawa.

Ratajczak E. (*2001*): Polski przemysł meblarski nadal konkurencyjny. Przemysł Drzewny 6, s. 3-6

Ratajczak E., Szostak A. 2001: Integracja z Unią Europejską – ważniejsze problemy adaptacyjne w przemysłach przerobu drewna. Przemysł drzewny 5 s. 3-8

Rocznik Statystyczny Handlu Zagranicznego 1995-2003. GUS, Warszawa

Stasiuk T., Frączyk J. 1999: Przemysł płyt wiórowych i sklejek. Boss-Gospodarka, 6

Strategia dla przemysłu drzewnego do 2006 roku. Ministerstwa Gospodarki, Pracy i Polityki Społecznej, Warszawa 2003

Szczawińska E. 2003: Możliwości rozwoju małych i średnich przedsiębiorstw przemysłu drzewnego w Polsce [Development potential of small- and medium-size firms in the wood industry sector in Poland]. Conference materials „Leśna przedsiębiorczość", Sękocin 2003

Szkutnicka – Pieniążek M. 2002: Polska 2002. Raport o stanie gospodarki. Ministerstwo Gospodarki Warszawa

Zając S. 1998: Analiza eksportu i importu drewna oraz produktów drewnopochodnych w Polsce w latach 1987-1996. Sylwan R.142 nr 4 s. 5-18.

Zając S. 1999: Analiza rynku surowca tartacznego i tarcicy w Europie w 1998 roku. Przemysł Drzewny nr 2 s. 1-6.

See also **Part 1**.

4. Non-wood forest products and services

4.1. State of the art and historical development

Historical development of non-wood production and services in the country

Utilisation of non-wood forest products has its particularly rich tradition as a branch of forestry in Poland. The so called **Polish concept of forest minor production**, being the effect of work and experience of generations of foresters, was developed in the 40's of the 20th century under the supervision of professor Wiesław Grochowski. The concept's basic assumption has been the idea according to which the whole of forestry production process: both the production of wood and the production of all other forest uses (non-wood forest products – NWFPs), are oneness. The year 1989 was crucial for the use of NWFPs. The harvesting and processing of goods was taken over by private sector.

In the after World War II period, the leading branch of forest utilisation was - till the end of the 70-s, collection of Scots **pine resin** *(Pinus sylvestris L.)*. Beginning with the early 80-s however, a process of continuous decrease and finally complete cessation of resin harvest has been observed. Nowadays, our domestic production of resin was totally supplanted by the imported raw material, first of all from Belarus, the Ukraine, China and Brazil. The raw material resources, estimated in the after war period for some 30 thousand tons a year, are currently assessed to be approximately 24 thousand tons a year.

Spruce **bark** was commonly used in Poland in the tanning industry in the fifties and sixties (reaching the maximum level of more than 16 thousand tons in the year 1952). Later, however, its utilisation has been decreased as a result of the import of high quality tannin raw materials and the common use of synthetic tanning agents. Large amounts of pine bark are used in horticulture. No data are available on the actual size and use value of bark utilised this way. Still important forest raw is the bark of buckthorn *(Frangula alnus)* and oak *(Quercus sp.)* harvested for the needs of the

pharmaceutical industry (with demand exceeding largely the supply), these are however merely hundreds of tons.

Under the Poland's condition, the only rational direction of utilisation of **forest trees needles** is the production of volatile oils: the pine oil and, though to a lesser extent, the fir oil.

The problems connected with utilisation of **forest floor goods** are currently becoming especially important in Poland. The Polish concept of minor forest production assumed that the harvest of forest floor economic plants and mushrooms be organised or, at least, supervised by the administration of the State Forests. This idea had found its practical expression in the large network of purchase spots, those were run following the close co-operation with local foresters. On the other hand, the gathering of plants and mushrooms for the collectors' own use and other than protected species and carried outside the protected areas was unlimited and, actually, out of control.

Table 21. Selected non-wood forest products harvested in Poland (1950 – 2000) in tons.

Year	**1950**	**1960**	**1970**	**1980**	**1990**	**1992**	**1994**	**1996**	**1998**	**2000**
Resin	11686	22728	19821	9265	6400	806	0	0	0	0
Forest fruits	10300[1]	36800[1]	4500[1]	2824	3006	1258	252	5683	n.a.	10127
Edible mushrooms	1700[1]	2371	4546	6078	2792	618	87	940	n.a.	1705
Tannin spruce bark	11200	7100	1300	0	0	0	0	0	0	0

Note: 1: approximate data

Among **non-wood forest services**, the greatest emphasis in Poland is being drawn to the utilisation of recreational function of forests. A broad adjustment of forests for recreation was started at the early seventies of the 20th century. A dense network of facilities serving recreation and tourist needs was then constructed such as camping site, forest bivouacs, parking areas. The construction and maintenance costs of these facilities were covered by the State Forests. Nowadays, recreation and tourism are a permanent and constantly growing social phenomenon. The urbanisation and industrialisation processes and a resultant rise in population of the cities have caused that the demand for recreation, whose natural form is a regular contact with natural environment, is increasing. Forests being a great attraction are at the same time one of the least expensive forms of recreation. Forests are broadly accessible to the public and the access is free of charge. A tourist pressure on forests increases particularly around large industrial centres and urbane agglomerations. From the research by Głuch i Łonkiewicz (1991), it appears that nearly 50% out of 300 thousand respondents declare forests as the most attractive form of recreation. The growing general concern of society for recreation with special regard to forest areas point to the need of making forest areas accessible for recreation.

NWFP&S definition, classification and relevance in rural economies

The non-wood forest products in Poland used to be understood as:

- goods of plant origin – resins, gums, bark, foliage, forest fruits, medicinal herbs, industrial plants, moss, etc.,
- edible mushrooms,
- goods of animal origin – animals, skins or other hunting products, snails, the products of forest bee keeping and silk-worms etc.,
- dug products (regardless their origin) – peat, sand and others.

The wildlife management traditionally being a separate branch of forestry does not participate in minor forest utilisation in spite of the management of plantations of economic plants (basket willow, Christmas trees, medicinal and fruit-bearing plants) and charcoal burning.

In the multifunctional forestry the concept of forest minor production gains ever greater importance. The broadly understood benefits (often non-measurable ones) derived from forests are linked with the protective, landscape and recreational functions of forests.

Table 22. Selected non-wood forest products harvested in Poland and their actual relevance

Product	**Status**	**Economic relevance for rural economies**
fruits	heavily harvested, available data are not complete (considerable extent of harvest volume is unrecorded)	high
mushrooms	as above	
herbs	heavily harvested; mainly outside forest sector – increasing importance of plantations;	poorly recognised
parts of plants for ornamental purposes (i.e. mosses)	locally heavily harvested – harvest volume difficult to be estimated	considerable share of harvest is unrecorded.
resin	cessation of harvest in 1993	
bark	waste: utilised outside forestry sector, for horticulture; tanning: cessation of harvest in 1975; pharmaceutical: utilised – several species.	poorly recognised
forest grazing	historical importance	
forest fodder	historical importance	
forest litter	historical importance	

In the 60-s and 70-s, minor forest utilisation in the State Forests had participated in up to 25% to the total value of forestry production. At present, the actual value of minor forest production is estimated at 2%. The most substantial problem is the fact that the importance of minor forestry production has been nowadays underestimated by the forestry administration.

Property rights regulation system (access)

The access to the State-owned forests that dominate in Poland is free of charge. Forests are made accessible for the collection of forest fruits from herbaceous cover for people's own needs without restrictions. The forest administration may refuse to enter a forest in cases where the collection of forest fruits threatens the forest environment. The collection of fruits for commercial or industrial goals requires to enter into a contract with a forest district.

List of statistical information sources, databases, web sites at national/local/enterprise level, review articles.

Web-pages and institutions

Name	**Information**	**www**
Ministry of the Enviroment (*Ministerstwo Środowiska*)	Legislation, Policy	http://www.mos.gov.pl/
National Forest Holding "The State Forests".	Administration.	http://www.lp.gov.pl/
Central Statistical Office in Warsaw (*Główny Urząd Statystyczny*)	Data about production and value of NWFP&S	http://www.stat.gov.pl/
Agricultural University of Cracov. Faculty of Forestry. (*Akademia Rolnicza w Krakowie im. Hugona Kołłątaja*)	Education, Research.	http://www.ar.krakow.pl
The August Cieszkowski Agricultural University of Poznań (*Akademia Rolnicza im. Augusta Cieszkowskiego w Poznaniu*)	Education, Research	http://www.au.poznan.pl
Warsaw Agricultural University. Faculty of Forestry.	Education, Research	http://www.sggw.waw.pl/
Forest Research Institute in Warsaw (*Instytut Badawczy Leśnictwa w Warszawie*)	Research	http://www.ibles.waw.pl/

Articles

Author	**Title**	**NWFP&S**	**Information**
Janeczko E., 2000	Próba oceny krajobrazu leśnego na przykładzie lasów Mazowieckiego Parku Krajobrazowego (w:) Mat. z III forum architektury krajobrazu, OOZK, Warszawa	Recreation	Case study – landscape assessment
Janeczko E., 2002	Środowiskowe i społeczne uwarunkowania funkcji rekreacyjnej lasów Mazowieckiego Parku Krajobrazowego (MPK), praca doktorska, SGGW, Warszawa	Recreation	Case study – social functions of forests
Janeczko K. i in., 2002	Ekonomiczne konsekwencje realizacji pozagospodarczych funkcji lasów na przykładzie wybranego leśnego kompleksu promocyjnego. Praca wykonana na zlecenie Dyrekcji Generalnej LP, Warszawa	Recreation	Case study – value assessment of non-productive functions of forests

Kalinowski M. 1998	Non-Wood Forest Products in Poland. EFI Proceedings. 23.	NWFP in general	State of the art
Kalinowski M. 2000	Wybrane aspekty użytkowania jadalnych owoców leśnych W: "Stan i perspektywy badań z zakresu użytkowania lasu". Materiały III Konferencji Leśnej. Sękocin Las, 30-31 marca 2001 r. IBL. Warszawa.	NWFP in general	State of the art
Kalinowski M., Rzadkowski S. 2001	Harvesting of non-wood forest products in Poland and their resources. Seminar Proceedings. Menemen-Izmir, Turkey 2-8 October 2000. FAO. Roma.	NWFP in general	Harvesting and resources
Łonkiewicz B., Gołąb P., Gozdalik M., 1982	Analiza zapotrzebowania społecznego na funkcje rekreacyjne lasów jako podstawa ich racjonalnego zagospodarowania turystycznego, Dok. IBL, Warszawa	Recreation	Social demand, recreational management
Staniszewski P., 1998	Użytkowanie zasobów runa leśnego w trwałej i zrównoważonej gospodarce leśnej. Sylwan 8: 81-88, Sum.	Mushrooms, fruits, berries, herbs	Utilisation of forest ground cover resource at sustainable forest management
Staniszewski P., Oktaba J., 2000.	Current Trends of Changes in the Utilisation of Non-Wood Foorest Goods and Benefits in Poland. Harvesting of Non-Wood Forest Products. Menemen-Izmir. Proceedings.	NWFP in general	State of the art, trends, rules, policy
Staniszewski P., 2001.	Aktualne problemy użytkowania leśnych surowców niedrzewnych w Europie. Sylwan 7: 79 – 87, Sum.	NWFP in general	State of the art, trends, rules, policy – in Europe
Staniszewski P., Głowacki S., 2002.	Próba oceny możliwości reaktywowania żywicowania sosny zwyczajnej (Pinus sylvestris L.) w Polsce. Użytkowanie lasu w wielofunkcyjnym, zrównoważonym leśnictwie. Wyd. SGGW, Warszawa. s. 102 – 107, Sum.	Resin	Assesment of the reactivation possibility of resin harvesting in Poland

Literature:

Central Statitical Office, 2003: Information and Statistical Papers "Forestry 2003". Warszawa.

Grochowski W. 1990: Uboczna produkcja leśna. PWN. Warszawa.

National and local organisations studying non-wood forest products and services and their special field of work.

- Forest Research Institute, Warsaw
- Warsaw Agricultural University, Faculty of Forestry, Department of Forest Utilisation
- Agricultural University of Cracow, Faculty of Forestry, Department of Forest and Wood Utilisation

- August Cieszkowski Agricultural University of Poznan, Faculty of Forestry, Department of Forest Utilisation

The main directions of research study connected with the utilisation of non-wood forest products in Poland are:

- survey of NWFPs resource bases in order to enable the rationalization of the resource utilisation;
- study on quality of forest raw materials with particular attention paid to the impacts of a number of factors (both biotic and abiotic factors, with particular emphasis on the anthropogenic influences);
- study on the effect of NWFPs utilisation on the natural environment;
- the role of cultivation practices and plantations in the minor forest production;
- assessing the potential for and economic efficiency of the NWFPs utilisation;
- assessment of the possibility to reactivate resin harvest in Poland;
- development and verification of the principles of NWFP&Ss utilisation in the sustainable forestry.

The broadly understood utilisation of non-wood forest functions especially recreational function of a forest is a separate and relatively novel issue. The aim of actions that are being taken in this area is a comprehensive analysis of the usefulness of a forest for recreation deriving from the natural capacity, recreational accessibility and scenic beauty of a forest.

Policy framework and regulations

A document of the paramount significance for sustainable and balanced forest management is National Policy on Forests adopted in 1997. The overriding aim of policy concerning forests is to designate the complex of actions shaping relations between humankind and forests, with the aim of preserving, in changing natural and socio-economic circumstances, the conditions for the indefinite maintenance of forests, their universal utility and protection and their role in the shaping of the natural environment, in line with the present and future expectations of society. One of the goals of the National Policy on Forests is regulation and steering of recreation and tourism in forest areas in a manner harmonising the social functions of forests with the protective and productive functions.

The main legal basis for managing forests is the Forest Act of 28 September 1991 (Dz. U. 91.101.444 of 8 November 1991). The Act defines the principles for the maintenance, protection and enlargement of forest resources and the rules for the forest economy as linked with other elements of the environment and the national economy. It also defines the principles of **sustainable forest management** and determines its aims such as the production – on the basis of a rational management - of wood and non-wood forest products.

Pursuant the Act the forest owners are obliged to maintain the permanency of forests and ensure the continuity of their use among others to harvest wood and non-wood forest products in a manner that the biological capabilities of forests are retained, as well as to protect forest floor vegetation.

In accordance with the provisions of the Forest Act, the State Forests are obliged to initiate, co-ordinate and carry out periodical evaluation of the state of forests and forest resources, as well as to anticipate changes ongoing in forest ecosystems; to carry out periodical large-scale inventories of the forest state and to update databanks about forest resources and the state of forests. Forests that are the property of the State Treasury are made accessible for the collection of forest fruits from herbaceous cover for people's own needs without restrictions. The forest administration may refuse to enter a forest in cases where the collection of forest fruits threatens the forest environment. The collection of fruits for commercial or industrial purposes requires entering into a contract with a forest district.

Other legal acts relevant from the point of view of the NWFP&S utilisation are:

- Act of 4 July 2004 on nature conservation (Dz. U. 2004 No. 92, item 880) and the regulation of the Ministry of the Environment of 11 September 2001 on drawing up the list of wild indigenous plant species subject to full and partial protection, restrictions specific to them, as well as waivers (Dz. U. No. 106, item 1176 of 29 September 2001).
- Regulation of the Minister of Environment, Natural Resources and Forestry of 28 December 1998 on detailed principles for the protection and collection of fruits of herbaceous forest cover and principles for the location of apiaries in forest areas (Dz. U. 1999 No. 6, item 42).
- Regulation of the Minister of Health of 19 December 2002 on mushrooms permitted for sale or processing, as well as on mushroom classificator and expert licence (Dz. U. of 2003 No 21,item 178). The regulation contains, among others, the list of edible mushrooms permitted for sale and processing (42 species).
- The Hunting Law Act of 13 October 1995. (Dz. U. 95.147.713 of 18 December 1995), drawing up the principles for wildlife population management.

4.2. Case studies of successful marketing strategies

Case study 1: Forest fruits and mushrooms

(a) NWFP&S definition, area of production, harvesting level, technical characteristics of production

The "case study" is a review of websites of 24 firms operating in the sector of purchase, processing and sale of non-wood forest products.

A group of 25 companies involved are the producers of: forest mushrooms (fresh, frozen, dried, pickled, in natural marinade, sterilised, blanched, in oil, decorative mushrooms, mushroom concentrate, granulate – fig. 1) a forest fruits (fresh, frozen, for meat, marmalade, deserts, dried). Nearly 70% of firms in the group surveyed are dealing both with fruits and mushrooms, little above 30% - exclusively with mushrooms. The assortment of mushrooms is considerably richer (15 species) when compared with fruits, which represent only three species: bilberry, cowberry and cranberry. It is noteworthy that only a small number of mushroom species is intensively harvested.

Figure 2. Mushrooms: dried, pickled and frozen (Source: Jampol)

The websites of firms reviewed do not provide information about the harvest and production volume. Only general information can be found for example forest and cultivated fruits. Currently, the Central Statistical Office is the only source of data available at a country level (see Table 23).

Table 23. Volume and other selected characteristics of industrial harvest (purchase) of forest floor goods (table prepared according to data of the Central Statistical Office 2003)

fruits				**mushrooms**			
1999	**2000**	**2001**	**2002**	**1999**	**2000**	**2001**	**2002**
purchase volume (tons)							
11280	10127	8745	15062	1484	1705	3276	2379
purchase value (thousands of PLN and EUR)*							
45,615.5	54,105.9	23,767.1	39,384.8	19,404.2	17,649.0	29,161.1	28,242.7
10,372.6	13,540.0	6,123.9	9,657.4	4,412.4	4,416.7	7,513.8	6,925.3
share of main species in the purchase volume (%)							
bilberry				chanterelle, king bolete, bay bolete			
n.a.	n.a.	62	57	n.a.	n.a.	98	94

*) conversion of Polish zloty to the euro is estimated according to National Bank of Poland mid - rates in the years 1999-2002:

According to the Central Statistical Office data of 2001 and 2002, the export of mushrooms amounted to 8,999 and 6,731 tons, respectively. Taking into consideration the minimal export level and in the light of information about the purchase volume (Table 3) this means a considerable surplus of export over harvest. This may result from a high percentage of unrecorded purchases, as well as stating in the records forest and cultivated mushrooms jointly.

In 2002, exports of forest fruits amounted to 2,454 tons, and imports – to 3,438 tons, which, at the harvest level of 15,062 tons, provides 16,046 tons for the domestic market.

75% of firms in the group under study have declared exports to the following target countries (in parenthesis – the number of firms): Germany (4), Italy (2), Switzerland (2), France (2), Spain (1), Great Britain (1), Austria (1), USA (1), Canada (1), Israel (1), Argentina (1), Sweden (1) and Denmark (1). One firm acts as an agent importing mushrooms from Russia and Belarus and exporting them to the West European countries (after radiological examination).

Several firms can boast modern processing and packaging lines (Fig. 2) or liquid nitrogen-based cryogenic tunnels for deep freezing of fruits and mushrooms thus minimising the loss of their value. In this way the final product, offered in shops is almost the same quality as fresh mushrooms straight from the forest.

Figure 3. Mushroom processing line (Source: P.H.U Danex)

(b) Description of the "product chain" organisation.
(c) Policy framework – see above separate heading: "Policy framework and regulations"
(d) Profit appropriation by the landowner/contractor/manufacturer/dealer/seller
(e) Contractual agreements between non-wood processing

The product chain in the version typical for the group of firms surveyed is as follows:

forest → collectors → buying spots → processing → middlemen → consumers

The forest administration (in a majority of cases the State Forests) does not actively participate in the chain. Regardless of the regulations in force neither the collector nor the purchase spots enter into a contract with the owner of a forest. The form of co-operation between the firms and the buyers of forest products is imprecise. This probably takes place on the basis of a certain form of co-operation or contracting. The number of purchase spots per firm and geographical distribution of the network of purchase spots are unknown. The firms deliver raw material or products to the receivers by their own means of transport or those of the co-operating enterprises. A number of

firms have admitted that catering firms are their end receivers. Four firms (17%) have declared deliveries to hypermarkets.

A considerable part of the forest mushrooms and fruits market is of the primitive nature and not included in any statistics – the collectors sell fresh fruits or mushrooms along the roads or on local markets. In this way the product chain is markedly shortened:

forest → collectors → consumers

The number of firms operating on the market is unknown. A catalogue of 25 firms has been found in the Internet resources. 63% of firms in the group under study are one-person firms (including 40% belong to women and 60% - to men). The forms specified are: enterprise, limited liability company, general partnership, partnership.

Profit appropriation by landowner/contractor/manufacturer/dealer/seller is not known, but in accordance with general observation of Lintu (1998), the position of the gatherers, primary processors and middlemen compared to the more committed members of the marketing and processing chain is weak.

(f) Characteristics of technological or organisational innovation behaviour in non-wood production, processing and service industries

The important technological innovation behaviour observed in the surveyed group is deep-freezing, which allows keeping high quality of mushrooms and berries for the long time

(g) "Territorial" marketing (i.e.: the integration of the NWFP&S to other services and products offered by the local community)

- use the same production lines or technological equipment for other, especially agricultural products (cultivated mushrooms, fruits, vegetables)
- other side-line activity

62% of firms in the group under study have declared to run a "non-forest" activity. The firms concentrate first of all on production, purchase, processing and sale of cultivated mushrooms (oyster mushroom, common mushroom, shii-take and mun mushrooms) and substrates to cultivation, fruits and vegetables. The specific kinds of side-line activity are: the production of quail pickled eggs, powder ice-cream concentrates and waffles. A number of firms have processing lines for frozen food production

(h) Lessons learns/driving forces/factors affecting competitiveness (SWOT analysis)
(i) Open questions (barriers to entrepreneurship) and related research needs

- variation of resource (and supply) in space and time, including seasonality (feature of some species described by Saastamoinen 1998 and Lintu 1998)
- weakness of the gatherers, primary processors and middlemen, comparing with the further of the chain members and other products/substitutes (feature of NWFPs chain described by Lintu 1998)
- evolution of NWFPs markets - loss of traditional markets because of competition with synthetic materials, emerging new markets (described by Lintu 1998)

STRENGHTS (S)	WEAKNESSES (W)
- new, flexible and modern sector based on SMEs - innovations (deep-freezing)	- lack of producers organisation and representation (associations etc.) - variation of resource (and supply) in space and time, including seasonality (feature of some species described by Saastamoinen 1998 and Lintu 1998) - low durability of mushrooms and fruits as a fresh products (Grochowski 1990) - weakness of the gatherers, primary processors and middlemen, comparing with the further of the chain members and other products/substitutes (feature of NWFPs chain described by Lintu 1998) - poor knowledge and low implementation level of existing regulations – consumption of only few highly valuable fruits and mushrooms (above all: bilberry, chantarelle and edible boletus).
OPPORTUNITIES (O)	THREATS (T)
- picking, consuming of mushrooms and berries deeply rooted in country tradition - the considerable part of the named by Lintu (1998) “green” and “nostalgia” market - continuous growth of demand	- replacing some species by cultivated equivalents, for example the most important forest fruit - bilberry (Vaccinium myrtilus L.), by very similar highbush blueberry – (Vaccinium corymbosum L.)

(j) Recommendations, proposals for documentation.

Very important is to focus on NWFP&S economic, marketing and social aspects, with emphasise on:

- special features of resource and product
- evaluation of cities population demand for NWFP&S (very little known, crucial for the Action)
- contribution of NWFP&S to rural development and role of SMEs in the process

The surveyed firms:

Internet portal „Onet.pl” 2004. The catalogue of enterprises by branches. Agriculture, silviculture, food. Mushrooms, forest floor. http://katalog.onet.pl/191,kategoria.html

Name	Web site
Biegpol	http://www.biegpol.pl
A.H. "Boletus"	http://www.boletus.home.pl
P.P.H.U. Bruspol	http://www.bruspol.pl
P.H.U. Danex	http://www.danex.pl
P.H. EWiTA	http://republika.pl/ewitaewa
Food S.C.	http://www.nawrot.zgora.pl
Wiesław Guzik	http://www.grzyby.krakow.pl
Jampol	http://www.jampol.pl
Kasol	http://www.kasol.com.pl/
PPUH Komirex	http://www.komirex.com.pl
„Las-Bór"	http://www.las-bor.cil.pl
Las Olsztyn Sp. z o.o.	http://www.las.com.pl
„Lasovia"	http://www.lasovia.pl
Lobo export-import	http://www.lobo-ariti.com
Morzycki	http://www.morzycki.pl
PHU Noris II	http://www.noris.com.pl
PolGrzyb	http://www.polgrzyb.pl
Polwit P.H.	http://www.tai.com.pl/firmy/pn/polwit
PROVITUS	http://www.provitus.com.pl
P.P.H.U, „Runo Leśne"	http://republika.pl/runolesne
Runopol	http://republika.pl/runopol
Zakład Produkcji Spożywczej – Stefan Skwierawski	http://www.skwierawski.com.pl
Tagros-Polska	http://www.tagros.pl
OOO „Verpol"*	http://www.verpol.ru
Żynda	http://republika.pl/grzybyzynda

* The polish company with the head office in Russia

Literature:

Central Statistical Office. 2003. Information and statistical data. Leśnictwo 2003. Warsaw, Poland. 304 p.

Grochowski 1990. Uboczna produkcja leśna. Państwowe Wydawnictwo Naukowe. Warszawa.

Lintu L. 1998: Development Issues Related to the Marketing of Non-Wood Forest Products. EFI Proceedings. 23.

Saastamoinen, O. 1998: Non-wood goods and benefits of boreal forests: concepts and issues. EFI Proceedings. 23.

Case study 2: Recreation in forests

The best illustration in terms of utilisation of recreational functions of forests is the research on the assessment of conditions for the development of recreational functions of forests of the Mazowiecki Landscape Park (MPK) (Janeczko 2002). Evaluation studies on scenic beauty of forests that are carried out in Poland are occassional. However the need to launch such studies is emphasised by many researchers (for

example Stanowska, Stanowski 1984, Janeczko 2000, Stępień et al. 2000). It is by no means a new trend in the recreational management of Polish forests. It has to be thought that the fast development of research methods and studies on scenic values of forests proceed along with the growing demand for forest social functions. Currently, a spatial approach to forest natural environment is being emphasised in a majority of analyses. This is a result of the advancement and, first of all, wide availability of modern techniques of space management. Digital databases that most forest districts in Poland have at their disposal contain detailed information about forests. Studies on recreational needs and preferences of tourists play a particular role in recreational management of forests. In Poland studies in this area have been conducted for over twenty years (Łonkiewicz et al. 1982; Krauz 1989; Gołos 2002; Janeczko 2002). They allowed to establish preferences of tourists as regards forms and sites for recreation, recreational management of forest, time and frequency of recreational activities, as well as preferable elements of the scenic beauty of forests.

A broader approach to the issue of social preferences has been presented in the studies concerning the assessment of the conditions for the development of recreational functions of forests of the Mazowiecki Landscape Park (Janeczko 2002). These studies permitted to determine not only recreational preferences of a tourist, but also to establish relationships between such preferences and individual characteristics (sex, age, education) family status and place of residence. So far, no studies has taken account of recreational needs of handicapped persons. Only recently, have been undertaken studies aimed at defining principles concerning access to forests for the needs of the handicapped persons especially those using wheelchairs (Woźnicka 2002, 2003). Such studies are presently carried out in the communal forests of Warsaw.

The development of studies on the assessment of the non-wood forest services may cause that in the future these services will subject these services to the market economy rules. Today, the costs of recreational management of forests are mainly covered by the State Forests while benefits go to the business entities providing tourist services. Studies on the estimation of profits obtained by the beneficiaries of non-wood forest functions were carried out in the "Białowieża Forest" Promotional Forest Complex (Janeczko et al. 2002). The result of the study was a detailed characterisation of the composition of expenses incurred by tourists visiting the Forest Complex and at the same time the structure or the structure and estimate value of additional revenues generated by the beneficiaries of non-production forest functions.

Literature:

Gołos P., 2002: Wycena wartości ekonomicznej rekreacyjnej funkcji lasu na przykładzie leśnego kompleksu promocyjnego Gostynińsko-Włocławskiego, praca doktorska, IBL, Warszawa

Janeczko E., 2000: Próba oceny krajobrazu leśnego na przykładzie lasów Mazowieckiego Parku Krajobrazowego (w:) Mat. z III forum architektury krajobrazu, OOZK, Warszawa

Janeczko E., 2002: Środowiskowe i społeczne uwarunkowania funkcji rekreacyjnej lasów Mazowieckiego Parku Krajobrazowego (MPK), praca doktorska, SSSG, Warszawa

Janeczko K. i in., 2002: Ekonomiczne konsekwencje realizacji pozagospodarczych funkcji lasów na przykładzie wybranego leśnego kompleksu promocyjnego. Praca wykonana na zlecenie Dyrekcji Generalnej LP, Warszawa

Krauz K., 1989: Społeczne odczucia walorów rekreacyjnych lasów (w:) Rekreacyjne użytkowanie lasów. Mat z I Sympozjum Naukowego zorganizowanego przez AWF Poznań oraz ZLP Piła, Morgolin 6-8 listopada 1989

Łonkiewicz B., Gołąb P., Gozdalik M., 1982: Analiza zapotrzebowania społecznego na funkcje rekreacyjne lasów jako podstawa ich racjonalnego zagospodarowania turystycznego, Dok. IBL, Warszawa

Stanowska L., Stanowski T., 1984: Przyrodnicze kryteria waloryzacji rekreacyjnej przydatności lasów górskich, Czasopismo Geograficzne, 4/84, 453-463

Stępień i in., 2000: Waloryzacja lasu dla potrzeb rekreacji na przykładzie Uroczyska „Młociny" w Warszawie (w:) Problemy turystyki i rekreacji w lasach Polski. Krajowa konferencja naukowa, AWF, Warszawa.

Woźnicka M., 2002. Dostosowanie obiektów liniowych do potrzeb osób niepełnosprawnych poruszających się na wózkach inwalidzkich. Adaptation of the linear objects to the needs of handicapped people on wheelchairs. Użytkowanie lasu w wielofunkcyjnym, zrównoważonym leśnictwie. Wydawnictwo SGGW. Warszawa 2002.

Woźnicka M., 2003. Ocena dostępności leśnych ścieżek przyrodniczych dla rekreacji osób niepełnosprawnych na przykładzie lasów miejskich Warszawy. An estimation of forest nature paths acccessibility to handicapped people recreation, on example of Warsaw municipal forest. Kształtowanie i ochrona środowiska leśnego. Wydawnictwo AR w Poznaniu. 2003.

4.3. Conclusions: Supporting and limiting factors for enterprise development in non-wood forest products and services production and barriers to enterpreneurship

See case study 1: forest fruits and mushrooms, points h), i) and j).

5. Forests and ownership

5.1. State of the art and historical development

In the past, forests were present nearly all over Poland. The social-economic processes in which economic goals dominated as a result of agricultural expansion and increased demand for raw wood materials have had a great impact on the changes of Poland's forests. By the 18th century, the forest cover of Poland (in its then borders) had been 40% to drastically fall to 20.8% in 1945. Deforestations and associated impoverishment of species structure of stands have led to a decrease in biological diversity in forests and impoverishment of the landscape, as well as soil erosion and disturbance of the water balance in the country. Efforts to reverse the process began immediately after the World War II and continue till present. Today, the area of forest in Poland (as of 31.12.2001, according to data from the Central Statistical Office - GUS) is 8,942,000 hectares, which is equivalent to 28.6% of the country's forest area. In line with the standard adopted for international assessments, which takes account of the land associated with

forestry management, the area of forests in the country as of 1 January 1999 was 9,088,000 hectares. Poland's forest cover in accordance with the TBFRA 2000 standard (related to land area excluding inland waters) as of the end of 2003 was 30.0% and was close to the Central European average. The comparison of the forest area falling per 1 inhabitant (0.24 hectares) with the total land area is unfavourable for Poland and is one of the lowest in the region.

5.2. Forest resources

Areal structure of forest resources

Diversified conditions of forest distribution in Poland are illustrated in natural-forest regionalisation taking account of geological underlying material, climatic conditions, natural landscape types and forest shaping role of woody plant species. Poland's forests have mainly been retained on the poorest soils, as reflected in the differentiation into habitat types. The habitat structure of forests reveals a prevalence of coniferous forest habitat types with these accounting for 58.7% of the total forest areas, the more fertile broadleaved forest habitats account for 41.3%, and the alder carr and riparian habitats for 3.7%. Coniferous species prevail on 75.8% of forest area (Table 24). Within its Eurasiatic natural distribution range, pine (together with larch accounting for 67.6% of forests) has found the most favourable climatic and habitat conditions in Poland forming many valuable ecotypes (e.g. Tabor or Augustów pine). Preferential use of coniferous species by the wood-processing industry since the 19th century has contributed to the high share of conifers in stand composition. The years 1945–2003, brought major changes in the species structure of Polish forests expressed, among others, in an increased percentage of stands with a prevalence of broadleaved species from 13.0 to 23.2 in the State Forests. Nevertheless, their participation in the total share of forest area is still lower than the potential resulting from the spatial distribution of forest habitats.

Table 24. Areas of forests by type groups of trees

Specification	State Forests[1)]		National Parks[2)]		Private and commune-owned forests[3)]	
	'000 ha	%	'000 ha	%	'000 ha	%
Total	6986.9	100.0	180.0	100.0	1590.6	100.0
Coniferous trees	5366.0	76.8	107.4	59.7	1170.4	73.6
Pine and larch	4844.6	69.3	68.2	37.9	1008.9	63.4
Spruce	384.7	5.5	30.1	16.7	89.2	5.6
Fir and Douglas-fir	136.7	2.0	9.1	5.0	72.3	4.6
Broadleaved trees	1620.9	23.2	72.6	40.3	420.2	26.4
Oak, ash, maple, sycamore, elm	501.3	7.2	8.4	4.7	65.4	4.1
Beech	345.4	4.9	37.2	20.7	45.2	2.8
Hornbeam	20.1	0.3	1.0	0.5	17.2	1.1
Birch and robinia	409.9	6.0	11.1	6.2	131.7	8.3
Alder	304.0	4.3	13.4	7.4	143.1	9.0
Aspen, linden, willow	16.7	0.2	1.5	0.8	15.7	1.0
Poplar	23.5	0.3			1.9	0.1

Sources: BULiGL. Results of updating the state of forest area and timber resources in the State Forests as of 1.01.2003,
BULiGL. Assessment of the state of forest area and wood resources in the forest not in Treasure ownership as of 1.01.1999,
Central Statistical Office: Forestry 1999, after Ryszard Sumiński "National Parks" No. 3/1999

Prevalent in terms of forest age structure are stand classes II and III, respectively accounting for 21.8% and 23.8% of area (Table 25). Stands over 100 years old account for 8.3% of the State Forests Holding and of some 13.3% of standing timber resources. The indicators of changes in the age structure of stands are: a steady increase in the area of stands aged 80 years and over, from ca 0,9 million hectares in 1945 to ca 1,6 million hectares in 2003 (without KO, KDO) and an increase in the mean age of stands to 59 years in 2003 in the State Forests, as compared with 40 years in privately-owned stands.

Table 25. Areas of forests by age class

Specification	**State Forests[1)]**		**Private and commune-owned forests[2)]**	
	thousand ha	%	thousand ha	%
Total	6986.9	100.0	1590.6	100.0
including:	6925.0	99.1	1510.6	95.0
Age class I (1-20 years)	800.3	11.5	282.7	17.8
Age class II (21-40 years)	1315.4	18.8	552.9	34.8
Age class III (41-60 years)	1636.2	23.4	402.2	25.3
Age class IV (61-80 years)	1358.0	19.4	174.1	10.9
Age class V (81-100 years)	918.6	13.1	71.2*	4.5*
Age class VI (101-120 years)	389.8	5.6		
Age class VII (121 years and over)	187.9	2.7		
KO, KDO, SP	318.8	4.6	27.5	1.7

1) State as of 1.01.2003

2) State as of 1.01.1999

* Sources: BULiGL. Results of updating the state of forest area and timber resources in the State Forests as of 1.01.2003, BULiGL. Assessment of the state of forest area and wood resources in the forest not in Treasure ownership as of 1.01.1999

Changes in the area of forest

The basis for all the reafforestation works ongoing in Poland is "The National Programme for the Augmentation of Forest Cover" (KPZL). The Programme anticipates the afforestation an increase in the proportion of the country cover to 30% by 2020 and 3% by 2050. It also specifies the ecological priorities and economic mechanisms and instruments for programme implementation. While planning afforestation priorities at a commune level 12 priority criteria (ecological criteria prevail defining hydrological, geomorphologic and sozological functions) have been adopted and justified and synthetic indicators detailed for communes to which preference is given.

The year 2003, saw the afforestation of 26,494 hectares of land, including the largest afforested areas were in the Warmińsko-Mazurskie Province amounting to 3,556 hectares, Zachodniopomorskie Province – 2,795 hectares and Mazowieckie Province – 2,674 hectares. Recent years have seen a considerable (almost two-fold) increase in the amounts of private land afforested. In 1999, the figure was 6,902 hectares, in 2000 - 10 149 hectares, in 2002 - 10,409 hectares and in 2003 – 17,180 hectares which accounts for more than 65% in comparison with the previous year.

In addition to land afforestation (related to ex-agricultural land and wasteland) forest plantations are being established on land where mature stands had been felled. The year 2003 saw reafforestation on 39,630,000 hectares, of which 4000 hectares were restocked naturally.

A continuous reduction of the youngest stands area (age class I) has been observed; this phenomenon may have an impact on the reduction of forest sustainability in the future. The reasons behind this trend should be seen in, among others, significant reduction of aforestation, limitation of commercial cutting in favor of pre-commercial thinning and reduction of clear cuts. A positive result of commercial cutting reduction is growth of the older stand area; however, if the mature growing stock waits too long for cutting, its value as a raw material is depreciated.

The volume structure of growing timber resources

Since 1967, when the first full inventory was carried out in the State Forests, the timber resources have been steadily increasing. As of 1.01.2003, the standing timber resources administered by the State Forests were estimated to reach 1522.9 million m^3 of gross merchantable timber (according to the annual timber resources updates carried out by the Office of Forest Management and Survey - BULiGL). As of 1.01.1999, the gross merchantable timber in private and commune-owned forests was 188.6 million m^3 (BULiGL). According to the updates of forest resources in the State Forest Holding and other forms of ownership as of 1.01.2003, the estimated overall volume of Poland's forest resources thus amounts to ca 1787 million m^3 of gross merchantable timber.

The greatest share (50%) in terms of age structure is taken by stands aged of 41–60 and 61–80 respectively accounting for 23.8% and 17.9% of the total forest area. Pine is a prevailing species accounting for as much as 70% of the total forest resources under the management of the State Forests. This figure for this species in private and commune-owned forests is 55% (Table 26).

With regard to the forest area (without land associated with forestry management), the mean stand resource in the forests managed by the State Forests Holding as of 1.01.2003 was 218m^3/ha while as of 1.01.1999 it was 119m^3/ha in private and commune-owned forests.

Forests are a renewable source of raw wood materials that may condition civilisational development without harming the environment. In recent years, the use made of wood has come close to the natural potential as set in accordance with the principles of forest sustainability and increasing forest resources. In 2003, some 28,737 million m^3 of net merchantable timber was harvested in Poland, including 27,135 million m^3 of net merchantable timber from the State Forests. Of the letter, 56% of the overall potential harvest was obtained via intermediate (tending) felling, as well as incidental and sanitation fellings resulting from the needs to remove damaging effects caused by catastrophic events (e.g. blowdowns in the Pisz Forests). Timber harvest under a clear-cutting system has been limited to the level of 6.3 million m^3 of gross merchantable timber, i.e. to 23% of the overall harvest.

Table 26. Gross merchantable timber resource by type groups of trees

Specification	State Forests[1)]		Private and commune-owned forests[2)]	
	M m^3	%	M m^3	%
Total	1522.9	100.0	188.6	100.0
Coniferous trees	1199.5	78.8	138.3	73.4
Pine and larch	1059.6	69.6	103.3	54.8
Spruce	103.4	6.8	17.3	9.2
Fir and Douglas-fir	36.5	2.4	17.7	9.4
Broadleaved trees	323.4	21.2	50.3	26.6
Oak, ash, maple, sycamore, elm	100.6	6.6	7.9	4.2
Beech	86.5	5.7	7.8	4.1
Hornbeam	4.5	0.3	2.2	1.1
Birch and robinia	66.3	4.4	13.4	7.1
Alder	59.5	3.9	16.9	9.0
Aspen, linden, willow	3.7	0.2	1.8	1.0
Poplar	2.3	0.1	0.3	0.1

1) State as of 1.01.2003
2) State as of 1.01.1999
Sources: BULiGL. Results of updating the state of forest area and timber resources in the State Forests as of 1.01.2003,
BULiGL. Assessment of the state of forest area and wood resources in the forest not in Treasure ownership as of 1.01.1999

The standards adopted internationally in assessment of stand volume differ from the Polish definitions. To make the data more uniform, the forest resources specified in national statistics (in m^3 of gross merchantable timber) were supplemented by the volume of small timber (ca 20% of the overall gross merchantable timber resources). In accordance with the TBFRA 2000 assessment, Poland being a country with markedly great absolute forest area and higher mean stand resource (213 m^3/ha including small timber) has at its disposal the region's third (after Germany and France) largest volume of standing timber (gross merchantable timber and small timber) amounting to 1908 million m^3.

Changes in timber resources

In the period from January 1983 to January 203, the increment in gross merchantable timber in the forests managed by the State Forests was ca 903 million m^3. As ca 514 million m^3 of gross merchantable timber were harvested in the same period this means that 389 million m^3 of gross merchantable timber, or ca 43% of the entire increment was left to increase standing resources.

The mean annual increment in gross merchantable timber calculated for the past 20 years (1983–2002) from the difference at the end (January 2003) and beginning (January 1983) of the period including harvest and expressed per hectare of forest land managed by the State Forests was 6.58 m^3/ha. In turn, the mean annual increment in gross merchantable timber calculated in the State Forests over the past five years has been 7.73 m^3/ha. The volume of stands in all age classes has considerably increased; because of the marginal amount of merchantable timber in stands in age class I the volume is not considered significant component in the overall volume.

The changes in timber volume (volume per ha) in age classes suggest that an overall increase in the standing volume is not only the effect of increasing the area of forests. A steady rise in value of this indicator is being recorded for all age classes (except for KO/KDO). The observed rise in timber resources to some degree stems also from application of more precise inventory methods.

Non-wood forest products utilisation

As far as minor forest utilisation is concerned, the aspect of harvesting of non-wood forest products in Poland is, contrary to European countries, as important as utilisation of non-productive forest functions. In this respect, information on the raw material base for individual products is largely insufficient. The available data providing direct information on resources concern only the purchase of forest produce and not its real harvesting. Detailed examples and research issues related to this scope are described in the previous chapter.

5.3. Forest ownership

As far as the ownership structure of Poland's forests is concerned (Table 27), it is public ownership that predominates accounting for 82.5%, including the forests under the management of the State Forests National Forest Holding – 78.4%. The ownership structure of forests has not changed since the World War II. The observed rise in the share of total forest area that is within the national parks – from 1.0% in 1985 to 2.0% in 2003 (according to GUS, state as of 31.12.2003).

The comparison of the percentage share of public forests in the total forest area in the group of countries that have been selected for the purpose of the analysis points to a diversified ownership structure – the prevalence of public forest is found also in western countries (Switzerland, Germany). It is possible to identify three groups of the countries: those of the former USSR (CIS), in which 100% of forests are state-owned, the Nordic countries and France and Austria, in which a decisive majority of forests are in private hands, and remaining countries with a diversified structure however with a prevalence of public ownership.

The ownership structure of forests in Poland is spatially diversified with the greatest share of private forests being in the Małopolskie Province - 187,300 hectares (43.5% of the total forest area in the province), Mazowieckie Province – 330,700 hectares (42.2%) and Lubelskie Province – 217,300 hectares (38.7%). The lowest share of private forests are recorded in Lubuskie Province – 8,000 ha (1.2%), Zachodniopomorskie Province – 10,000 ha (1.3%) and Dolnośląskie Province – 13,200 ha (2.3%).

As far as private ownership in Poland is concerned, the decisive factor making it impossible to carry out effective forest management is huge (also on European scale) fragmentation of forest ownership. A different situation is in the public ownership sector. Here, the number of forest farms is among the lowest in the analysed group of countries.

The fragmented private forest structure, lack of full information on the volume of forest resources and timber harvest, as well as low business activity of forest owners require

radical solutions to enable proper evaluation of the condition of private forests and above all to create proper conditions for correct management and protection of forests.

Table 27. The ownership structure of forests in Poland

Specification	**1995 '000 ha**	**2000 '000 ha**	**2001 '000 ha**	**2002 '000 ha**	**2003 '000 ha**
Total	8756[a)]	8865[a)]	8894[a)]	8918[a)]	8942[a)]
Public forests	7262	7341	7349	7363	7379
State Treasury-owned forests	7186	7262	7270	7283	7298
Including: under the management of the State Forests	6868[b)]	6953[b)]	6968[b)]	6987[b)]	7006[b)]
National parks	162	181	181	181	181
Others	156	128	121	115	111
Commune-owned	76	79	79	80	81
Private forests	1494	1524	1545	1555	1563
Including: natural persons	1397	1428[c)]	1447[c)]	1458[c)]	1467[c)]
Land communities	68	69[c)]	68[c)]	68[c)]	67[c)]
Farm co-operatives	14	9[c)]	9[c)]	8[c)]	8[c)]
Others	15	18[c)]	21[c)]	21[c)]	21[c)]

a) Besides, land associated with forestry management: 1995 – 190,000 ha, 2000. – 194,000 ha, 2001 – 194,000 ha, 2002 – 195,000 ha, 2003 – 197,000 ha

b) Besides, land associated with forestry management: 1995 - 187,000 ha, 2000 – 189,000 ha, 2001 – 194,000 ha, 2002 – 190,000 ha, 2003 – 191,000 ha

c) Together with land associated with forestry management: 1999 r. – 400 ha in all private ownerships, 2000. – 200 ha, 2001 – 200 ha, 2002 – 300 ha, 2003 – 200 ha

5.4. Main problems and research questions in forest resources and ownership for enterprise development in forest sector

The following are selected major issues related both to forest research and practice in the above scope.

- Necessity to modify the way of assessing timber volume harvested through precommercial cutting (the tables do not reflect the reality).
- Modest database of the private sector, particularly with regard to the qualitative-dimensional and species structure of the harvested raw material.
- Lack of a tradition among private forest owners to form associations of communities.
- Necessity to revise the principles of determining the rotation age of individual species and sites taking into consideration the changing market conditions, as well as public demand for utilisation of non-productive forest functions and maintenance of biodiversity.
- Analysis of the techniques and technologies used by forest service providers for timber harvesting with regard to compliance with the sustained forest management rules.
- Creation of transparent principles of forest utilisation in the scope of harvesting of both wood and forest non-wood products as an executive document to be used in forest practice – (in the making).
- Emphasising the significance of the necessity to study the non-wood forest products base for their rational utilisation by local communities.

Portugal

Américo M. S. CARVALHO MENDES
Faculty of Economics and Management, Portuguese Catholic University
Rua Diogo Botelho, 1327, 4169-005 Porto – Portugal
Tel.: +351-226196200, Fax: +351-226196291
e-mails: amendes@porto.ucp.pt

Diana FELICIANO
Faculty of Economics and Management, Portuguese Catholic University
dfeliciano@porto.ucp.pt

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

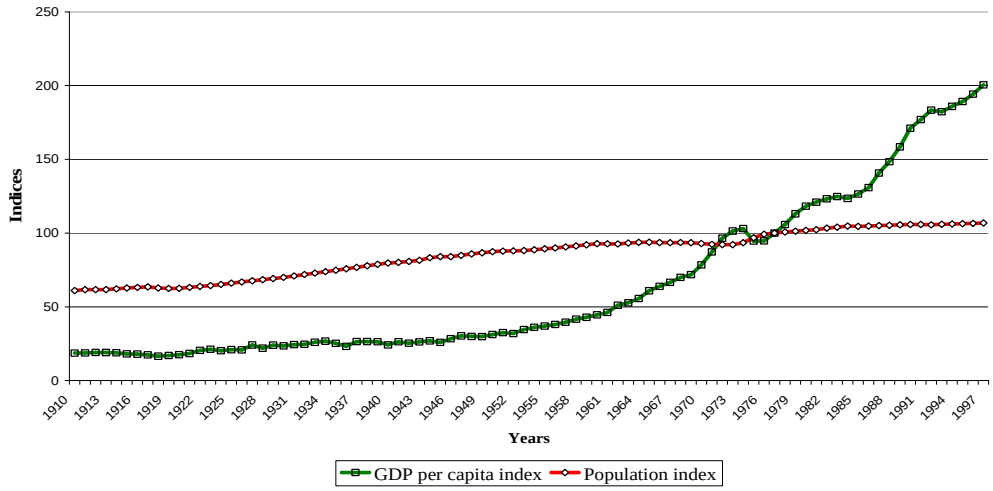
Graphic 1.1[1] shows the long run trends in total population and GDP per capita. We can see from these data another turning point in the Portuguese economy in the sixties, as far as consumption is concerned: until that time consumption was driven both by the growth in total population and in GDP per 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.

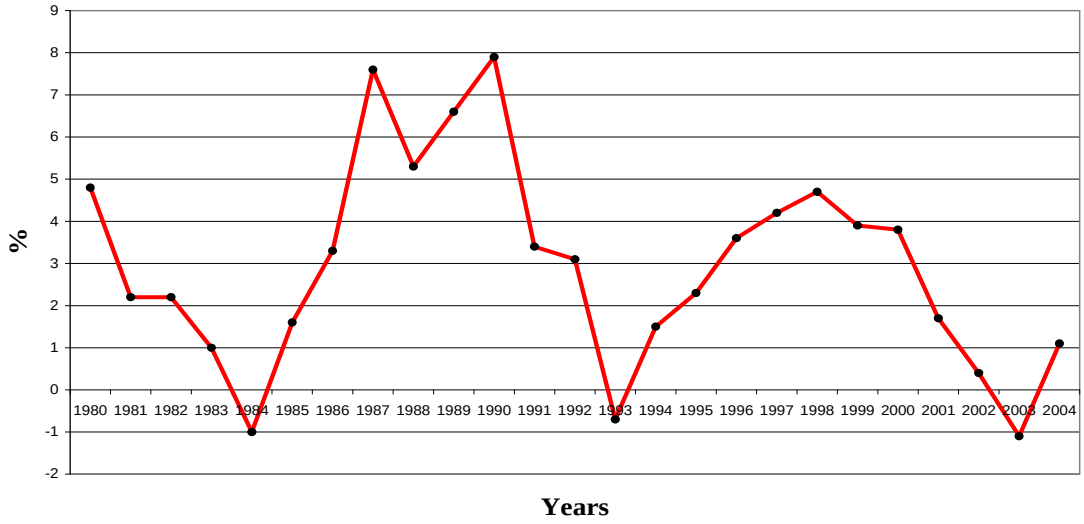
Besides this look at the long run trends, it is also necessary to look at the conjunctural variations in GDP. As we will see in the chapter about the wood-processing industries, these variations matter a lot for the dynamics of those which are oriented towards the domestic market.

[1] The indices represented in the graphic are based on the data provided in annex of the book by Mateus (1998).

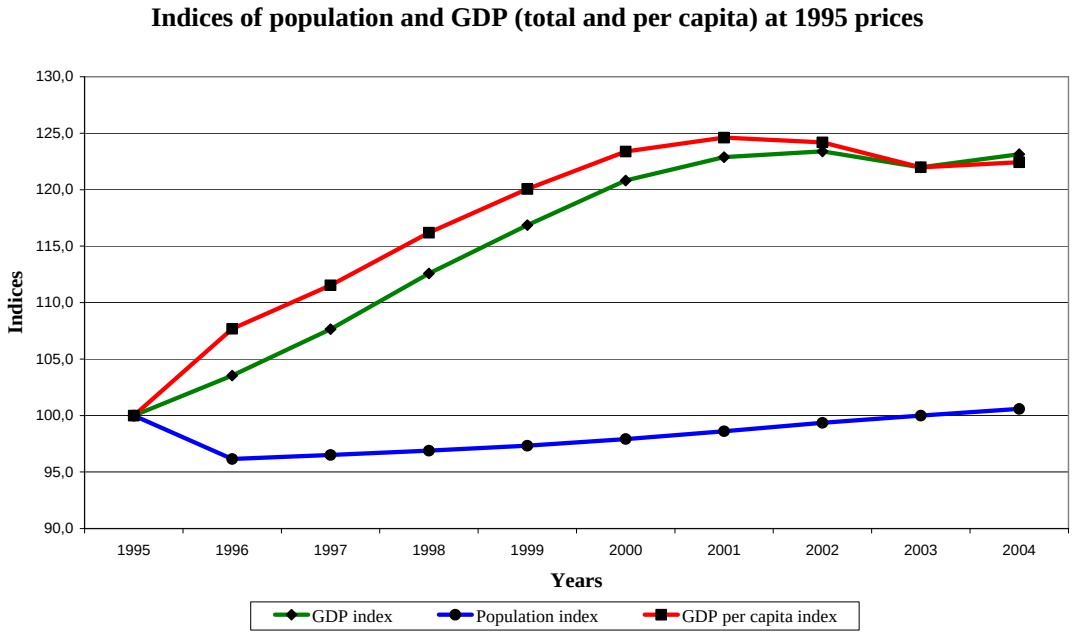
Indices of total population and GDP per capita (base 100: 1977)



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:

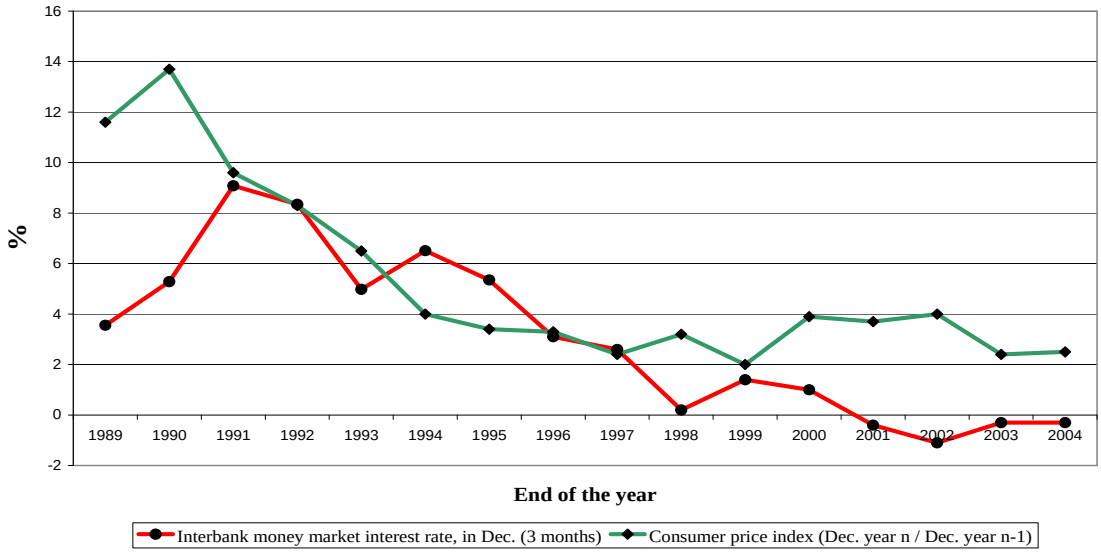
- a sharp decline in the share of food and beverages which was still very high in 1980/81;
- an increase in the share of housing and related equipment (furniture included) and services;
- an increase in the share of services such as transportation, communication, education, entertainment, cultural services,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

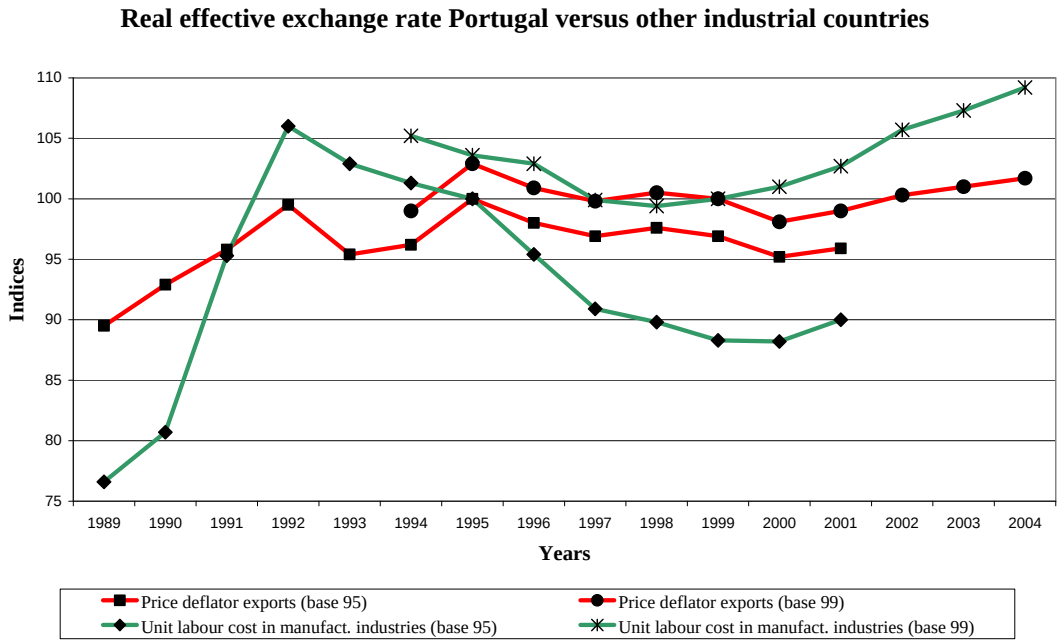
Short run interest rate and inflation rate



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 XIXth 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^3 o.b. of annual feelings for wood supply are almost of the same amount as the 12,900,000 m^3 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^3/ha/year for *Pinus pinaster* and 9,0 m^3/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.

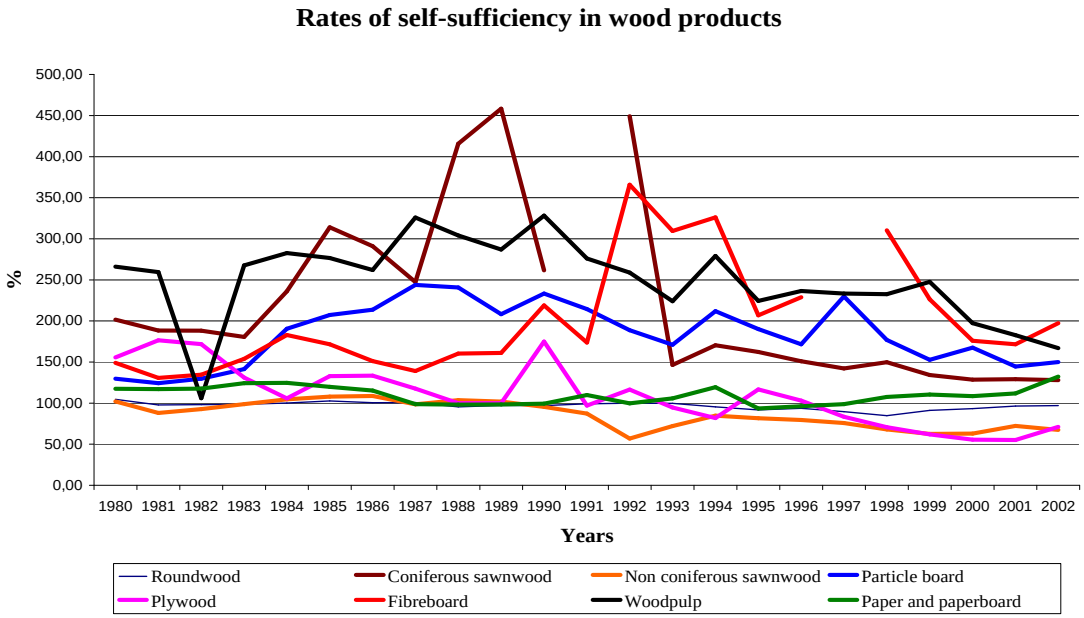
Removals of pine and eucalyptus wood

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[2]. 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 XIXth century as the moment of take off for the cork industries;

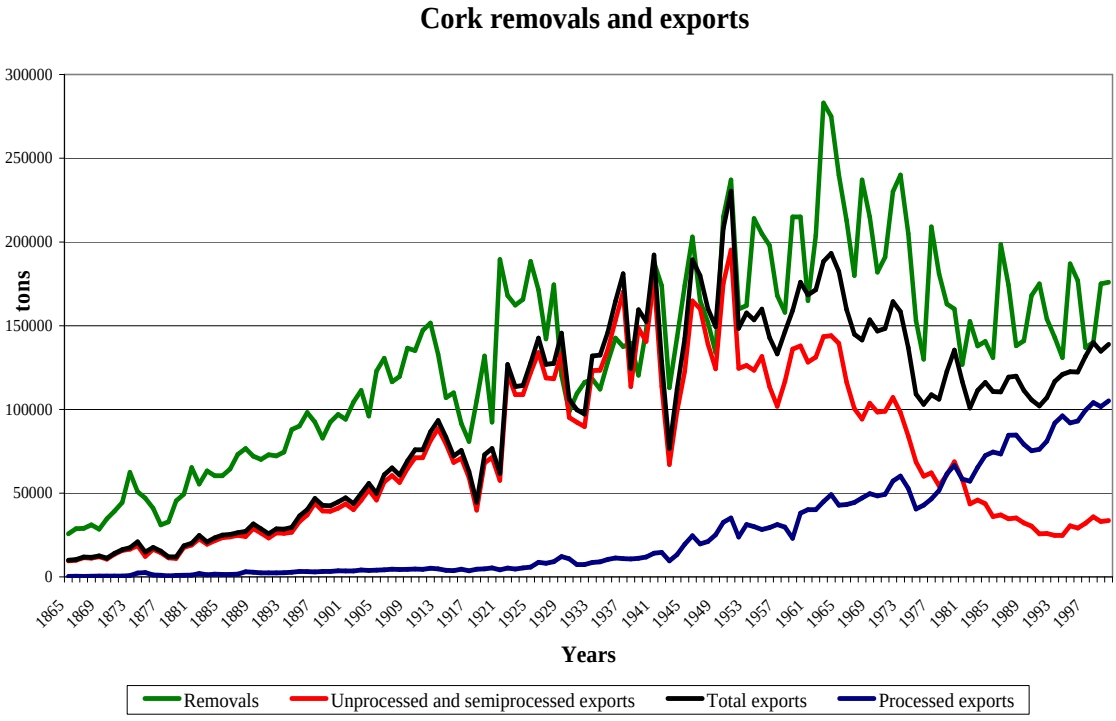
b) **from the second half of the 30s until mid 60s**:

- 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;

[2] 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. Supproting and impeding factors for enterprise develompent 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 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 f 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/xxiiaphes/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 (10006€)	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

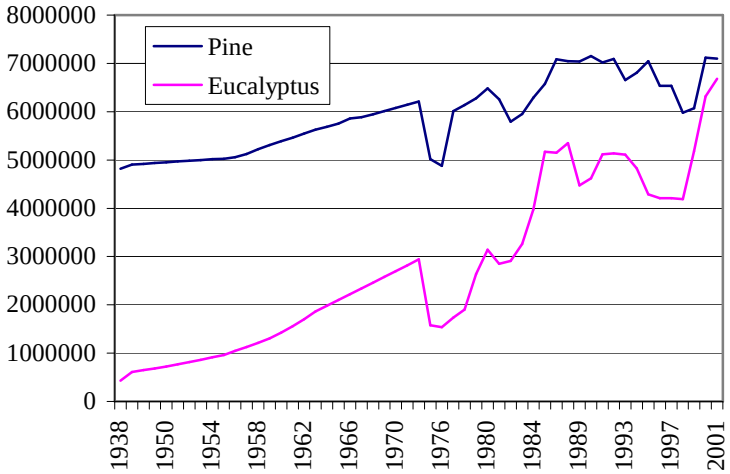
Source: European Commission – Directorate General for Economics and Financial Affairs. Price and Cost Competitiveness (several issues).

Table 1.5: Trade balance in forest products

		1990	1992	1994	1996	1998	1999
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^3 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^3	10831,00	8946,00	8742,00	8742,00
	Imports1000 m3	1342,10	1152,00	1080,00	1080,00
	Exports 1000 m3	570,10	812,00	807,00	807,00
	Consumption 1000 m3	11603,00	9286,00	9015,00	9015,00
	Rate of self-sufficiency (%)	93,35	96,34	96,97	96,97
Coniferous sawnwood	Removals 1000 m3	1020,00	987,00	859,00	859,00
	Imports1000 m3	45,00	50,00	47,00	47,00
	Exports 1000 m3	271,70	272,00	235,00	235,00
	Consumption 1000 m3	793,30	765,00	671,00	671,00
	Rate of self-sufficiency (%)	128,58	129,02	128,02	128,02
Non-Coniferous sawnwood	Production 1000 m3	407,00	505,00	439,00	439,00
	Imports 1000 m3	252,20	202,00	227,00	227,00
	Exports 1000 m3	11,70	9,00	15,00	15,00
	Consumption 1000 m3	647,50	698,00	651,00	651,00
	Rate of self-sufficiency (%)	62,86	72,35	67,43	67,43
Particle board	Production 1000 m3	722,00	700,00	736,00	736,00
	Imports 1000 m3	88,60	80,00	75,00	75,00
	Exports 1000 m3	379,60	296,00	320,00	320,00
	Consumption 1000 m3	431,00	484,00	491,00	491,00
	Rate of self-sufficiency (%)	167,52	144,63	149,90	149,90
Plywood	Production 1000 m3	31,00	32,00	32,00	32,00
	Imports 1000 m3	29,50	32,00	24,00	24,00
	Exports 1000 m3	4,70	6,00	11,00	11,00
	Consumption 1000 m3	55,80	58,00	45,00	45,00
	Rate of self-sufficiency (%)	55,56	55,17	71,11	71,11
Fibreboard	Production 1000 m3	495,00	470,00	440,00	440,00
	Imports 1000 m3	96,30	114,00	122,00	122,00
	Exports 1000 m3	309,90	310,00	339,00	339,00
	Consumption 1000 m3	281,40	274,00	223,00	223,00
	Rate of self-sufficiency (%)	175,91	171,53	197,31	197,21
Wood pulp	Production 1000 m3	1774,00	1806,00	1929,00	1929,00
	Imports 1000 m3	94,20	163,00	140,00	140,00
	Exports 1000 m3	969,10	980,00	914,00	914,00
	Consumption 1000 m3	899,10	989,00	1155,00	1155,00
	Rate of self-sufficiency (%)	197,31	182,61	167,01	167,01
Paper and paperboard	Production 1000 m3	1290,00	1419,00	1537,00	1537,00
	Imports 1000 m3	643,60	642,00	605,00	60,5,00
	Exports 1000 m3	744,40	792,00	979,00	979,00
	Consumption 1000 m3	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 frestry 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 develoment in small-scale forestry and barriers to entrepreneurship: the role of forest owners organisations and frest 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 simples 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

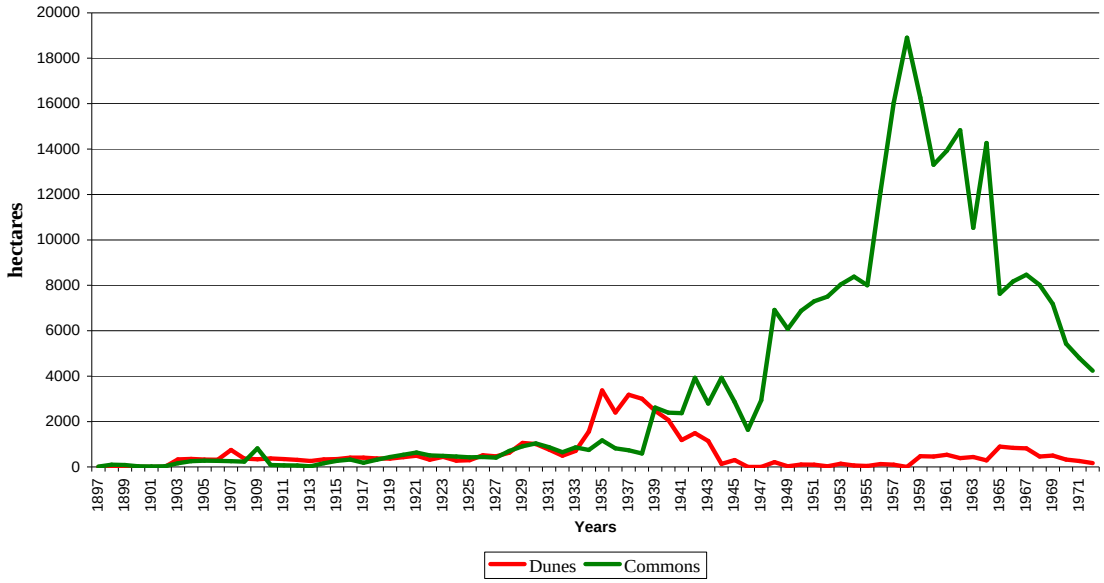
The large amount of uncultivated land fit for cultivation and without a productive use existing in the middle of the XIXth century (38,2 % of the total land area) explains why afforestation was, by far, a major priority of the Forest Services, which were making their beginnings by that time. This purpose 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 XIXth century and in the beginning of the XXth 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 XIXth 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 XIXth 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 XIXth 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 XIXth 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. It 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 they 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^{th} 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 is 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 had 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 if 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 as 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.

Some publication of interest

Almeida, Celestino A. Morais. 1997. Landowners’ organisation and forestry development in Portugal. PhD dissertation, University of Reading.

Banco de Fomento e Exterior. 1996. Plano Estratégico para o Sector Florestal - 1.ª Fase. (unpublished manuscript).

Banco Português de Investimento; Agro-Ges; Jaakko Pöyry. 1996. Proposta para o Desenvolvimento Sustentável da Floresta Portuguesa. Lisbon. (mimeo);].

Banco Português de Investimento & Agro-Ges. 1997 Propostas para o Desenvolvimento Sustentável da Floresta Portuguesa. O sistema de financiamento do investimento florestal. Lisbon. (mimeo)

Baptista, Fernando Oliveira & Ricardo Terra Santos. 2005. Os Proprietários Florestais. Oeiras: Celta Editora.

Brouwer, Anthony Roland. 1995. Planting Power. The Afforestation of the Commons and State Formation in Portugal. Wageningen: Proefschrift Landbouwuniversiteit Wageningen.

Costa, Zita. 2002. Instrumentos Financeiros de apoio às organizações florestais: passado e presente. Paper presented at the Seminar "Associativismo e Cooperativismo Florestal" organized by FORESTIS and FENAFLORESTA, Viseu, 24 May 2002.

Direcção Geral das Florestas. 1999. Anuário Florestal 1999. Lisbon: Direcção Geral das Florestas.

Instituto Nacional de Estatística. 1997. A floresta nas explorações agrícolas 1995. Lisbon: Instituto Nacional de Estatística.

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). 1998a. Livro Verde da Cooperação Ensino Superior-Empresa. Sector Florestal. [Lisbon & Porto]: CESE-Conselho Para a Cooperação Ensino Superior-Empresa.

Mendes, Américo M. S. Carvalho. 1998b. *Forest owners' associations as a case of joint production of public goods and private services: a game-theoretical approach*. In FORESEA Miyazaki 1998. Proceedings of the International Symposium on Global Concerns for Forest Resource Utilization - Sustainable Use and Management, October 5-8, 1998, Seagaia, Miyakaki, Japan. Vol I. Atsushi Yoshimoto & Kiyoshi Yukutake (eds.). Miyazaki (Japan): Department of Agricultural & Forest Economics, Myazaki University. pp. 186-196.

Mendes, Américo M. S. Carvalho. 2002. Associative institutional innovations in forest management: elements for an analytical framework grounded in the Portuguese case. Porto & Bordeaux: Universidade Católica Portuguesa, Faculdade de Economia e Gestão / Institut Européen de la Forêt Cultivée. (report prepared for Action 5 of the EUROSILVASUR project).

(http://www.pierreton.inra.fr/IEFC/activites/eurosilvasur_tache3_portugal.en.pdf)

Mendes, Américo M. S. Carvalho. 2004a. *Portugal: The forest policy process since 1996*. In Forests for the Future: National Forest Programmes in Europe. Country and Regional Reports from COST Action E19, David Humphreys (ed.). Luxembourg: Office for Official Publications of the European Communities. pp. 231-252.

Mendes, Américo M. S. Carvalho. 2004b. *Current trends in forest legislation in Portugal*. In Boscos i Societat. Boesques y Sociedad. Forests and Society. Actes del V Forum de Política Forestal, 16-18 de Juliol de 2003, Gloria Dominguez, Eduardo Plana & Eduardo Rojas Briales (eds.). Solsona: Centre Tecnològic Forestal de Catalunya. pp. 333-353.

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. *Implementation Analysis of Forest Programmes: some theoretical notes and an example*. (forthcoming in Forest Policy and Economics).

Mendes, Américo M. S. Carvalho. 2005c. The role of institutions in forest development: the case of Forest Services and forest owners' associations in Portugal. Paper presented at the International Conference "The Multifunctional Role of Forests – Policies, Methods and Case-Studies", University of Padova, 29 April.

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.

Radich, Maria Carlos & A. A. Monteiro. 2000. Dois séculos da floresta em Portugal. Lisbon: CELPA-Associação da Indústria Papeleira.

Rego, Francisco Castro. 2001. Florestas públicas. Lisbon: Comissão Nacional Especializada de Fogos Florestais & Direcção Geral das Florestas.

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
TOTAL	2331.4	100	2900	100	3056	100	3349	100

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
TOTAL	3349	100	976	100	672	100	713	100	988	100

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
TOTAL	3349000	3129000	93.4	40000	1.2	180000	5.4

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**							
	NW	**NE**	**CW**	**CE**	**R & W**	**Alentejo**	**Algarve**	**Total**
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**		
Legal status	Associations	Cooperatives	Associations	Cooperatives	TOTAL
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
TOTAL	98	12	110	99	31	130

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
TOTAL			242,954

Table 2.10: Targets and outcomes of the Portuguese Forest Project

	Targets	Outcomes
Time horizon	**1980/85**	**1981/88**
Afforestation (ha)	150,000	131,908
1. By the Forest Services		
- 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
2. By PORTUCEL (pulp and paper company)		
- 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.[3]
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
TOTAL	343009	380601	114130	211249	63770	162492	165109	6860

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
TOTAL	1	4	28	2	4	39

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 forestry section in an existing cooperative	Creation of an extension in an existing association	Total
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
TOTAL	15	36	9	14	74

Source: Costa (2002)

[3] There were also 1285 ha of natural regeneration funded by this programme, not included in the table.

3. Wood-processing industries

3.1. Overview

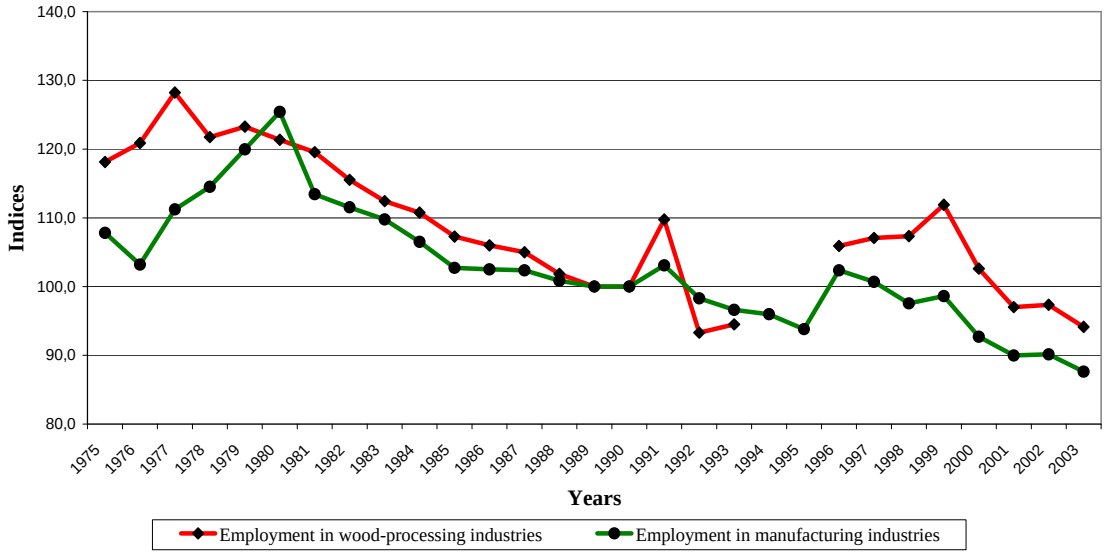
In 2003, the wood and cork-processing industries contributed with 11.8% of the employment and 10.8% of the gross value added of the manufacturing industries. They are also a **positive contributor to an exporting position of the balance of trade**, but have a **smaller size** and a **lower labour productivity** 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 planing

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.

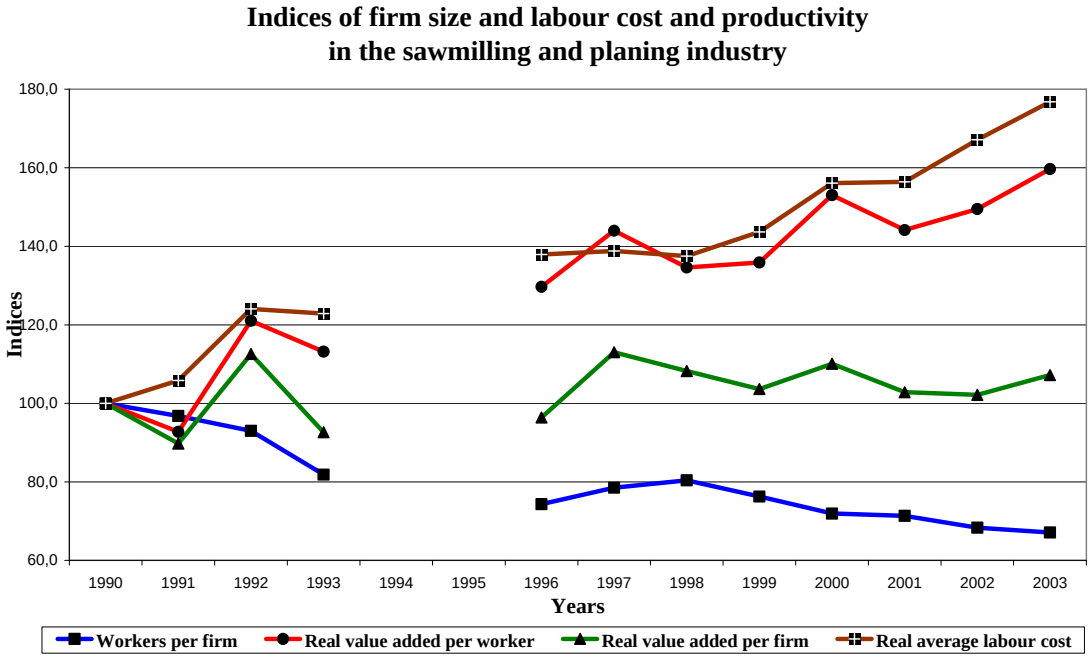
The output of the industry **increased during the 70's**, mainly supported by the growth in exports of pallets (the percentage of exports on the total volume of production was 30,3% in 1975, and 61,2% in 1980 and the percentage of wood for pallets on the total volume was 4,1% in 1975 and 67,5% in 1980). 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[4], 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.

[4] 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.



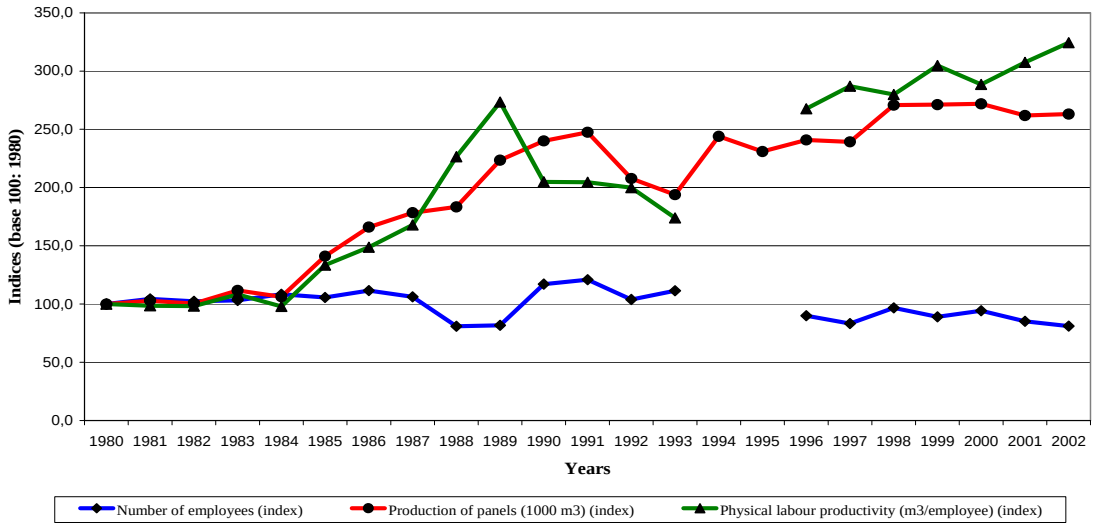
3.2.2. Wood-based panels

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:

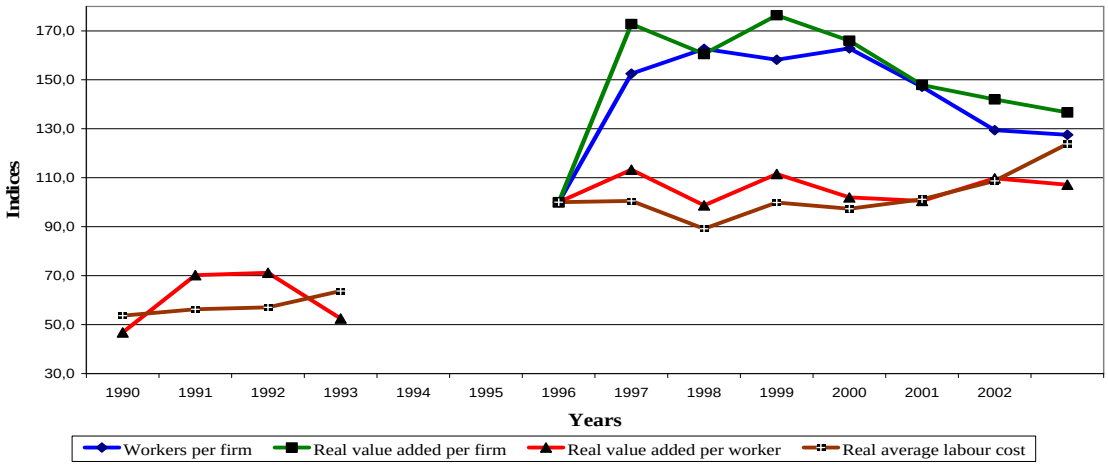
a) the trends in output and labour productivity are positive over the period, but output is stagnating since the turn of the century;

b) 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:

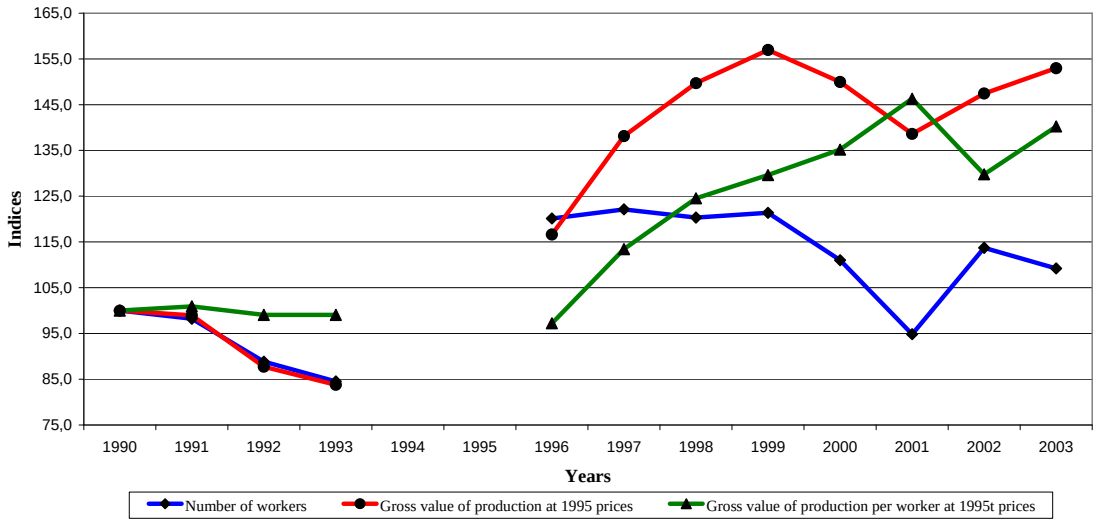
- the **"traditional carpentries"** of small dimension, which have a non standardized and diversified production, responding to the specifications of the local demand;
- the **"industrial carpentries"** with a specialized and standardized production, technologically more developed, with larger firm sizes 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.

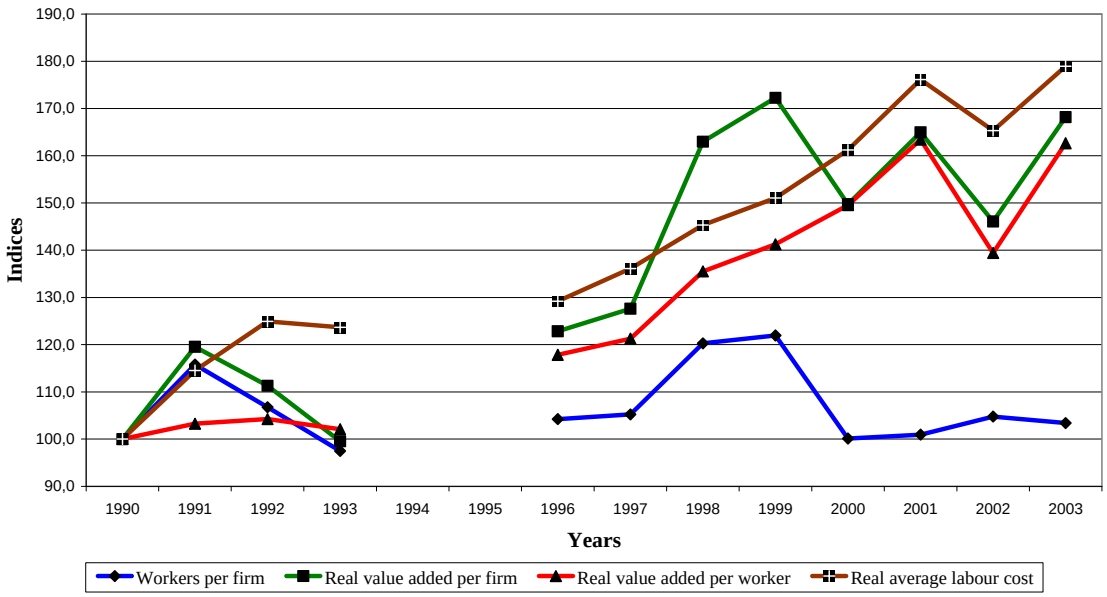
The main output of the "industrial carpentries" throughout the 80s and 90s, at least, has been the production of **doors**. This industry has not yet definitely engaged in other products such as windows or joinery. Part of the production is exported, mainly for EU markets. However, the main destination 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:
a) the first half of the 1990s was a time of decline in production and employment and stagnation in labour productivity;
b) the second half of the 1990s was a period of growth in all these three indicators;
c) 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.

Indices of firm size and labour cost and productivity in builders' carpentry



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.

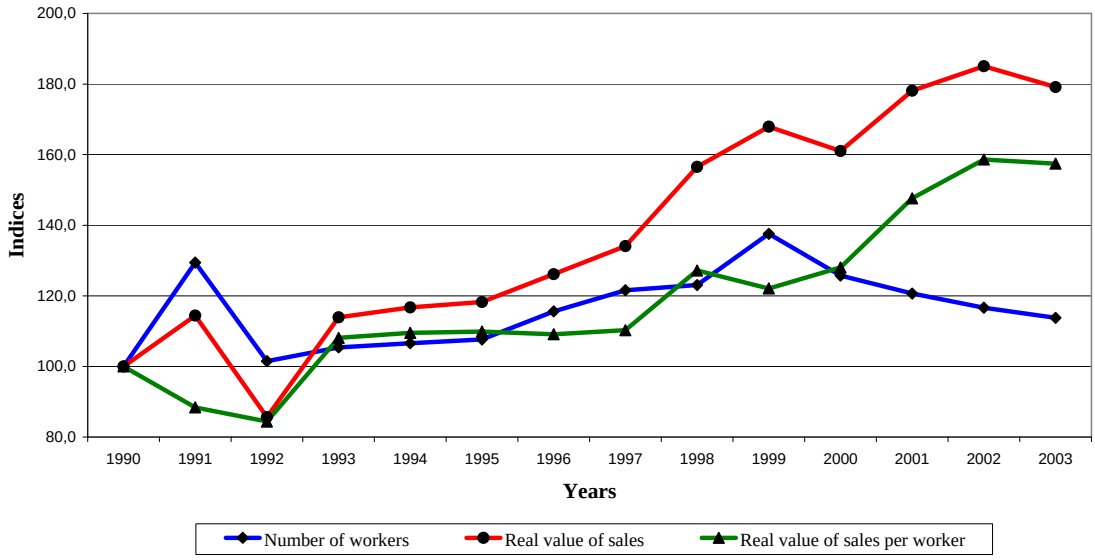
From this pattern of output it follows that this is another industry that has been very much **dependent on the evolution of GDP** and disposable income of the households. Since 1992, until 2002, the trend in the wooden furniture industry was positive, in terms of output and labour productivity, while 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

CELPA-Associação da Indústria Papeleira. Indústria Papeleira Portuguesa. Boletim Estatístico (annual bulletin).

Direcção Geral da Indústria. 1986. Estudo da Indústria de Serração de Madeiras. Lisbon: Direcção Geral da Indústria.

Forum para a Competitividade. 1995. A Competitividade da Economia Portuguesa. Lisboa: Forum para a Competitividade.

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[5]

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 industrues	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	25.5
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

[5] 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 industrues	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
TOTAL		296,801	100,0

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^3)**	**Physical productivity of labour (m^3/worker)**
1980	16685	2200	132
1985	13291	1800	135
1990[6]	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.

[6] 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^3)	Physical labour productivity (m^3/worker)
1980	3184	459	144
1985	3367	648	192
1990[7]	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

[7] 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
TOTAL		269,759,538	100

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[8]

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

[8] 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[9]

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	Total		
1990			178206	33732	211941	247017	85,8
1991			208673	43145	251818	282624	89,1
1992	55016	32664	66660	37132	191472	211571	90,5
1993	68438	30451	87245	77577	263711	281442	93,7
1994	74298	28181	97448	77730	277657	288325	96,3
1995	77737	55400	74607	84386	292130	292130	100,0
1996	83081	33977	110720	96253	324031	311568	104,0
1997	96333	63408	124461	67579	351781	331244	106,2
1998	113709	68808	133225	106909	422651	386689	109,3
1999	127128	79152	151123	105538	462941	414822	111,6
2000	132239	57130	151664	111651	452684	397789	113,8
2001	141044	95159	156007	119050	511260	439983	116,2
2002	154834	108790	158350	118790	540764	457112	118,3
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.

[9] 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 NFWP&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 of 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 owned 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 then 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 tool 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)
A. Direct use values			**543,594**
Timber harvested			430,604
- Pulpwood			
Coniferous	2,153,000 m^3	€19.54/m3 o.b.	42,070
Broad-leaved	6,684,000 m^3	€31.70/m3 o.b.	211,883
- Saw-logs			
Coniferous	4,733,000 m^3	€33.42/m3 o.b.	158,177
Broad-leaved	221,000 m^3	€41.89/m3 o.b.	9,258
- Other industrial wood	220,000 m^3	€41.89/m3 o.b.	91,216
Fuelwood			37,273
Coniferous	286,000 m^3	€38.22/m3 o.b.	10,931
Broad-leaved	488,000 m^3	€53.98/m3 o.b.	26,342
Net growth in standing timber stock			75,717
Coniferous	2,060,000 m^3	€19.53/m3 o.b.	40,232
Broad-leaved	1,794,000 m^3	€19.78/m3 o.b.	35,485
B. Non wood pforest products			**584,771**
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 nicra)	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

C. RECREATIONAL SERVICES			**37,883**
Hunting	219,005 hunters		21,383
Informal forest recreation	6 million day-visits	€2.75/day-visit	16,500
D. TOTAL DIRECT USE VALUES			1,166,248
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
E. TOTAL INDIRECT USE VALUES			163,838
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
TOTAL NEGATIVE EXTERNALITIES			136,850
TOTAL ECONOMIC VALUE			1,193,236

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.egi.ua.pt/xxiiaphes/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 XIXth century to the end of the XXth 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).

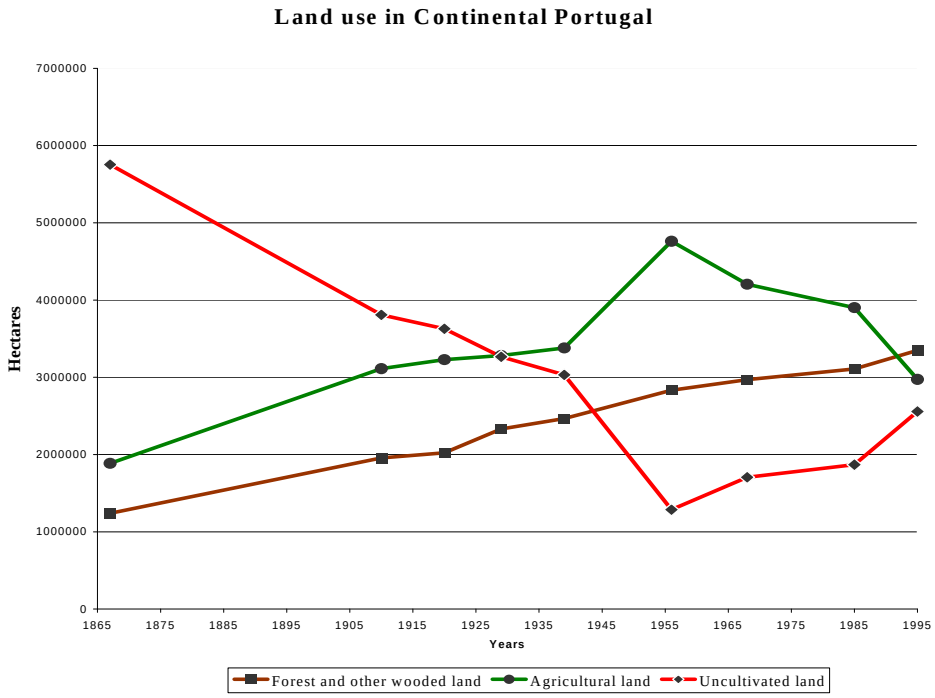
5. Forest and their economic importance

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 XIXth 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.

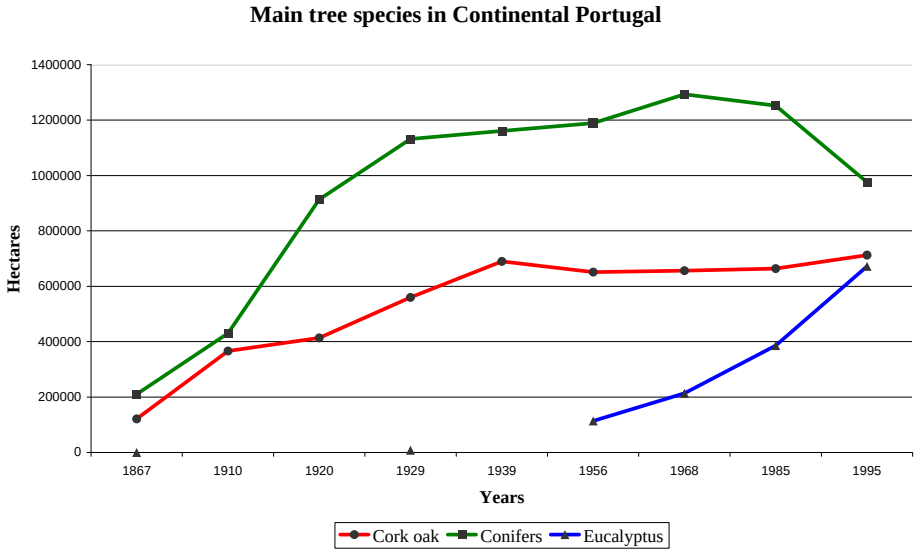
According to the most recent forest inventory (DGF, 2001), agricultural land represents 33.5% of the area of Continental Portugal, while forest and other wooded land[10] represents 37.7% corresponding to an area of 3,349,327 ha.



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%).

[10] "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 XVIth 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^3 o.b. of annual fellings for wood supply are almost of the same amount as the 12,900,000 m^3 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^3/ha/year for *Pinus pinaster* and 9.0 m^3/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 car 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^3/ha/year to 5.5 m^3/ha/year (+19.6%)
b) eucalyptus: from 9 m^3/ha/year to 11 m^3/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

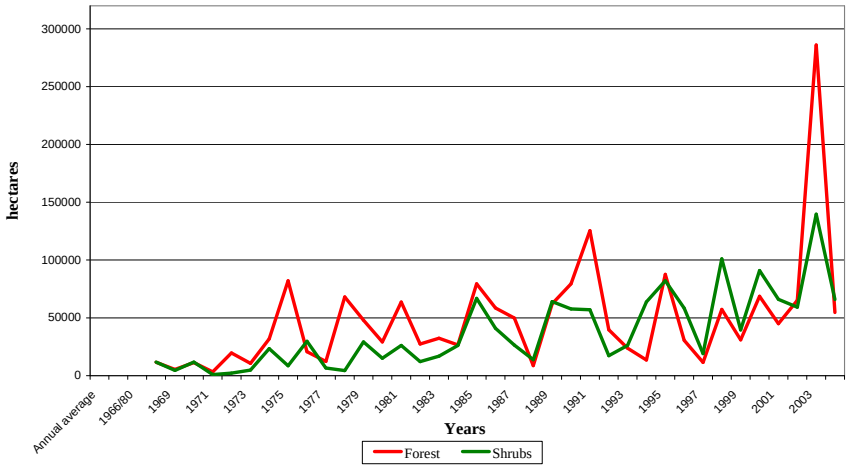
Forests damaged by fires versus afforestation and reforestation
Fire is a major threat to Portuguese forests, especially to the pine forests in the Northwest and Central West regions, which were reduced respectively by 41 and 21% between 1982 and 1995. This problem definitely emerged in the 1960s when 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.

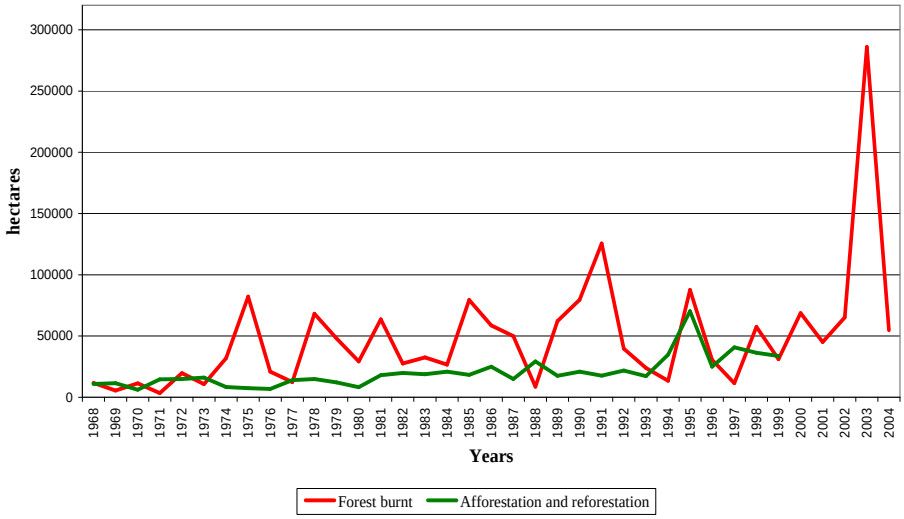
Since 1968, when data started to become available on the number and area of forest fires, the annual and cumulated areas of afforestation and reforestation have tended to be below the annual and cumulated area of forests burnt. More precisely, the cumulated forest area burnt from 1968 to 1999 is about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

Area of forest fires



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 obvious not interest 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 the 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

Blombäck, Peter; Peter Poschen; Mattias Lövgren.2003. Employment Trends and Prospects in the European Forest Sector. A study prepared for the European Forest Sector Outlook Study (EFSOS). UNECE/FAO Timber and Forest Discussion Paper ECE/TIM/DP/29.

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

Direcção Geral das Florestas. 2001. Inventário Florestal Nacional. Portugal Continental. 3.ª Revisão, 1995-1998. Relatório Final. Lisbon: Direcção Geral das Florestas.

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.

GCPF-Grupo Coordenador do Projecto Florestal-Banco Mundial. 1986. Portugal. Programa de Desenvolvimento Florestral. Fase II do Projecto Florestal. Lisbon: Ministério da Agricultura, Pescas e Alimentação-Gabinete do Ministro.

Goes, Ernesto. 1991. A Floresta Portuguesa, Sua Importância e Descrição das Espécies de Maior Interesse. Lisbon: PORTUCEL.

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[11]	Area (1000 ha)	1306.4	1247.9	1047.1	976.0
	Growing stock (1000 m^3)	100,925.6	96,848.7	87,837.2	89,417
	Mean growing stock (m^3/ha)	77.25	77.61	83.86	91.61
	Annual increment (1000 m^3)	6989.1	6295.6	4932.6	n.a.
	Mean annual increment (m^3/ha)	5.35	5.04	4.71	n.a.
All stands	Growing stock (1000 m^3)	103388.3	101324.1	93315.2	98804
	Annual increment (1000 m^3)	7164.4	6557.2	5236.5	n.a.

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

[11] Stands where maritime pine is the only or the dominant species.

Table 5.3: Eucalyptus inventory data for 1986, 1992 and 1995[12]

Inventory data	**1986**	**1992**	**1995**
Area (ha)	434700	529100	805546
Growing stock (1000 m^3)	26955.2	21808.6	34897
Mean growing stock (m^3/ha)	62.0	41.2	43.3
Annual increment (1000 m^3)	n.a.	n.a.	n.a.
Mean annual increment (m^3/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 m3/ha.

Table 5.4: Forest according to main functions

Functions	**1985**		**1995**	
	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
TOTAL	3203	100.0	3275	100.0

Source: DGF- Inventário Florestal Nacional

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

	Area	**Growing stock volume**	**Annual net increment**	**Fellings**	**Annual removals**	
	1000 ha	1000 m^3	1000 m^3	1000 m^3	1000 m^3	1000 m^3
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[13]	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	
Trees in other wooded land		16,246	213	0	0	
Trees outside forest and other wooded land			670	0	0	
TOTAL		292,006	15,195	11,500	11,300	

Source: DGF (1999)

[12] 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.
[13] 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^3 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	594,509
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
TOTAL (without double counting)			**1,520,000**	**Not available**

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		Endangered	
			Number	% 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**
Forest Sector	Forestry	647	598	562	609	641	781	744
	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
	Annual	Cumulated				
1942/51[1]	5000					
1966/80					181272	181272
1968	11680	11680	11760	23440	10799	10799
1969	5384	17064	4570	9954	11367	22166
1970	11335	28399	11722	23057	6078	28244
1971	3343	31742	915	4258	14561	42805
1972	19670	51412	2238	21908	14896	57701
1973	10618	62030	4834	15452	15991	73692
1974	31777	93807	23297	55074	8331	82023
1975	82086	175893	8601	90687	7376	89399
1976	20790	196683	29800	50590	6825	96224
1977	12360	209043	6568	18928	13903	110127
1978	68165	277208	4368	72533	14812	124939
1979	48060	325268	29179	77239	12120	137059
1980	29219	354487	15041	44260	8230	145289
1981	63649	418136	26148	89797	17920	163209
1982	27436	445572	12121	39557	19785	182994
1983	32427	477999	16953	49380	18742	201736
1984	26580	504579	26133	52713	20829	222565
1985	79440	584019	66815	146255	18278	240843
1986	58612	642631	40910	99522	24882	265725
1987	49848	692479	26420	76268	14890	280615
1988	8628	701107	13807	22435	29229	309844
1989	62165	763272	64070	126235	17410	327254
1990	79549	842821	57703	137252	20892	348146
1991	125488	968309	56998	182486	17574	365720
1992	39701	1008010	17311	57012	21803	387523
1993	23839	1031849	26124	49963	17194	404717
1994	13487	1045336	63836	77323	34714	439431
1995	87554	1132890	82058	169612	70286	509717
1996	30542	1163432	58325	88867	24947	534664
1997	11466	1174898	19068	30534	40715	575379
1998	57393	1232291	100975	158368	36234	611613
1999	31052	1263343	39561	70613	33743	645356
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 beween 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.): a) Permanent employment b) Seasonal employment (number of equivalent permanent workers)	 4,700 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[14]	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

[14] 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	34,290
	FOREST INDUSTRIES	69,337
	OTHER FOREST RELATED INDUSTRIES	80,923
	OTHER FOREST RELATED SERVICES	43,244
	TOTAL	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 ,
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
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, E-mail**:** 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, E-mail**:** 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, E-mail**:** 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, E-mail**:** 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, E-mail**:** 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/
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
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/
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
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, E-mail**:** 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, E-mail**:** 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/, E-mail**:** 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, E-mail**:** 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
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/, E-mail**:** 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
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 , E-mail**:** 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

	Chapters									
	1		**2**		**3**		**4**		**4**	
Institution	**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		

Romania

Bouriaud, L. - Nichiforel, L. - Năstase, C. - Drăgoi, S. - Pădureanu, L. Borlea, G.F.

Laura BOURIAUD[1], lecturer, Ph.D.
Forestry Faculty, University "Stefan cel Mare" Suceava, 9, str. Universitatii, 720225, Suceava, Romania
Tel. +40. 230 216147; Fax: +40. 230 521664; bouriaud@yahoo.com

Liviu NICHIFOREL, assistant professor
Forestry Faculty, University "Stefan cel Mare" Suceava, 9, str. Universitatii, 720225, Suceava, Romania
Tel. +40. 230 216147; Fax: +40. 230 521664; nichiforel@usv.ro

Carmen NĂSTASE, lecturer
Faculty of Economic Sciences and Public Administration, 9, str. Universitatii, 720225, Suceava, Romania
Tel. +40. 230 216147; Fax: +40. 230 520080; ncarmen@eed.usv.ro

Simona DRĂGOI, researcher, Ph.D.
Forest Research and Management Institute (ICAS), 128, Sos. Stefanesti, 077190, Voluntari , Romania
Tel. +40. 21 2406095; Fax: +40. 21 2406845; sdragoi@go.ro

Leonard PĂDUREANU
National Forest Administration, branch Bacău, 14, str. Nicolae Titulescu, Bacău, Romania
Tel. +40.234 588.959 int. 103; Fax: +40. 234 588.959; ecsef@silvabc.ro

Gheorghe Florian BORLEA, researcher, Ph. D.
Forest Research and Management Institute (ICAS), 1, Aleea Pădurea Verde, 1900, Timişoara
Tel/Fax: +40. 256 220085; fborlea@mail.dnttm.ro

Executive summary

Competitiveness of Romanian wood processing industry/NWFP on external markets is based mainly on the comparative advantage of lower labour costs. Competitiveness was affected till recently by the regulation of timber prices, restriction on timber trade and monopolistic position of the national forest administration.

In the last decade the low level of internal consumption of forest products and the system of selling timber from public estate (NFA and the communal forests) had a high impact on firm development, particularly for firms from harvesting and primary wood processing. Before the years 2000 - 2001, the development of the SMEs and of the associations of the private owners faced difficulties because of lack of public programmes addressing them. Financial system started only recently to have special programmes and/or credit lines for SMEs.

The lack of information is one critical factor affecting entrepreneurship, and it concerns the consumers' preferences, the forest products and services and the way of procure them, the public support of innovation or of SMEs development. Secondly, the low

[1] **Editorial responsibilities**: Laura Bouriaud – sections 1, 2, 3, 4, 5 (corresponding author); Liviu Nichiforel – sections 1, 3, 4, 5; Carmen Năstase – sections 1, 3; Simona Drăgoi – section 4; Leonard Pădureanu – section 3, 4; Florian Borlea – section 2.

intensity of trade relationship within the wood processing chain characterises a weak vertical integration and networking among the SMEs. Entrepreneurship is limited also by the weak organisation of internal market for timber and non-timber products, and by the lack of aggregation of supply from small-scale forestry. Enterprise should innovate more and invest in quality, services, and labelling. Huge potential exist on biomass production, recreation services, wild berries gathering and trade. The National Forest Administration strategy on the market of timber and non wood forest products might be of central importance in introducing new ideas and stimulate entrepreneurship. Enable policy framework, including extension services, change of legal rules, and cross-sectoral approach of the enterprise development are more than necessary for increase the competitiveness of the forest sector.

Research is needed for a better knowledge on the consumption/marketing of forest products and on the timber flow; on the forestry contribution to the rural development; on the expectations and needs of private owners and economic agents upon the policy-decision makers; on the social, cultural and economic value of NWFPS. At the firm level, there is weak probability that the research-development expenditure would increase in short term.

The apparently stabilisation of industrial structure at the regional level may open the possibility in the middle term for clustering and for increasing the networking among the SMEs. However, it has to be stressed here that this structure might be probably different if the rules of selling timber from public forests were changed. Positive signs of development are found on the upper level of wood processing chain (furniture industry, dwellings) where the short term forecast is the diversification of products and maintaining of external markets. The expected growth for the next decade would increase the domestic consumption of forest products; demand for forest recreational services is likely to increase, so do the possibilities for entrepreneurship.

1. Consumption

1.1. State of the art and historical development

Macroeconomic stabilisation, privatisation of state enterprises and alteration of ownership structure on land and forestland has constituted the institutional context of activities in Romanian forest sector since 1990. The transition to the market economy generated a decade of economical contraction. Long time being under the 1990' level, the GDP started to grow only in 2000. In 2003, the GDP recorded a 4.9% growth compared with 2002.

Consumer prices indices show that the final consumption of household remained under the 1990' level, but started to increase since 1998. In 2003, the final total consumption has grown by 6.9% comparing with 2002. The final consumption for the first six months of the year 2004 was with 8.8% higher compared with the same period of year 2003, while the households net final consumption increased by 9.0%.

In the case of sylviculture and logging activities, the production and the intermediate consumption decreasing since 1990 were stabilised for a short period in 1994-1996 but they have been continuously growing since 1999. For the same period, the production and the intermediate consumption in the wood processing industries increased. The

level of annual indices indicates a stronger increasing trend in the wood processing industries than in the case of sylviculture and logging.

Concerning the forest products, a particular low internal demand existed for furniture. Thus in 2001, the furniture and dwelling maintenance accounted for 2.9% of the total expenditure of the households, while the food products represented 52%. The recreation and culture represented 3.6%. Although information exist on the production and consumption of forest products and services (National Statistical accounts, available on Internet), there are no studies providing qualitative explanations, except those relaying on the truism of economic collapse after the fall of command and control economy.

1.2. Forest products' and services consumption

The apparent consumption of roundwood and sawnwood decreased compared to the first years after the fall of command economy. This reduction might be explained by the restructuring of industry, but also by the reducing of the annual allowable cut. The fuelwood consumption had been increased by almost 100% for a short period (1996-1998). The high share of rural population and the use of timber as source of energy make the fuelwood consumption sensitive to climatic conditions in wintertime.

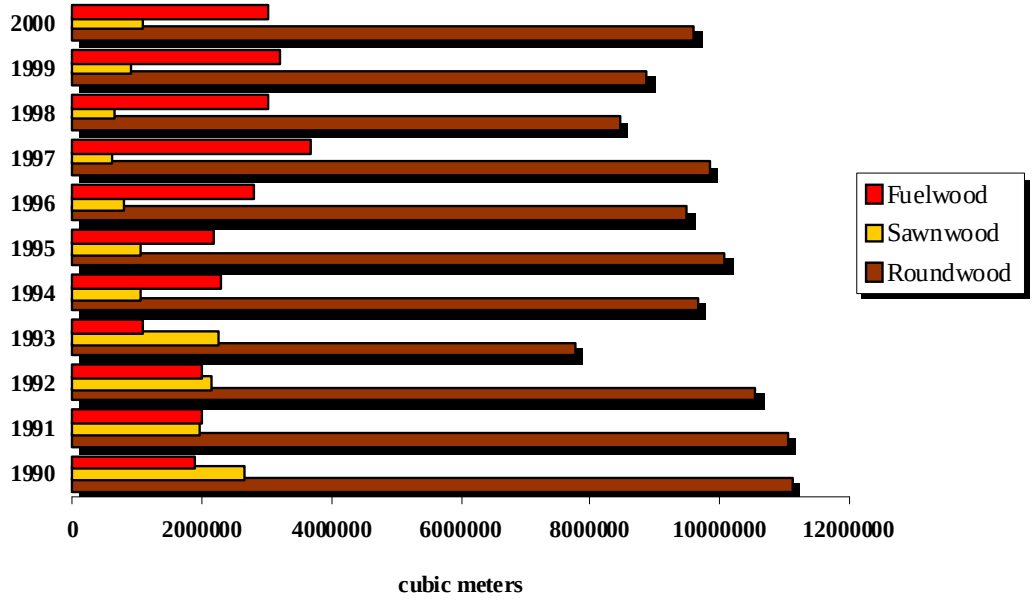
The National Institute for Wood forecasts for 2004 and 2005 an increased apparent consumption of coniferous sawnlogs of 4%, and 13% of non-coniferous, while the apparent consumption for wood residues, chips and particles would grow up by 14% (National Institute for Wood, 2004). The total apparent consumption of sawnlogs and other roundwood for industrial purposes would be around 10.7 million cubic meters for 2004. For the same year, the apparent consumption of fuelwood would be 3 million cubic meters.

The share of intermediate consumption in the value of production is 40% in the case of wood processing industry compared with 65% for the total industry. The index of intermediate consumption shows that the intensity of relationship between wood processing industry and furniture is three times higher than the intensity of relationship between the wood processing industry and the construction branch, or trade.

That means that the wood processing industry is developed in a classical wood-chain concept (logging – primary timber processing – furniture), with little product diversification, oriented rather towards external trade than towards internal consumption.

There is lack of information on non-wood forest products. The available pictures concern only the production from forest managed by the national forest administration, which is mainly sold on external markets (details in the part 4). Picking berries and mushrooms is a source of income and/or food for poorest categories of rural population. There are no information regarding the consumption of forest products and services. In general, the expenditure for services (including housing, electricity, gas and water, considerably high for those living in the urban area) comprises 19.4% from the household expenditures in the case of unemployed people and retired persons, 7.9% in the case of farmers, and 24% in the case of the employees. The share of household expenditure for leisure and culture in the total consumption expenditure is only 3.6%,

being the higher for the category of employees (4.6%) comparing with farmers (1.7%). The trend was positive, in 1997 consumption of services was 19% in the household expenditure, and increased to 27% in 2001. The number of enterprises providing services for the population was stable in 1998-2001, while the number of enterprises providing services for firms sharply increased in the same period.



Source: TBFRA, 2000.

Figure 1. Apparent consumption for roundwood, sawnwood and fuelwood, in Romania, cubic meters

1.3. Market demand for forest related products and services by urban population

There are few market surveys, except some private initiative which are not publicly available. There is certainly demand for recreational service as looking to the traditional practices such the picnic in forests or mushrooms gathering. Nevertheless, there is no information available on this demand. Although the system of forest classification (within the forest management planning) assigns recreational functions to a certain area of forests around localities, often these forests have not the necessary infrastructure to really provide recreational services.

1.4. Main problems and research questions in consumption for enterprise development

The relative poverty in the country and especially the poverty in the rural area lead to the situation of low internal demand for forest products with high value added, and for services. The share of self-consumption is high for non-wood forest products and for timber coming from small-scale forestry.

The consumption is oriented to “basic” and “classical” forest products – roundwood, fuelwood, sawnwood. Nevertheless, small and medium enterprises started to propose products for specific demands, e.g. small wood cottages for holidays or gardens, office furniture, garden furniture. Roundwood is traditionally used to build the houses

especially in the mountain region, but new woody materials started to be used in housing the latest years. The sector of buildings can increase in the future the demand for wood products, as looking to the trend of building sector contribution to the GDP, or to the number of dwellings. Thus the sector of prefabricated buildings with an estimated production in 2002 of 40 thousand units, registered in the first half of the year 2003 a production growth by 66% and of export by 37.3%. The trend continued, thus during the period 1st January–31th July 2004 the furniture and the prefabricated wood houses achieved a total export of 523.3 million euro, e.g. with 19.8% more than in the same period of the previous year, representing 4.8% from the aggregate Romanian export.

The trade chain for forest products is underdeveloped. For example, forest berries from internal production appeared only recently on the supermarkets and there is still a lack of shopping points for basic wood materials. The wood for rural buildings (e.g. fences) are not easy to find everywhere, except at the producer or on markets organised weakly in the villages. The same for fuelwood, which is bought rather directly in the forests, while residues from timber processing industries able to be used as fuelwood cannot be find on the market, but only at the producer. The lack of information, certitude and trade chains for basic wood materials induces costs for the final consumers and maintains the internal timber market underdeveloped.

Research is needed for a better knowledge on the consumption of forest products. There is a need also to understand in what extent the low level of internal demand on wood and services is not due to the lack of facilities on timber procurement/timber flow and information on the supply rather than on the low level of house budget, as far as timber, and basic timber products (e.g. fences, residual timber for rural buildings) have competitive prices compared with substitute materials.
The fuelwood needs a particular attention, because almost nothing is done in order to improve the efficiency of using wood for energy purposes, in private houses or in the public domain.

Annex A: Organisations studying forest products' consumption and main publications and information sources.

The research is carried out within the National Institute for Wood (INL), the National Institute for Forest Research and Forest Management Planning (ICAS) and within the forest faculties.

There are several forest faculties or forest departments in the country: Brasov (faculty) Suceava (faculty), Oradea (department), Cluj Napoca (department) and Timisoara (department). The number of permanent teaching staff varies from 59 in Brasov to 14 in Timisoara. Very few of them are involved in forest economics research.

There is little information on consumption of the forest products. The research institutions paid attention almost exclusively to the forest taxation, forest pricing and forest industry transformation during the transition period. Valuable information may be found on the annual national reports commissioned for the UNECE Timber Committee by the National Institute of Wood.

2. Small-scale forestry practises

2.1. State of the art in research

Private forestry is a relatively new, but important issue of forest policy in Romania. However, it is not a topic of interests for national forest research. There are several explanations of this situation. For long time, the law had been refusing to recognise the situation of private forestry as a particular one, in promoting the same rules of forest management in public and in private forests. However, the main reasons consist in the lack of staff trained in socio-economics and the lack of knowledge and know-how on socio-economics theories applied in forestry. Some studies were done by the National Institute for Forest Research (ICAS) in order to improve the knowledge on private forests distribution, species composition, forest works, and unauthorised clear-cutting of stands (Annex B). Universities and international organisations provided also some few studies on small-scale forestry issue.

2.2. Small-scale forest holding and historical development

In 1948 before the nationalisation, two thirds of Romanian forests were in private hands having an average size of ownership above 3 ha. During the communist period all forests were State forests (Table 1).

The restitution of forests started in 1991 and has been done in two wakes. In a first stage (1991-1999) the area to be given back to the former private owners was limited at maximum one hectare. In the second stage, started in 2000, the maximum of forest properties to be given back was increased at 10 ha. That has for result a scattered situation of forest holdings. The structure of ownership today is 70% State, 13% communes, 8% forest communities, 1% different institutions (churches, schools), 8% private individuals. All forests transferred are originally forestlands, not plantations.

Table 1. Ownership structure and evolution of average private estates (ha)

	1947	1990	1998	2000	2003	%
Total forested area	6,487,000	6,372,000	6,367,000	6,367,000	6,367,000	100
Public forests	1,878,723	6,372,000	6,028,000	5,998,784	4,443,700	69.8
Private forests (individuals)	1,514,486	-	339,000	343,754	499530	7.8
Average area of private forests	3.1	-	0.6	0.56	0.68	-
Forests of different institutions	567,399	-	-	-	72,999	1.1
Forests of the communities	1,330,120	-	-	-	522,808	8.3
Forests of the communes	1,412,972	-	-	-	827,963	13

Sources: Machedon et alii, 1999; RNP, monthly bulletin; Ministry of Agriculture, Forests, Water and Environment

The number of owners is not known. What the statistics record as “owner” (Table 2.) means in fact the former owner, in excluding the eventual transmission of property to his heirs-at-law. There is no information on the number of plots composing the ownership. That is likely that the average area of forest holdings is less than one hectare for private owners According to a study from 1997, 70% of private owners hold less than 0.3 ha of forests.

Table 2. Average area and number of forest holdings

	Total surface ha	**Number of owners**	**Average area -ha**
Private forests (individuals) – law 18/1991	344,277	503,654	0.68
Private forests (individuals) – law 1/2000	359,007	229,696	1.56
Total forest of individuals	499,530	700,000*	1.00
Forests of different institutions	72,999	4,158	17.55
Forests of the communities	522,808	1,506	347.15
Forests of the communes	827,963	1,629	508.26

*: Estimation

The forests hold by the different institutions (schools, churches) still belong to the small-scale forest category because the maximum transferred to these entities was 30 ha. The majority of communes and forest communities' properties can not be characterised, in the Romanian context, as "small-scale" forestry.

The restitution of forests is completed at 97% nowadays. Particular for Romanian case was the "two wakes" restitution, made by two different laws, in 1991 and in 2000, which increased the scattered structure of private forests. For example, if someone had 10 ha of forests before the war, the first wake of restitution gave him back one hectare, and the remaining 9 hectares were been split between other neighbouring former owners. When the second restitution law came in 2000 to recognise the ownership up to 10 hectares, the owner remained with one hectare in the first location and received the other 9 hectares somewhere else.

In some counties (Bistrita), private forests became the dominant ownership form. That should influence locally and in short term the market for roundwood and sawnwood.

2.3. Small-scale forestry practices

The studying of private forests and private forestry is only of recent date. A survey on private owners' attitudes and behaviour was done in 2000 in the north part of the country (counties Suceava, Neamt and Botosani). It appears that the main preoccupation of private owners was to defend the woodland against timber robbery, rather than to comply with the forest management plan or the formal rules for forest management. Most of them acknowledged that they were harvesting two or three times the official allowed quota. For 25% of them the forest represents a legacy for children, while 8% of owners are effectively pronouncing for the preservation of forests. The main expectation of owners is that the State must provide the protection of forests against illegal cutting, and provide training on forestry (Bouriaud, 2001).

The forestry practices are formally submitted to the same rules than those implemented in public forests. High harvesting age, large size of roundwood, small areas for clear cuttings and natural regeneration are preferred. The harvesting of trees is subject of marking with a forest hammer by a forest official, often being a representative of the National Forest Administration. In forests without a forest management plan (that is the case of almost all individuals' forests), the harvesting is based on an official quota established per hectare and per year. A usual way to legally exceed this quota when

marking is to declare that trees have to be harvested as "sanitation cutting". This explains why the volume harvested as final cutting was inferior to the planned volume, while the sanitation cuttings exceeded the estimations (Table 3).

Table 3. The partition of harvested volume in private forests (1990-1999)

Type of sylvicultural intervention	Volume to extract 1000 m^3	Allowable cut m^3/year/ha	Volume marked for extraction 1000 m^3	Realisation of planned crop %
Final cutting	2,648.5	0.79	873.0	34
Conservation cuttings	156.7	0.05	71.2	45
Selection	259.5	0.08	88.1	34
Thinning	1,813.5	0.54	861.2	47
Sanitation cuttings	2,175.1	0.65	3,034.2	139
Total	7,053.3	2.11	4,927.8	70

Source: MAPPM-RNP-ICAS, 1999

The share of harvests from the private forests in the total harvested volume in the country was between 4 and 10% in the period 1994-2001 (Table 4). Based on it, one may estimate the contribution of private forestry to the national GDP as being less than 0.06%. The contribution of small-scale forestry may increase up to 0.20% of the GDP when the restitution process would be ended. In the year 2004, the volume to be harvested from private sector attained 16.7% from the total volume (annual allowable cut), and it will be slightly increasing in 2005 at 19.2%. Nevertheless, most of the small-scale forestry production would be self-consumed for the household needs.

Table 4. Volumes harvested in small-scale forests

Year	Volume harvested in private forests 1000 m^3	Total harvested volume 1000 m^3	Contribution of private forests in the total harvests %
1993	559.9	13,590.7	4.1
1994	552.3	12,897.9	4.3
1995	628.6	13,768.6	4.6
1996	984.7	14,755.8	6.7
1997	1,240.6	14,452.3	8.6
1998	1,138.9	12,598.6	9.0
1999	1,202.1	13,692.8	8.8
2000	1,309.6	14,232.7	9.2
2001	665.5	13,375.1	5.0
2004*	3,000.0	18,000.0	16.7
2005*	3,500.0	18,200.0	19.2

*forecast

Source: National Forest Administration, Internal Report; Governmental ordinances for approving the annual allowable cut

Forest owners, institutions and forest communities are free to choose the way to sell timber. The communes have to respect the same rules of selling timber than those applied in forests managed by the National Forest administration (obligation introduced by governmental ordinance n. 85/2004), e.g. they are obliged to organise auctions for selling timber. Timber is sold on stand to the harvesting companies, also on forest road. Romania was one of the first transition countries in Europe to introduce an auction system for allocating harvesting rights for standing timber (stumpage) in public forests

(1995). The auctions involve small tracts of forestland that must be harvested within a short period, typically less than one year from the date of the sale. In the individuals' forests, the family/friends work is the main way to cut and transport timber at home. When the volumes are important, the owners conclude arrangements with private contractors. Nevertheless, the final cuttings are not done systematically, which might be a first sign of forest abandonment in middle term. Regarding the non wood forest products, one may estimate their economic importance as being neutral. On the hand the non-wood forest products are free of access; on the other hand, when harvested by the forest owner there are almost exclusively for the household needs, not for market.

The constitution of forest associations is in progress. During the last decade, the association of private owners has been motivated the need to ensure protection against timber theft rather than by the need to organise themselves the forest works. Thus, in 1997, some 15% of private owners have been organised in order to fight against timber robbery (Giurgiu and Popescu, 1997). The first private structure for the management of the private forests was established in April 2002. Since then, a number of 118 private forest districts (ocoale silvice) were created by private owners, individuals, communities or communes. These private structures manage now (mid 2004) 528,326 ha, which represents one third of private forests area. Other 14 thousand ha private forests of individuals were managed by the National Forest Administration (NFA) through contracts. Around 200 thousand forests of communities were in the NFA management as well. Beside that, the NFA concluded contracts with individuals for providing guarding services against timber robbery on 55 thousands ha (19,508 private forest owners).

Successful experiences of association appeared when forest officials from the NFA were actively involved in the local communities' life and organised meetings and workshops with people. The results of the survey mentioned above show that where the forest officials were involved in the process of associating, the owners become more likely to participate in to local policy processes, and they were more likely to ask about extension services.

2.4. Policy framework and production conditions

The core idea of policy system is that the forests have to be managed according to the same rules irrespective to the form of ownership. The policy framework is represented mainly by regulatory means, amongst which the forest law and the governmental regulation take a central place. Law implementation in private forests is monitored by a forest inspection. The forest management has to respect three main categories of duties:

- the conservation of forested areas, which consists of prohibiting irregular deforestation, harvesting less than the annual increment, and an obligation to regenerate the forest after clear felling or natural damage;
- the preservation and the improvement of forest stand quality, which consists of undertaking measures to prevent and combat pests and diseases, restrict grazing activities, and undertake sylvicultural operations such as selection or thinning;
- the compliance with a (simplified) forest management plan.

According to the Romanian forest law the owners who proceeded to afforestation of agricultural land have the possibility to choose the rules of management to apply. The plantations made on agricultural land are not submitted to the same rules of management than the forests. The Law 141/2001 defines several categories of activities eligible for annual funding from the central budget or for free technical assistance provided by the NFA. However, during the last decade the state support for the non-state forests has been extremely limited, e.g. some free seedlings and some technical advice for afforestation works. Despite the legal provisions, there are no effective financial incentives able to influence the management behaviour.

The last years saw the development of several small projects supporting directly or indirectly the local associations of private forest owners and providing them some extension services, funded by international donors or foreign governmental agencies. The main governmental institution in charge with the private forestry issue is the Ministry of Agriculture, Forests and Rural Development. The Forest Inspectorates, which role is to monitor the law implementation, are presently under the structure of the National Guard for Environment. There is little institutional co-ordination between the sector-based agencies and organisation, e.g. NFA and other governmental agencies relevant for the forest sector, such the National Agency for Rural Development, the National Agency for Mountainous Areas or the Regional Directions for Agriculture. Providing extension services is in the charge of the National Forest Administration and of the Forest Inspectorates. Their efficiency with this respect is hampered by the lack of funding, staff and training.

The Association of Private Forest Owners (APPR) is a national level umbrella organisation established in 1998 representing all categories of private forest owners in Romania. It is a registered non-governmental, non-profit legal entity and its funding comes from membership fees and sponsorship. By June 2003 its membership included 23 regional branches with about 300 local and county associations, communes, and town halls and circa 90 individual members. According to its Executive President statement (June, 2003) it is estimated that APPR represents through its membership more than 1 million forest owners and members of the undivided common ownership entities owning about 900 thousand ha. The APPR's main aims are:

- representing private forest owners at the national and international level;
- promoting the awareness of forest ownership;
- supporting the understanding of forest legislation, in particular the rights and responsibilities of private owners;
- providing support for members at local level in all aspects of sustainable forest management.

Despite its strategic role, APPR started to become active in the Romanian forestry arena only recently and major efforts to improve its operational activities have only been recorded in the second part of the year 2003. The role of the APPR as active provider of extension and information services is likely to increase in the frame of the external funded "Forestry Development Programme" launched the latest year.

2.5. Summary: Supporting and limiting factors for enterprise development in small-scale forestry and barriers to entrepreneurship

The small scale forestry may potentially have a powerful influence in forest economy, as far as the area covered by this category represents approximately 800,000 ha on a total of 6 million ha. Two main problems exist on entrepreneurship in small scale forestry: the problem of property rights, and the problem of association in order to realise scale economies.

Securing the property rights was the major problem of the last decade, e.g. clarify the ownership in the restitution process or in the Courts and fight against timber thefts. The National Forest Administration started at the end of latest year (2003) to sign contracts for ensuring the forest guarding in private forests of individuals (50,000 thousand ha at the end of September 2004, or 7% of the area given back to the former owners). Association of owners is in progress, and will continue on the "core" example of communities and communes which manage themselves their forests. Examples already exist among the recently created private structures, which have been able to certified forests, or to find external sources for financing forest activities. The management of human resources is of greatest importance for the newly created management structures. Impediments to entrepreneurship are represented by:

- Some few examples illustrate the policy framework of forestry in Romania. Not only the forestry activities are strongly regulated, but also the timber market. Most barriers for entrepreneurship exist at the level of raw material procurement. Particularly on a market dominated by the supply coming from the public forests;
- the low exclusivity of rights on non-wood forest products (berries, mushrooms) and activities (hunting);
- the lack of training on economics, management and marketing;
- the lack of resources for extension services and training, including the slow implementation of forest expertise and consulting;
- the difficult functioning of forestland market.

The slow delivering of the official property entitlements still hampers the transmission of forest properties on land market. Nevertheless that innovative management style can make the private forest enterprise viable from an economic viewpoint. These innovations concern the certification of forests, made in one private forest district (for Forest District Năruja, with an area of 20,000 ha, certified by Smartwood) and in progress for other three (National Institute for Wood, 2004), and the success in obtaining international donors funds for nature conservation.

Annex B: Organisations studying small-scale forestry and main publications and information sources.

The main research institution is the ICAS – the National Institute for Forest Research and Forest Management Planning. The institution represents an autonomous branch of the NFA.

Research activities are provided also by the Universities but few things are done specifically for private owners.

The Ministry of Agriculture, Forest, and Rural Development organised some courses in several departments for informing and training private forest owners with support from a NGO. For most representative research see table below.

Table 5. Studies on small-scale forest issue

Author	Year	Title	Main information or contribution
Popescu and Giurgiu	1997	Contribuţii la cunoaşterea pădurilor particulare din România	Structures of private forests
Bouriaud	1997	Aspecte ale constituirii proprietăţii forestiere private în România	Historical development of private rights on forests
RNP-ICAS	1999	Studiu – inventariere a pădurilor private privind compoziţia, vârsta, starea fitosanitară şi posibilităţile de recoltare de masă lemnoasă	Structural description of private forests
MAPPM-RNP-ICAS	1999	Studiu privind volumul de material lemnos de recoltat din pădurile private	Potential of harvests in private forests
RNP-ICAS	1999	Studii complexe de fundamentare a soluţiilor de gospodărire a pădurilor proprietate privată din România	Evolution of harvesting in private forests in the period 1990-2000
INDUFOR/ECO	2001	Implication of land restitution programs on achieving WB/WWF alliance targets in Eastern Europe and the Central Asian Region. Country case study. Romania	Features of land restitution, consequences on economic efficiency
Bouriaud	2001	Sustainable forest management: with or without privately owned forests? A Romanian case survey.	Survey on owners attitudes and motivations on cutting issue

References

Bouriaud, L., 2001. Sustainable forest management: with or without privately owned forests? A Romanian case survey. In Niskanen, A., et Väyrynen, J., eds., Economic sustainability of small-scale forestry, EFI Proceedings, n. 36, pp. 143-159

Giurgiu, I., Popescu, O., 1997. Contribuţii la cunoaşterea pădurilor particulare din România. Aspecte biometrice, Revista de Silvicultură, Anul II, n. 2, pp. 40 – 44

Governmental ordinances for approving the annual allowable cut: nr. 1063/4.03.2003 and 1325/19.08.2004; Ordin nr. 812 din 10/15/2003; Ordin nr. 629/01.09.2004

Machedon, I., Enăşescu, S., Popa, A., Popescu, V. 1999. Istorie şi actualitate în managementul silvic românesc. Economica, Bucureşti, 208 p.

MAPPM-RNP-ICAS, 1999. Studiu privind volumul de material lemnos de recoltat din pădurile private. Referat de prezentare, Bucureşti, 13 p., unpublished

Ministry of Agriculture, Forests, Water and Environment, Bucarest, Romania. www.maap.ro

National Forest Administration, Internal Report, 2002. Unpublished.

National Institute for Wood, 2004. Forest products market in 2004 and prospects for 2005 in Romania. National Report for UNECE Timber Committee Forecasts, national respondent C. Istratescu, Bucuresti, Romania

National Statistical Accounts, National Institute for Statistics (Institutul National de Statistica): http://www.insse.ro/

RNP, monthly bulletins. Different years. Unpublished.

TBFRA, 2000. UNECE/FAO Temperate and Boreal Forest Resource Assessment 2000, http://www.unece.org/trade/timber/welcome.htm

3. Wood-processing industries

3.1. State of the art and historical development

The main processes influencing timber industry development in the last decade were:

- The privatisation of public enterprises. All wood processing industries were in public ownership before 1990. Although private firms have been early established in harvesting and in primary wood processing, the State ownership still prevailed until 1997.
- The liberalisation of foreign trade and the regulation of quantities and timber products allowed for the exportation. The evolution of Romanian forest industry was influenced by the external market demand, especially for the sawnwood and the furniture, but also by the regulation of the foreign trade. Thus, the export of the sawnwood was controlled by quantities until 1998, and the export of the roundwood allowed was prohibited till 1999.
- The public regulation on the timber procurement. The regulation concerned the annual allowable cut, the setting of the reserved price for timber sold on stand and the procedures of selling timber from public forests. Thus, the annual allowable cut has been reduced drastically after 1990 e.g. from 18 million cubic meters per year at 13 million cubic meters per year. Beside that, the forest sector faced important changes on the way of setting timber prices. Until 1994, the reserved price was agreed at the central level by the national forest administration and the harvesting companies. Since 1995, the introduction of auction as compulsory way of selling timber from public forests completely changed the price level and structure, but also the relationship between the contractors and the timber supplier.

At present, market regulation is the main mechanism of timber pricing, and the production of timber industries follows the market demands, not the planned indicators as in the command and control economy.

The first sector emerging from a decade of economic crisis (1990 - 2000) was the furniture sector, which has been recording a constant development since 1994 by re-orientation of capacities according to the new markets and by a sustained effort to modernise. The production of the furniture industry exceeded in 1998 the level recorded in the year 1990, and is still keeping the increasing trend, e.g. the total turnover of the furniture industry growth up by 9.6% in the first semester of the 2004 compared with 2003.

After a decade of difficulties, where the public policies aimed at improving the efficiency of timber industry by means of restructuration, privatisation, regulation of foreign trade and raw material procurement, there are recent signs proving a policy of modernisation, diversification of products and growth of high value added products. The factors that induced this evolution were the foreign investments which occurred the latest three years, the growing of building sector and the stabilisation of external markets. The exports of forest products accounted in 2000 for 10% of the total value of Romanian exports. In 2003, the furniture industry and the wood housing industry accounted for 4.8% of the total Romanian exports; nevertheless, the high share of export in the furniture industry is associated to a high share of unprofitable firms. In the year 1998, when the export represented 60% of the furniture turnover, only 47% of the enterprises were profitable (Boscaiu and Mazilu, 2001).

3.2. Wood processing industries

Before 1990 only 244 large companies existed in the country for wood processing, pulp and paper and furniture. The companies were split to facilitate their control and to be more attractive for privatisation. For example, the main company for harvesting has been split in 1993 in three regional enterprises, then in 17 enterprises, and then submitted to privatisation which finished in 1999. During this time, the SMEs were set up with private capital mainly for the production of sawn timber and building materials. In the last period, private capital has been invested also in furniture and the production of pulp and paper. Consequently, the configuration of the forest sector is completely different from 1990 (Table 6).

Table 6. Number of companies from forest sector, in 1990 and in 2002

	1990	**2002**	**From which**		
			Large	**Medium**	**Small**
Wood processing industry	107	5235	65	245	4925
Furniture	114	2965	180	1225	1560
Pulp and paper	23	434	26	119	289
Total	**244**	**8634**	**271**	**1589**	**6774**

Source: National Institute for Statistics

There are more than 5,000 companies in the wood processing industry, from which only 65 are large companies (Figure 1). This sector is at 99.8% private. The total number of the employees in wood processing industry is of 3.4% out of the total number of the employees on the industry sector. In the furniture industry, the number of companies is around 2,900, from which 2,785 are small and medium sized companies, mostly founded after the 90's.

In 2002 the furniture exported for 441 million dollars, and represented:

- 2.1% of the volume of the industrial production;
- 4.4% of the total volume of the export;
- 4.9% of the number of employees that work in the industrial sector.

Regarding the gross value added, at the level of the year 1998, it was:

- sawnwood, coniferous: 692 thousand lei per m^3 (63 US$);
- sawnwood, beach and oak: 1200 thousand lei per m^3(108 US$);
- MDF: 733 thousand lei per m^3 (66 US$);
- Pulp: 165 thousand lei per m^3 (15 US$);
- Paper: 1263 thousand lei per m^3 (11 US$).

The furniture industry is strongly oriented towards export. Thus, in the period 1992-2003, the value of furniture export was between 70 and 86% of the value of production, and represented between 5 and 10% of the total Romanian exports. Furniture export has grown up in the first half of 2004 by 20.4% compared with the latest year, but remained under the level of the year 2002, with only 419 million euro. The import increased for the same period by 14.6%, the value being 63 million euro. The main export markets were as usual Italy, France, Germany, Austria, Holland, and United States. EU countries import from Romania furniture for living room (22.7% in total furniture import), chairs (19.7%), and furniture for bedroom. The Figures 2 - 5 (source: National Statistic

Institute, 2003) show the evolution of companies by size, number of employees, turnover, and form of ownership. The data are for the period 1998 (or 1996) to 2001. The number of firms with the number of employees comprised between 50 and 99 was constant, while the number of SMEs was continuously rising. They represent more than 95% in the total number of firms from the wood processing industries (Figure 2), and 38% of the number of employees (in 2001). The evolution of SMEs turnover is noteworthy, from 85 million euro in 1996 to 339 euro in 2001. However, it represents only 40% of the total turnover of the wood processing industry, and less than 30% from the wood processing industry exports. The public regulation of export presents importance to understand the evolution of forest sector. Before 1989, all export/import activities were planned and executed by a state enterprise specialised in this activity. From 1990 to 1997, it was not possible to export any rough material (logs for pulp or roundwood). Only the export of processed forest products (e.g., lumber) was allowed, on the basis of a quota system. Difficult to implement and to control, this system was replaced in 1998 by a license system, the license being required "only for statistical purposes". This opened the external market for all forest enterprises. The value of exports of wood processing industry almost doubled in three years only: from 127 million euro in 1998 to 249 million euro in 2001 (Figure 5). The turnover was the same evolution, from 288 million euro in 1998 to 485 million euro in 2001 (an increase of 70%). There is to remark that the prohibition of exporting rough timber material (roundwood) did not lead to an increase of local furniture production. During the time while the rough timber export was prohibited, the export of furniture decreased and the domestic production of furniture decreased as well (Press release, 24.04. 2002).

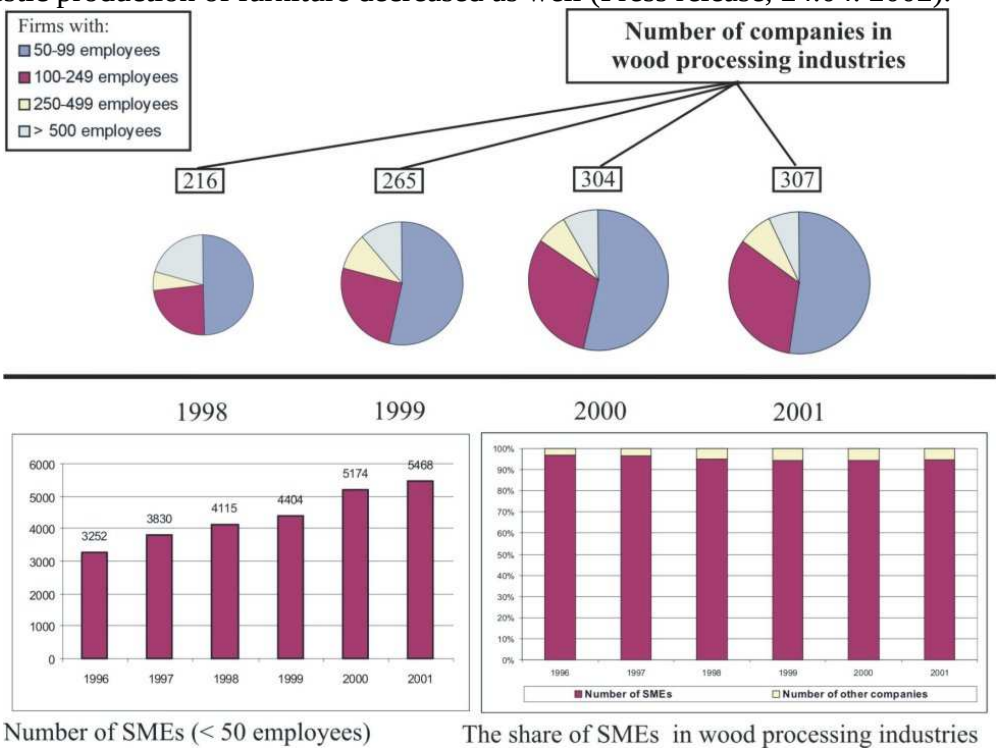


Figure 2. Number of companies in wood processing industries

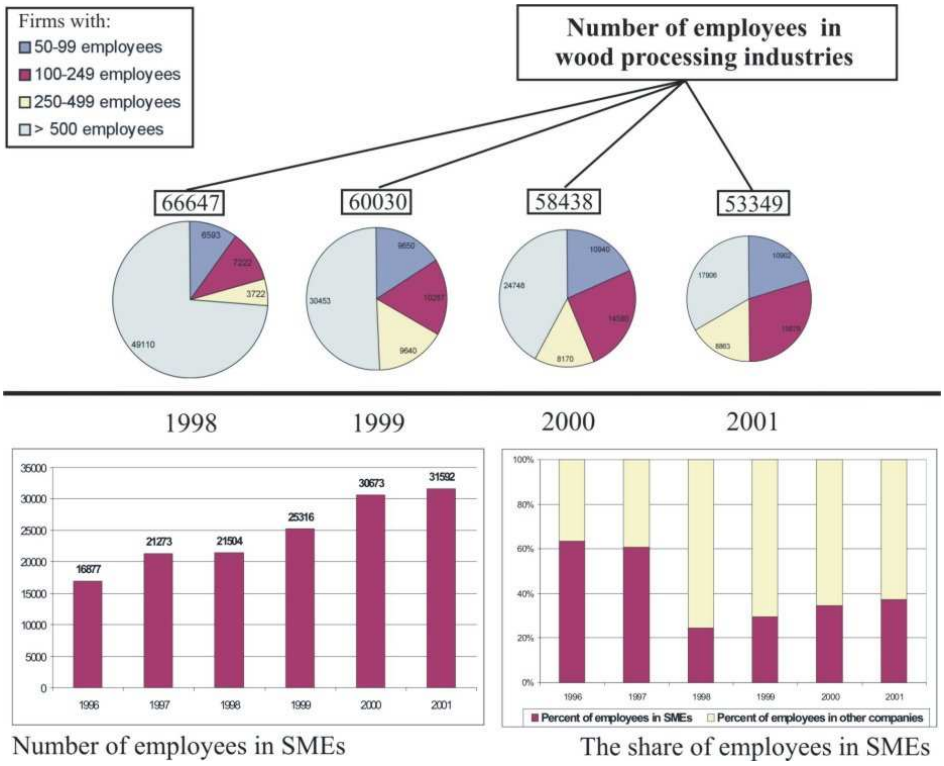


Figure 3. Number of employees in wood processing industries

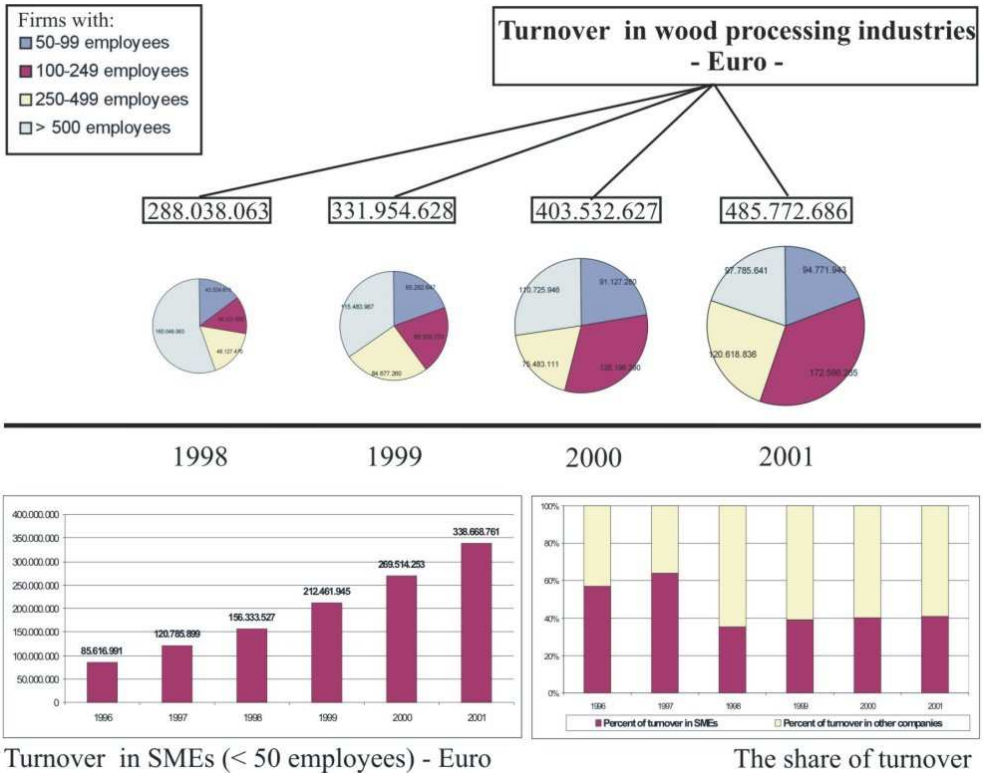


Figure 4. Turnover in wood processing industries

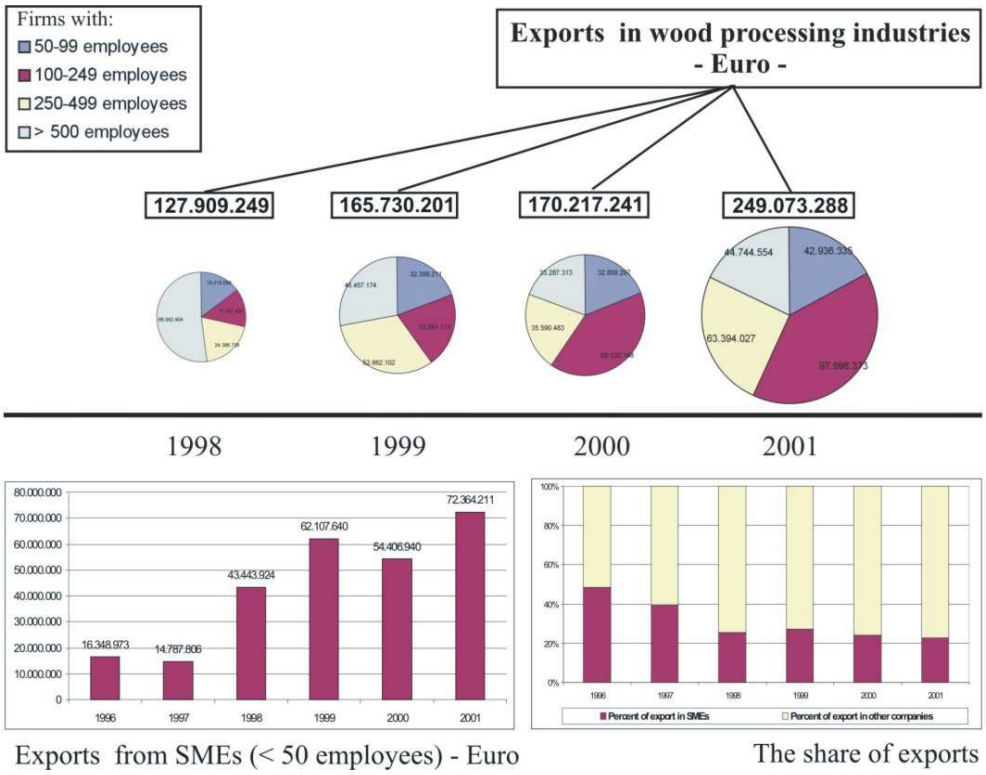


Figure 5. Exports in wood processing industries

The total foreign investment for the period 1990-1999 was 815 million dollars. There are regional differences regarding the timber market and the regional competition in primary wood processing industry. In the highly forested departments from the North part of the country is characterised by strong competition, great number of firms, and high investment level. The Western part of country presents weak competition, low demand for timber product, but very specialised. Some division of NFA experienced international auction system for selling high quality logs and proved to have an aggressive marketing strategy to promote their timber. Third, the South part of the country is characterised by low demand, low forest resource, weak competition, and a structure of forest enterprises similar to that existing before the privatisation.

The regional differences concerning the wood production are illustrated in the Figure 6. One may see that the wood production has an increasing trend in Northeast, South and West, while in central part, Southeast and Northeast the production is rather stabilised. This is related with the windfalls from 2001 in North, but also with the changes in ownership. Changes in ownership were important, in counties like Bistrita or Brasov the State is not anymore the main forest owner.

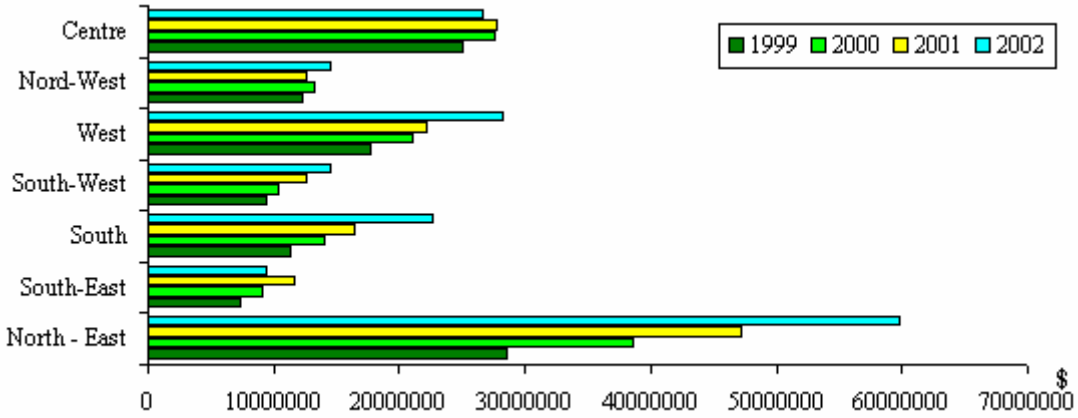


Figure 6. The contribution of the production of wood processing industries in the regional economy

The small logging enterprises are important for the rural development. In 2002 the National Institute of Statistic recorded a number of 184 familial logging associations which harvested 280,299 m^3. The harvested volume per hectare varied between 1-140 m^3. A number of 2500 companies harvested 7.3 million m^3, and one million m^3 has been harvested by the three ruling companies that dominated the market (i.e. Forestar, Euroforest and Romanel), the latter harvesting 80,000 m^3 of salvage caused by the windfalls and wind throws.

There are no studies regarding the entrepreneurship culture in the forest sector. The forest sector was dominated in early transition towards a market economy by an exclusivist and elitist criteria in establishing trade partnership, which may be summarised by an often heard formula: “only a forester knows how harvest a forest”. The non-foresters and the private contractors have been discriminated for the access upon the raw material resource. According to the representatives from small companies, intimidating strategies might be recorded against them during the auctions, or the situation is that they are strongly dependent on large firm services regarding the information on market or even the contracts for selling their products. Opinions exist (Tobescu, www.forestry.ro) that the corruption that Romania faced and is still facing and the uncertainty on the rule of game shaped two different organisational culture within the firms of forestry sector: on the hand, there are the firms which tried to benefit from the possibilities to free-ride the system, possibilities located along the whole production chain, from the marking of timber in the forests to the tax evasion, involving payment of the bribes and the collusion in timber auction; and on the other hand, there are the firms acting as the competition were fair.

3.3. Wood processing industries practices

Current small and medium scale wood processing industries practices:

- ownership characteristics:

  Amongst the large companies (more than 50 employees), only nine remained in public ownership, the others 298 being private. The small companies are all of them in private ownership.

- the share of wood used by SMEs in wood processing (% of the total wood harvesting)

  The SMEs harvested in 2002 more than 8 million cubic meters from a total of 12 million that means approx. 70%. There is no information about the wood chain flow. In the survey undertaken by the National Institute of Statistics in 2003, amongst the 1693 respondent firms, 61% of them (1029 firms) practised both harvesting activities and wood processing activities while 39% of them (663 firms) only had harvesting activities.

- trade characteristics (raw material import, product export flows)

  The wood processing industry is a net "exporter" for roundwood, sawnwood, plywood, and fibreboard.

- the share of harvesting done by wood contractors, wood contracting practices

  The system of the annual allowable cut is designed so to distinguish between the industry needs, the population needs (mostly the rural population needs on firewood and timber for construction) and the NFA share, which is the volume that the NFA will harvest by itself. The timber is sold on stands, little percentage of timber sales being done as cut logs. Thus the wood contractors are also the wood buyers. They harvest and buy approximately three thirds (70%) of the total harvested volume in the country that is the timber to be harvested for industrial purposes (Figure 7). The wood contractors might do also some harvests on the volume reserved for the population' needs.

- technical characteristics of production/competitiveness

  There is generally acknowledged that technologies and equipments are too old (80% are more than 20 years old). Little attention is paid to the management of quality. Representative of the forest industry acknowledged that the export advantage of Romanian forest products is exclusively given by the low labour costs. In 1995, 3.85% of the total harvested volume has been utilised for new products. The percentage decreased to 0.66% in 2000.

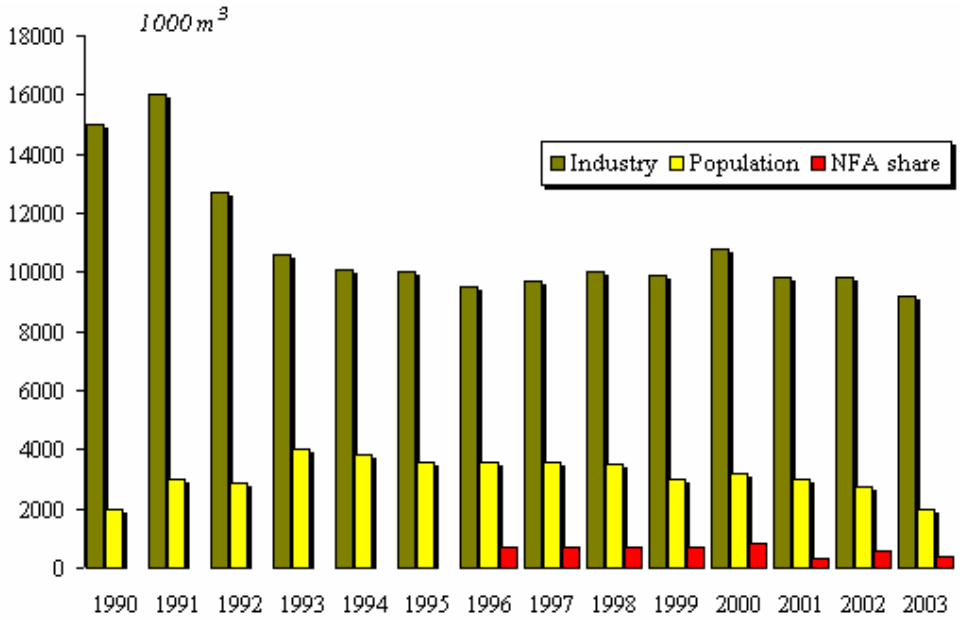


Figure 7. The share of harvesting according to the main destination of wood

- management (e.g.: family enterprises, joint enterprises, …, stock companies)
  The National Institute of Statistic accounted a number of 2246 firms with activities in wood harvesting, from which 1939 were societies with limited responsibility, 81 shared-stock companies, 148 family associations (enterprises), 35 others, and 43 represented NFA units.
- general educational background, owner and staff: no information about.

3.4. Policy framework and production conditions

There are three trade associations that officially represent most of the forest logging and wood industry operators: the Association of Romanian Foresters (ASFOR), which includes the great majority of the logging, transport and primary processing operators; the Association of Romanian Furniture Producers (APMR), which includes the furniture and other wood industry operators; and the Association of Romanian Pulp and Paper Producers (ROMPAP), which includes the pulp and paper industry operators. The objective of these trade associations is to represent members' interests to the official authorities. The main source of funding is an annual fee paid by members. The three organisations are involved in most of the political negotiations related with the timber trade.

The formal policy framework of wood processing industries are composed by all regulations industry-related, and by several forest-sector based regulations which address the issue of timber selling and the issue of the control of timber flow as measure to fight against illegal logging and illegal trade. The industry-related policies focus the latest years on the development of small and medium size enterprises, on the introduction of innovation and entrepreneurship, on change on technologies, on adopting common quality standards and accounting systems, etc. Several governmental programmes are running: in 2002 and 2003 these programmes financed 3200 projects, and contributed to the creation of 1300 places of work for young researchers in R&D institutions.

A special program has been launched by the local Chamber for Industry and Agriculture from Suceava County to speed up the process of starting a new firm. The Chamber would perform all the administrative procedures for registering a new firm on the behalf of the entrepreneur. At the National level, the National Agency for the SMEs succeeded in his lobby to promote a governmental regulation for reducing the time and the complexity of administrative procedures for creating a firm. After September, 2004, it should be possible to register a new firm in only three days.

Nevertheless, the Romanian Association of Industrials (UGIR, complains about the not-business friendly milieu, characterised by the strong intervention of the Government, via the administrated prices, the opaque public markets, the heavy subsidies for non efficient public enterprises, the tax burden, the lack of social dialogue when formulating economic policies, etc. Administration is said omnipresent and very powerful (http://www.ugir1903.ro/). The UGIR Economic Memorandum estimates that 1% of the firms' turnover is spent for softening the administrative constraints by payment of bribes to different officials.

Administration is involved also in timber sector for setting the reserve price in auctions for selling timber from public forests. As far as 70% of timber is sold by the NFA under the auction system, the regulation of auction is an important factor influencing the competitiveness of forest sector at whole, but particularly the development of SMEs with harvesting activities. In spite of the positive developments concerning the auctions system, a considerable number of details suggests that further institutional strengthening and improvements are needed (Marochko et al., 2003):

- constantly changing in government agencies and changes in the number and location of regulatory authorities (forest department moved from environment to agriculture, then to agriculture and rural development; the regulatory body moved from agriculture to national authority for control, and so on) has influenced investments in the processing sector and so the demand for wood and forest products;
- the NFA changes on its structure, managers, executive, etc. are strongly related with the political agreements and legislative elections schedule, which induces instability on the timber market and on the rules applied to wood contractors;
- in the last two years (2002 and 2003), the Ministry was not able to set up the annual allowable cut on time. Therefore, the organisation of auctions was postponed, and those already organised were cancelled. When an auction takes place two months late, it is more likely that firms will not finish the harvesting operations before December 31, when the remaining timber is re-inventoried and rescheduled for harvest the following spring. The firm may incur penalties for delay in carrying out the contract even though it was not responsible for delaying its harvesting operations;
- some respondents declared that smaller firms should not compete in the same auctions along with big firms because they have an unfair advantage: often the small firms do not declare all their employees; they may easily evade taxes; and they tend to cluster around a lot bought by a big firm, in order to free-ride on the large firm's security force;
- there is no integrated national timber market, as firms have little mobility to do business in other forest directorates, where they lack a network of relationships for marketing the waste wood and for security against theft. An explanation may be insufficient transportation infrastructure.

3.5. Summary: supporting and limiting factors for enterprise development in wood processing industries and barriers to entrepreneurship

For instance, the rate of creation of new enterprises in the Romanian economy is by far higher in urban area than in rural area (28,902 enterprises created in urban area in 2000, against 4,739 in rural area). The average number of new created enterprises was 1.5 for 1,000 inhabitants in 2000, with an average of 2.9 employees (Dumitru et al., 2004). In rural area, the rate of firm creation is only 0.5 enterprises for 1,000 inhabitants.

As overall evaluation of forest sector situation, there is a need to remark the lack of concentration of forest industry and, in the same time, the low density of trade relationship, with few purchasers, few intermediaries and one or few suppliers for raw material. Although there are a strong domestic forest industry and an important internal demand, the timber products market are underdeveloped when looking to the chain of distribution to the final consumers.

The competitiveness of the forest industries was affected in the recent past by the low productivity, the relative out-of-date equipment and technologies, by the lack of experience in management and marketing on international/national markets, and by the difficulties that the Romanian producers had to meet constantly the partners' quality requirements. These impeding factors tend to be removed slightly, with the consolidation of Romanian producers on the European markets for furniture, the starting of export of panel housing and the increased foreign investment which plays important role in spreading the innovation and a certain culture of partnership.

Barriers to entrepreneurship come from bureaucratic procedures when start a firm; from the lack of credit available for SMEs on the financial markets; from the lack of information concerning the markets and the public policies for SMEs development; from the lack of co-operation between R&D institutions and the private sector; finally, by the lack of well trained staff in rural area.

Supporting factors in enterprise development can come via the technological change which would require investment and via the change in management practices and strategies. The public policies in support of SMEs, innovation, technological change, and environmental concerns integration have an important role in forest enterprise development (National Agency for SMEs, http://www.animmc.ro). Yet, their effectiveness is hampered by: the lack of co-ordination between the general economic policies and the sector-based policies; the general acknowledged corruption/political dependency of the Romanian administrative system, which lead to unfair competition while obtaining credits, financial subsidies or technical support from the State; the heavy weight of State intervention and State ownership in non efficient and non competitive sectors of the manufacturing industry.
The research may provide policy relevant results in investigating several issues, from which: the innovation and the technological change (how it is introduced and by whom, which effects on sustainable development); the evaluation of informational and financial means on stimulating the entrepreneurship in forestry; the structure of wood processing chain; the effect of timber procurement procedures on the structure of wood chain. Life cycle analysis could be of help to optimise wood channel production and trade. Even in the context of the very low amount of R&D in the firms' expenditures, both the research and the private sector would gain from a stronger co-operation.

SWOT analysis

Strengths	**Weaknesses**
• high quality and diversified, valuable raw materials available • rapid development of the SMEs • interest for innovating, interest for information and co-operation • well educated/trained workforce • tradition and experience on woodworking industries • comparative advantage on labour costs • traditional trade relation with European partners, markets kept over the last decade	• limited capacity to negotiate international contracts due to the lack of experience • low profitability of harvesting operations • poor marketing, competitiveness and product development • lack of experience in promoting innovation • low educational level in the field of management and marketing • high share of low value added products • no attractive design of products • poor entrepreneurship • low internal demand and poverty • national brands of producers are not very known • poor knowledge on international markets and on consumers' preferences • not addressing specific demands, e.g. luxury products
Opportunities	**Threats**
• raw material available in the country (80-90%) and accessible at 60% • consumer' income on targeted markets are increasing • similar products are profitable • public programmes for SMEs, start-up, innovation • possibility to open towards new markets : recreational, tourism • technical endowment started to be renewed • social impact: employment and income generation in the remote areas • ecological and traditional harvesting, e.g. using horses	• small-scattered ownership structure • the unpredictable change on rule of law (forest law mostly) • the restrictions when importing or exporting timber materials • the lack of sectoral-based policies in supporting of the forest sector development • increasing costs for raw materials (NFA announced a rise of 20% of prices for standing timber) • relatively high costs of transport, because of the infrastructure • difficulties to maintain a constant quality • yield table predictions, risk on the exact amount of timber bought and its quality • illegal felling • unfair competition by those firms evading tax, or other cost

Annex C: Organisations studying wood processing industries and main publications and information sources.

The most representative organisations studying wood processing industries are presented in Table 7.

Table 7. Organisations studying or providing information on wood processing industries

Institute / organisations	Type of information	Remarks
INS (National Institute for Statistics)	Romanian statistical yearbook	Statistics, internet available, on forestry and timber processing industries
ICAS (National Institute for forest research and forest management planning)	Studies on forestry and wood processing industry	Department on forest economics
INL (National Institute of Wood)	Studies on wood characteristics, wood processing technologies and on timber market	Department on timber market
Private association providing information on firms with activities on forest sector	ASFOR (Romanian Association of Timber Industries); APRM (Romanian Association of Furniture Producers); APSLR (Romanian Association of Manufacturers of Panels); ROMPAP (Pulp and Paper Industry Association); UGIR;	
Other public institution providing occasionally studies on wood processing industry	Institute of industry economics; Ministry of industry and resources; Center of research on economics; Center of information and documentation on economy; Romanian Academy for Economics Sciences; Universities	

For most representative research and publications see Table 8.

Table 8. Publications regarding the wood processing industries in Romania

Author	Year	Title	Remarks
Nichiforel, L., Bouriaud, L.	2004	Factori perturbatori ai pieței lemnului, din perspectiva agentului economic şi al gestionarului pădurilor publice (Disturbing factors on timber market, a forest manager's perspective)	Study based on interviews with economic agents and representatives from National Forest Administration to identify factors with negative influence on timber market and sustainable forest management
IRIS, University of Maryland, and IGCC, University of California	2003	World Bank project "Governance in the Romanian forestry sector – an overview of institutional, legislative and enforcement effectiveness"	Unpublished study, with an analyse on timber auction system
National Institute for Statistics	2003	Ancheta statistica privind volumul de lemn exploatat de catre agentii economici atestati (Enquiry on volume harvested by contractors)	Information on timber volume harvested by contractors
Nicolescu O, Plumb I, Pricop M, Verboncu I	2003	Abordari moderne in managementul si economia organizatiei (Modern approaches of organization' management and economics)	Case study on timber processing and furnitures
Năstase, C.	2002	Strategii de restructurare în industria lemnului în Bucovina (Reform strategies in timber industry in Bucovina)	
Nichiforel, L. Horodnic, S.	2002	Considerații cu privire la evoluția cererii şi ofertei de produse lemnoase la nivelul județului Suceava	Case study on demand and supply in wood processing industry
Stanciu, C.	2001	Managementul calitatii in industria lemnului (Management of quality in wood	Analyze of wood chain: forest resource – harvesting – primary

		processing industries)	processing – industry of furniture; Main aspects of managing quality improvement in furniture industry
Centrul de informare si documentare economica	2000	Probleme economice – Eficienta utilizarii resurselor naturale in industrie (The efficiency of industrial utilization of natural resources)	Chapter on efficient utilization of forest resource
Centrul de informare si documentare economica	2000	Probleme economice – Evaluarea gradului de aliniere a Romaniei la aquis-ul comunitar privitor la politica industriala (The level of implementing the acquis communautaire on industrial policy in Romania)	Chapter on the development of small and medium size enterprises
Dragoi, S.	2000	Timber Pricing System in Romanian Market Economy	
Dragoi, S.	1999	Particularitatile costului de oportunitate in silvicultura (Opportunity costs in forestry)	Timber pricing
Dragoi, S.	1998	Metode alternative de estimare a pretului de pornire la licitatiile de masa lemnoasa	Timber pricing
Năstase, C.	1998	Silvicultura românească în perspectiva integrării țării noastre în Uniunea Europeană (Romanian forestry in the perspective of accession to EU)	
Dragoi M	1997	Decision Support System for Timber Bidding	
Harvard Institute for International Development D	1996	Licitarea masei lemnoase în Suceava: rezultatele preliminarii ale unui studiu efectuat pentru Romsilva şi MAPPM	Analyze of auction in Suceava county
Milescu,I., Marocico, V	1995	Considerațiuni privind structura prețului de cost al lemnului pe picior în condițiile economiei de piață (The structure of timber price)	Timber pricing
ICAS	1993	Concepte şi metode de evaluare a prețului lemnului pe picior în condițiile economiei de piață	Timber pricing

Sources of information

National Institute for Statistics (Institutul National de Statistica): http://www.insse.ro/
Forestry&Fordaq, http://www.forestry.ro

References

Boscaiu, V., Mazilu, A., 2001. Investitiile straine directe si competitivitatea industriei prelucratoare din România. Working paper, nr. 29, November 2001, Romanian Centre for Economic Policies, Bucharest, http://www.cerope.ro/

Dumitru, M, Diminescu, D., Lazea, V., 2004. Dezvoltarea rurala si reforma agriculturii romanesti. Working Paper, Romanian Centre for Economic Policies, Bucharest, http://www.cerope.ro/

Ionescu, O., 2002. www.maap.ro/main_windowZ/actualitati/c_p_24_04_2002.htm

Marochko, V., Saphores, J.-D., Vincent, J.R., Zinnes, C., Bouriaud, L., Padureanu, L., with assistance from Abrudan, I., 2003. Governance in the Romanian forestry sector. Prepared by IRIS Center of the University Research Corporation, University of Maryland, College Park, in collaboration with Institute on Global

Conflict and Cooperation, University of California, San Diego. Draft Report submitted to The World Bank and The Food and Agriculture Organization of the United Nations, December 28, 2003, 172 p., Unpublished

National Institute for Statistics (Institutul National de Statistica): http://www.insse.ro/

National Institute for Statistics, 2003. Ancheta statistica privind volumul de lemn exploatat de catre agentii economici atestati, Bucuresti

National Institute for Wood, 2004. Forest products market in 2004 and prospects for 2005 in Romania. National Report for UNECE Timber Committee Forecasts, national respondent C. Istratescu, Bucuresti, Romania

Saphores, J-D., Vincent, J.R., Marochko, V., Zinnes, C., Bouriaud, L., and Abrudan, I., 2003. Collusion in Romanian timber auctions: background and initial econometric results. Working paper for the FAO, Draft November 26, 32 p.

Tobescu, O., http://www.forestry.ro. Regulile jocului (Rules of the game). Editorial, 12.08.2003

UGIR (Uniunea Generala a Industriasilor din Romania –1903), http://www.ugir1903.ro

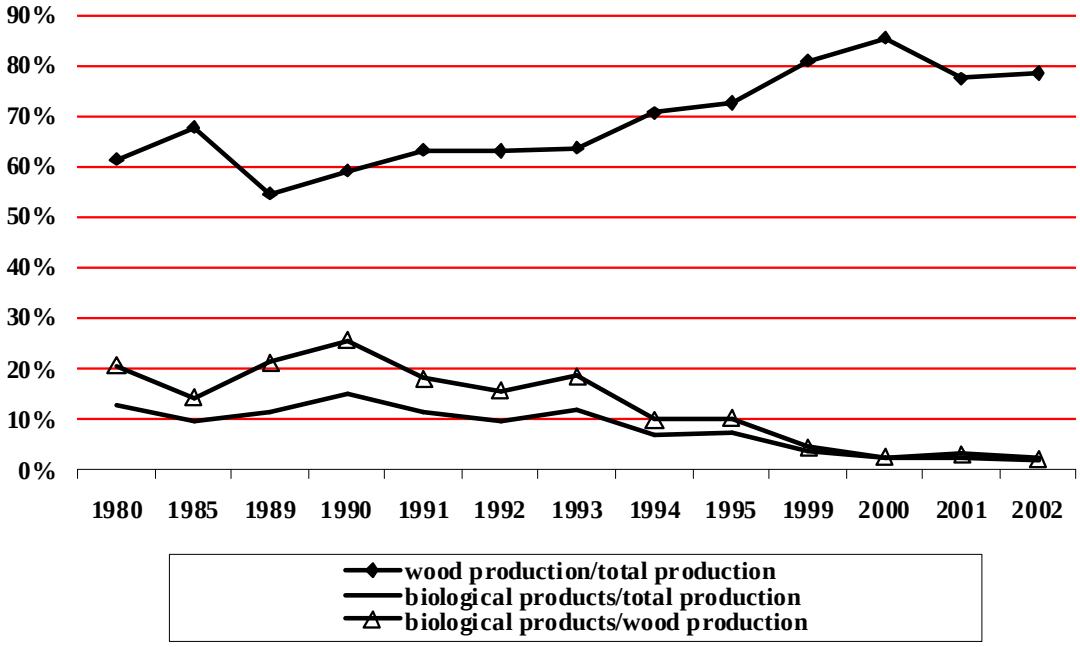
National Agency for Small and Medium Size Enterprises and for Cooperation, http://www.animmc.ro/

4. Non-wood forest products and services

4.1. State of the art and historical development

The non-wood production and services in the country, historically important for the livelihood, was emphasised especially during the latest two decades of the communist period. At that time, the national plans established production levels to be reached on picking berries and mushrooms, gathering medicinal plants, making traditional woodcrafts, fishing, gathering resins, capturing live animals for trade, etc. Forests were subject of grazing, and eligible forest administration units had to deliver a certain number of animals for meat production. Since the beginning of the 90's the production of so called "accessories forest products" is decreasing.

The data series (Figure 8) covering 22 year time horizon shows a decline of the biological products (berries, edible mushrooms, Christmas trees, medicinal plants) and an ascending trend line for the wood production/total forest production ratio.



Source: Forest Research and Management Planning, 2003

Figure 8. Supplied and marketed ratio of wood, biological products and total forest production

Biological products comprise berries, edible mushrooms, Christmas trees, medicinal plants. Their share in the total value of NWFP remained relatively constant during the period 1999-2002, e.g. around 35 to 40%. Hunting activities include venison, furs, game, pheasants, antlers, and leases for the hunting areas, taxes and permits/allowances for hunting. They represent around 20% of the value obtained trough NWFP. Wicker is mainly based on *Salix* species and represented 20% in 1999 and only 10% in 2002. Fish-breeding products include trout, both in the rivers and ponds, roe, spawn, taxes, leases, fishing allowances, and contributed with 8 (1999) to 15 (2002) percents in the value of NWFP. Unlike wicker and biological products which manifested a slightly decreasing trend, the value of seedlings produced and marketed has tripled between

1999 and 2002. The evolution of NWFP supply over the last decade is presented in Table 9 and 10.

Table 9. Domestic market size

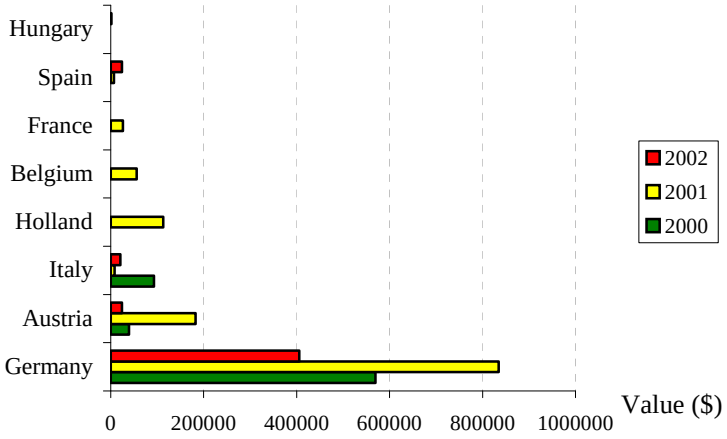
Product	Unit	1993	1994	1995	1996	1997	1998	1999
Forest Seeds	tonnes	307	130	130	356	69	787	47
Berries	tonnes	4959	1773	4217	3034	2797	1889	1757
Edible mushrooms	tonnes	91	145	257	162	1708	486	739
Medicinal plants	tonnes	1012	736	744	590	632	361	305
Drinks	hl	7823	2732	1157	1319	714	1335	152
Venison	tonnes	8	142	251	76	125	174	227
Pheasant	thousand	65	30	40	40	55	45	65
Fish (trout)	tonnes	344	417	504	390	454	565	614
Bee honey	tonnes	210	115	89	56	57	137	108

Table 10. Export market size

Product	MU	1993	1994	1995	1996	1997	1998	1999
Forest Seeds	tonnes	-	-	-	-	-	-	-
Berries	tonnes	7071	5258	4951	4293	5578	4661	5802
Edible mushrooms	tonnes	381	934	1696	1711	394	243	186
Medicinal plants	tonnes	-	-	-	-	-	-	-
Drinks	hl	-	-	-	-	-	-	-
Venison	tonnes	454	187	164	189	152	110	-
Pheasant	thou pcs	177	224	184	137	105	130	77
Fish (trout)	tonnes	-	-	-	-	-	-	-
Bee honey	tonnes	-	-	59	100	79	-	-

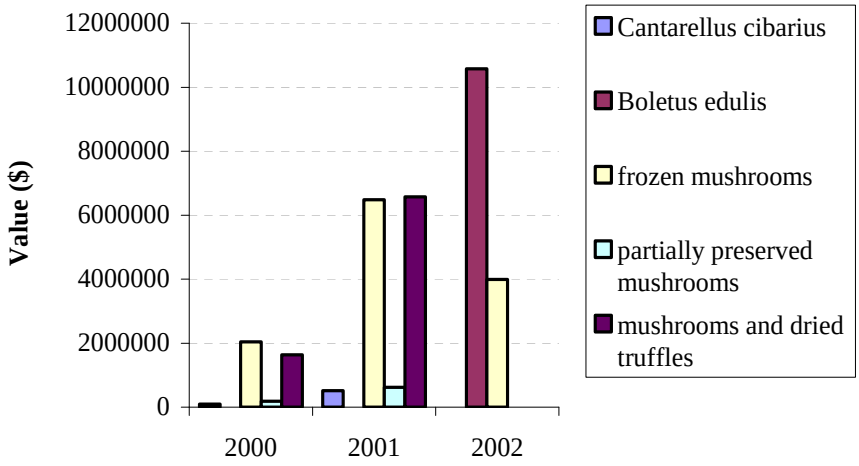
From 2000 the supply of dog rose fruit and of bilberry has increased while the blackberry supply has dramatically decreased. But a complete picture cannot ignore the fact that the actual harvest of *Rosa canina* fruits hardly equals the quantity (2,373 tonnes) collected in 1985, which represent the lowest value of the time series considered. The huge variations in the supply are due to the both natural resource growth and the external market opportunities.

The main export country for bilberry (Figure 9) is Germany as well as for the red bilberry but unfortunately this market is declining. Regarding the export of the edible mushrooms, Italy (Figure 10) is definitely the ruling export country, the next exporting market for edible boletus being also Germany. New investments were made in 2003-2004 by the National Forest Administration for the better conservation of wild berries (industrial installation for freezing). One may expect that in these conditions the markets would be more stables, due to the effect of more constant quality, but also to the possibility to store unsold production.



Source: Romanian Foreign Trade Centre, 2002

Figure 9. Exports of blueberries



Source: Romanian Foreign Trade Centre, 2002

Figure 10. Exports of mushrooms in Italy

NWFP&S definition and classification

The main product groups consist of edible mushrooms, medicinal and aromatic plants, forest fruits, forest seed and seedlings, hunting and game, pheasant and fish, services without market and services with market.

Edible forest mushrooms. The production (harvested) of three most looked-for mushrooms accounts for almost 9000 tonnes per year (Table 11).

Table 11. The average annual crop for edible forest mushrooms

Species	Tonnes/year
Armillaria mellea - honey agaric	1615
Cantharellus cibarius - chanterelle	1495
Boletus sp. - edible boletus	4520
Other sp.	340

Medicinal and aromatic plants (Table 12). About 150 species of medicinal plants are commonly harvested. In 1990 Romania ranked as the fifth country in the world for medicinal and aromatic plants production, exporting in more than 20 countries.

Table 12. The average annual crop for medicinal and aromatic plants

Species	Part of plant harvested	Tonnes/year
Rosa canina sp	Fruit	530
Crataegus monogyna	Flores and folium	22.4
Crataegus monogyna	Fructus	172
Sambucus nigra	Flores	51.1
Tilia sp	Flores	50
Hypericum perphoratum	Herba	70
Urtica dioica	Herba	50
Vaccinium sp	Flores	20
Betula pendula	Folium	30
Pinus nigra	Turiones	60
Abies alba+Picea abies	Foliage	60
Frangula alnus	Cortex	10

Table 13. The average annual crop for wild berries

Species	tonnes/year	kg/ha	kg/shrub or tree
Vaccinium myrtillus - bilberry	1095	22-350	
Rubus idaeus - raspberry	3090	70-200	
Rubus fruticosus - blackberry	2590	100-250	
Rosa canina - dog rose fruit	4030		1-4
Prunus spinosa	2030		2-4
Hyppophae rhamnoides - sallow thorn fruit	640		3-4
Crataegus monogyna - common hawthorn fruit	595		3-5
Other sp including:	1150		
Prunus padus			3-6
Prunus cerasifera		15-25	
Malus sylvestris			20-30
Prunus avium			20-30
Fragaria vesca		15-25	

Forest seeds and seedlings. Main species exported are: *Abies alba* Mill - fir tree, *Larix decidua* - larch; *Picea abies* (L.) Karst - spruce; *Alnus glutinosa* (L.) Gaertn - alder, *Carpinus betulus* l. - hornbeam; *Castanea sativa* Mill - chestnut tree, *Cornus mas* L.- cornel tree; *Cornus sanguinea* L. - red dogwood; *Crataegus monogyna* Jack -common hawthorn; *Eleagnus angustifolia* L. – oleaster. In 1998 the total area covered with seed stands was 56,823 ha and there were 164 seed orchards established on 828.1 ha.

Hunting and game. The main game species that can be hunted are: red deer, fallow-deer, roe-buck, chamois, bear, wild boar, wolf, grouse, rabbits, pheasants, quails, geese, ducks. The 10 most valuable brown bear furs and 5 biggest skulls worldwide were harvested in Romania. The utilisation of the hunting areas is shared between the national hunting association (61%), the private (particulars) hunting associations (6%), the National Forest Administration (31%) and the educational and research organisations (2%). Pheasant is important both for shooting and meat. It is also used for repopulating hunting funds.

Fish. The main fish species are: the brown trout (*Salmo trutta fario*) which lives in mountain rivers with high oxygen concentration and low temperature range. The lake trout (*Salmo trutta lacustris*) lives in mountain lakes and can weigh up to 10-12 kg. The rainbow trout (*Salmo gairdnery*) lives in mountain rivers and lakes. The brook trout (*Salvelinus fontinalis*) can be found in cold and well oxygenated waters. The Srayling (*Thymalus thymalus*) is living in the inferior sector of mountain rivers, in deep and cool water. *Hucho hucho* is the largest representative of the family, an endemic species of the Danube. Being so scarce fishing for it is allowed with the approval of the Ministry of Waters, Forests and Environmental Protection.

Service without market. The distribution of the Romanian forest according to the functions to be fulfilled is 53.3% protection forests and 46.7% production and protection forests. Most of the protective forests are managed to enhance the protection of the soils against erosion and the protection of the watersheds (Figure 11).

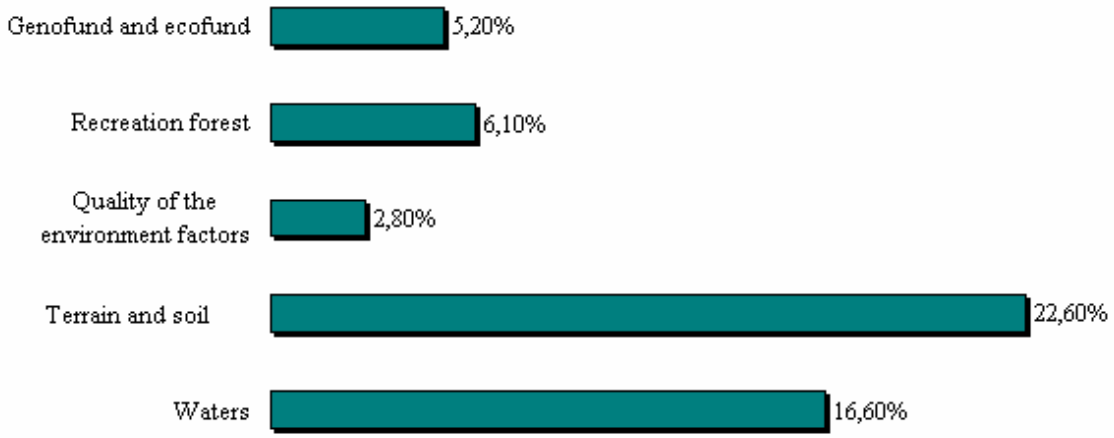


Figure 11. Repartition of Romanian forest by type of protective function

Service with market:

- The National Forest Administration and Prototype Carbon Fund managed by World Bank are carrying out a project on afforestation of the degraded agricultural lands. The object is 850,000 tones of CO_2 within 15 years. The ongoing project has started in 2002. The price for one tonne is 3.6 US$/t CO_2, paid at delivery. The annual sequestrated quantity is calculated and delivered to the external partner by the National Forest Administration.
- The Government Decision nr. 1105/2003 formally acknowledged on the NFA tasks the silvotourism and the outdoor activities. These activities always represented an important component of the NFA activities, but it is the first time that a legal framework was established to allow the NFA to provide recreational services. The framework was particularly required after the horses breeding has integrated to the NFA follow the dissolution of the former national agency for horse breeding. At this stage an objective financial analysis related to the horse breeding and horse tourism activities is deemed.
- The National Forest Administration concluded contracts and received income for administration/management of forests hold by communes, communities or private individuals. The concerned forest area is 677 thousand ha, mostly communal forests. There is not information available about the income realised.
- The right to pick up mushrooms on the forest managed by the NFA for commercial purposes is leased towards private contractors. The NFA receives 0.2-0.3 euro/kg harvested.

Those examples show a trend to diversify the forest managers' activities and sources of income. Although the NFA had already experience in some activities, e.g. external trading of the biological products, however most of the economic activities performed now may be considered as innovative.

Description of the "product chain" organisation

The quantities of berries supplied are limited in a higher extent by the physical capacity of the resource than by the market demand. The resource is less abundant since intensive forest harvesting operations replaced in the last two decades the large size clear cuttings. The supply of non-forest wild berries such *Rosa canina* are more constant than the supply for forest-specific berries (e.g. blueberries, raspberries).

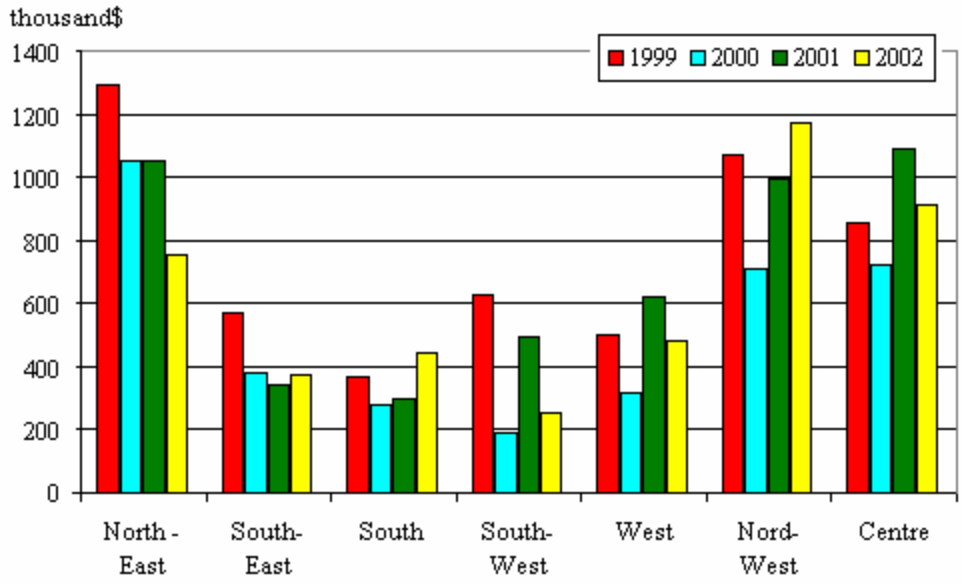
The berries are collected by the rural inhabitants and brought to the collecting centres belonging to the National Forest Administration. Usually, the collectors are paid on quantities harvested and there is any formal contract between them and the buyer (the NFA). Then the NFA will sell the berries (fresh, frozen, or refrigerated) trough the private firms specialised on external trade. These will make the transaction with the external partners on behalf of the NFA. Their role is that of as commissioners. Hunting services for foreign hunters are managed also trough commissioners firms.

Regarding the mushrooms gathering little is done by the NFA by the way of collecting centres, such the case if for wild berries. Mostly the right to gather mushrooms is accorded to private firms which paid a tax on quantity harvested. The firms collect and sell the mushrooms only on the external market, the main importer being Italy.

A product sold by the NFA directly on the internal market (via the supermarket chain Metro) is the trout. The recent investments made by the NFA in the biological forest products processing leaded to a more constant supply, but also to a higher possibility of negotiating prices, e.g. if the price offered is not convenient, the NFA still can store the production without the risk of lose it.

NWFP&S relevance in rural economies

The forest non-wood yield value has been accounted for seven development regions as stated in the Romanian Statistical Yearbook, i.e. North East, Southeast, South, Southwest, West, Northwest, Centre. As shown in the figure bellow it is only the Northwest region along with the South and South East ones that have recorded a significant increase in the production level while in the Northeast region this has dropped visibly (Figure 12). There is a link between the sharp increase of timber production value in this region and the decrease of the NWFP value, explained by the fact that the main supplier of NWFP is the National Forest Administration, and that the NFA has concentrated its effort on copping with the effects of storm damages from 2001 rather than concluding new contracts for NWFP.



Source: Forest Research and Management Planning, 2003

Figure 12. Contribution of forest non-wood yield to regional development

There is lack of information on how much the NWFPS could contribute to the rural economy. One may identify three main socially customised approaches of using non wood forest products such mushrooms, berries or medicinal plants:

- the berries or other biological products are gathered by the private persons and sold on the farmers' market. The other possibility is to sell them to the specialised enterprises which act as buyers for biological products. The National Forest Administration is used to collect berries with the help of rural inhabitants. The gathering of berries is economically and socially important in this context because most of people collecting them belong to the poorest categories of rural population (unemployed, gypsy minorities);
- the berries and mushrooms are collected for completing the inhabitants' winter food provisions. Particularly the honey agarics, the chanterelle and the edible boletus are used for that purposes. The economic benefit is a substitution effect. The winter time food provisions are important in the rural Romanian context, because the food supply in the shops existing in the rural area is not very diversified and rarely contain fresh vegetables and fruits;
- finally, the gathering may have not economic value, but a recreational one only, especially for the urban population.

The way of gathering wild berries and mushrooms creates potential for SMEs development. The production chain for berries and mushrooms (previous sub-section) illustrate that there is room for entrepreneurship as commissionaire firm for external trade or as firm for collect and trade berries and mushrooms as far as the supply is by far inferior to the demand.

Property rights and general regulatory framework

There are general laws regulating forest products in Romania, according to the provisions of the following laws in force:

- The Forest Code (Law 26/26 Apr. 1996)
- Law on hunting fund and protection of game (Law 103/23 from Sept. 1996) that regulates administration and management of Romania's hunting fund, the hunting activities and the game protection
- Law on environment protection (Law 137/23 Dec. 1995)
- The Order of Ministry of Waters, Forests and Environment Protection No 647/06-07-2001 on authorising harvesting, capture and purchase plants and animals for domestic and external trade, modified by the Order n. 117/05-05-2003
- Law of Waters (Law No 107/25 Sept. 1996)
- Government Decision No 1105/2003 – regarding the reorganisation of NFA, that gives the legal framework for silvoturism.

The rule of the public access on all national forests is not consecrated by law, otherwise it seems to be a largely acknowledged social custom. For instance, kind of advertising such "private property, do not enter" or "trespassing prohibited" did not appear yet on forestland.

Special rules exist when collecting berries, mushrooms or other biological forest products for commercial purposes. In this case, the collector is obliged to be authorised by the local agency for the environmental protection. Secondly, the collector can not gather biological forest products from the private lands without the owners' acceptance, expressed trough a contact, convention or any kind of agreement.

The Romanian Forest Code states that the beneficiaries of the protective forest services have to pay for those materialised in economic income. The valuation of forest services is still targeted, as research has been carried out and some methods have been developed. However, the only forest service subject to payment is the practice of the hunting activities, from which the landowner may receive some economic benefits.

Annex D: Organisations studying non wood forest products and services and main publications and information sources.

The research organisations are the same that mentioned at the Annex C, otherwise there are not many research done in the socio-economic aspects of the NWFPS production or evaluation.

4.2. Case studies of successful marketing strategies

Case study 1: CO2 sequestration

NWFP&S definition, area of production, harvesting level, technical characteristics of production

Carbon sequestration is the capture, from power plants and other facilities, and storage of carbon dioxide (CO_2) and other greenhouse gases that would otherwise be emitted to the atmosphere. Forest lands offer significant opportunities including the below-ground carbon and the long-term management and utilisation of standing stocks, ground cover, and litter. The targeted activity is afforestation of degraded agricultural lands and establishment of a basis for long term sustainable management. The afforestation of the degraded lands is a strategic objective of the sustainable management of the national forest resources. It is estimated that an amount of 1-3 t CO_2/year/ha will be sequestrated depending on the site conditions and biological characteristics of the species to be used.
A four year afforestation project (2002-2005) is running, located in seven Romanian counties in South-Western and East-Southeaster part of the country. The designed sites are abandoned and degraded agricultural lands, improper for agricultural use. The works comprise site/soil preparation, seedling plantation and maintenance/tending operations for new plantations until the stage of canopy closure (up to five years after planting), in accordance with the rules of the forest vegetation establishment and of the ecological restoration. The most appropriate species to use are those adaptable to floodplain conditions such as indigenous poplars (*Populus alba* and *Populus nigra)* and black locust *(Robinia pseudoaccacia*), along with *Quercus cerris* and *Quercus pedunculiflora* where site conditions are favourable, preferably together with some accompanying native tree and shrub species.

Description of the "product chain" organisation

- number of companies involved and management characteristics

  The National Forest Administration (NFA) has signed the contract with an external partner and seven of its territorial branches (forest directorates) are involved in carrying out the project;

- the role and share of SMEs in the the product chain

  The total area subject to afforestation is 6033 ha. The National Forest Administration provides seedlings from its own forest nurseries and technical advice trough its field staff. Local labour is involved in manual work whilst for the mechanised operations some firms are subcontracted. After establishment, the forests are periodically surveyed and monitored for the identification /control of pests/damages. They are subject of specific management in the context of local sustainable development, focusing on benefits for local communities (fuel wood from tending operations, recreation, etc., but also protective effects for soil and climate, particularly important in the South part of Romania);

- trade activities (import and export flows and development patterns)

  The trade between the National Forest Administration and the Prototype Carbon Fund administered by the World Bank consists of transferring 855,000 tonnes of CO_2 at a price of 3.60 US$/t CO_2 (or 13.2 US$/t C), the total value of the contract being 3,077,946 US$. The value of the carbon accumulation in the year 2002 and the first half of the year 2003 was 13,400.75 US$ (3722.43 t CO_2 x 3.6 US$/t CO_2). The estimate of total project cost is US$ 10,340,000. National Forest Administration covers the costs of afforestation from its own sources and from the budgetary allocation from Ministry of Agriculture, Forests and Rural Development.

- policy framework

  The actors involved are National Forest Administration and the Ministry of Agriculture, Forests and Rural Development. The State Domain Agency was involved as well, by the transfer of 5,028 ha to the NFA starting with the second year.

  Research contribution was important in this project. Previous studies have documented the quantification of stocks and fuelled the financial analyses (see the references). The focus was on comparison of CO_2 Fix Model results with the field data.

- profit appropriation by the landowner/contractor/manufacturer/ dealer/seller

  According to the financial plan, the Romanian government (NFA and Ministry of Agriculture, Forests and Rural Development) has made the necessary financial commitment to cover investment cost the schedule is as follows:

Table 14. Annual investment

Year	2003	2004	2005	2006	2007	2008	2009	Total
Cost (thousand US$ per year)	3,110	3,460	3,071	510	114	71	3	10,340

- contractual agreements between landowners and resource managers; networking and joint ventures among/between non-wood processing and service industries

  All the areas included in the project are in state ownership. Initially 1700 ha administrated by National Forest Administration were included in the project.

Starting with the second year, additional 5028 ha have been transferred from the State Domain Agency in the administration of the NFA.

- characteristics of technological or organisational innovation behaviour in non-wood production, processing and service industries

  This technological innovation is the result of innovative and open management strategies on NFA headquarters in the period 2001 – 2003.

- "territorial" marketing (i.e.: the integration of the NWFP&S to other services and products offered by the local community)

  In addition to the timber and carbon revenues, the project will contribute significantly to non-timber forest products in terms of soil stabilisation and potential forest fruits and honey production. Black locust is a prolific flowering species and highly prized for honey production. The estimated yields are 20-25 kg/ha after age 6. The beekeepers are not charged for placing their hives under the crops.

Lessons learns/driving forces/factors affecting competitiveness (SWOT analysis)

SWOT analysis

Strengths	**Weaknesses**
• ability to approach innovative instruments to solve global environment problems such as climate change	• limited capacity to negotiate international contracts due to the lack of experience
Opportunities	**Threats**
• imminent market-based mechanism concerning carbon emissions • improvement of land use • social impact: employment and income generation in the regional areas • biodiversity enhancement	• risks associated with the project: grazing, drought, fire/diseases • model predictions, yield table predictions • site productivity class • illegal felling • financial and technical capacity.

Case study 2: Hunting

NWFP&S definition, area of production, harvesting level, technical characteristics of production

Romania is one of few countries in Europe which still hold important resources for hunting activities on wildlife from aquatic or forest ecosystems. It is known that before 1990, the game management was done to supply international hunting trophies. That led to the fact that the country obtained trophies on red deer, bear, roe deer, wild boar, brown bear, etc. In other words, the quality of Romanian brand has an international recognition.

The Suceava County is located in the North-East. It is the second largest in the country, with 8,553.5 km^2, from which half is covered by forests. Natural large forests tracks and difficult to access still represent a last refuge for brown bar, wolfs and lynx.

Suceava county has the largest area for game management amongst the Romanian counties, that means 876,130 ha. This area is shared in 71 game management units (GMU), composed by 449,647 ha forests, 378,840 ha agricultural land, grassland and mountain pastures, and 945 ha water surface. The size of one game management unit varies between 5,000 ha in the lowland area to 10,000 ha in the mountains. The number of some wild animal of hunting interest is given in the Table 15 for the latest five years.

Table 15. Evaluation of game units

Game species	2000	2001	2002	2003	2004
Cervus elaphus - the red deer	4165	4270	4369	4026	4074
Capreolus capreolus - the roe deer	4880	4905	5155	4850	4870
Sus scrofa attila - the wild boar	2070	2195	2447	2359	2335
Ursus arctos - the brown bear	251	267	280	265	278
Tetrao urogallus - the capercaillie	1103	1152	1249	1212	1287

Source: I.T.R.S.C. Suceava

Description of the "product chain" organisation

1. Number of companies involved and management characteristics. The game management units are in the administration of different entities, as following:

- 73% of the GMU are in the management of hunting associations;
- 25% of the GMU are managed by the local branch of the national forest administration (Forest Directorate Suceava);
- 2% of the GMU are managed by the educational institutions on forestry.

The management of game population is based on the principle of maintaining the optimal number of animals, established according to the characteristics of the GMU. When the population overreaches the optimum level, a certain number of animals will be extracted. Hunting can be practiced by the manager of the GMU or by the others (hunters from legally recognised associations, forest officers from national forest administration) based on a permit. Hunting is possible for foreign hunters as well, provided that they have a hunting licence in their origin country and they are allowed by the manager of the GMU.

In the latest case, the product chain may involve one or several intermediary firms between the manager of the GMU and the client. There is not the case for county Suceava.

2. The role and share of SMEs in the product chain

Amongst 71 GMU in Suceava County, four only are managed by private persons. They are real entrepreneurs, while consider that they have to manage a natural stock which is the game. However, their utility function seems do not be the profit, but the practice of the recreational activities and perhaps the preference for an exclusive right on the game management.

3. Trade activities (import and export flows and development patterns)

From the viewpoint of income to be obtained, is by far more interesting to attract foreign hunters, because the perceived prices are higher. However, the participation of foreign hunters is reduced, except for the brown bear and the capercaille (Table 16).

Table 16. Game units extracted by Romanian (R) and foreign (F) hunters, in Suceava Forest Directorate

Game species	2000		2001		2002		2003	
	R	F	R	F	R	F	R	F
Cervus elaphus - red deer- female	84	0	89	0	110	0	133	0
Cervus elaphus - red deer-male	36	9	42	6	41	19	60	11
Capreolus capreolus - roe deer-female	53	0	77	0	89	0	107	0
Capreolus capreolus - roe deer-male	35	0	43	9	53	7	68	5
Sus scrofa attila - wild boar	240	n.a	304	n.a	361	n.a.	365	n.a.
Ursus arctos - brown bear	14	0	9	0	12	10	5	16
Tetrao urogallus - capercaillie	49	0	21	19	33	22	34	27

Source: I.T.R.S.C. Suceava

4. Policy framework. The institutions involved in the sector are the Ministry for Agriculture, Forests and Rural Development, the Forest Inspectorates, the NFA, and the organisations with game management activities. Ecologist non governmental organisations play an important role too in the political process.

The main regulations that directly influence the NWFP&S production and harvesting are in the Law no. 103/1996 on the hunting grounds and game protection. According to this law, the manager of the GMU has the right to obtain income from the game acquired according to the rules of hunting and on the limits of allowed quota. The owner of the land on which the GMU is established has in right to obtain income from the practice of hunting activities. When the ownership size included in a GMU is over 100 ha, the landowner would receive a direct payment from the hunting association. In the case when the land in property is under this size, the landowner would received a payment representing 25% of the price that the manager of the GMU paid for having the right to manage the unit. This amount is distributed by the local public administration.
The main policy instruments available are regulatory. Nothing exists to stimulate the entrepreneurship in this particular field. However, make the hunting more attractive in the Romanian forests is part of the internal policies of the National Forest Administration, and it is concretised in the utilisation of some management and marketing strategies. The taxation remains high in the case of foreign hunters.

5. Role of research, education, and training extension services in NWFP&S development. The existing research is targeted to a poor spectrum of aspects, mainly of technique/technological nature. The sustainability aspects are emphasised when studying the relationship between the game management and the forest management. Some researches warn about the potential impact of “hunting for money” on the sustainability of the forest ecosystem and on the quality of the game. However, despite of quantities of the anecdotic evidences reported by the newspaper, few research articles exist on that topic. There is any research on economics of hunting activities. Mainly, the information sources on economic importance of the game management are represented by the NFA organisation internal accounting and reporting.

The curricula of forest engineers and forest guards provide them with high level educational background on game management. There is also a special “hunting school” in Brasov.

6. Profit appropriation by the landowner/contractor/manufacturer/dealer/seller
There is no information at the national level on the profit realised by the managers of GMU, except the fact that, according to the National Statistical Accounts, the national trophies brought in the year 2001 an income of 14 million euro. The income obtained by the managers of the GMU located in the Suceava County (Table 17) was calculated based on average prices obtained by the selling of the trophies and of the meat (Table 18).

The taxes practiced are on the limits of medium prices in Eastern Europe, with clearly higher prices obtained in the case of high value trophies. For Romanian hunters, the prices to be paid are significantly lower, e.g. 120 to 2000 euro for red deer and 600 to 4000 for brown bear. The costs of managing a GMU are high. One way to cover them and make substantial profit is to have the foreign hunters as clients.

Table 17. Approximation of annual income from hunting activities, in Suceava Forest Directorates

Incomes - euro	2000-2001		2001-2002		2002-2003		2003-2004		Total
	R	F	R	F	R	F	R	F	
Cervus elaphus - female	13440	0	14240	0	17600	0	21280	0	66560
Cervus elaphus - male	14760	38340	17220	25560	16810	80940	24600	46860	265090
Capreolus capreolus -female	1060	0	1540	0	1780	0	2140	0	6520
Capreolus capreolus -male	2800	0	3440	10800	4240	8400	5440	6000	41120
Sus scrofa attila	36000		45600		54150		54750		190500
Ursus arctos	14000	0	9000	0	12000	60000	5000	96000	196000
Tetrao urogallus	4900	0	2100	19000	3300	22000	3400	27000	81700
Total	125300		148500		281220		292470		847490

Note: R – incomes from Romanian hunters, F – incomes from foreign hunters

Table 18. Charges for foreign hunters

Species	Trophy euro/ unit		Damaged charges euro/ unit		Failed shot charges euro/shot		Hunting organisation charges
	Male	female	male	female	male	female	euro/day/hunter
Cervus elaphus	550-8800	150	800	75	150	30	20
Dama dama	250-550	25	200	15	25	5	20
Capreolus capreolus	225-2900	15	200	10	25	5	20
Rupicapra rupicapra	1100-2800		1000		125		20
Sus scrofa attila	250-750	200-300	100	100	50	500	150
Ursus arctos	5000-7000		1500		275		150-275
Lynx lynx	800-1000		200		50		15
Canis lupus	400-500		100		50		15
Tetrao urogallus	1000		350		100		20

Source: synthesis from Ministerial Order, No 117/19.04.2001

The Forest Directorate Suceava offers other services associated or not to the hunting, e.g. accommodation in the 13 hunting cottages that the Forest Directorate owns, translator, transportation, equipment renting. For the foreign hunters, the charges for accommodation range between 60 euro to 40 euro per day and per person, according to the comfort level. For silvoturism and ecoturism or other activities besides the hunting, the prices charged are 18 euro per day and per person.

Taking pictures and make movies seem to be a new opportunity to further develop. Using a camera is free for the hunters paying their charges, but for other foreign clients the charges are 100 euro per day for pictures and 200 euro for making movies. The service comprises guidance from a forest specialist.

7. Contractual agreements between landowners and resource managers; networking and joint ventures among/between non-wood processing and service industries. Contract is reduced to the payment towards the private owner of the land, or towards the local administration. In fact, the resource managers (the managers of the GMU) have to pay both the State, for acquiring the hunting rights, and the land owners, as right to use the space of their properties. The price is fixed, and it's not related with the income on managing the game.

8. Characteristics of technological or organisational innovation behaviour in non-wood production, processing and service industries. According to the Government Decision nr. 1105/2003 the silvoturism and the outdoor activities represent a new task added to the NFA bylaw. Therefore, the innovation represented by this new "product" – silvoturism and outdoor activities, appeared after the legal framework was created. This evolution was triggered by the transfer of the horse breeding activity from the former state agency towards the NFA.

The latest years, the Forest Directorate Suceava modernised its 13 cottages, and started to build two new ones. These preparative are not without risk: the main option seems to be "the foreign hunters"; the possibility to realise income from domestic tourists or visitors are not enough explored; the lack of marketing and information hampers the meeting between the supply and the demand.

9. "territorial" marketing (i.e.: the integration of the NWFP&S to other services and products offered by the local community)
The hunting tourism is an opportunity to promote landscape and cultural values of the tourist zone of county Suceava. Usually, the hunters are supplied with services for visiting historical sites (Bucovina four centuries' old monasteries) and taking profit from being in a rural traditional area. In the GMU managed by the National Forest Administration the hunters received accommodation in the NFA own hunting cottages. Therefore, the silvotourism is promoted. In the other GMU the hunters receive accommodation in rural area (mainly farms). The agro-tourism is then promoted by the same way. But there is any co-ordination between the authorities in charge with rural development policies and the managers of GMA or State agencies involved in allocating the GMU.

Lessons learns/driving forces/factors affecting competitiveness (SWOT analysis)

Strengths	**Weaknesses**
• diversity of the game populations • the high quality of the trophies acknowledged by the international prizes obtained • "wilderness" of the hunting area, far from human settlements • high level standards accommodation	• quality of services • high bureaucracy, particularly for enter the country with a gun fire and for export the trophy • the risk of unsustainable management of stocks • weak marketing • no marketing from the private "producers", few marketing tentative by the national forest administration • a successful hunting (and then the client' satisfaction) is subject to hazard
Opportunities	**Threats**
• promote ecotourism, silvotourism, agrotourism • develop "picture hunters" • obtain finance to recompense ecological balanced management of wildlife • promote ecological image • develop "new markets", not only foreign hunters oriented, but based on smaller services, e.g. rent the hunting cottages in week-ends for the urban population, organise field trips, etc.	• development of international movement anti-hunting • unsustainable management of the game population by the hunting of the bests individuals (impoverishment of the population) • the decrease of the present natural habitats because of the chaotic harvest of private forests • corruption in its different forms, e.g. disguised practice of hunting with foreigners, invited as "observers" of hunting by Romanian friends, or voluntary misclassification of game captured (Detailed description on a NGO site, http://www.alpinet.org/main/liste/index_ro_id_11060.html).

4.3 Summary: Barriers to entrepreneurship and research needs

As a main supplier, National Forest Administration targets a sustainable supply of forest products attainable by a multipurpose management in which evaluation system is an important component. Evaluation of the NWFPS may contribute to:

- the better knowledge on the forestry part on the GDP and on the rural economy;
- improve the tax collecting from the direct beneficiary of the forest services;
- improve the tax system for forest land owners according to the impact of the ecological restrictions on forest management efficiency.

Investments in the protective forests should be substantiated by cost-benefit analysis to increase their recreational value. Valuation research studies in Romania should be given a special attention in the future. Developing a basic national data collection for setting up a management information system is needed.

Barriers to entrepreneurship on biological NWFP pertain to both the supply and demand sides. The drawbacks are summarised in the Figure 13. Regarding the barriers to entrepreneurship on hunting activities, there are several problems listed bellow:

- the private managers access few GMUs, that are not enough to avoid a marketing strategy on medium and long term. The NFA has better opportunities to satisfy clients preferences, and by that it hold a strong position on the market;
- due to the management costs, the only one profitable option is now the hunting with foreign clients. Yet, there are not feasibility studies on the real management options and costs;
- there should be entrepreneurship opportunities for the commissioners firms. Nevertheless, a search with Google engine leads to identify only 6 commissioner firms. Avoiding Internet for the purpose of commercial information to attract foreign customers is a weakness of the chain. Yet, it might be so also that the "service" chain is well established then it constitute by itself a barrier to new entrants. This hypothesis would require further investigation;
- the game is a moving resource. Therefore not negligible risk exists for free-rider behaviour in the border of contingent GMUs, e.g. they can hunt intensively, and for the regeneration of the stock they would attract individuals from the other GMU, by offering them food or salt.

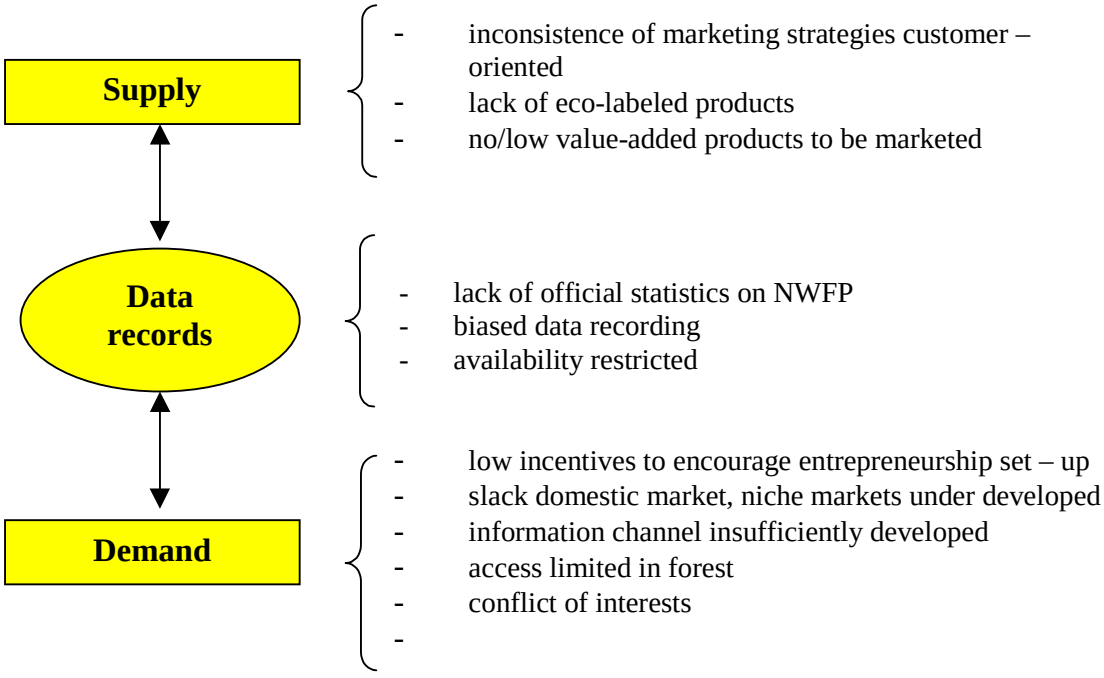


Figure 13. Barriers to entrepreneurship related to NWFP

In the field of Carbon sequestration, the main barrier to entrepreneurship is related with the scale of afforestation operations. In the given case study, an important organisation was able to negotiate a contract within the Prototype Carbon Fund. The same negotiation would not be possible for private enterprises or for private forest management structures, at the existing situation, unless the Government does not intervene with some guarantees or financial incentives.

The research needs consist of establishing appropriate indicators, to correct the significantly underestimates of the carbon stocks in above ground biomass and litter for the designed sites resulting from the model simulations as compared to the field measurements. This will improve the accuracy of estimation about certifiable emission reductions.

As in the case of the wood processing industries, the lack of the market information, and the lack of management and marketing strategies are the main impeding factors of enterprise development in NWFPS. The non wood forest products/services chain is even lesser developed than in the case of timber products and it is still dominated by the NFA. Therefore often good opportunities for the firm creation/development may exist in partnership with the NFA, or in developing innovation in those fields where the NFA has no competitive advantage because of its statute of public agency.

Sources of information

NFA, 2003. Buletin informativ anul III, nr. 10 (septembrie - octombrie, 2003)

National Institute of Statistics, Annual reports 1980-2002

Romanian Foreign Trade Centre, 2002

http://www.rosilva.ro/index_eng.html

ITRSC Suceava (Teritorial Inspectorate for Forest and Game Management Regime)

http://www.alpinet.org/main/liste/index_ro_id_11060.html

References

Blujdea, V., Dragoi, S., 2000. General overview on the forest products and services in Romania. Proceedings of the Seminar on Valuation of Forest Goods and Services, Opocno, Czech Republic, 19-21 Nov.

Dragoi, M., 1995. Conceptie sii metoda de calcul a valorii terenurilor silvice, prin cuantificarea functiilor acestora. Manuscris I.C.A.S., unpublished

Dragoi, S., 2003. Socio-economic analysis of the supply and demand on forest products. Forest Research and Management Planning. Internal report 110 p., unpublished

Dragoi, S., Parnuta, Gh., 2000. Statement on non-wood forest products in Romania. Proceedings of the international workshop on Sustainable development of NWFP in countries in transition to the market economy. Chisinau, 23-27 Oct.

Dumitru, I., Machedon I., 2004. Consideratii privind cuatificarea atributiei R.N.P. – Romsilva referitoare la “desfasurarea unor actiuni de silvoturism si agrement”, Revista Padurilor, nr. 2/2004, p. 4

Machedon, I, 2003. Silvicultura si dezvoltarea rurala. Ed Tridona Oltenita

Machedon, I., 2002. Rolul padurilor in conservarea si protejarea mediului inconjurator, Revista padurilor, nr. 1/2002, p. 23

Abrudan, I., V., Blujdea, V., Pahontu, C., 2002. Impadurirea terenurilor degradate din Romania in contextul eforturilor de diminuare a impactului schimbarilor climatice. In Revista Padurilor, 117, 3/2002, p. 1-5

Brow, S., Philips, H., Voicu, M., Abrudan, I.,V., Blujdea, V., Pahontiu, C., Kostyushin, V., 2002. Romania Afforestation of Degraded Agricultural Land Project: Baseline Study, Emission Reductions Projection and Monitoring Plans. Prototype Carbon Fund, Washington, 145 p.

Abrudan, I., V., Blujdea, V., Brown, S., Kostyushin, V., Pahontiu, C., Philips, H., Voicu, M., 2003. Prototype Carbon Fund: Afforestation of Degraded Agricultural Land in Romania. In Revista Padurilor, 118,1, p. 5-17

5. Forests and ownership

5.1. State of the art and historical development

Romanian forest distribution as showed in Figure 14 is:

- 66% in the mountains (30% of country area)
- 24% in the hill (37% of country area)
- 10% in the plain (33% of country area)

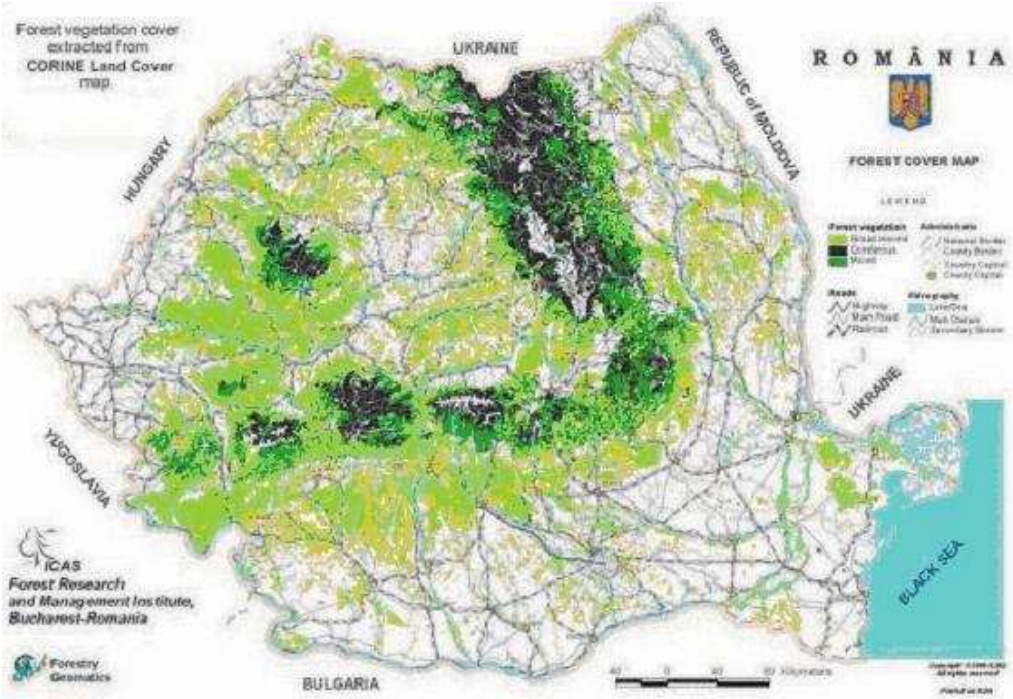


Figure 14. Forest cover map

In the last 100 years the forest resource in Romania was decreasing. Between the firs and the second global wars, the forest area decreased by more than one million ha. During the socialist period, despite of afforestation policy, the forest area did not increase, in particular because of systematically overreaching of annual allowable cut. Experts estimated at 400 thousand hectares the loss of forest area after the second war. Except the latest years, the harvesting was generally above the annual possibility of forests, which is situated between 12 and 14 million m^3 (Figure 15).

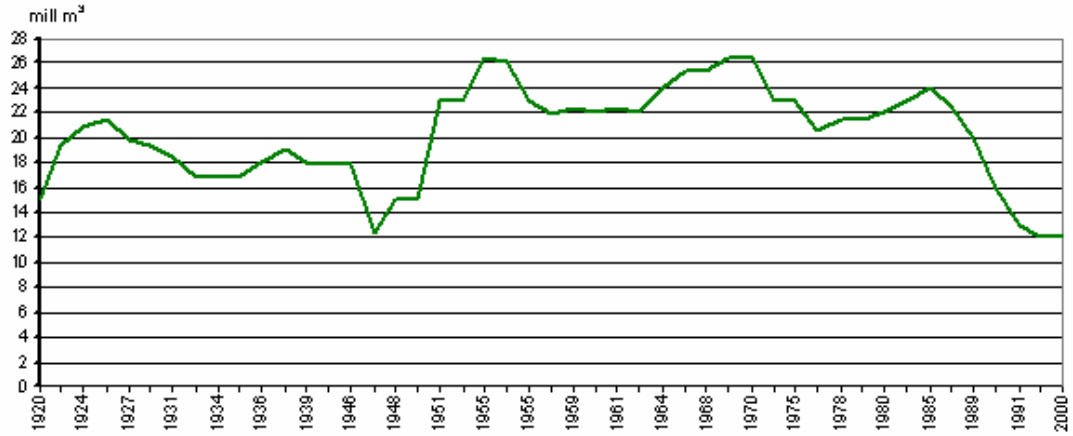


Figure 15. The historical evolution of harvested volumes

The repartition of forests on age classes (Figure 16) shows an unbalanced structure, with few forests in age of harvesting. That represents the effect of over-exploitation during the communist period.

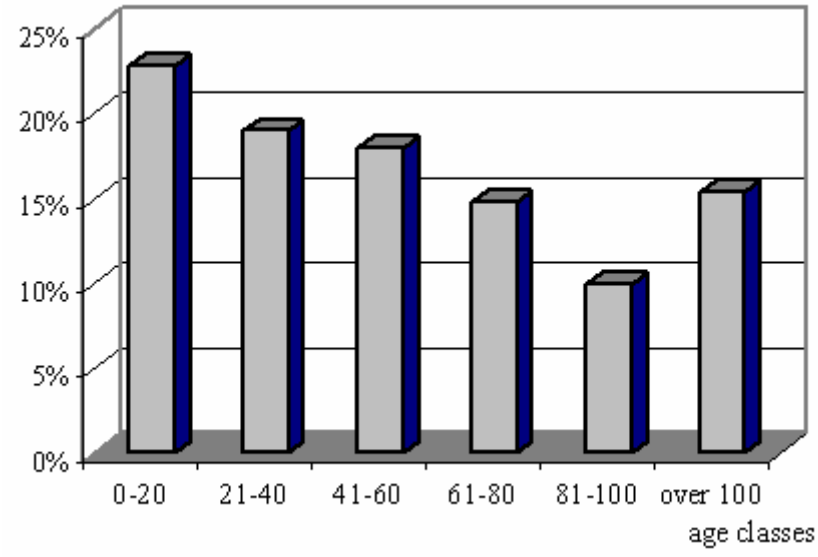


Figure 16. Repartition of forest by age classes

The management of the forest resource is based on the forest management plans (for public forests and private forests over 10 ha), and on simplified forest management plans for the small-scale forests. The State finances the costs of establishing the forest

management plans in private forests. The forest management plans are draw-up by the National Institute for Research and Forest Management Planning (ICAS) and by some private firms for a period of 10 years (with few exceptions). To enter in force, the forest management plans are check-out by the Forest Inspection, then they are approved by Order of the Ministry for forests.

5.2. Forest resources

The forests cover 26.7% of the total land area, which ranks Romania on 10th position among European countries. Forests are unequally distributed, the less forested area being the plain region situated at the country borders from South, East and West (Câmpia Bărăganului, Câmpia de Vest and Câmpia Moldovei – less than 4% forest cover).

Contradiction exists between pictures on forest area provided by the National Statistical Accounts sources and those provided by the National Forest Administration. In the former the forest area (forest and other forest vegetation land) decreased from 6685.4 thousand ha in 1990 to 6,457.3 thousand ha in 2000 (a reduction to 0.5% of forested area). The National Forest Administration mentioned about 10 to 20 thousand ha deforested (land use has been changed) in private forests this last decade. This deforestation occurred because of few means to support the regeneration of forests in private area, but also because of grazing activities. Indeed, one can observe the increasing of pastures area with around 180 thousand ha during the last ten years.

Area covered by forests decreased in parallel with the increase of other categories of land included in forest estate (Table 19).

Table 19. Forest land (end of year, in thousand hectares)

	1938	**1996**	**1997**	**1998**	**1999**	**2000**	**2001**	**2002**
Forest and other wooded land		**6366**	**6367**	**6367**	**6367**	**6366**	**6367**	**6377**
From which forest area	5955	**6240**	**6236**	**6227**	**6226**	**6223**	**6225**	**6238**
coniferous	1525	1890	1883	1868	1861	1856	1853	1858
beech	2060	1935	1939	1942	1943	1951	1956	1958
oak	1221	1131	1129	1127	1122	1120	1117	1120
various species	1149	1284	1285	1290	1300	1296	1299	1302
other lands		126	131	140	141	143	142	139

Source: National Forest Administration, www.rosilva.ro, National Statistical Accounts

The growing stock was calculated at the latest inventory (1985) at 1,341.4 million cubic meters, which means an average volume per hectare of 213 cubic meters. The mean annual increment is 5.06 m^3/ha/an, situating Romania on fourth rank in European countries, after Suisse, Austria, Czech Republic and Slovakia. The mean annual increment is 4.09 m^3/an/ha, if including the first age class, and 5.27 m^3/an/ha if not included.

The forest contribution to the GDP (sylviculture, logging and primary wood processing industries) accounts constantly the latest ten years for 2.4% in production and 2% as gross value added. Timber industries, including furniture, represented during the latest ten years 5.6% of the manufacturing industry in term of production, despite of decreasing wood removals volume, and 12% in term of employees. The total number of

employees in forest sector represented in 2001 5% of national labour force, furniture included.

The share of forest available for wood supply is almost 90%, according to the public regulation on forest functions. The national reports specified between 7 to 11% of forest affected by restrictions in harvesting for protection purposes, while on the global maps (TBFRA 2000), it appears that this percent is only 4%.

Table 20. The forest area with protective functions

Forest with special protective functions	**53.3% of total forest area**
Waters regime	16.6%
Terrain and soil sensitivity	22.6%
Protection of the environment factors	2.8%
Protection of genetic resources	5.2%
Recreation forests	6.1%

Source: National Forest Administration, www.rosilva.ro

The main restriction on harvesting comes from the accessibility of forest stands. The density of forest roads is 6.1 m/ha, which situates Romania among the latest ranked European countries (Germany: 45 m/ha, Switzerland: 44 m/ha, France: 26 m/ha). Thus, only 65% of Romanian forests are economically and technically accessible. There are 2.2 million ha of forests where the harvesting is not possible because of lack of forest roads.

The share of species on forest area is 31% beech, 30% coniferous, 18% oak, 16% various hard wood species and 5% various soft wood species. Because of availability of wood supply, more precise information of species contribution to the forest economy is provided by the pictures on harvested volumes (Table 21).

Table 21. Harvested wood volume (1000 m^3 – gross volume)

	1996	**1997**	**1998**	**1999**	**2000**	**2001**	**2002**
Total harvested	14803	14509	12642	13718	14285	13410	13039
coniferous	5751	5836	5195	5564	5346	4915	4983
beech	4266	4263	3635	4115	4509	4260	3786
oak	1658	1489	1276	1358	1333	1288	1295
Other hard wood	1876	1757	1491	1588	1731	1673	1582
Other soft wood	1252	1164	1045	1093	1366	1274	1390

Source: National Forest Administration, www.rosilva.ro, National Statistical Accounts

The reforestation of forest land according to the forest management planning concerned 18.5 thousand ha (0.31% of forest area) in 2003.

Table 22. Afforestations and reforestation (ha)

	1996	**1997**	**1998**	**1999**	**2000**	**2001**
Total	12,727	10,641	10,607	11,863	12,701	13,539
Plantations	12,559	10,479	10,542	11,820	12,640	13,465
coniferous trees	4,184	3,736	4,112	4,931	5,849	6,570
broad-leaved trees	8,375	6,743	6,430	6,889	6,791	6,895
Direct sowings	168	162	65	43	61	74
coniferous trees	12	54	15	8	16	2
broad-leaved trees	156	108	50	35	45	72

Source: National Forest Administration, www.rosilva.ro, National Statistical Accounts

The activity of afforestation (respectively, the change of land from other categories to a forest land by plantation) is very weak. In 2003, the National Forest administration afforestated 1400 ha which have been transferred at this aim from the Agency of Public Domain. The National Forest Administration started an afforestation programme for marginal agricultural lands within Prototype Carbon Fund framework, managed by World Bank. The object is to afforestate 6033 hectares (0.04% of total agricultural land) within 15 years.

5.3. Forest ownership

The forest ownership structure has changed from one third public, one third communal and institution' properties and one third private before the second war to 100% public during the communist period. After 1990, the restitution process started and the ratio between public and private was 95 to 5% from 1993 to 2000. The second restitution law brings the ownership on forest land at 70% State, 13% communes, 8% forest communities, 1% different institutions (churches, schools), and 8% private individuals. There are no industrial owned forests in Romania. Only half of the forests hold by individuals are more than one hectare (average 1.56 ha). The maximum size of private forests is 10 hectares.

Table 23. The ownership structure

Year	**Total**	**State**		**Communes**		**Private**	
		ha	%	ha	%	ha	%
2000	6,366,700	5,873,300	92.2	137,700	2.2	355,700	5.6
2001	6,366,700	5,483,500	86.1	384,000	6.0	499,200	7.9
2002	6,373,500	4,694,900	73.7	702,500	11.0	976,100	15.3
2003	6,384,700	4,443,700	69.6	1,941,000 (30.4%)			

Source: National Forest Administration, www.rosilva.ro

The share of ownership will not change significantly in the next years, as far the restitution process nears it end. In 1990 all forest estate was public ownership. The first restitution law reduced the public ownership by 357.4 thousand ha (5.6% of the national forest estate) and the second restitution law transferred other 1,583.6 thousand ha to the other entities. Now the State ownership represents 69.6% of the forest estate (Table 23). Private forest includes individuals, institutions, and forest communities. The forests holds by communes are in public ownership form.

The right to collect NWFP for recreation or self-consumption purposes is "every man's right", except the game. The law does not regulate formally the issue of public access.

Thus, the picking of berries, medicinal plants and other forest products, as well as the picking of dead timber for fuelwood are popular, historical customs. Nevertheless, the picking is regulated by the National Forest Administration, which can limit the quantity collected per day per individual. The NFA can also create a concession on NWFP for private contractors. The collecting of NWFP from other forests than those managed by the NFA is regulated only when collecting is of commercial purpose.

The ownership clarification will bring a positive input to the whole forest sector in the next years. It is assumed already that the appearance on the market of the timber from communes and forest communities will improve the concurrence and will stimulate the creativity and innovation among timber producers. The size of ownership of private individuals is a limiting factor for small-scale forestry and for enterprise development in rural area.

There is also a need to clarify the rights on non wood forest products. The NFA has now monopolistic position on NWFP collecting and processing. The prices for NWFP, when established on central and top-down way, risk do not reflect the real market value of NWFP, and to be a hampering factor for future private initiative in this field.

5.4. Main problems and research questions in forest resources and ownership for enterprise development in the forest sector

A first impediment for forest industries development was the continuously reduction of volumes of timber available for industry (Figure 17) and the uncertainty related with the quantities annually supplied.

A second impediment is represented by the rules of selling timber as settled out by the Government. The concessions are short time running (one year). Only recently the long term contracts have been introduced, based on the idea that the large companies with harvest and timber processing activities would prefer the long term contracts, which allow them to better investment strategy. On the other hand, the rules themselves for contracting and harvesting changed several time during the last five years. That introduced uncertainty on raw material procurement. A third impediment is represented by the low accessibility level of forest resource. The situation of forest roads implies high cost in harvesting.

Finally, the timber sellers pay little attention to the demand. For example, the selling of timber is based on poor timber shortage system. Firms with particular demand on roundwood quality rarely have the possibility to buy it on the auction. Starting with the year 2000, the National Forest Administration organised auction for high quality logs to address this demand.

Moreover, the legislative framework is rather not permissive to the intensive utilisation of forest resource, e.g. harvesting of timber at lower ages, for pulp purposes is restricted, as well as the use of forest for the intensive production of wild berries, etc.

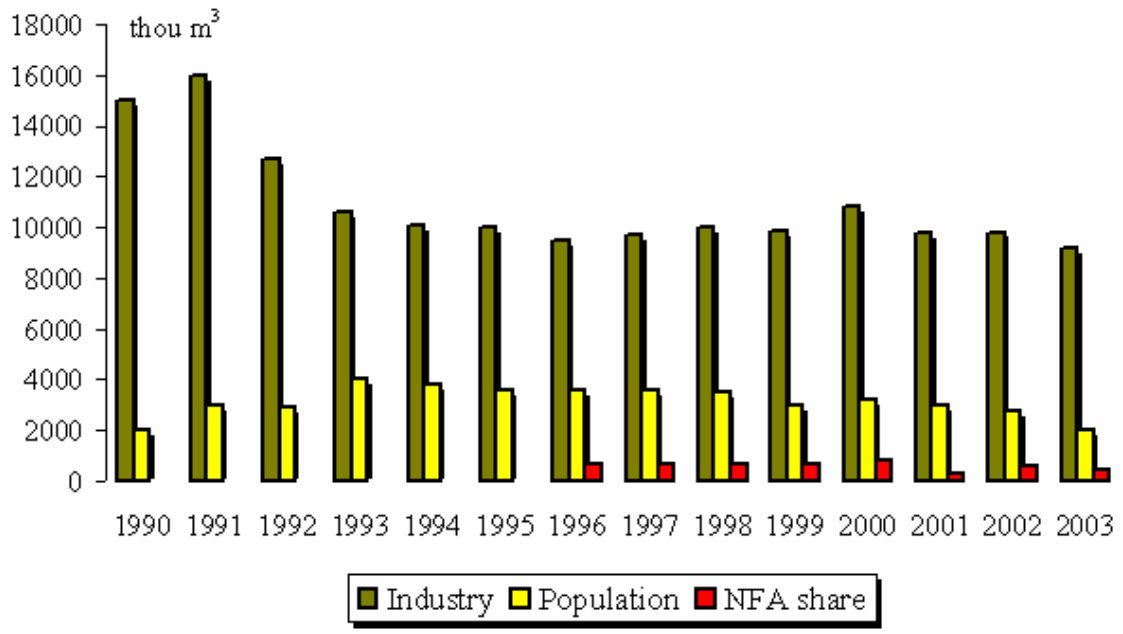


Figure 17. The repartition of harvested volumes by category of forest user

Main problems of enterprise development in the forest sector:

- ownership related: clarification of forest ownership; association of private forest owners to realise scale economies; clarification of rules and procedures of management of private forests;
- market related: the enterprises from forest sector need better knowledge on the demand, particularly on the internal demand; marketing, management of human resources, and innovation should be improved to meet the demand. There is a stringent need to meet/organise/enhance the demand for recreational activities and for NWFP;
- public regulation related: the system of annual allowable cut approval determined the latest years delays on harvesting activities (not in 2004); a second effect is to increase the uncertainty, because introduces new forest users and reduces the quantity of timber available for industrial purposes; the rules for timber selling procedures are not adapted to the diversity of harvesting firms; there is a lot of bureaucracy in keeping records about the firms' debts over the NFA;
- raw material procurement related: there is an artificial "scarcity" of timber resources in the country. Better timber shortage, more partnership oriented contracts and flexibility on the terms of contracts for harvesting should allow the interested contractors to build investment strategy and to improve the timber products utilisation.

Switzerland

Seeland, K. - Ballesteros, N. - Berger, T.

Klaus SEELAND, Prof. Dr., ETHZ

Swiss Federal Institute of Technology (ETH) Zurich, ETH-Zentrum, Rämistrasse 101, CH-8092 Zurich, Switzerland. Tel.: +41 1 632 32 19, Fax: +41 1 632 11 10. E-mail: klaus.seeland@env.ethz.ch

Nicolas BALLESTEROS, dipl. Forsting. ETHZ

Current address: Swiss Agency for the Environment, Forests and Landscape (SAEFL), Department Nature and Landscape, Section Landscape and Infrastructure, Worblaufenstrasse 68, 3063 Ittigen, Switzerland. Office: 2.093, Tel.: 031 322 93 85, Fax: 031 324 75 79. E-Mail: nicolas.ballesteros@buwal.admin.ch

Till BERGER, dipl. Biol., ETHZ

Swiss Federal Institute of Technology (ETH) Zurich, ETH-Zentrum, Rämistrasse 101, CH-8092 Zurich, Switzerland. Tel.: +41 1 632 32 15, Fax: +41 1 632 11 10. E-mail: till.berger@env.ethz.ch

Summary

Competitiveness of Swiss public forest enterprises is hampered by the fact that there is, by and large, little economic dependence on timber and wood production. Cross-financing and alternative or other sources of income are more important. Private forest enterprises do well if they are big enough to be economically viable. High level of wages and the low prices in the forest and timber market as compared to other countries is a limiting factor to entrepreneurship. The uncertain development of the forestry sector is not a rewarding perspective for the younger generation to embark on the establishment of forest enterprises. Other sectors of the economy offer better economic alternatives to entrepreneurs. Innovations in the forestry sector bear high uncertainties of success and profit. Externalities of the societal demands in the spheres of recreation, landscape aesthetics and climatic services are taken for granted and are likely not be adequately compensated in future.

1. Consumption

1.1. State of the art and historical development

From 1945 to 1995 the annual wood consumption of about 4 million m^3 was very constant, although there were considerable changes in use. Whereas the need for firewood was highest during the Second World War, it decreased during the subsequent years. There was again a slight increase during the last twenty years. The entire timber industry went through a phase of structural change during the last decades. The portion of pulpwood decreased, since wood of inferior quality was no longer used for reasons of profitability and the industry used to recycle old wood and waste paper. During the last 20 years the overall consumption of board and paper increased by a third.

Over the last 50 years more processed wood was imported than exported and lower quantities of unprocessed wood were exported. High quality roundwood consumption increased and the manufacturing and wood processing industry did well, provided enterprises were big enough to meet the challenges of shrinking profits. In comparison to 1955 only a fourth of the roundwood manufacturing industry, namely 700

enterprises, had survived in 2001 (Swiss Federal Statistical Office (SFSO) and Swiss Agency for the Environment, Forests, and Landscape (SAEFL) 2003), whereas the quantity of harvested wood had increased constantly. Employment in this sector was going down and apart from some big enterprises, only small and one-man carpenter workshops with low fix costs and high production flexibility as far as supply and demand is concerned could survive. Paragraph

There was an increasing demand for services, which formerly used to be provided by public forest enterprises and the question how to compensate them financially in times of decreasing profits in the wood marketing sector became a political issue. A process of rapid urbanisation of the Swiss Low-Plain and the population's rising amount of leisure time led to an increasing demand for recreation. The forest infrastructure used for recreation was expected by the public to be maintained without compensation and was taken for granted. Furthermore there is a general right of access to any forest in Switzerland, whether private or public, and therefore no market for NWFP such as, for instance, mushrooms or berries.

1.2. Forest products' and service consumption

In 2000, the Swiss population was 7.288 Mio., out of which 68% were living in urban areas (SFSO 2003). Less than 2% of the population lived in Bern, the federal capital. During the last 20 years urbanisation led to an enlargement of agglomerations. In terms of commercial relevance and population size Zurich, Basel, Geneva, and Bern are by far the most important (Eisinger 2003). These cities form an agglomeration belt across the midlands from Lake Geneva to Lake Constance.

From 1990 to 2002 the annual Gross Domestic Product (GDP) of Switzerland increased by 65 billion euro from 205.85 to 270.72 billion euro. In 2002, a per capita GDP of 37,096 euro was generated by approximately 60% of the population based on the 2000 census data (SFSO 2003). The primary production sector (forestry and agriculture) accounted only for 2.2%, while the share of the industrial and services' sectors was 29.5% and 66.8%, respectively.
In 2000, 61.5% of the Swiss population was in the most productive age between 20 and 64 years. The share of young people (0-19 years) was approximately 23% and thus below the average of developed countries (25%) (2002 data) (SFSO 2003) (Table 1).

Table 1. Age distribution of the Swiss population in 2000 (SFSO 2003)

Age	**0-19**	**20-39**	**40-59**	**60-79**	**80-**
Number	1,662.13	2,074.79	2,069.65	1,205.44	305.85
(%)	22.7	28.4	28.3	16.5	4.2

The monthly household expenditures increased by 27.2% from 1990 to 2001, whereas the consumer spending increased less (16%) than the transfer costs (50%) (SFSO 2003). In 2001, the share of consumer spending and transfer costs was 63% and 37%, respectively(Table 2).

Table 2. Household expenditure distribution 1990 and 2001 (SFSO 2003)

Household expenditures	**1990**		**2001**	
	€ [1)]	%	€	%
Total monthly household expenditures	4042	100.0	5143	100.0
Total consumer spending	2792	69.1	3258	63.4
Aliments and non alcoholic beverages	451	11.2	433	8.4
Alcoholic beverages	63	1.6	66	1.3
Clothing and shoes	197	4.9	170	3.3
Habitation and energy	699	17.3	910	17.7
Furnishing and running household expenditures	201	5.0	163	3.2
Healthcare	132	3.3	233	4.5
Traffic	308	7.6	376	7.3
Telecommunication	50	1.2	91	1.8
Entertainment, recreation and culture	234	5.8	340	6.6
School and education fees	32	0.8	19	0.4
Public houses and lodging	316	7.8	335	6.5
Other products and services	112	2.8	121	2.4
Total transfer costs	1250	30.9	1885	36.6
Insurance	650	16.1	1074	20.9
Social insurance contributions 2)	346	8.6	488	9.5
Health insurance contributions	170	4.2	345	6.7
Other insurance contributions	134	3.3	241	4.7
Taxes and fees	497	12.3	683	13.3
Contributions, donations and other transfers	103	2.5	127	2.5

1) Exchange rate of 10.08.04 2) Without Health insurance contribution

In contrast to most other private household expenditures which increased over the last decade, the expenditures for furniture have decreased. On the other hand, the growing market of food and cosmetics might open new niches for NWFP, since they are considered as natural alternatives to industrial products.

Furthermore, the technological progress in wood heating systems increases their competitiveness, which could lead to a rising demand for wood-pellets.

1.3. Market demand for forest related products and services by urban population

During the last 20 years, approximately 4.5 million m^3 of wood were used; apart from the increased use in 2000 and 2001 due to the storm "Lothar" in 1999 (Table 3). At present, the major part, namely 67% is roundwood, 22% firewood, and 11% pulpwood (SAEFL and Swiss Forest Agency 2003; SFSO and SAEFL 2003). During the last decade the share of roundwood consumption has increased, with an average of 54% (Table 4).

Table 3. Annual wood harvesting (SFSO and SAEFL 2003) million m^3

	Roundwood production						**Fuel wood**
	1997	**1998**	**1999**	**2000**	**2001**	**2002**	**2002**
Public	3.2	3.5	3.3	5.4	3.8	3.1	0.6
Private	1.2	1.5	1.4	3.9	1.8	1.4	0.4
Total	4.4	4.9	4.7	9.2	5.7	4.6	1.0

Two thirds of the wood is harvested in the Low Plain and the alpine region and the remaining third is spread over the Jurassic Plateau, the Alps and the southern part of the Alps, which is the smallest fraction.

Out of the total amount of Swiss wood and timber production 28 % is consumed as source of energy, 23 % for construction, 7 % for furniture, 6 % for packing material and 33 % for board and paper (SFSO and SAEFL 2003). According to this yearbook an increase of modern wood burning heating systems in private homes is to be expected during the next years.

Table 4. Average wood consumption during the last decade (thousand m^3)

	Round-wood	**Sawn softwood**	**Sawn hardwood**	**Particle board**	**Plywood**	**Fibre board**
Product	3,100	1,500	250	400	150	300

Source: (UNECE/FAO TIMBER database 2002, SAEFL 1998a)

Switzerland mainly imports semi- and fully fabricated wood products and exports roundwood. In terms of roundwood equivalents the annual wood consumption in Switzerland was 6 to 7 million m^3 during the last ten years[1]. The export of 5 to 6 million m^3 wood mainly consisted of unprocessed wood. Annually, about 4.5 million m^3 wood was cut and 6.5 to 7.5 million m^3 were imported[2] (see Table 11.2, p.121 in SFSO and SAEFL 2003).

The preliminary report of a SNSF (Swiss National Science Foundation) project of Zimmermann and Jakob published in 1990 (final report: Hurst 1991) showed that the most important value adding in wood processing did not happen in Switzerland and that there is a need for the Swiss timber industry to improve the efficacy of its production structures. Furthermore, the report criticises that the services provided by forest enterprises were not compensated as external costs. A survey of the wood marketing branch by the (SAEFL 2001), based on computer simulations, intended to optimise the procedures of logging and wood processing. It could be shown in this survey that an improved economic growth in Switzerland would have positive effects on the national timber industry and it was emphasised that the export of sawn timber should be increased and the domestic demand should be met with Swiss wood products. In a synthesis paper of the "FORUM für HOLZ", this strategy had been already propagated several years before this survey was made (Hofer 2003; SAEFL 1995a); for more details see Hofer 2003). Important political changes happened in the Swiss timber industry during the recent years. In the middle of the 1990s a study on the Swiss timber industry commissioned by the SAEFL (see SAEFL 1998a; SFSO and SAEFL 1998, 1999) was conducted and a support programme was initiated by the Swiss Confederation in co-operation with the Swiss Association of Forestry and Forest industry (LIGNUM). Its aim was to increase the use of domestic wood and timber through sales promotion and to encourage improved competitiveness of the wood chain (see Meuter 2001; Starck 2001). The sustainable management of forests and timber production should be certified by obtaining the FSC (Forest Stewardship Council) label.

[1] Except 2000 and 2001, where production and consumption were higher due to the storm "Lothar" in winter 1999.

[2] Roundwood equivalents

It was thus attempted to raise the consumer's awareness and preference to buy timber that was produced according to principles of sustainability. The sales promotion for timber and wood products and the opening of new markets was recommended by several key players. Recently, the Swiss Forestry Association issued 8 theses to optimise Swiss forestry (WVS 2003). A major point was the restructuring of the entire wood chain. It should become more efficient, for instance, by outsourcing wood harvesting to private forest enterprises or by making legal regulations more flexible and economic, which are sometimes hampering the logging and marketing of timber. Moreover, governmental subsidies were to be phased out for logging and structural changes should replace them by agreements with the owners on the achievements of economic objectives. Similar arguments were raised by forestry experts, who developed visions for a competitive timber industry for the Canton of Berne (Balsiger et al. 2003). One of the favoured approaches in this discussion was the formation of bigger forest clusters by merging small holdings of forest and make forestry more efficient. The Swiss National Forest Programme (WAP-CH) (see SAEFL 2004b) stressed the need for favourable economic and political conditions to support an efficient and innovative forestry and timber industry.

The quantities and the respective economic value of the NWFP were recorded for the first time in 1996 (Alfter 1998; SAEFL 1997b). Only the products which were obtained within the forest area were included (Table 5). Therefore, Christmas trees for instance, which were grown outside the forest, were not considered. The only reliable quantitative data are those from products which are recorded in the hunting statistics annually. Each year, game animals with an average value of 11.3 million euro are shot (Alfter 2004). Compared to the study on NWFP&S in Switzerland in 1996 (Alfter 1998; SAEFL 1997b) the updated version (Alfter 2004) shows some smaller deviations – positive and negative.

The socio-economic non-marketable services of the forests, for instance, recreation and protection forest, are difficult to quantify. The publication of (Kübler *et al.* 2001) contains a selection of studies, which quantify the services of the forests (table 12, p. 84).

The NWFP listed in Table 5 yield about 42 million euro annually (Alfter 1998; SAEFL 1997a). According to Alfter, the annual amount generated from all NWFP and services of Swiss forests is 5 billion CHF. The data of this investigation were obtained by inquiries of enterprises, shops and associations, which are concerned with the commercialisation of NWFP. A study of the SAEFL has shown that welfare amenities provided by forests can be quantified and worked out with adequate methods and made suggestions to internalize these costs (SAEFL 1995b). New forest related services such as adventure parks in treetops (rather small income for forest owners, since the service is provided by third parties) or burials in forests (the forest owner receives up to 20% (3400 euro on average)) can generate some additional income (Alfter 2004).

Table 5. Estimated quantity and value of NWFP (SAEFL 1997b :52)

Product	Quantity or number	Value in €/year	Comments
Chestnuts	12,000 kg	37,300.-	
Mushrooms	735,000 kg	5,400,000.-	includes individual use
Honey	500,000 kg	5,170,000.-	includes individual use
Beeswax	12,800 kg	50,000.-	
Seeds of forest plants	4,200 kg	118,700.-	
Tree nurseries	1,500,000	1,500,000.-	
Christmas trees	400	3,500,000.-	
Decorative materials:			
- pine cones	200 m^3		
- green foliage	8,000 m^3		
- moss	350 m^3		
medicinal use of flowers, roots, herbs berries, moss, lichen	25,000 kg	225,000.-	dry material
bark chips	700,000 m^3	16,300,000.-	
dead leaves	3,200 m^3		for decoration + compost
compost, mould	27,000 m^3	1,440,000.-	
food and fodder:			
- forest pastureland	42,500,000 kg	10,500,000.-	150,000 ha of forest pastures
- meat consumption by wild animals	261,000 kg		only for lynx and boar
- consumption of plants by wild animals	115,000,000 kg	20,800,000.-	

The study of Bieger *et al.* (2003) concludes that for the Swiss alpine regions the wood chain should be more focused on supporting local industries, such as house construction industry, tourism, wood processing enterprises and agriculture. In many studies it was argued that the sales promotion of roundwood and its processing should have priority. According to experts of the Swiss forest business (Arbeitsgruppe Starkholz 1999) large dimension timber (top diameter > 45 cm) is not suitable for bulk processing and is therefore not much in demand. But other authors ((Eschmann et al. 2003)) see no short-term available opportunity to reduce the rotation period, in order to decrease the share of large dimension timber in the near future. Furthermore, according to the latest study about Swiss foreign wood trade (SAEFL 2004a) there are no economic improvements to improve the timber industry. Services provided by forest enterprises should be compensated by applying marketing strategies, be it by outsourcing of forest management to private entrepreneurs or by supplying particular goods or services on demand. The urban forest enterprise of the city of Baden in Switzerland has made successful attempts in marketing nature conservation services in peri-urban forests (Schoop 1997).

1.4. Main problems and research questions in consumption for enterprise development

According to a study of the (SFSO and SAEFL 1998) a main problem of the Swiss timber industry is its dependence on the building industry and its cyclical economic development. In addition, there is a net import of semi-finished and finished products and a net export of raw wood, which allows only small profit margins. To increase its

profitability, the timber industry tries to optimise the wood chain. There are several studies in progress, which try to show how the problem of internalisation of external effects, such as the provision and maintenance of recreational infrastructure by forest enterprises can be solved. This is of great economic importance, since the study of (Schelbert and Maggi 1988) calculated an economic existence value between 1 and 3 billion Swiss Francs just for one of Zurich's peri-urban forests of approximately 800 hectares (Adlisberg, Zurich) in the late 1980s.

Annex A: Organisations studying forest product's consumption and main publications and information sources

Publications

Annual statistical bulletins

SFSO and SAEFL (eds.) 2003. Wald und Holz in der Schweiz: Jahrbuch 2003 / La forêt et le bois en Suisse: Annuaire 2003. Swiss Federal Statistical Office (SFSO), Swiss Agency for the Environment, Forests and Landscape (SAEFL), Neuchâtel. 178 p.

SAEFL and Swiss Forest Agency (eds.) 2003. Holzmarktbericht / Bulletin sur le marché du bois. 36. Swiss Agency for the Environment, Forests and Landscape (SAEFL), Swiss Federal Forest Agency (Eidg. Forstdirektion), Bern. 24 p.

Publications focusing on Swiss forestry

Bieger, T., Bischof, L. and Wittmer, A. 2003. Beitrag zur strukturellen & regionalökonomischen Entwicklung der Forstwirtschaft in Berggebieten: Effektivität und Effizienz der Bewirtschaftung von Schutzwäldern. Institut für Öffentliche Dienstleistungen und Tourismus, Universität St. Gallen, St. Gallen. 75 p.

Bürgi, M. and Schuler, A. (2003): Driving forces of forest management - an analysis of regeneration practices in the forests of the Swiss Central Plateau during 19th and 20th century. Forest Ecology and Management 176 173-183.

holz 21 (eds.) (2004): Resultate. Bulletin Förderprogramm holz 21 des BUWAL März 2004. Geschäftsstelle holz 21, Bern. 15 p.

Hurst, A. 1991. Das Nationale Forschungsprogramm 12 "Holz, erneuerbare Rohstoff- und Energiequelle" : Schlussbericht der Programmleitung. SAH-Bulletin 1/1999, Bern. 220 p.

Oswald, K., Thees, O., Lemm, R. and Riechsteiner, D. (2003): Verbesserung von organisatorischen Strukturen und betrieblichen Abläufen in der Holzproduktion: Fallbeispiel Kanton Solothurn, Forstkreis Bucheggberg / Lebern West. Swiss Federal Institute for Forest, Snow and Landscape Research (WSL), Section Forest Use Management, Birmensdorf. http://e-collection.ethbib.ethz.ch/show?type=bericht&nr=293. 198 p.

SAEFL (eds.) 1995. Regionalwirtschaftliche und ökologische Effekte der Wald- und Holzwirtschaft. Umwelt-Materialien 35. Swiss Agency for the Environment, Forests and Landscape (SAEFL), Bern. 90 p.

SAEFL (eds.) 1995. Holz - Rohstoff mit Zukunft: Ziele und Strategien zur Holzförderung. Umwelt-Materialien 33. Swiss Agency for the Environment, Forests and Landscape (SAEFL), Bern. 23 p.

SAEFL (eds.) 1997. Holzaussenhandel der Schweiz 1985-1995. Umwelt-Materialien Nr. 71. Swiss Agency for the Environment, Forests and Landscape (SAEFL), Bern. 70 p.

SAEFL (eds.) 1997. Ökosystem Wald - Rohstoff Holz - Prinzip Nachhaltigkeit: Kongress Wald und Holz vom 22./23. Oktober 1996 in Biel / Ecosystème: forêt - Matière première: bois - Principe: durabilité: Congrès Forêts et Bois du 22/23 octobre 1996 à Bienne. Umwelt-Materialien Nr. 67. Swiss Agency for the Environment, Forests and Landscape (SAEFL), Bern. 251 p.

SAEFL (eds.) 1998. Endverbrauch des Holzes in der Schweiz 1996. Umwelt-Materialien 94. Swiss Agency for the Environment, Forests and Landscape (SAEFL), Bern. 106 p.

SAEFL (eds.) 2001. Ökonomische Branchenstudie der Wald- und Holzwirtschaft. Umwelt-Materialien 138. Swiss Agency for the Environment, Forests and Landscape (SAEFL), Bern. 109 p.

SAH (eds.) 1998. ETH Kolloquium: Schweizer Holzwirtschaft im Spiegel der Zahlen. SAH Bulletin CSRB 2/1998. Schweizerische Arbeitsgemeinschaft für Holzforschung (SAH) % Lignum, Zürich. 28 p.

SFSO and SAEFL (eds.) 1998. Profil Schweizer Wald- und Holzwirtschaft 1995 / Profil de l'économie suisse des forêts et du bois en 1995. Swiss Federal Statistical Office (SFSO), Neuchâtel. 134 p.

SFSO and SAEFL (eds.) 1999. Holzverarbeitung in der Schweiz 1996: Studien über den Holzfluss 1991-1996 / La transformation du bois en Suisse. Swiss Federal Statistical Office, Neuchâtel. 51 p.

WSL and SAEFL (eds.) 1999. Schweizerisches Landesforstinventar: Ergebnisse der Zweitaufnahme 1993 - 1995. Swiss Federal Institute for Forest, Snow and Landscape Research (WSL) and Swiss Agency for the Environment, Forests and Landscape (SAEFL) (eds.) Haupt, Bern [etc.]. 442 p.

Zimmermann, A.J. and Jakob, R. 1990. Neuorientierung der schweizerischen Wald- und Holzwirtschaft. Nationales Forschungsprogramm 12 "Holz, erneuerbare Rohstoff- und Energiequelle" des Schweizerischen Nationalfonds Paul Haupt, Bern. 347 p.

NWFP&S

Alfter, P. 1998. Recherche sur les biens et services non-bois de la forêt suisse: Quantification et essai de valorisation dans le cadre d'un projet de l'OFEFP. Schweizerische Zeitschrift für Forstwesen 149:87-104.

Alfter, P. (2004): Biens non-bois et services de la forêt Suisse: Mise à jour partielle des données. Ingénieur forestier diplômé EPF-Z / CRIFOR, Fresens / NE. 24 p.

SAEFL (eds.) 1997. Criteria and indicators for sustainable forest management in Switzerland. Swiss Agency for the Environment, Forests and Landscape (SAEFL), Bern. 80 p.

SAEFL (eds.) 1997. Bewertung und Honorierung von Waldleistungen (VAFOR): Orientierungshilfe. Umwelt-Materialien 64. Swiss Agency for the Environment, Forests and Landscape (SAEFL), Bern. 52 p.

SAEFL (eds.) 1998. Überprüfung der Marktfähigkeit von forstbetrieblichen Leistungen. Praxishilfe. Vollzug Umwelt Swiss Agency for the Environment, Forests and Landscape (SAEFL), Bern. 122 p.

Table 6. List of organisations studying forest product's consumption and their corresponding web-pages

Name	**URL**	**Field of work**
Swiss Agency for the Environment, Forests and Landscape (SAEFL) (Bundesamt für Umwelt, Wald und Landschaft (BUWAL)), Bern.	www.environment-switzerland.ch	Support in working out basic elements
Swiss Forest Agency (Eidgenössische Forstdirektion), Bern	www.forstdirektion-schweiz.ch	Forest statistics, information
Swiss Federal Statistical Office (SFSO) (Bundesamt für Statistik (BFS)), Neuchâtel	www.statistik.admin.ch	Forest- and timber industry statistics
Swiss Federal Institute for Forest, Snow and Landscape Research (WSL) (Eidgenössische Forschungsanstalt für Wald, Schnee und Landschaft (WSL)), Birmensdorf, Zürich.	www.wsl.ch	Sense-making processes Chestnut production and processing (Marco Conedera, FNP Sottostazione, south of the Alps, Bellinzona-Ravecchia).
Swiss Federal Institute of Technology (ETH) (Eidgenössische Technische Hochschule (ETH)), Zürich. Department of Environmental Sciences (D-UWIS)	www.env.ethz.ch	Urban demand for NWFP&S Labelling in developing countries (FSC)
Hochschule für Architektur, Bau und Holz (HSB) – Fachbereich Holz, Biel/Bienne.	www.hsb.bfh.ch	Innovations in the field of wood
Swiss Federal Laboratories for Materials Testing and Research (Empa) (Eidgenössische Materialprüfungs- und Forschungsanstalt (EMPA)), Dübendorf	www.empa.ch	Development of new resources
Lignum / Timber Industry Switzerland, Zürich. Cédotec / Lignum (office romand), Le Mont sur Lausanne	www.lignum.ch	Represents the interests of the forest- and timber industry. Commercialisation

4. Non-wood forest products and services

4.1. State of the art and historical development

Swiss forests were always used in manifold ways. Be it to protect people from stone and snow avalanches or simply to meet their needs for wood supply. Also the agricultural usage was very important until the fifties of the last century. The development of agroforestry use is described extensively in several sources (Bürgi and Stuber 2003; Stuber and Bürgi 2001; Stuber and Bürgi 2002).
During the middle ages until the age of industrialisation, the combination of forestry and agriculture, some sort of slash-and-burn cultivation, was quite widespread. In the 18th and the 19th century it developed into agroforestry. Following a clearing, an area was temporally used for agriculture. Subsequently it was sowed with tree seeds (Bürgi and Stuber 2003). Until the late 18th century the forests were usually grazed. In particular, pig rearing and fattening was very common. In the beginning of the 20th century grazing in forests was still widespread on the Jurassic Plateau and in the alpine region. At that time, about a fourth of the forests of the Bernese Oberland and parts of the Valais, Grisons, and Ticino were grazed (Stuber and Bürgi 2001). In addition, forest litter was withdrawn, which was used as bedding for cattle and humans. By the advent of stable feeding during summer, the need for forest litter increased dramatically in the second half of the 20th century. At the same time, the local production of straw decreased, which lead to an additional shortage of bedding. As soon as train transportation enabled the import of straw over far distances, the collection of forest litter decreased tremendously (Stuber and Bürgi 2001, 2002).

The extraction of resin was in most cases not commercially viable and declined in the 19th century. Resin was used for shipbuilding, by cellarmen and tanners, and for domestic purposes (Bürgi and Stuber 2003). Forest fruits, such as berries, nuts, fir cones, and mushrooms were also used. But in the beginning of the 20th century they lost their importance even for the rural and poor people. Whilst berries were mainly used as food for self consumption and partially for commercial purposes, acorns, beech-nuts, and chestnuts were primary used for pig fattening. In addition, oil extracted from beech-nuts and chestnuts served as food for humans and cattle. Until the beginning of the 20th century fir cones, mainly stone-pine nuts, were regarded as delicacy in the alpine region (Bürgi and Stuber 2003). Apart from forest pasture and some gathering activities, the agrarian usage of forests disappeared almost completely from the memory of the people. This strongly contrasts with its earlier meaning, mostly for the poor, and its impact on the development and structure of the Swiss forests. A present study ("Austragswald") of the Swiss Federal Institute for Forest, Snow and Landscape Research (WSL) investigates the impact of the reintroduction of forest litter collection on soil and vegetation.

In 1994, the SAEFL launched the project VAFOR (Valorisation des Forêts) to inform forest owners and enterprises about the potential of commercialisation of NWFP, since the expenses for forest cultivation were no more covered by wood and forest products and services (SAEFL 1997a, 1998b). Within the framework of this project a list of the socio-economic products and services from and by forests as NWFP&S, was compiled. On this basis, an internal internet survey of the Chair of Forest Policy and Economics (ETH Zurich) was conducted (Berger and Seeland 2004), and a list of existing NWFP&S in Switzerland was produced.

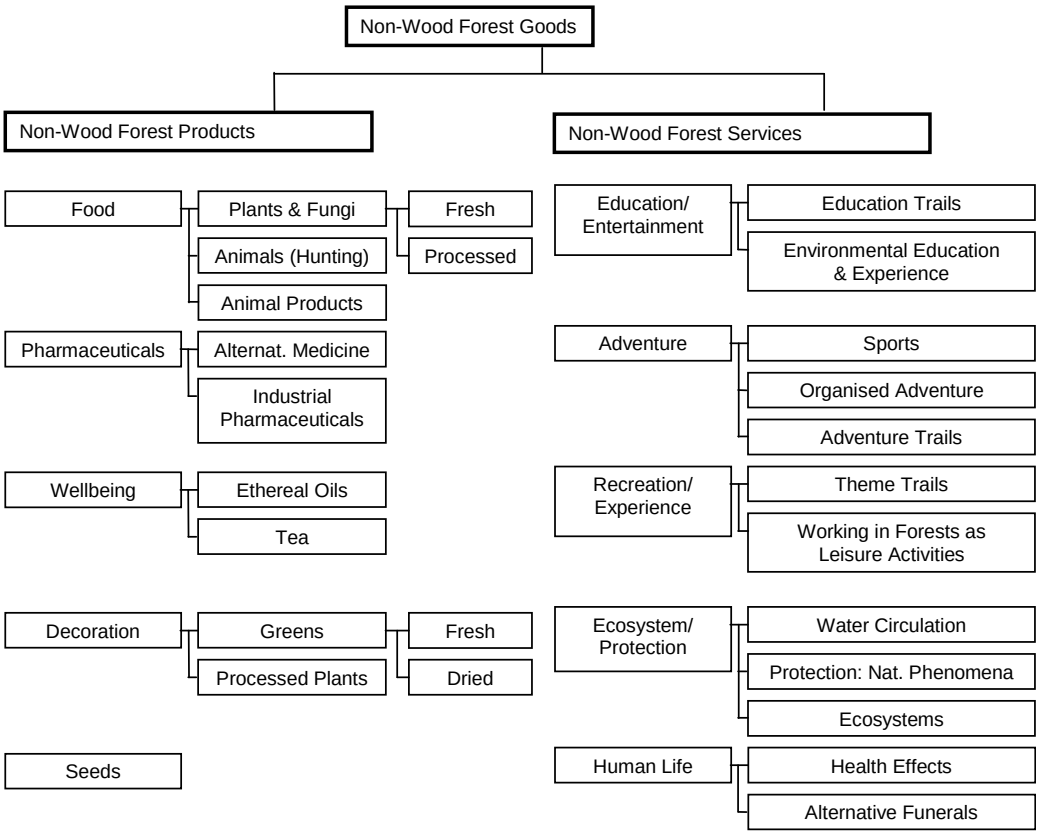


Figure 1. Diagram of actual NFWP&S in Switzerland (Berger and Seeland 2004)

According to Alfter (1998), NWFP are defined as products including animals and vegetation, which are to be found inside forests, except wood and timber. The NWF services are subdivided into environmental services, which serve the whole natural environment (biodiversity, noise control, water supply, etc.) and in social and cultural services, such as recreation. See chapter 1.3 for more information about the value of these NWFP&S. Forest enterprises are of considerable importance in rural areas as employers. Due to structural adjustments in forestry and agriculture, marketable NWFP would have an important potential as well.

According to article 699 of the Swiss Federal Civil Code, the public has the general right of access to pasture and forest. The same article says that the collection of wild-growing berries, mushrooms, herbs etc. is allowed in reasonable amounts. The various cantonal laws have their distinct regulations as far as the collection of NWFP are concerned (season, amount, etc.). With respect to non-marketable goods and services of the Swiss forest with regard to NWFP some references are given in (Kübler *et al.* 2001): 84). Despite several efforts of the federation during the last years (e.g. VAFOR) NWFP are still economically unimportant. Wood products are still dominant in the forest sector. Apart from some exceptions, NWFS such as the function of recreation and protection have not yet been internalised.

Table 7 lists national and local organisations studying non-wood forest products. Statistical information sources and web sites at national, local and enterprise level are listed in Table 8.

Table 7. List of organisations studying NWFP&S and their corresponding web-pages

Name of institution	URL	Field of work
Swiss Agency for the Environment, Forests and Landscape (SAEFL) (Bundesamt für Umwelt, Wald und Landschaft (BUWAL)), Bern.	www.environment-switzerland.ch	Executive function, forest policy, developing basic knowledge.
Swiss Federal Institute for Forest, Snow and Landscape Research (WSL) (Eidgenössische Forschungsanstalt für Wald, Schnee und Landschaft (WSL)), Birmensdorf, Zürich.	www.wsl.ch	Future oriented management of forest use. Land resources in peri-urban environments
Swiss Federal Institute of Technology (ETH) Eidgenössische Technische Hochschule (ETH), Zürich. Department of Environmental Sciences (D-UWIS)	www.env.ethz.ch	Attitude and perception of urban dwellers towards green spaces. The meaning of forest services to people
Swiss Forest Agency (Eidgenössische Forstdirektion), Bern	www.forstdirektion-schweiz.ch	Forest statistics, general information
Federal Institute for Fruit, Wine and Garden Cultivation (FAW, Agroscope) Eidg. Forschungsanstalt für Obst-, Wein- und Gartenbau, Wädenswil	www.faw.ch	Cultivation of agricultural products including forest related products such as chestnuts
SILVIVA – union for environmental education and forest SILVIVA – Verein für Umweltbildung und Wald, Birmensdorf, Zürich	www.silviva.ch	NWFS: Forest- and nature-pedagogy, environmental education
Protection.Forest.Man – a collaboration of SILVIVA, GOWN and the Swiss underwriting association Wald.Schutz.Mensch – eine Zusammenarbeit von SILVIVA, GOWN und ASA (Elementarschadenpool)	www.schutz-wald-mensch.ch	Educational trails concerning protection forest and other forest services
Link Institute – bureau for market and socoal research Link Institut – Markt- und Sozialforschungsbüro, Luzern	www.link.ch	Research activites: Perception of urban dwellers towards forests and their services, activities in forests

Table 8. List of statistical information sources, databases. Web sites at national/local/enterprise level

Name	URL	Information
Swiss Federal Statistical Office (SFSO) (Bundesamt für Statistik (BFS)), Neuchâtel	www.agr-bfs.ch	Statistical information
Interest Group Pro-Chestnut Central Switzerland and Murg IG Pro-Kastanie Zentralschweiz und Pro-Kastanie Murg	www.kastanien.net	General information about chestnut cultivation and consumption and about the activities of IG Pro-Chestnut
Friedwald GmbH Switzerland	www.friedwald.ch	Information about locations of forest funerals
GrünStadtZürich, department for civil engineering and disposal of Zurich	www3.stzh.ch/content/internet/gsz/home.html	Range of NWFP&S in Zurich
GrünStadtZürich, Tiefbau- und Entsorgungsdepartement Zürich		
Forest Economy Switzerland Verband Waldwirtschaft Schweiz	http://www.wvs.ch/de/waldwirt/fuchs.html	Information about innovative projects in the field of NWFP&S
Association of the Communities of the Region Malcantone Associazione dei Comuni Regione Malcantone, Tessin	http://www.regionemalcantone.ch	Informatin about a chestnut trail
Local Autorities Association UNESCO Biosphere Gemeindeverband UNESCO Biosphäre, Luzern	http://www.biosphaere.ch	Value of NWFP, sustainability, trails for information and recreation
Association Nature-School St. Gallen Verein Naturschule St. Gallen	http://www.naturschule.ch/index.htm	Education in frorests and trails

4.2. Case studies of successful marketing strategies

Case study 1: Alternative funerals in forests

(a) NWFP & S definition, area of production, harvesting level, technical characteristics of production

Alternative funerals in forests are a relatively new forest related service that first occurred in Switzerland in 1994. It is an unconventional option to bury the ashes of the deceased under trees, which are purchased by a person and will be protected by law for 99 years (entry in the cadastral register of the corresponding municipality). The service was first provided and patented by the Swiss entrepreneur Ueli Sauter who founded the company “Friedwald GmbH” in 1994. Apart from some slight deviations, the same service is provided by the municipal office “GrünStadtZürich” (GSZ), a division of the department for civil engineering of Zurich, in collaboration with the municipal office for funerals and cemeteries (Bestattungs- und Friedhofsamt). In some very few cases, this service is also provided by some other municipalities.

Since in most Cantons of Switzerland people are free where to bury the ashes of family members this service remains a rather small business. Nevertheless, the sales of Friedwald GmbH grew from 2000 up to 20% per year and reached in 2003 an amount of 600'000 euro with nearly 100 funerals. GSZ provides the service since early 2003 and made about 40'000 euro with 60 funerals.

Today, Friedwald GmbH provides 50 locations which serve as burial grounds, most of them in the northern part of Switzerland in the regions of Basel, Berne, Zurich, Aargau, Lucerne and St. Gallen. New locations are in preparation and others are planned. GSZ offers its services on two small forest patches near a municipal graveyard.

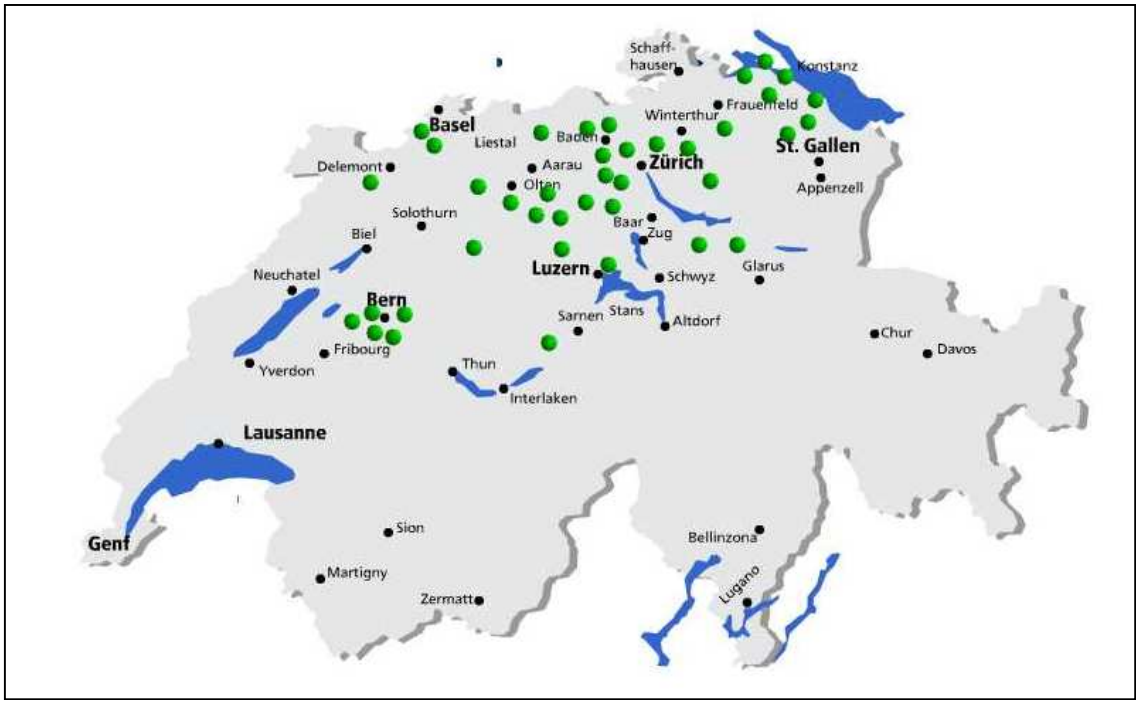


Figure 1. Locations of the company Friedwald GmbH without locations of the agent "Forêt Dernier Repos" in western Switzerland

(b) Description of the product chain organisation

The service provided by Friedwald GmbH comprises only a few activities. There are no contracts or agreements with crematories, since cases of death have to be announced at the office of civic affairs (Zivilstandsamt) of the respective municipality, which automatically organises the burial or cremation with the office for funerals and cemeteries (Bestattungs- und Friedhofsamt). In the latter case the ashes of the deceased are treated according to their last will. The deceased either contacted Friedwald GmbH in their lifetime or – if there is no other order by them – their families can get in touch with the company after death. In some rare cases interested people are mediated by offices of civic affairs (Zivilstandsämter) or urns are sent from undertakers from Germany near Konstanz to locations in the canton Thurgau. In the case of an agreement, the clients choose their last resting-place under a young tree in one of the 50 locations. The ashes are then buried at the foot of this tree.

At the location in the canton Biel the opening of the hole has to be done by a forester, whereas at the other locations the involvement of foresters or other employees of forest enterprises are facultative. There are several partners for mental support (one-man business) to the relatives, which are provided by Friedwald GmbH on request. There is no contractual agreement. Apart from some undertakers in Germany there are no foreign companies involved in any aspects of the service provided by Friedwald GmbH. The municipal supplier in Zurich, GSZ, directly collaborates with the office for funerals and cemeteries (Bestattungs- und Friedhofsamt), with which the clients directly arrange the funeral which will then be accompanied by GSZ.

(c) Policy framework
Funerals of deceased persons' ashes in forests need no official permission. They are, however, limited to defined forest patches, which have to be granted by the forest office of the respective canton. The crucial criterion is whether such a region has to be defined as graveyard or not. In the latter case, the purpose of the forest patch is alienated according to the federal law about the forest Art. 4. A permission of the forest office is therefore linked to three conditions. Firstly, the forest law (WaG) applies to the concerned forest, secondly, the public has the right of access according to article 699 of the Swiss Federal Civil Code and thirdly, neither gravestones nor plates, candles or flowerpots are allowed in the location where the ashes have been buried.

In most parts of Switzerland, the funeral of the ashes of deceased is not limited to official graveyards, which is regulated by cantonal law. Family members of the deceased often organise the funerals by themselves, which reduces the margin of suppliers of this service. One of the major differences of private funerals to the service provided by Friedwald and GSZ is the protection by law of a chosen family tree for 99 and 30 years, respectively.

Municipalities do not have any regulatory influence on the services provided by Friedwald GmbH or GSZ, since there are no specific laws. There are neither trainings nor courses to train the personnel to support this special kind of forest related service. On an academic level, there is only one semester-thesis in Germany that has treated some aspects of this topic.

(d) Profit appropriation by the landowner/contractor/manufacturer/dealer/seller
Friedwald GmbH and GSZ charge different services: while the former bill the customers for the funeral itself (100-150 euro), GSZ raises a general commission for the fostering of the forest (130 euro). The price for family trees varies widely and ranges at GSZ from 650 euro (residents of the canton of Zurich) to 1'300 euro (clients from outside the canton) and at Friedwald GmbH from 3'200 euro to 5'750 euro (depending on the position of the trees).

Forest owners receive about 33% of the margin of Friedwald GmbH. Another third is administration fees. The last third is mostly reinvested in new locations. Undertakers from Germany receive 5% of the margin of Friedwald GmbH for procuring clients.

In contrast to Friedwald GmbH, which makes profits, the margin of GSZ and the office for funerals and cemeteries (Bestattungs- und Friedhofsamt) just cover the costs. The

margin from the provision of family trees are transferred to the city treasury through the office for funerals and cemeteries (Bestattungs- und Friedhofsamt), while GSZ receives the general commission for the fostering of the forest. The forest patches used by GSZ are the property of the city.

(e) Contractual agreements between landowner and resource manager; networking and joint ventures between non-wood processing and service industries
Friedwald GmbH has made contracts with private and public forest owners, which regulate the share of the profit, the rights and the form of usage.

GSZ, the office for funerals and cemeteries (Bestattungs- und Friedhofsamt) and other involved offices of the city of Zurich have made written statements of cooperation.

Friedwald has a loose network of partners for mental support, which are recommended on request. They do not with a contractual agreement. None of the suppliers has joint-ventures with other companies, but Friedwald has an agent in western Switzerland (French speaking) called “Forêt Dernier Repos”, that works on a commission basis.

Purchased (Friedwald GmbH) or leased (GSZ) family trees are protected by law with a registration in the cadastral register of the respective municipality.

(f) Characteristics of technological or organizational innovation behaviour in non-wood production, processing and service industries
Since the work of both suppliers of this service is based on existing infrastructures, methods and techniques, neither organisational nor technological innovations have been developed.

(g) Territorial marketing (i.e.: integration of the NWFP&S to other services and products offered by the local community)
Friedwald GmbH advertises in local newspapers. In addition, the offices for civic affairs and offices for funerals and cemeteries inform clients about the different forms of funerals, including those in forests.

(h) Lessons learned/driving forces/factors affecting competitiveness (SWOT analysis)
The most crucial strength of this service is its novelty. According to Friedwald GmbH no weaknesses are known. As threats are seen poor co-operation by the municipalities or churches and the cantonal laws that allow people to bury the ashes of their deceased family members on their own. The increasing demand for this service is the most important opportunity.

(i) Open questions (barriers to entrepreneurship) and related research needs
A market survey to identify the actual demand and the needs of potential clients would be helpful in planning further locations.

(j) Recommendations, proposals for documentation

Table 9. Information sources

Name of Institution	URL (http://www.)	Information
Friedwald GmbH	www.friedwald.ch	Contact, information about the company, the locations and services
GrünStadtZürich	www3.stzh.ch/content/internet/gsz/home.html	Information about the service provided, and the locations
Waldesruh	www.waldesruh.ch	Contact, information about the company, the locations and services
Office for cemetery and sepulture of the municipality of Zurch	www.bestattungsamt.stzh.ch	Information about the service provided

Case study 2: Chestnuts

(a) NWFP & S definition, area of production, harvesting level, technical characteristics of production

The chestnut culture as it exists nowadays in Switzerland emerged after the year 1000 A.D. (Conedera 1996) and was the major food source of the mountain population south of the alps (Lurati 1971) that depended on it during four to six months per year. The importance of chestnuts decreased mainly with the introduction of other food items in the 19th century. Today, the chestnut has been rediscovered as traditional, healthy and a biological valuable alternative to conventional food.

There are two different kinds of chestnut with different market values (Conedera 1996): “marroni” and “common” chestnuts. This difference is rather of commercial than of biological nature and can vary from country to country. In southern Switzerland and Italy, marroni are distinguished from common chestnuts as they have easier-to-peel fruits, finer skin and less fruits in their husk.

Chestnuts occur also in Northern Switzerland but the commercial cultivation is mainly concentrated on the Ticino and to a smaller extent on the canton Grisons. In central Switzerland a chestnut culture has emerged in the late 14th century and the production reached a similar importance as in southern Switzerland. It has been revitalised in recent years after the importance of chestnuts decreased substantially over the last 200 years. However, in terms of harvested amounts, the canton Ticino is the main chestnut producer in Switzerland today, and the only region with reliable data on official harvesting data.

In Switzerland 200 tons of chestnuts were produced in 1999 with a share of 0.04% in international production (FAO 2001). The largest portion of collected chestnuts is used for private consumption (Moretti 2004).

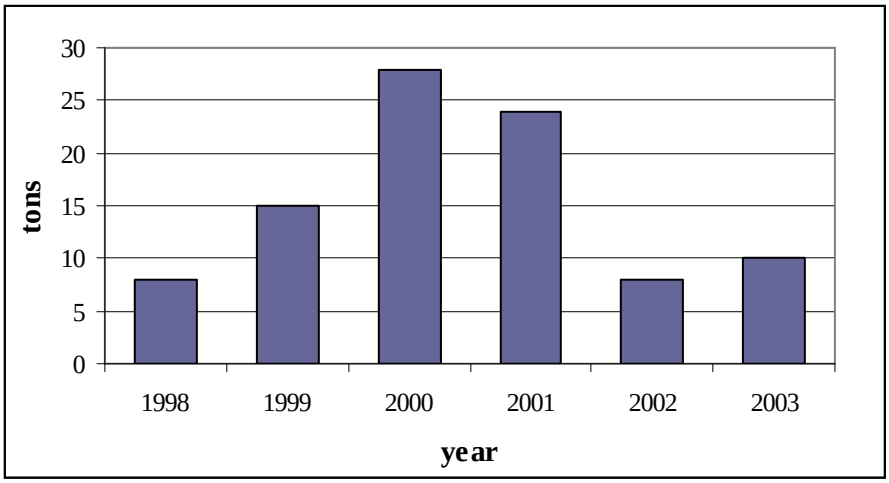


Figure 2. Quantities of chestnuts delivered to the three collection centres in the canton Ticino (Moretti 2004).

To strengthen the chestnut market in the canton Ticino several attempts have been made to establish collection centres. In 1998, three distributors have agreed to do the collection and selling. The amount of chestnuts delivered to and distributed from the three collection centres increased in the first three years from 8 tons to almost 30 tons per year, but fell to the level of 1998 in 2002 again (Moretti 2004) (Figure 2). Since chestnut production is strongly influenced by climatic conditions, heavy fluctuations of the amounts traded are not uncommon. But there might be two other reasons for the decline from 2000 to 2003: first, private parallel markets might have emerged, where the collectors sell their harvest directly to the consumers. Secondly, since the quantities of collected chestnuts do not reach the critical mass to be profitable for the collection centres, they tend to do the obligatory treatment for the elimination of pathogens with less care than private sellers. Therefore, the customer's trust in the collection centres might have declined. The collected fruits have to be treated immediately. In commercial processing classical techniques to kill pathogens and to reduce the metabolism of the chestnuts have been replaced by modern methods such as the cold or warm hydrotherapy. Most of the harvest is done by hand (Conedera *et al.* 2004). The productivity varies considerably (from 5 to 30 kg/h), depending on the size of the fruits and the terrain (Breisch 1993).

(b) Description of the product chain organisation

Because of the low market prices the gathering of chestnuts is not a cost-effective business. Therefore, the commercial harvesting is done by private people such as pensioners and unemployed, who intend to generate an additional income. The use of harvester to increase the efficiency is limited by the properties of the terrain (steep slopes, unevenness, distribution of the chestnut trees, etc.).

The collected chestnuts are either sold directly to the consumers or to one of the three collection centres in the canton Ticino, which sort the chestnuts by size. Chestnuts of lager size are then treated as described above and sold to groceries or directly to consumers. The smaller chestnuts are sold untreated to companies, which make beer, pasta, cookies, jam, etc. out of it. Because of the low quantities, the commerce and manufacturing of chestnuts is in most cases only an additional activity of the involved

companies. One of the biggest buyers of small chestnuts in the canton Ticino is a two-man company called “La Pinca SA”, which manufactures them into chestnut-beer.

Switzerland imports large quantities of chestnuts from Italy, France and Portugal and exports smaller amounts mainly to Germany and Austria (FCA 2004) (Table 10).

Table 10. Foreign commerce of chestnuts in 2003

	Italy		**France**		**Germany**		**Total EU**	
	tons	€	tons	€	tons	€	tons	€
Import	2,296.4	7,789,992	222.3	392,043	1.7	5,508	2,683.3	8,634,414
Export	1.8	5,724	0	0	22.8	46,533	45.3	92,084

Source: (Federal Customs Administration, FCA 2004)

(c) Policy framework

Chestnut orchards are considered as ecological buffer areas and their restoration is therefore subsidised by the cantonal forest office and by the Swiss Landscape Fond (to about 70 to 80% of the costs). The financial contributions to the ecological cultivation are then supplied by the Federal government (Swiss federal office for agriculture via the cantonal agricultural office: 1040 euro per ha and 13 euro per tree). The ecological standards, which have to be met in order to receive financial contributions, are regulated on the cantonal level by laws and regulations. The grant for recultivation of ecological chestnut orchards basically depends on the structure, size, coherence and the form of cultivation, which has to be sustainable.

In accordance with article 699 of the Swiss Federal Civil Code, which regulates the access of forests and pastures, the canton Ticino bans the general public from chestnut collection on orchards by law, to protect the interest of the chestnut orchard managers and owners. In regions where chestnut trees are not managed, the gathering is granted to the public.

The Swiss federal institute for forest, snow and landscape research (WSL) or the forest office of the canton Ticino offer chestnut processing courses to the public. Research on cultivation and processing is done by the agricultural research station (RAC, Station fédérale de recherches agronomiques de Changins) in Cadenazzo and the WSL.

(d) Profit appropriation by the landowner/contractor/ manufacturer/dealer/seller

The market distinguishes four sizes of chestnuts. When sold to a distributor the large-sized fruits (best) fetch with 2 euro/kg the highest yield, whereas small-sized chestnuts can be sold for only 0.5 euro/kg. Direct marketing of large-sized fruits yields on average 3.2 euro/kg. Distributors (collection centres) buy all sizes of chestnuts, separate them and sell those with the best quality for 3.2 euro/kg on average, whereas the smaller fruits are sold without margin to manufacturers.

Since distributive trade with chestnuts is only a side-business of the distributors, the profit is rarely reinvested in the product chain. As the collection of chestnuts is not a profitable business, the margin is generally not invested in the cultivation of chestnut trees.

(e) Contractual agreements between landowner and resource manager; networking and joint ventures between non-wood processing and service industries
Normally, chestnut orchards are managed by their owners. In some cases, cultivation and harvest are done by third parties that have lease contracts with the owners, whereas only a few hectares are managed this way. In either case, the managers have the control over the harvest and can exclude other parties. The public is permitted to gather in regions where there are no cultivated chestnut orchards. There are no networks or joint-ventures between harvesters, managers or collection centres. Contrary to the recent years, collection centres do not guarantee anymore to buy all chestnuts delivered to them, since their sales have been decreasing since 2000 (see Figure 2).

(f) Characteristics of technological or organizational innovation behaviour in non-wood production, processing and service industries
In recent years, there have been hardly any technical or organisational innovations in the field of harvesting and processing of raw chestnuts. In contrast, many methods in the sector of other products have been adapted and are now used for the manufacturing of chestnuts, such as brewing beer or the production of cookies.

(g) Territorial marketing (i.e.: integration of the NWFP&S to other services and products offered by the local community)
The local press is the main channel to advertise chestnuts and their products. In the chestnut season, many articles are written, which inform about their cultivation, the harvest, new companies in this sector and about old and new products. Furthermore, there are two periodicals on chestnuts, one in the canton Ticino (Il Castagno) and one in the German speaking central Switzerland (Chestene Zytig). Many cooking books have taken up chestnut recipes.

(h) Lessons learned/driving forces/factors affecting competitiveness (SWOT analysis)
The cultivation and consumption of chestnuts has a long standing tradition in some regions of Switzerland, such as the cantons Ticino and Grison and some Cantons in central Switzerland, which has a considerable influence on the marketability of this product. Furthermore, the commercial food market has rediscovered it as a healthy and biological valuable product. Chestnuts and their products have become popular again.

The profitability of the chestnut market is rather limited by many different varieties and sizes, which hamper an efficient processing. Missing quality standards and low profitability cause a disregardful treatment of the chestnuts after collection, which reduces the quality of these fruits. In addition, traditional knowledge gets lost or is already missing and the manufacturing of chestnut products is in most cases not very professional. Since the introduction of the three collection centres, the chestnut market got a certain stimulation, which seems to disappear again already.

Chestnuts imported from Italy are generally of better quality than those in Switzerland, for the reasons mentioned above. Since they are sold in different markets, they do not directly threat the Swiss sales, but disappointed consumers may loose their trust in this product. In general, the Swiss chestnut market is dominated by Italian imports, especially in autumn, the peak season, when freshly roasted marroni are sold in the streets.

(i) Open questions (barriers to entrepreneurship) and related research needs
For historical reasons, chestnut breeding resulted in a product quality, which hampers their commercialisation, since many varieties and sizes are mixed. Homogeneous chestnut orchards of varieties with large-sized fruits would improve the profitability. Research on new harvesting techniques and on the special needs of certain varieties would be helpful in increasing the productivity.

4.3 Conclusions: Supporting and limiting factors for enterprise development in non-wood forest products and services production and barriers to entrepreneurship

The economic relevance of NWFP&S is rather limited in Switzerland and forest enterprises rarely trade in these resources. The main factors limiting the competitiveness of Swiss forest enterprises in this field are

- Low harvesting levels of NWFP
- High costs of harvesting and/or treatment
- Low levels of networking with processing industry, tourism, merchants, etc.
- Missing knowledge (know-how and competence)
- Laws and regulations
- Conservative attitude and a lack of innovation.

The entrepreneurship in the forest industry is partly hampered by federal, cantonal and municipal laws and regulations, such as article 699 of the Swiss Federal Civil Code, which permits public access to the forests and the gathering of a variety of forest products. This is mainly relevant in densely populated regions. The cultivation of NWFP is restricted by the Swiss federal forest legislation, in order to maintain the functions of the forests (sustainability). Thus, forest enterprises are faced with restricted usage rights, low harvesting levels and high harvesting costs. The commercialisation of NWFS is limited by the fact that most services are provided by the mere access to the forests (e.g. recreation) and the need for skilled labour to provide additional services, such as education or adventure events, impedes the competitiveness of forest enterprises in this field. A lack of innovation and low levels of networking with industry, tourism, merchants, etc. are relevant factors as well. However, NWFP that are hardly available in urban areas, such as decorative articles (fir cones, chestnut husks, greens, etc.), can seasonally be sold at high prices. But the markets for many NWFP&S are rather small and overhead costs can lead to unprofitable market prices. A major barrier to entrepreneurship is the missing information on potential markets in urban areas. Thus, forest enterprises need incentives to develop new NWFP&S that centre around the needs of the urban population as the core customer potential.

The main problems and research questions for enterprise development in the field of NWFP&S are on the one hand selling conditions, which hinder them from developing and offering well directed NWFP&S, and on the other hand low levels of innovation, know-how or competence to offer profit-yielding products and services (e.g. lacking pedagogic skills required for outdoor education services). Most services, which are provided by forest enterprises to the public, are hardly marketable or unprofitable. Since the economic rate of return from wood sales is decreasing, an increase in collective financial compensation for the provision of these services could become a positive policy achievement.

5. Forests and ownership

5.1. State of the art and historical development

During the Middle Ages the use of mountainous forests was banned, i.e. any use was strictly forbidden and severely punished. In the first half of the 19th century natural calamities became frequent which were widely claimed to be caused by deforestation. This raised political initiatives to promulgate the first Swiss Forest Police Law in 1876 and, among many other restrictions, clear cutting of forests were prohibited. In the Forest Police Law of 1902 more responsibility for the maintenance of the forest was transferred to private forest owners. (Schuler *et al.* 2000) refer to several aspects of historical forest use and the respective change in forest aesthetics over the last centuries. In the 1970s the most important stakeholders in the field of forest- and timber industry participated in forest policy, which reflected the urgent problems of this sector at that time. Major topics were the reduction of forests in urban areas, problems arising from inadequate game animal populations and natural disasters. In the course of the debate about the forest dieback, the promotion of a new federal forest law was launched (Zimmermann 1988), which was implemented on the first January 1993. Important elements of this law are conservation and fostering of forests in the light of sustainability. The future development in the forest sector is inter alia strongly influenced by sector-related political processes.

In order to elaborate instruments and measures to implement key points of the Swiss forest policy, a forest program (WAP-CH) was launched in 2001. Five prioritized aims have been defined by it (SAEFL 2004b): maintenance of the services provided by protection forests, preservation of biodiversity, protection of the natural resources provided by forests (water, soil, etc.), strengthening of the value added chain of wood and increasing the efficiency of forestry.

In the near future, the forestry sector will be confronted with several important challenges: since wood production is not profitable without financial contributions, structural changes have become necessary. The preservation of forest areas, mainly in mountainous areas, is discussed (see Bebi and Baur 2002). Furthermore, the large wood stocks and the therefore increasing amount of large dimensioned timber are very cost-intensive for wood processing companies.

5.2. Forest resources

Almost one third of the Swiss territory is covered with forests. Another third comprises agricultural land, one fifth is unproductive rock area, and 7% is covered with buildings and infrastructure (SFSO and SAEFL 2003). The distribution of the forest area depends on the geographical region (Figure 3). Forests cover about a fourth of the midlands, 41% of the Jurassic Plateau, 33% of the alpine region, and 48% of the southern part of the Alps (WSL and SAEFL 1999).

Source: (SFSO and SAEFL 2003: 9)

Figure 3. Share of forest area in Switzerland

The distribution of the predominant tree species varies between the regions. Norway spruce is the most common species in the entire accessible forest area with a share of 43.1% (47.6% of the total biomass), followed by beech (*Fagus sylvatica L.*) (17.9%/17.1%). Further common tree species are (with decreasing abundance) the silver fir (*Abies alba Mill.*), European larch (*Larix decidua* Mill.), common pine (*Pinus sylvestris* L.), ash (*Fraxinus excelsior* L.), chestnut (*Castanea sativa* Mill.), the oak (*Quercus robur* L. and *Quercus petraea* Liebl.), sycamore maple (*Acer pseudoplatanus* L.) and the Swiss stone pine (*Pinus cembra* L.) (Brändli 1996; WSL and SAEFL 1999). Coniferous forests are most frequent, followed by mixed forests (Table 11). They constitute the main portion of the growing stock of Switzerland's forests (Table 12).

Table 11. Forest area

Land categories	**Area (1000 ha)**
Land area	4128.4
Forest and other wooden land	1234
Forest	1173
Predomi-nantly coniferous forest	522
Predomi-nately broadleaved forest	221
Mixed forest	383
Share of forest in total land area	31%
Forest available for wood supply	92.4%

Source: (WSL and SAEFL 1999)

The dominant forest type is the high forest with a share of 80%. 85% of the trees are even-aged. Coppice with standards and coppice forests make up only 2% in each area. Wooded pastures and the few orchards (mainly chestnut or walnut), but also non-overgrown surfaces such as forest roads and timber yards are counted as forest area.

Table 12. Growing stock

Forest not available for wood supply	For economic reasons	0%
	For conservation/ protection reasons	0%
Mean net annual increment	Forest	9.2 m^3/a/year
Growing stock	Other wooded land and trees outside forest	?
	Broadleaved forest	116,059 thousand m^3
	Coniferous forest	287,448 thousand m^3
	Total forest	403,507 thousand m^3

Source: (WSL and SAEFL 1999)

On average 2.5 million tree saplings per year were provided for afforestation during the last 5 years (SFSO and SAEFL 2003). The forestry sector mainly sets on artificial regeneration. Therefore, plantations on large areas usually are not necessary, except in certain cases, such as storm loss areas.

With regard to the midlands, there are limiting factors for forest development apart from economic considerations. Swiss forests have a high amount of standing tree stock and even with an increased usage, Swiss forestry would still be in accord with the criteria of sustainability.

5.3. Forest ownership

Less than a third of the Swiss forests are private property. The average forest area per owner is 1.35 ha (SFSO and SAEFL 2003). Over two thirds of the forest area is publicly owned. Out of these, almost half belongs to public municipalities (see Table 13). The portion of public forest varies between the cantons and ranges from about one fourth to almost 90%.

Table 13. Forest ownership

Property categories		**[%]**
Public forest	Public municipalities (Bürgergemeinde)	32.9
	Political municipalities (politische Gemeinde)	21.3
	Corporations (Korporationen)	8.0
	Cantons (Kantone)	4.8
	Confederation	0.8
	Total public forest	93
Private forest	Privately-owned forest	28.8
	Companies	3.4
	Total private forest	43
Total		100

Source: (WSL and SAEFL 1999: 44)

The highest portion of private owners is to be found in the plains and the pre-Alps. Their approximate number in Switzerland is about 250,000 with an average property size of 1.3 ha (Table 14). Only 3.4% of the total forest area is owned by private companies, and no information about their land tenure is available.

Table 14. Forest holdings (SFSO and SAEFL 2003)

	Public ownership	**Private ownership**
Area of holdings of forest and other wooded land (1000 ha)	878	326
Number of holdings (number)	3503	257700
Average size of holdings (ha)	250.6	1.3

The size of public holdings ranges from less than 10 ha to 100,000 ha with an average size of 250 ha (Table 15).
Article 699 of the Swiss Federal Civil Code grants the right of access to pasture and forest to the general public. This regulation is supported by the Swiss Federal Forest Law (art. 14) which states that walking, running, horse riding (in most cases), as well as picking berries, mushrooms and collecting dead wood are permitted in public and private forests (Jenni 1993). In case of negative consequences for the forest owners, measures can be taken. Big events within forests need a special permit and motor vehicle traffic inside forests is, with certain exemptions, generally banned.

Table 15. Number of holdings in public ownership

Number of holdings in public ownership in size classes	**%**
<10 ha	4.9
11-20 ha	9.7
21-50 ha	16.9
51-100 ha	15.4
101-500 ha	32.3
501-10,000 ha	7.1
10,001-100,000 ha	3.8

Non-wood forest product usages such as the use of grass and litter and forest grazing which may have negative effects on the forest are prohibited (art. 16 Federal Forest Law). This restriction may be mitigated by a demarcation of forest grazing grounds were grazing is allowed. Recreation facilities, such as fire places, sports and education trails are legally regarded a disadvantage to the forest (Jenni 1993), but can be sanctioned with certain injunctions by the Cantons.

The collection of wild-growing berries, mushrooms, herbs etc. for private consumption is allowed in reasonable quantities (art. 699 Federal Civil Code), provided these are not protected species (arts. 19, 20 Federal Law on the Protection of Nature and Cultural Heritage). The collection for sale requires sanctioning by the respective Cantonal authority (art. 19 Federal Law on the Protection of Nature and Cultural Heritage). There are Cantonal rules and regulations for hunting and all hunters have to have a hunting license. Due to the vast amount of private forest smallholders, there is only small scale forest management and for economic reasons there is only occasional forest tending and wood harvesting. Public forest enterprises are not in a position to cover their costs because of low wood prices. A planned major sawmill of the Austrian company Josef Kogler GmbH, which may possibly be built at the end of 2005, having a capacity to process about 1 million m^3 of wood per year, would have an influence on the whole trading area of this sawmill (Hofer 2001). The forest owners would be committed to sell their wood for a relatively low and fixed price to this mill.

5.4. Main problems and research questions in forest resources and ownership for enterprise development in the forest sector

The following main problems and research questions have to be tackled in future:

- What motivation do forest enterprises have to embark on **new products and services?**
- What are the perceived **import and export potentials** of Swiss forest enterprises after the enlargement of the European Union with new and more wood and timber supplying countries?
- **How can the external costs** for the provision of recreation amenities, health and wellbeing which are burdening Swiss forest enterprises **be internalized** in a sustainable way?
- What potentials are there to motivate small and medium forest enterprises to cooperate and possibly merge to **larger and economically more efficient units**?

Annex A. References

Bibliography

Alfter, P., 1998. Recherche sur les biens et services non-bois de la forêt suisse: Quantification et essai de valorisation dans le cadre d'un projet de l'OFEFP. Schweizerische Zeitschrift für Forstwesen. 149 (2): 87-104

Alfter, P., 2004. Biens non-bois et services de la forêt Suisse: Mise à jour partielle des données. Ingénieur forestier diplômé EPF-Z / CRIFOR, Fresens / NE. 24

Arbeitsgruppe Starkholz, 1999. Perspektiven der Starkholznutzung in der Schweiz. Projektleiter Stefan Zeltner, Trin. 33

Balsiger, H., Krebs, B. and Meier, A.L., 2003. Projekt "GALILEO" im Kanton Bern: Rentable Holzproduktion im Nutzwald oder Waldpark? Wald und Holz. (9): 35-38

Bebi, P. and Baur, P., 2002. Forest Expansion in the Swiss Alps: A quantitative analysis of bio-physical and socio-economics causes. Austrian Journal of Forest Science. 119 (3/4): 217-230

Berger, T. and Seeland, K., 2004. Actual market of non-wood forest products and services in Switzerland - an internal survey of the Chair of Forest Policy and Economics ETHZ.

Bieger, T., Bischof, L. and Wittmer, A., 2003. Beitrag zur strukturellen & regionalökonomischen Entwicklung der Forstwirtschaft in Berggebieten: Effektivität und Effizienz der Bewirtschaftung von Schutzwäldern. Institut für Öffentliche Dienstleistungen und Tourismus, Universität St. Gallen, St. Gallen. 75

Brändli, U.-B., 1996. Die Häufigsten Waldbäume der Schweiz. Berichte der Eidg. Forschungsanstalt für Wald, Schnee und Landschaft (WSL). 342. Swiss Federal Institute for Forest, Snow and Landscape Research (WSL), Birmensdorf. 278

Breisch, H., 1993. Harvest, storage and processing of chestnuts in France and Italy. In: Antognozzi, E. (ed.) International congress on chestnut. Spoleto, Italy. 429-436

Bürgi, M. and Stuber, M., 2003. Agrarische Waldnutzungen in der Schweiz 1800-1950: Waldfeldbau, Waldfrüchte und Harz. Schweizerische Zeitschrift für Forstwesen. 154 (9): 360-375

Conedera, M., 1996. Die Kastanie: Der Brotbaum. Bündnerwald. 6 28-47

Conedera, M., Jermini, M., Sassella, A. and Sieber, T.N., 2004. Ernte, Behandlung und Konservierung von Kastanienfrüchten. WSL Swiss Federal Institute for Forest, Snow and Landscape Research, Sottostazione Sud delle Alpi, Switzerland, Bellinzona. 27

Eisinger, A., 2003. Stadtland Schweiz: Untersuchungen und Fallstudien zur räumlichen Struktur und Entwicklung in der Schweiz. Birkhäuser - Verlag für Architektur, Basel. 399

Eschmann, P., Bachmann, R.P. and Horat, S., 2003. Marktorientierte Sortimentsoptimierung im Forstbetrieb: Schlussbericht. Federal Institute of Technology (ETH), Chair of Forest Inventory and Planning, http://e-collection.ethbib.ethz.ch/show?type=bericht&nr=294, Zürich. 64

FAO (eds.), 2001. Inventory of Chestnut Research, Germplasm and References. Food and Agriculture Organisation of the United Nations, Rome, Italy.

FCA (eds.), 2004. Customs declaration: fruits. Federal Customs Administration,

Hofer, P., 2001. Auswirkungen eines Grosssägewerkes im Grossraum Bern: Zusammenfassung. Studie der GEO Partner AG im Auftrag der Volkswirtschaftsdirektion des Kantons Bern, Zürich. 13

Hofer, P., 2003. Holzwirtschaftspolitik: Skriptum zur Vorlesung im Wintersemester 2003/2004. GEO Partner AG; Professur Forstpolitik und Forstökonomie, ETH, Zürich.

Hurst, A., 1991. Das Nationale Forschungsprogramm 12 "Holz, erneuerbare Rohstoff- und Energiequelle" : Schlussbericht der Programmleitung. SAH-Bulletin 1/1999, Bern. 220

Jenni, H.-P., 1993. Vor lauter Bäumen den Wald doch noch sehen: Ein Wegweiser durch die neue Waldgesetzgebung. Schriftenreihe Umwelt. 210. Bundesamt für Umwelt, Wald und Landschaft (BUWAL), Bern. 114

Kübler, D., Kissling-Näf, I. and Zimmermann, W., 2001. Wie nachhaltig ist die Schweizer Forstpolitik? Ein Beitrag zur Kriterien- und Indikatorendiskussion. Oekologie & Gesellschaft. 14. Helbing und Lichtenhahn, Basel; Genf; München. 135

Lurati, O., 1971. Abitudini alimentari della popolazione ticinese fino alla metà dell'Ottocento. Archiv für Volkskunde (Schweiz). 67 (1-3):

Meuter, M., 2001. Erwartungen der Holzwirtschaft an das neue Holz-Förderprogramm der Bundes - Partnerschaftliche Arbeit in fünf Richtungen. Schweizerische Zeitschrift für Forstwesen. 152 (3): 94-96

Moretti, G., 2004. Cantone Ticino, sezione forestale. Source: Associazione dei castanicoltori della Svizzera italiana. Personal communication (pers. comm.)

SAEFL (eds.), 1995a. Holz - Rohstoff mit Zukunft: Ziele und Strategien zur Holzförderung. Umwelt-Materialien. 33. Swiss Agency for the Environment, Forests and Landscape (SAEFL), Bern. 23

SAEFL (eds.), 1995b. Regionalwirtschaftliche und ökologische Effekte der Wald- und Holzwirtschaft. Umwelt-Materialien. 35. Swiss Agency for the Environment, Forests and Landscape (SAEFL), Bern. 90

SAEFL (eds.), 1997a. Bewertung und Honorierung von Waldleistungen (VAFOR): Orientierungshilfe. Umwelt-Materialien. 64. Swiss Agency for the Environment, Forests and Landscape (SAEFL), Bern. 52

SAEFL (eds.), 1997b. Criteria and indicators for sustainable forest management in Switzerland. Swiss Agency for the Environment, Forests and Landscape (SAEFL), Bern. 80

SAEFL (eds.), 1998a. Endverbrauch des Holzes in der Schweiz 1996. Umwelt-Materialien. 94. Swiss Agency for the Environment, Forests and Landscape (SAEFL), Bern. 106

SAEFL (eds.), 1998b. Überprüfung der Marktfähigkeit von forstbetrieblichen Leistungen. Praxishilfe. Vollzug Umwelt. Swiss Agency for the Environment, Forests and Landscape (SAEFL), Bern. 122

SAEFL (eds.), 2001. Ökonomische Branchenstudie der Wald- und Holzwirtschaft. Umwelt-Materialien. 138. Swiss Agency for the Environment, Forests and Landscape (SAEFL), Bern. 109

SAEFL (eds.), 2004a. Holzaussenhandel der Schweiz 1985-2000: Materialströme, Analysen, Einflussfaktoren, Perspektiven. Umwelt-Materialien Nr. 182. Swiss Agency for the Environment, Forests and Landscape (SAEFL), Bern. 154

SAEFL (eds.), 2004b. Waldprogramm Schweiz (WAP-CH). Schriftenreihe Umwelt Nr. 363. Swiss Agency for the Environment, Forests and Landscape (SAEFL), Bern. 117

SAEFL and Swiss Forest Agency (eds.), 2003. Holzmarktbericht / Bulletin sur le marché du bois. 36. Swiss Agency for the Environment, Forests and Landscape (SAEFL), Swiss Forest Agency (Eidg. Forstdirektion), Bern. 24

Schelbert, H. and Maggi, R., 1988. Wertvolle Umwelt: Ein wirtschafts-wissenschaftlicher Beitrag zur Umwelteinschätzung in Stadt und Agglomeration Zürich. Institut für Empirische Wirtschaftsforschung (Zürich), Universität Zürich Sozialökonomisches Seminar. Zürcher Kantonalbank, Zürich. 90

Schoop, G., 1997. Verkaufen von Holz und Waldleistungen. In: SAEFL (eds.). Ökosystem Wald - Rohstoff Holz - Prinzip Nachhaltigkeit: Kongress Wald und Holz vom 22./23. Oktober 1996 in Biel. 67. Swiss Agency for the Environment, Forests and Landscape (SAEFL), Bern. 75-77

Schuler, A., Bürgi, M., Fischer, W. and Hürlimann, K., 2000. Wald- und Forstgeschichte. Skript zur Vorlesung 60-316. ETH, Professur Forsteinrichtung und Waldwachstum, Arbeitsbereich Wald- und Forstgeschichte, Zürich. 148

SFSO (eds.), 2003. Statistisches Jahrbuch der Schweiz 2003. 110. Jahrgang. Verlag Neue Zürcher Zeitung, Zürich. 912

SFSO and SAEFL (eds.), 1998. Profil Schweizer Wald- und Holzwirtschaft 1995 / Profil de l'économie suisse des forêts et du bois en 1995. Swiss Federal Statistical Office (SFSO), Neuchâtel. 134

SFSO and SAEFL (eds.), 1999. Holzverarbeitung in der Schweiz 1996: Studien über den Holzfluss 1991-1996 / La transformation du bois en Suisse. Swiss Federal Statistical Office, Neuchâtel. 51

SFSO and SAEFL (eds.), 2003. Wald und Holz in der Schweiz: Jahrbuch 2003 / La forêt et le bois en Suisse: Annuaire 2003. Swiss Federal Statistical Office (SFSO), Swiss Agency for the Environment, Forests and Landscape (SAEFL), Neuchâtel. 178

Starck, C., 2001. Das Förderprogramm Holz 2001 bis 2003. Schweizerische Zeitschrift für Forstwesen. 152 (3): 91-93

Stuber, M. and Bürgi, M., 2001. Agrarische Waldnutzungen in der Schweiz 1800-1950: Waldweide, Waldheu, Nadel- und Laubfutter. Schweizerische Zeitschrift für Forstwesen. 152 (12): 490-508

Stuber, M. and Bürgi, M., 2002. Agrarische Waldnutzungen in der Schweiz 1800-1950: Nadel- und Laubstreu. Schweizerische Zeitschrift für Forstwesen. 153 (10): 397-410

WSL and SAEFL (eds.), 1999. Schweizerisches Landesforstinventar: Ergebnisse der Zweitaufnahme 1993 - 1995. Swiss Federal Institute for Forest, Snow and Landscape Research (WSL) and Swiss Agency for the Environment, Forests and Landscape (SAEFL) (eds.). Haupt, Bern [etc.]. 442

WVS (eds.), 2003. 8 Thesen für eine zukunftsfähige Waldwirtschaft. Waldwirtschaft Schweiz (WVS), Solothurn. 15

Zimmermann, W., 1988. Auf dem Weg zu einem neuen schweizerischen Waldgesetz. Forstarchiv. 59 (3): 106-111

Zimmermann, A.J. and Jakob, R. (1990): Neuorientierung der schweizerischen Wald- und Holzwirtschaft. Nationales Forschungsprogramm 12 "Holz, erneuerbare Rohstoff- und Energiequelle" des Schweizerischen Nationalfonds. Paul Haupt, Bern. 347 p.

Laws

Federal Civile Code: Schweizerisches Zivilgesetzbuch (ZGB) vom 10. Dezember 1907/Federal Civil Code of December 10, 1907, Systematische Rechtssammlung/ Systematic Collection of Federal Laws No. 210.

Federal Law on the Protection of Nature and Cultural Heritage (LPNH): Bundesgesetz vom 1. Juli 1966 über den Natur- und Heimatschutz (NHG)/Federal Law of 1 July on the Protection of Nature and Cultural Heritage, Systematische Rechtssammlung/ Systematic Collection of Federal Laws No. 451.

Federal Forest Law: Bundesgesetz über den Wald (Waldgesetz, WaG) vom 4. Oktober 1991/Federal Forest Law of October 4, 1991, Systematische Rechtssammlung/ Systematic Collection of Federal Laws No. 921.0.

Federal Forest Ordinance: Verordnung über den Wald (Waldverordnung, WaV) vom 30. November 1992/Federal Forest Ordinance of November 30, 1992, Systematische Rechtssammlung/ Systematic Collection of Federal Laws No. 921.01.

United Kingdom

Prof. Bill SLEE and Dr Julie INGRAM
Countryside and Community Research Unit, University of Gloucestershire
Dunholme Villa, Park Campus, Cheltenham GL50 2QF
Tel: +44 (0)1242 544083, Email: bslee@glos.ac.uk

Mr Roger COOPER
School of Agricultural and Forest Sciences, University of Wales, Bangor

Dr Suzanne MARTIN
Forest Research, Northern Research Station, Roslin

Dr Jenny WONG
Wild Resources Limited, Bangor

Executive Summary

A number of factors impact on competitiveness in the forest, forest products and non-timber forest products sectors.
Although there is a very wide size range of private forest/woodland units in the UK, the majority of non-industrial private forest (woodland) holdings are small. The objectives of many owners are more orientated towards amenity than commercial forestry. The low profitability of private forestry is compounded by relatively high wage rates and other production costs and low timber prices.

In the UK there is a weakly developed wood culture. Other materials dominate construction and wood products are not seen as high performance materials. The wood product market is dominated by imports and there is a lack of skilled workers and designers in the UK.

While there has been a growth of demand for many NTFPs, the same pattern of import dominance prevails. Even where market opportunities exist, firms are likely to remain small. In the UK labour costs are quite high and there may be labour shortages in areas with high levels of NTFP. There can be logistical problems with trying to aggregate supplies from small fragmented forests. In some non timber forest services, such as active recreation, the UK may be advantaged by a large and dense population, but the state forest sector, rather than private woodland owners may be in a better position to provide such facilities, although nearby related private service providers may benefit

There are a number of significant barriers to entrepreneurship in the forest sector, in wood processing and in the NTFP sector.
For few woodland owners is the forest and woodland asset a major source of well-being. In the case of private farms, traditional estates, hobby farms or amenity holdings, forestry is rarely a significant contributor to income. The consumption-related objectives of many private owners suggest that the warm glow of ownership or private pheasant shooting are more likely to influence forest/woodland decision making than entrepreneurial activity.

Many of the high value outputs of UK forests are public or quasi-public goods. Their 'production' depends on grant and subsidy design rather than market signals. Even new planting is driven more by the prospect of grant drawdown than by profitable silviculture.

Property rights relating to NTFPs, especially fungi, may impede marketisation.
The wood product sector has a complex structure of some very large firms and a legacy of smaller firms. Many firms do not have access to good market data and find difficulty in finding appropriate supply chains to access urban markets. Further they are not aware of institutional and policy support mechanisms, are compromised by low profitability and are consequently unable to secure finance for restructuring and investment.
In relation to NTFPs, consumers identify only weakly with UK sourced material. There is little product labelling with place of production.

Mainstream business nor forestry businesses do not seem to recognise the opportunities afforded by NTFPs and those managing grants for business development and other forms of assistance have not been readily assessed. There is an 'alternative culture' demand for many products which is not always entrepreneurial and often lifestyle based.

Institutions do not appear to recognise the value of NTFPs and non-wood SMEs, although a problem of resource ownership because of uncertainty of property rights. Consequently access to resources is on an informal ad hoc basis, with no guarantee of supportive or even benign resource management for NTFP production.

Each of the elements of the NIPF sector and associated supply chains are characterised by specific problems which generate particular research needs.
In relation to the forest owners, the internalisation of the externalities either through enterprise or through negotiating grants for public good delivery is essential for the delivery of public goods to be optimised.

The weak state of the small-scale forest products industry (with the partial exception of a burgeoning craft sector) makes it difficult for the forest owner to connect to niche markets.

There is a major need to establish the green infrastructure values of forest and woodland and the extent of the halo effect. Once established there is a need to design effective mechanisms by which woodland owners can be rewarded for the external benefits provided to others who behave entrepreneurially to take advantage of the green infrastructure provided by forest owners.

In the forest processing sector, there is little public support for development and testing of new product ideas for SMEs. There is little available life cycle analysis information on wood products and the environmental and technical benefits of wood products vis-a-vis alternatives are weakly promoted.

In relation to non-wood products, there is uncertainty as to the volume and availability of supplies. Quality control is weak and labelling rarely advertises UK production.

There is a need (see above also) to develop means for rewarding landowners for the provision of green infrastructure. There is also a need to ascertain the extent to which the state forest is an impediment to the development of NTFP enterprise because of its dominance of the market and its capacity to use public money to displace private initiative.

There are a number of policy implications.
The forest and woodland sector clearly needs better targeted and more efficient support systems to reward woodland owners for public good provision. Many forest owners are unaware of the commercial values associated with their woodland resource and there is a need for a more supportive advisory and information system for non-industrial private forest owners.

There is a need to target support more effectively to maximise the scope for value added enterprise. Current support mechanisms for the forest processing sector fall largely under the umbrella of general support measures when more specific support is needed to help the forest processing sector adapt. In relation to non-wood products there is a need to better understand the impact of new legislation on both recreational and product based non-wood production.

1. Consumption

1.1. State of the art and historical development

The UK has been predominantly an urban society for the past 150 years. Throughout this period it has had one of the lowest levels of woodland area per head of population in Europe and the urban population's requirements for wood products has been met overwhelmingly from imports. Consequently, for the urban population the value of the non-timber benefits from woodlands (both non-timber products and the environmental and social services provided by woodlands) has for many years exceeded the value of the consumption of wood products derived from British grown wood. In recent years a growing number of studies has focussed on identifying and quantifying these non-timber, non-market benefits, particularly biodiversity, landscape, recreation and carbon sequestration. These have led to a clearer understanding of the significance of these non-market benefits and they have now become key objectives of governments in formulating forest and woodland policies across the UK.

Wood products
UK consumption of forest products in 2003 totalled 45 million m^3 wood raw material equivalent or approximately 0.75 m^3 per head. Over the past 30 years consumption has grown at a rate of approximately 2% p.a., mainly from increased demand for paper and panel products. Imported products currently account for 86% of consumption but this percentage has slowly declined over the past 20 years as domestic production of timber has increased.

Consumption statistics for forest products are compiled by the Forestry Commission, trade associations (UK Forest Products Association, Forestry and Timber Association, Paper Industry Federation, Wood Panels Industry Federation, Timber Trades Federation) and the Office for National Statistics. There is no sector-wide compendium containing comprehensive details of forest products consumption.

Non-wood products

Although a number of recent inquiries have been conducted, the nature and extent of the market size for NTFPs remains conjectural. However, it is certainly small in relation to existing or potential demand and much of what could be supplied from the UK is in fact imported.

It can be argued that UK forestry is in a post-productionist milieu where services are more significant in terms of social and economic benefits than production of timber, wood fibre, mushrooms or berries. A few studies of the scale of the 'market' for services have been undertaken (described below) and indicate values many times greater than the combined value of products even including multiplier effects. Nevertheless there is as yet no general accounting for such values and it is not clear whose responsibility this should be. Some aspects of green infrastructure are monitored by general 'Quality of life' indicators (collected by DEFRA, www.cs2000.org.uk) and some by the Forest Research Omnibus surveys.

1.2. Forest products' and services consumption

Income and expenditure

GDP and expenditure per head are summarised in Table 1.

Table 1. Gross domestic product and household spending £ per head (2000 prices)

	1990	**2000**	**2002**
GDP per head	13,115	16,221	16,693
Household final consumption expenditure per head	8,416	10,684	11,299

Household expenditure on major spending classes is given in Table 2 and shows a rising share of expenditure on recreation and culture.

Table 2. Final household consumption expenditure by major spending classes (%)

Expenditure class	**1990**	**2000**	**2002**
Food and drink	10.5	9.8	9.2
Alcohol and tobacco	5.6	4.1	4.0
Clothing and footwear	4.3	5.9	6.6
Housing	20.2	17.7	17.1
Household goods and services	5.0	6.0	6.7
Health	1.9	1.5	1.4
Transport	15.9	15.0	15.1
Communication	1.2	2.2	2.5
Recreation and culture	8.6	12.1	12.7
Education	1.3	1.6	1.2
Restaurants and hotels	13.5	11.5	11.1
Miscellaneous	13.4	12.4	12.3
Total%	100.0	100.0	100.0
Total £ billion (2000 prices)	470	596	634

1.3. Market demand for forest related products and services by urban population

Apparent consumption of main wood product categories.

No data are published on urban consumption of forest products but it is likely that 80%-90% of the value of consumption is by the urban-based population. Figures of total UK consumption of forest products are published regularly by UN ECE.

It is not possible to determine apparent consumption for NWFPs are there is little or no readily available information on the quantities imported or produced within the UK. Table 3 gives figures for some indicative products and sectors gleaned from a market survey undertaken in 2001 by Dyke & Primrose (2002). Demand for many of these products is buoyant and as Figure 1 shows, demand is rising for herbal remedies.

Table 3 Market demand for NWFP in the UK

Product type	Species	Demand	Source
Cosmetics	Heather, Bluebell, Primrose, Horse chestnut, Pine resin & oil, Orchids, Hawthorn, Hazel	Increasing	Imported – UK sourced only used for small scale production of regionally branded products
Drinks	Elderflowers, elderberries, sloes, bilberry etc.	Increasing	Mainly UK, though several companies import more than half their requirements
Veterinary products Hilton Herbs, Somerset	Cleavers	10-12 tonnes/year	Mostly imported from Germany
	Nettles	10-12 tonnes/year	
	Meadowsweet	6-7 tonnes/year	
	Hawthorn, eyebright, comfrey, dandelion, rosehips, valerian, skullcap	Increasing	
Pharmaceutical plants	Total imports in 1995	8,200 tonnes and rising at 10% per year	Global imports, UK sources insignificant
Decorative products	Non-floral plant parts including Willow, Hazel, Moss, Ivy, Logs, Branches, Twigs, Ferns, Holly and tops of Birch etc.	Estimated as 10% share of floristry revenues = £119 million in 2001	Most imported, UK collection only a small fraction of this though there are net exports of rhododendron
Herbal remedies	General	Estimated as worth £279 million in 2002	Global imports, UK sources insignificant
	Dandelions	50-100 tonnes/year	Imported from Belgium and Holland

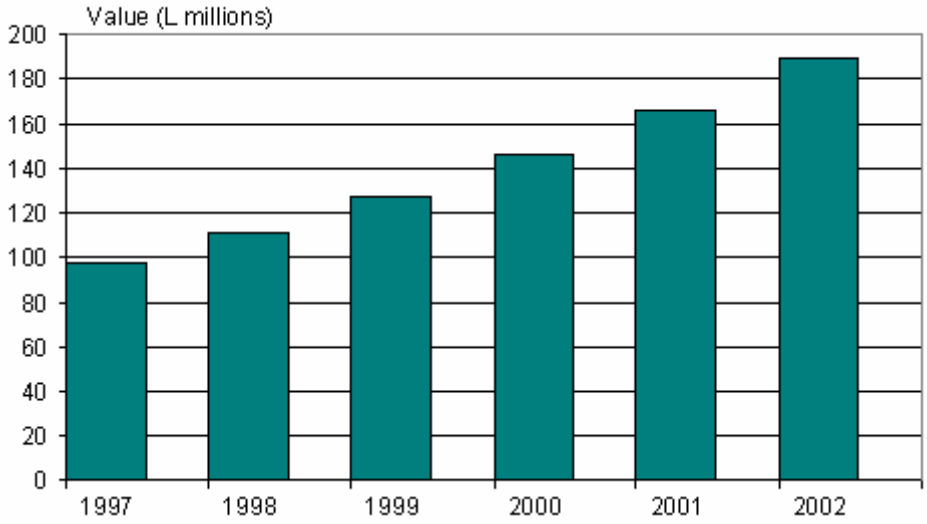


Figure 1 Estimated value of herbal remedies UK 1997-2002

The figures in Table 3 and Figure 1 clearly indicate that there is large demand for many NWFP products but that the vast bulk of this demand is being met by imports even for common species native to the UK. This is because the prices if imports are much lower than the cost of UK collection and there is no premium or strong preference for UK-sourced material. UK collectors cannot compete with imports, particularly from eastern Europe to supply larger-scale manufacturers (e.g. of cosmetics) because of (a) lower wage rates, (b) availability of seasonal labour, (c) size and accessibility of the resource, (d) traditional market infrastructure which already collects for internal consumption and (e) lack of trade barriers. This means that opportunities for UK collection and enterprise development is likely to remain undeveloped unless it can gain some market advantage such as UKWAS or organic certification and niche marketing (such as small-scale production of regional or tourism related products). Even so the scarcity of cheap, seasonal, rural labour is a critical constraint on the development of UK NTFP enterprises and the larger companies are importing seasonal labour gangs from eastern Europe.

Estimation of the share of consumption by urban population.

Data related specifically to the urban population are not available. Between 70% and 90% of the UK population is classified as living in urban areas. Consumption of most categories of wood products is likely to be spread relatively evenly across the population and it would be reasonable to assume that consumption patterns broadly follow population distribution. However, consumption of fuel wood and many non-wood forest products is likely to be more heavily biased to rural areas, in part because of vernacular use and in part because of the demand of affluent new rural residents. For some NTFPs such as fungi, the exclusive restaurants of major cities are an important source of demand.

Estimated consumption of services.

The most comprehensive data available relate to recreational use of forests and woodlands and the following points summarise findings from the biennial surveys of public opinion of forests and woodland conducted by the Forestry Commission.

- 355 million visits are made annually to woodland and forests
- two thirds of the UK population have visited woodland or forests in the previous two years
- reasons for visiting forests in descending order of importance are:
    - peace and quiet
    - wildlife
    - attractive scenery
    - safe environment
    - knowing visitors are welcome
    - good for exercise
    - no entry charges (usually)

A higher number of visits are made to woodlands owned by voluntary bodies (e.g. National Trust) than to state (Forestry Commission) forests, reflecting both location and woodland attributes.

Market surveys of demand for non-wood products by urban population.

There are no statistics or surveys of the consumption of wood products that are specifically consumed in urban areas (see above comments of likely urban/rural consumption patterns).

There have also been no surveys of the specifically urban demand for NWFP. However, the majority of the population in the UK is urban so total market demand for NWFPs is a reasonable surrogate. A market survey of a range of NWFPs (edible fine foods, decorative, herbal medicine and pharmaceutical products) was undertaken in 2001 on behalf of the Scottish Forest Industries Cluster (Dyke & Primrose 2002). Unfortunately, although this survey was targeted at NWFPs, it was impossible to disaggregate wild from cultivated, native from non-native, or UK sourced from imports. Most respondents where not able to address such specific enquiries and figures are only related to general categories such as ‘herbal remedies’. The market survey suggests that demand is largely being driven by the fashion for natural health and beauty products, demand for natural veterinary products by the requirements of organic food certification, natural home decoration by television ‘make over shows’ and novelty and wild foods by television chefs.

Second homes

There are estimated to be 150,000 second homes in the UK. A significant percentage of these is for commercial letting, not holiday-making. The holiday second homes tend to be in areas of high amenity value. Further research is necessary to determine the role of woodlands in the decision making process in purchasing second homes, although in some tree-rich areas such as Speyside and Perthshire, there is likely to be a woodland-induced premium on second home property values.

1.4. Main problems and research questions in consumption for enterprise development

Important knowledge gaps related to the consumption of **wood products** can be summarised as follows:

- lack of comprehensive statistical information on end uses of forest products and trends in substitution;
- lack of statistics on consumption of new products particularly further processed products;
- lack of information on the premium people will pay for locally produced/gathered products;
- lack of information on consumption of certified timber products;
- poor data on product prices along the wood chain; and
- difficulty for SMEs in accessing supply chains.

For non-wood products there is an enormous gap in understanding the extent to which trees and woodland in so called tree-rich areas create enhanced living space both for residential and recreational use. A recent study by Slee, Evans and Roberts (2002) suggests that over 90% of the economic value attributable to trees may not arise from timber or even non timber forest products but from forest services, through what has been described as a halo or shadow effect on surrounding households and businesses. In densely populated countries, the value of these services may be overwhelmingly important. Other knowledge gaps include:

- the size of the market;
- the value of the produce;
- the contribution of local NTFPs to local livelihoods and identity
- the nature of supply chains for NTFPs and the scope for value addition.

2. Small-scale forestry practices

2.1. State of the art and historical development

In the UK, there are enormous definitional difficulties in defining small-scale forestry because of an absence of any data on the size of forest holdings. There has been a recent inventory of forests, but it is based on ownership type and size of individual unit of forest and there is no available information on forest ownership, other than division into public and private sector. As can be seen in Table 4, 17% of all private forest/woodland by area in Great Britain are on units less than 20 ha. in size. Most professional and lay observers would consider such woodland as ‘small-scale’. Figures for percent of woodland area made up of private woodland of less than 50ha is 26% and of private woodland of less than 100 ha is 33%.

Table 4. Area of woodland in GB not owned by Forestry Commission

Size class ha	Number of woods	Total area (ha)	% of total area	Mean wood area (ha)
<10	65,485	275,687	11	4.2
10-20	11,056	153,966	6	13.9
20-<50	7,518	232,394	9	30.9
50-100	2,725	188,746	7	69.3

Source: NIWT 2003

The private forestry sector in the UK comprises a number of types of owner. The large-scale private owners are broadly of two main types: large traditional landowners, comprising the old aristocracy and, increasingly, a new class of owners of landed estates who own mixed land use estates (but often rely on cross subsidy from urban wealth); and new forest owners who took advantage of tax avoidance possibilities in the 1970s and 1980s. The latter created a group of absentee forest owners (often foreign residents), whose forest was/is nearly all managed by commercial forestry companies. A further group of private owners comprise the forest products firms who have acquired some land, but which in practice often prefer to work with long-term contracts with private landowners in order to secure wood raw material.

The small-scale forestry sector in the UK is more complex. It comprises two principal types of farm woodland: old relict woodland with little silvicultural management, (often grown on unproductive areas of farms, but sometimes associated with windbreaks/shelter belts and areas of woodland planted and/or managed for game management); new farm woodland planted since 1987 with grant aid. In addition, there is often a woodland component of many smaller rural land holdings which comprise mixed land use estates rather than farms. Finally, there is increasing ownership of small woods by environmental NGOs and private owners, neither of whom is normally interested in commercial exploitation of timber.

2.2. General information on small-scale forest holdings in the UK

The historical development of small-scale forestry in the 20th century shows a decline in the forest area of small-scale forestry for the first half of the century brought about by a combination of two world wars and the decline of what might be termed a traditional local forest economy. This was caused by changes in farm tenure and a decline in the use of local forestry products such as woodfuel, thatching spars and hurdles. Over this same period there was a dramatic increase in state afforestation. After the Second World War a programme of support to private forestry was initiated through a grant aid programme and later through certain tax advantages for new woodland planting. With the exception of a few forestry/woodland craft enthusiasts, the general state of small-scale forestry was one of general silvicultural neglect and of the use of forest and woodland for outwintering stock, protecting game (especially pheasants) and providing some fuelwood. With the exception of shelterbelts used to provide shelter to either crops or livestock, most small-scale woodland is hardwood, though in upland areas and in drier areas of Eastern Britain, there are some areas of lowground softwood planting.

From the 1980s, there has been a growing emphasis on new woodland for environmental reasons. Grant rates for broadleaves were raised to increase the broadleaved component in new planting. In addition, a number of new initiatives (often in partnerships with non-forestry organisations) have encouraged new private sector forestry in damaged post-industrial landscapes.

A step change in policy occurred in 1987, when farm forestry was actively supported by a new farm woodland grant scheme. This scheme has been revised and, in addition, locational supplements have been added to increase the attractiveness of new private forestry planting in certain areas.

Since the late 1980s, a new NGO, the Woodland Trust, has been active in acquiring small areas of established woodland. In general, small areas of ancient and semi-natural woodland have become attractive to a new type of woodland owner (whether private sector or NGO), whose purchases of the resource is rarely followed by commercial exploitation.

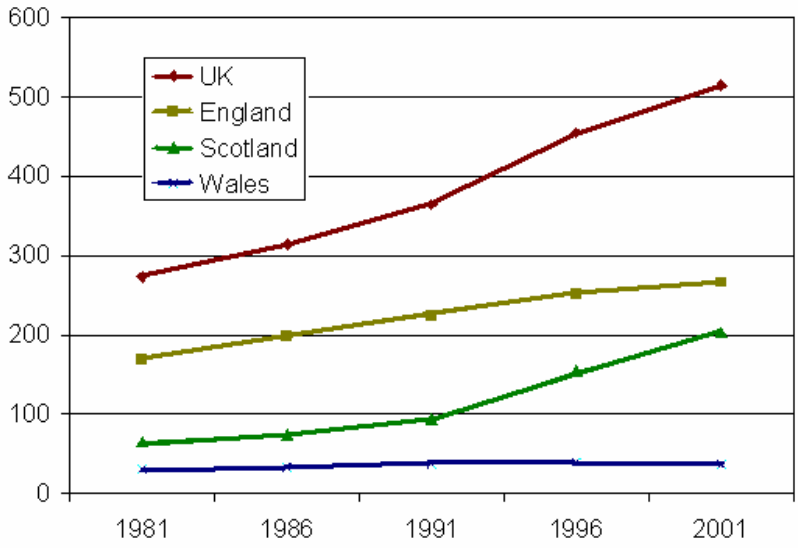
Since about 1990, there has been a proliferation of partnership-funded projects, which promote woodland management and conservation (see above). These projects often seek to engage and work with private forest owners. The net effect of these changes on the extent of small-scale forestry is summarised in Table 5. and Figure 2.

Table 5. Comparison of woodland area between 1980 census and 1998 Inventory (based on 1980 methodology)

Woodland size	**1980 Census woodland area**		**1998 Inventory woodland area**		**Change**
	ha	**%**	**ha**	**%**	**%**
2.0 or more	1,998,642	94.8	2,544,631	95.7	27
0.25-<2.0	109,755	5.2	107,075	4.0	-2
Total	2,108,397		2,658,775		26
% woodland cover	9.4		11.9		

Source: NIWT 2003

Forestry as a whole contributes less than 0.5% of GDP in the UK. In recent years, the cut of timber has been increasing (especially from the public sector, in spite of falling prices. The contribution of small-scale forestry to the total cut is negligible, as is its contribution to GDP.



Source: June Agricultural Census DEFRA, SEERAD, WAG

Figure 2. Changes in area of farm woodland 1981-2001 (000ha)

A recent study of English forestry's contribution to rural economics found that productive and traditional estate forests account for majority of jobs (4600 and 3400) compared to 1800 and 1200 in small farm and community woodlands (Public and Corporate Economic Consultants 2000). A review of WGS/FWPS 2002 for Scotland considered impact on employment figures: over period 1992-2002. Around 600-1,180 net additional jobs are estimated to have been created in the planting/establishment phase and when timber harvesting is included 1560-2140 FTEs will arise.

No public information exists on ownership types. Obviously a large number of farmers own woodland, most of whom still live on the farm. The farm population is ageing and there is recognition that intra-familial succession may not take place on many smaller farms. Much farmland that comes onto the market is bought by non-farmers for amenity reasons. Woodland is generally thought to create a premium on land values, largely because of its contribution to landscape, amenity and game management. The steady drift towards ownership of farms especially in more attractive and wooded regions (such as the Weald, the Chilterns and the English Marches in England) by entrepreneurs and rich people but as an amenity asset has major implications for the development of woodland as a commercial resource.

The volume and share of wood harvesting from small-scale forestry units is unknown but likely to be small, because of the absence of silviciultural management from the majority of such holdings.

NTFPs are likely to be very important to their owners but not often as marketed products. The amenity values are a major interest of most forest owners. Game is important to a significant number of owners and high-quality pheasant shoots are usually associated with a mixture of woodland and open country. In some parts of the UK a strong recent interest in edible fungi has promoted widespread collecting and small broadleaved woodlands are targeted by commercial pickers. Property rights are unclear and vary between different parts of the UK. Some estimates have been made for UK output of some NTFPs but figures are not regarded as reliable.

More highly wooded areas are often seen as attractive for residential and tourist use. Forest owners may or may not be engaged with tourism or recreational enterprises. However, many non-forestry tourist enterprises can still benefit from the landscape attractiveness conferred on areas through the presence of trees and woodland.

There are very distinct regional differences in the amenity uses of woodland. Pheasant shooting is predominantly in lowland areas and in some regions such as the Cotswolds, Suffolk or Hampshire may be an important facet of small woodland use. Deer are found everywhere that there are trees but shooting may be more difficult in areas with high-density rural populations and widespread recreational access. Gathering edible fungi is more important in the north and west of Britain due to frequency of occurrence rather than local demand.

2.3. Small-scale forestry practices

There are almost no studies of small-scale forest owners. The best researched area is those farmers who have planted farm woodland with grant aid, as ex-post evaluative studies have been conducted. Cobham Resource Consultants (1983) found that 56% owners of small woods said game was their motivation for planting.

In a Scottish review of WGS/FWPS the main objectives of owners were to enhance amenity, encourage wildlife, and improve habitats and landscape. Timber production was only an objective in 25% of cases. Very few existing woods have formal management plans.

Benign neglect is the most widely practiced style of management. Game management is common in some regions. This involves managing the woodlands almost exclusively for game shelter, especially with pheasants. Some woodland is widely used for deer shooting, although this can be as much a case of vermin control as game shooting. Many forest owners also extract firewood on an *ad hoc* basis.

Most small woodland is unmanaged. However, all new farm woodland is subject to an approved planting plan and there is greater likelihood of management of this type of woodland.

Most small-scale forest owners know little about the value of their trees and the problem of asymmetric information is endemic in the small-scale forest sector. Work in small-scale forests will normally be conducted by the landowner with respect to fuelwood. Most forestry tasks relating to commercial operations will be carried out by contractors. Often, the forest management advice will be outsourced, often to one of the larger companies like Tilhill, although there is also a significant number of forestry management microbusinesses. There is a wide range of forest contracting firms, though in regions with modest tree cover, there may not be great competition between contractors and small scale operations may be unattractive to many contractors.

There is a Small Woods Association, which promotes traditional management of small woods, but there are no associations or co-operatives addressing the general management and silvicultural needs of small-scale forest owners. There are national forestry societies, but the membership of such organisations is often associated with larger-scale forest holdings.

The share of self consumption of small woodland products is unknown but likely to be high. Most small woods do not generate profit. Owners do not invest with the expectation of any commercial return with the exception of farm forestry and challenge funded forestry, where the level of grant aid has been sufficient to encourage some landowners to engage in forestry for commercial reasons. However, the future earnings from timber are an inconsequential factor in that decision.

The loss of a tradition of farm forestry in the UK is attributable to the nature of rural land ownership in the UK. Woodland was normally the exclusive property of landowners, whereas by the 19th century most farmland was tenanted and farmers had neither need nor right to engage in woodland management. The rise of owner-

occupancy in the 20th century has not re-created a farm-forestry culture, due to low profitability of timber, modest support to existing woodland owners and reliance on imports.

Forestry (small or large scale) is still very much a part of the mixed land use estates where a number of tenanted farms co-exist alongside a home farm and areas of residential 'policies' and woodland. In such situations, game management, usually under the landowner's rather than the tenants' control is also a major land use.

There is virtually no evidence of specific innovation in small-scale forestry, although small-scale forestry inevitably has benefited from the developments in forestry as a whole, in particular tubes for enhancing the growth of new trees. Most equipment used in small-scale forestry is imported.

There is a growing interest in small-scale entrepreneurship relating to the use of wood fuel etc. There are some examples but these have rarely moved beyond exemplar status. Levels of wood-related activity remain very insignificant.

Given the modest skills of most small scale forest owners the majority of timber will be sold standing, felled by a contractor and probably sold by an agent who is likely to also be the woodland adviser/consultant to the owner.

2.4. Policy framework and production conditions

The Forestry Commission is the main regulatory authority that provides new planting grants and management grants and issues felling licences. Until recently, the grant systems in England Scotland and Wales were almost the same. New schemes are currently being launched in these countries, which reflect national forest strategy priorities and will lead to significant differences.

There are two general sets of grants that apply to small-scale forestry: these are the general grant schemes for forestry which provide new planting grants and grants for restocking; and second the farm woodland grants which provides compensation for up to 15 years for converting farmland into forestry. On farmland both grants can be used at the same time; indeed, this is implicit in the design of the scheme.

In addition, there are specific incentives in some specially designated areas, normally based on a desire to increase forest cover in tree-light regions or in damaged post-industrial landscapes. Some of these schemes are 'challenge-funded' and are based on tenders by landowners, which are then considered by an expert panel. In some cases, commercial timber production has a central role, though in many cases the principal objectives of landowners relate to amenity.

In general, it can be seen that the grants to small-scale forestry are designed to deliver multifunctional benefits. The grants and other payments are such that the value of the tree crop is almost immaterial in the decision to plant trees. Tree planting (except for replanting) is grant-driven not market-driven.

There are two key institutions: the Forestry Commission and the former agriculture ministries (now different bodies in England, Wales and Scotland). The Forestry Commission is both landowner and advisory body, and it is in the advisory/grant administering capacity that the Commission impacts on small-scale forestry.

The agricultural ministries are responsible for management of the Farm Woodland Schemes, which are administered under the EU-supported Rural Development Plans or the respective parts of the UK. There is a dual agency role in the delivery of the FWPS/WGS package at present, which may change as the FC takes on board such responsibilities.

Large-scale land ownership has been challenged in Scotland through the Land Reform Act 2003, which in crofting areas gives crofting tenants scope to acquire landlords' assets. This allows the collective purchase of land, including forestry, by local communities. The Forestry Commission in Scotland has responded to these changes by proposing state-sponsored sale of surplus public sector forest assets to communities under similar groundrules.

Other institutions that impact on small-scale forestry include the regional-level agencies, which manage the challenge schemes and a range of partnership bodies (e.g. Cumbria Broadleaves or Highland Birchwoods) which promote particular types of forestry in particular regions. There are some national level bodies, such as Coed Cymru in Wales and the Caledonia Partnership in Scotland, which have promoted native woodland management.

In relation to rural/regional development, the principal institutions in England are the recently formed regional development agencies, in Scotland the Enterprise Companies operated under a Scottish Enterprise or Highlands and Islands Enterprise umbrella. In Wales the equivalent body is the Welsh Development Agency. In the areas with greater levels of tree cover, these regional bodies have often taken an active interest in the local forest industry. However, their level of engagement with forest owners is very low.

The bulk of research work in forestry in the UK is carried out by Forest Research, which has two major research stations in the UK. In addition, some research is outsourced but still funded by the Forestry Commission.

Historically education has taken place in universities and colleges, with universities generating graduate foresters and colleges covering more craft-level diploma qualifications. The Institute of Chartered Foresters is a membership body with an explicit educational remit, though many foresters practice who are not members.

With the exception of the Forestry Commission's advisory support and the frequent presence of woodland advisers in municipalities, most forestry advice is provided by private sector consultants who range from one-man firms to subsidiaries of large forestry conglomerates of which the largest in UK terms is Tilhill Forestry, a subsidiary of UPM Kymenne.

2.5. Supporting and limiting factors for enterprise development in small-scale forestry and barriers to entrepreneurship

The biggest driver of entrepreneurial activity is the market for niche products created by an increasingly affluent population. However, the changing nature of small-scale forest ownership tends to mean that small-scale forests tend to be used for private amenity and game rather than more entrepreneurial activities.

The biggest barrier to entrepreneurial activity in small-scale forestry is thus the preferences and attitudes of forest owners, whose interests and activity with respect to their woodland are largely driven by amenity interests. For the larger-scale innovative wood processing forms the low quality/high extraction cost wood products of the small-scale forest sector afford little interest.

There is a craft processing sector that often uses local wood products and the small-scale traditional sawmills are increasingly selling into this artisanal/craft market. This sector may be entrepreneurial in its perspective, but many such firms are lifestyle businesses.

In general labour costs are relatively high in the UK.

3. Wood-processing industries

The UK's forest resource is small (11.6% of land area) in comparison with most European countries (46% of land area for Europe including Russia). Wood production is drawn almost exclusively from coniferous plantations and hardwoods now account for only 6% of the annual harvest. In 2003, UK forests supplied 8 million m^3 (under bark) to the wood processing industries. This is equivalent to 18% of Britain’s consumption (45 million m^3 wood raw material equivalent) of primary processed forest products (sawnwood, wood-based panels, pulp and paper). Britain's imports (82% of consumption) are drawn principally from Europe, North America, South America, S.E. Asia and West and Central Africa. The high import dependence means that the linkage between urban consumption of forest products and rurally based production of wood products has been very weak for over 100 years.

3.1. State of the art and historical development

UK wood production has increased from 3.7 million m^3 (over bark) in 1970 to 11.2 million m^3 in 2003, this growth coming wholly from the maturing softwood plantations. Table 6 illustrates the growth in production of primary processed products over the period.

Table 6. UK Production of Forest Products from Domestic Roundwood and Residues

Product		**1970**	**1975**	**1980**	**1985**	**1990**	**1995**	**2000**	**2003**
Sawn softwoods	000m³	585	753	980	1560	1935	2106	2389	2683
Sawn hardwoods	000m³	734	572	610	261	336	189	103	70
Particleboard	000m³	300	520	620	1065	1517	2118	2561	2526
Fibreboard	000m³	95	75	75	125	175	408	700	835
Wood pulp	000 T	434	318	306	400	595	639	517	504

Source UN/ECE

The expansion of the sawn softwood industry has been mostly by family businesses, and in the early development phase of the industry most of these were SMEs. However, there has been a growing concentration of production in the largest sawmills, largely because of scale economies. There has also been a consolidation of company ownership with the largest groups accounting for an increasing share of overall production.

The growth of the panels and pulp and paper sectors has been almost wholly in the hands of large multi-national companies, rather than domestically owned SMEs. The timber importing and merchanting sector, which traditionally traded only in imported wood products, is now also an important distribution channel for domestically manufactured products. This industry has also consolidated, though there are still many SMEs in this sector. Secondary wood processing industries (joinery, furniture) and paper industries (converting, packaging) have also experienced increasing consolidation in terms of unit size and ownership.

Cultures behind entrepreneurship

No comprehensive research has been undertaken in this field and the following comments are general observations.

Family business traditions and motivations were and still are strong drivers in the woodworking SMEs. Profitability, though obviously important, is not as rigorously pursued in many family businesses as in larger, corporate organisations. Innovation in the primary wood processing industries has relied largely on European, Scandinavian and North American technology (e.g. sawmill and wood panels equipment). There are some highly innovative SMEs in both primary and secondary processing sectors but access to finance is often a major constraint to capitalising on these ideas.

Over the last five years there have been conscious attempts by government agencies to encourage the development of industry clusters. The most successful of these is the Scottish Forest Industries cluster. The cluster's main activities include: lobbying government, promoting the use of timber, organising tours of overseas forest industries, disseminating technical and market information to industry, holding seminars and conferences. The cluster receives financial support from the Scottish Executive (the devolved administration for Scotland).

There is a strong craftsman culture and “lifestyle” ethos in bespoke furniture, joinery and carpentry businesses. Many of these are very small enterprises and are often rurally based. Some traditional crafts (such as coppice-based products) have declined, as markets have been lost to imports or non-wood materials.

Studies on wood industries

There is no central compendium of current studies/research projects on the UK wood processing industries. Consultancy reports have recently been undertaken (December 2004) on the future development of forest industries in Scotland and Wales. Research areas of the major research institutions are show in Annex C.

3.2. Wood processing industries

Structure of wood industries

Table 7 shows the trend in the number of establishments in the primary wood processing industries from 1990-2003. The decline in sawmills and round fencing manufacturers is clearly seen. The largest pulp mill has recently ceased production of wood pulp and converted to using 100% recycled fibre. Two smaller panel mills closed in 2003.

Table 7. Number of establishments in the primary wood processing industries using UK grown roundwood

Year	Sawmills	Pulp and paper mills	Woodbased panel mills	Round fencing manufacturers (GB only)	UK total
1990	3361	4	11	-	-
1995	459	4	11	131	605
2000	305	4	10	85	404
2003	250	3	8	64	325

Source: Forestry Commission

Details of the size and country distribution of sawmills is given in Table 8.

Table 8 Number of sawmills in the United Kingdom in 2003

Size category Production	UK	England	Scotland	Wales	N Ireland
<1000m3	96	58	23	7	7
1000-4999m3	84	50	24	4	6
5000-24999m3	43	17	18	7	1
25000-49999m3	12	4	5	2	1
≥50000m3	16	4	9	2	1
Total	250	133	79	22	16

Source: British Timber Statistics 2002 and Forest Service

There are no published data on distribution of companies in each industry sector by number of employees or turnover.

Value added along the wood chain

There are no regularly published figures of value added along the wood processing chain. However, multiplier studies of the forestry sectors in Scotland and Wales were undertaken in 1999 and these provide detailed analyses of the economic impact of an expansion and decline in forestry activities on the economies of both countries.

Table 9 gives a summary of the economic characteristics of forest growing, harvesting, haulage and primary wood processing in Wales. The figures on gross output (row 4) give an indication of values along the chain.

Table 9. Economic Characteristics of Forestry Related Sectors in Wales: 1998*

Sector	All Forest Sectors	Private Estates etc ***	Harvesting and Allied Contracting	Haulage	Sawmills	Panel Board and Paper
FTEs** in Wales	3,281	728	846	215	557	936
FTEs in Rest of UK	649		90		45	514
Total FTEs	3,930	728	936	215	602	1,450
Gross output £000s	403,448	16,533	43,474	9,352	47,253	286,837
Average Gross Wage £000s	17.6	10.4	19.6	15.1	13.6	24.4
Total non-wage spend in Wales £000s	81,673	5,605	9,293	2,152	26,031	38,592
Total Forestry related purchases in Wales £000s	52,133	4,197	3,875	0	23,514	20,548
All other non-wage spending in Wales £000s	29,540	1,408	5,419	2,152	2,517	18,044
Imports (UK and Overseas incl labour) £000s	166,621	1,354	4,302	1,852	5,703	153,411

Notes:
financial figures £000s 1996 prices;
**FTEs are full-time equivalent jobs.
*** including forest management companies, nurseries, and farm woodlands.
Row totals may not balance because of rounding

Share of imports and exports of the wood processing industries.

Imports dominate the UK forest products market and consequently the vast bulk of domestic manufacturers' products are aimed at the UK market. A comparison of imports and exports by broad product category is shown in Table 10. Figures are in thousands of m^3 wood raw material equivalent. In 2003 imports were the equivalent of 49 million m^3 (WRME) and exports 13 million m^3 (WRME). Imports are concentrated on sawn softwoods, wood-based panels, pulp and paper. Exports are mainly of wood panels, paper (based primarily on imported pulp and recycled fibre) and recovered paper where exports are growing rapidly. SMEs play a very small role in exporting.

Table 10. UK imports and exports (WRME volumes) thousand m³ WRME underbark

	Wood (round and sawn)			**Paper and Paperboard**			**Total**
	Softwood	Hardwood	Wood panels	Paper	Pulp	Recovered Paper	
			Imports				
1995	12 536	1 432	5 150	15 930	8 447	677	44 172
1996	13 335	1 659	5 372	16 564	7 929	250	45 107
1997	13 977	1 614	5 970	17 803	8 171	211	47 746
1998	14 070	1 514	6 312	17 244	7 542	161	46 843
1999	13 784	1 464	6 160	17 439	7 518	179	46 543
2000	15 263	1 767	6 825	16 493	7 865	400	48 613
2001	15 278	1 855	7 102	18 614	6 985	144	49 977
2002	16 131	2 016	8 279	15 500	6 951	213	49 089
2003	17 274	2 392	8 030	15 160	6 515	280	49 651
			Exports				
1995	290	81	718	3 355	158	762	5 364
1996	201	82	756	3 407	55	912	5 414
1997	203	93	985	4 193	22	1 341	6 838
1998	300	367	956	4 004	98	1 240	6 964
1999	391	193	1 359	4 071	124	1 311	7 448
2000	502	347	1 206	3 900	32	1 712	7 699
2001	833	277	1 467	3 532	12	2 033	8 154
2002	833	239	1 597	3 355	23	3 454	9 501
2003	1093	481	1 882	3 653	5	5 459	12 572

Source: UK Overseas Trade Statistics and conversion factors to WRME.

3.3. Wood processing industries practices

Current small and medium scale practices

SMEs dominate activity in timber harvesting, timber haulage and sawmilling. They probably account for between 50% and 60% of roundwood consumption in the sawmilling industry. These companies import virtually no raw material and export very little of their output.

Economic characteristics

Profitability of sawmilling is relatively poor and many SMEs have inadequate access to capital to finance plant modernisation and innovation. The bulk of recent expansion of sawmilling production has been in the larger sized SMEs. The smaller SMEs are mainly family businesses and the larger ones private limited companies. Statistical information on the educational background of managers in SMEs is not available. In the smaller SMEs, most managers probably have high school level qualifications but in the larger SMEs there is likely to be a higher proportion of graduates in management. There is a serious shortage of skilled workers in timber harvesting and in the woodworking industries.

Employment in the primary wood processing industries totalled 10,600 persons in 1998/9 (see Table 11) about one third of the sector.

Table 11. Employment in forestry and primary wood processing industries 1998/9

Employer[1]	**GB**	**England**	**Scotland**	**Wales**
Forestry Commission	3,909	1,331	2,011	567
Private woodland owners	8,425	4,242	3,196	987
Forestry companies and contractors	4,598	2,077	2,223	298
Wood processing industries	10,628	5,581	2,917	2,130
Other employers	1,972	1,508	347	117
Total	29,532	14,739	10,694	4,099

Sources: Forest Employment Survey 1998/9
Notes: [1] Figures include work by contractors as well as employees in full time equivalents

Many sawmilling SMEs manufacture commodity products and sell into fiercely competitive markets. Competitiveness focuses largely on production cost competitiveness rather than on qualitative factors. There is a major need for most SMEs to develop higher value markets with new or modified products which will help to move them away from commodity markets.

Characteristics of innovative behaviour.
The more successful SMEs have expanded their business through innovation in new products and markets and investment in new plant and machinery. These companies tend to be the larger SMEs.

Rate of formation of enterprises
Networking between SMEs has developed over the past 5 years, particularly in Scotland and Wales through initiatives by the devolved governments in providing financial support for cluster organisations. This has developed furthest in Scotland where there is a very active "Scottish Forest Industries Cluster".

In 2003 the approximate number of registered businesses in the sector were as follows:

- forestry and logging 2750
- sawmilling and planing of wood 850
- manufacture of wood based panels 160
- manufacture of pulp, paper and board 370

Over the past decade the number of businesses in each of these divisions has fallen, particularly in the processing industries. This has been due to industrial consolidation and closure of small businesses.

3.4. Policy framework and production conditions

Main wood industry policy institutions-national and regional.
Constitutional changes in 1999 established governments in Wales and Scotland with local responsibilities. Forestry and industrial support / development are devolved functions. Each country (England, Scotland, Wales) has formulated forestry policies which differ quite considerably and there are variations by country in the level and mechanisms for government support for forest industry development. It is strongest in Scotland and this reflects the higher share of the forestry sector in the Scottish economy compared with England and Wales.

Organisations providing financial and business support for the forest industries within each country include:

- The Forestry Commission
- Development Agencies (e.g. Welsh Development Agency, Scottish Enterprise)
- European Union through regional and structural policies e.g. Objective 1

At UK level, support is given for selected types of industrial development by the Department of Trade and Industry, the Department of Transport, Environment and the Regions and the European Investment Bank.

Main reform policies and policy incentives

There have been no major macro economic policy reforms over the past 10 years such as privatisation, international trade policies or price liberalisation that have impacted in a major way on the forest products industries. However, strong macroeconomic management has led to a strong pound and created major disadvantages for domestic producers whose prices can be readily undercut by imports. However, a number of other policies have seriously affected or will soon affect the sector.

These include:

- Policies to encourage the use of recycled materials. These include EU packaging waste regulations and the imposition of rising charges for disposing of waste in land fill. These policies have led to a sharp increase in the use of recycled fibre in paper making and recycled wood in board product manufacture. Both these developments have had a strong negative impact on the market for small diameter roundwood and sawmill co-products.
- Renewable energy policies. The UK government has set targets for the proportion of electricity generated from renewables. Renewable sources currently account for 3% of electricity production and the target for 2010 is 10%. The fastest growing renewable source is wind. However, there are now several incentives for investment in biomass energy, particularly for heating purposes in the home, commercial and institutional buildings. This might result in a major new market for small roundwood and forest residues.
- The "climate change levy" on energy-intensive industries. Energy-intensive industries, including the paper and panels industries, are encouraged to reduce energy costs by offsetting a fossil fuel energy surcharges by improving their efficiency of energy use or by producing / buying renewable energy.
- Public procurement of sustainably / legally produced timber. In 2004 the government established a Central Point of Expertise on Timber Procurement (CPET) which will ensure that all timber used in government and other public sector buildings is supplied from legal sources. Certified timber (FSC, PEFC) will satisfy these requirements. Non-certified timber will still be usable if it can be shown to come from legal sources. As most timber from British forests is certified, this policy may benefit the domestic industry. It is likely that these government requirements will be taken up by the private sector in the longer term.

Main policy (including financial) incentives available to wood industry that directly influence management behaviour

Incentives are available under regional development programmes usually for capital equipment and training, but in some situations there may be assistance with finding premises.

Extension and consultancy services.

Regional development agencies (e.g. Welsh Development Agency) provide some extension services to SMEs e.g. supporting formation of cluster organisations, providing business advisory services. There are several well-established consultancy organisations, some British others international, servicing the sector.

Bureaucracy

No data are available on the number of projects supported by development agencies. Some SMEs consider that development agencies are poor at stimulating the development of innovative businesses. Weaknesses cited include:

- inflexibility of support mechanisms and slowness to react
- suspicion/failure to understand entrepreneurial and creative ideas in SMEs
- excessive attention to short-term job creation by the business rather than long-term business growth and innovation.

3.5. Supporting and limiting factors for enterprise development in wood processing industries and barriers to entrepreneurship

Factors supporting enterprise development.

- Growing supply of wood from coniferous plantations.
- Scope for reversing the decline in hardwood production.
- Slowly growing recognition of the environmental benefits of wood products in comparison with competitive materials.
- Support mechanisms from Forestry Commission and development agencies.
- Wealth of innovative ideas and enthusiasm for product development in many SMEs.

Factors limiting enterprise development based on British grown wood.

- Dominance of imported supplies of wood products.
- Poor quality of softwood and hardwood resource.
- Declining supply of skilled woodworking workforce.
- Poor image of industry by young people.
- Lack of wood culture in major consuming industries e.g. construction.

Barriers to entrepreneurship.

- Confusion among SMEs about support mechanisms. This arises from the large number of organisations and schemes available for support. These vary by region, some are for specific types of development e.g. wood energy and others are generic across all sectors of industry.
- Inflexibility of support mechanisms, slowness to react, conservative attitudes to new ideas, over reliance on short-term job creation as a criterion for support.
- Access to finance by SMEs
- Poor market data available to SMEs

Policy and research implications.

- Policies and research needed to enable SMEs to develop and test new products
- Policies needed to improve information on the environmental benefits of wood products (e.g. Life Cycle Analysis) and to communicate this information to industry
- Policies needed to improve the image of forestry and wood and to encourage young people to seek training in woodworking industry skills

4. Non-wood forest products and services

The closest to a definition of NTFP for the UK is that promulgated in Scotland on the NTFP web site hosted by the Royal Botanical Gardens Edinburgh and funded by the Scottish Enterprise through the Scottish Forest Industries Cluster (see Box 1).

Box 1. NTFP Scotland definition

> Non-timber forest products (NTFPs), also known as *non-wood forest products* (NWFPs), include all materials supplied by woodlands except timber.
> Scottish woodlands provide a wide range of such products, including wild and managed game, edible and medicinal plants and mushrooms, foliage, seeds, bark, resins, dyes and craft materials.
> http://www.forestharvest.org.uk/

The NTFP Scotland definition is fairly conventional in its focus on woodland materials but many of the products are also found in hedgerows and open moorland and reports on such products generated by non-foresters have taken a broader view of the subject and used a variety of terms including:

- non-timber woodland products' Dyke (2001)
- wild living resources' Murray & Simcox (2003)
- wild and traditionally managed plants' Sanderson & Prendergast (2002)
- wild harvest' Prendergast & Sanderson (2004)
- woodland and hedgerow products' Wong & Dickinson 2003

The only consensus seems to be the distinction between 'wild' products and those which are cultivated whether they are harvested from forests or not. A further confusion is the that use of the term 'NTFP' to refer to products such as the industrial use of cellulose as a chemical feedstock by some in the wood science community. Regardless of this, all these definitions are concerned only with biological products. However, the definition of Mantau (2004) which has been adopted for this report also includes market and non-market services. For many years now the multi-purpose nature of forestry has been recognised in UK policy in which the social function of forests is prominent. Recent work by Slee *et al.* (2003) indicates that many of the social values of forestry translate into real incomes and cash transfers into local communities and the authors suggest that forestry impacts on rural development in four areas:

- **Forest production**, including forest-related work and the upstream and downstream connections of forestry on employment and income;
- **Green infrastructure** effects (the forest 'halo') on surrounding economic activity, for example through the encouragement of households or firms to move into the area, or through increased turnover of recreational and tourism businesses attributable to the forestry and woodland.

- The **non-market values** of forests and woodland, which although not generating immediate regional income, do create a contribution to national green accounts.
- The **social values** attributable to forests and woodlands, which range from their contribution to symbolic capital and community identity to their contribution to social capital building.

The biological products which are generally the focus of classic interpretations on NTFPs fall, alongside timber under 'Forest production'. Since the cash market for carbon credits is as yet undeveloped in the UK these values have been placed alongside biodiversity and other environmental goods i.e. water quality under non-market values. Although social capital is also a non-market value it is significant in providing infrastructure, particularly marketing, for the development of NTFP based enterprises i.e. the margins which accrue to the cache or cultural value attached to wild, local and traditional products.

4.1. State of the art and historical development

The mass movement of people from the country to cities consequent on industrialisation took place in the UK during the mid 19th century. Their descendants now four or more generations away from the land and living in a post-industrial society are dissociated from the realities of rural production (significant numbers of urban children think cotton comes from sheep and that oranges are grown in the UK). This means that demand for non-timber forest products from most people is low or non-existent. Niche markets exist for traditional products including herbal medicines, wild foods, woodcraft such as baskets and bodging (rustic furniture made from green wood). However, even among those which are derived from native species, there are only a few that are made from UK sourced raw materials e.g. sloe gin is a traditional liqueur but much of it is made from pulped sloes (*Prunus spinosa*) imported from eastern Europe. Interest in natural products is experiencing rapid growth and this provides significant opportunities for the development of new forest product based enterprises (see below).

Of more overall significance is urban demand for access to the countryside and forests for recreation, aesthetic landscapes and conservation (albeit the 'feel-good' of knowing that we still share our island with wild animals and plants rather than consumptive use). The relatively small size and communication infrastructure of the UK means that much of the countryside is easily accessible to urban people and can be deemed to be peri-urban. Over the past few years the tension between urban demand for services and rural, productionist sensibilities has been growing. This has been brought to the fore with the controversial Hunting Bill, which will ban hunting with dogs in the UK from February 2005. This promises to bring about civil protests and even a judicial challenge to the use of the Parliament Act to get the Bill past objections in the House of Lords which would have constitutional implications[1].

[1] The following web sites provide further information on the scale of discontent over these developments.
http://news.bbc.co.uk/1/hi/talking_point/4012743.stm
http://news.bbc.co.uk/1/hi/in_depth/uk/2002/hunting/default.stm
http://www.defra.gov.uk/rural/hunting/default.htm

There are various ways in which urban demands are communicated to forest managers. Public demand for forest services is expressed through civil society (letters to newspapers etc.) and special interest groups. It is possible to recognise two groupings of NGO interest. There are those mostly concerned with amenity (landscape quality) and public access for recreation e.g. Council for the Protection of Rural England (www.cpre.org.uk), Council for National Parks (www.cnp.org.uk) and the Ramblers Association (www.ramblers.org.uk). The second group are those which are concerned with conservation e.g. Royal Society for the Protection of Birds (www.rspb.org.uk) and Woodland Trust (www.woodland-trust.org.uk). The FC also undertakes its own surveys of forest use and amenity and recreation feature strongly in these. These concerns are also reflected in representations from statutory agencies such as Scottish Natural Heritage (www.snh.gov.uk), English Nature (www.englishnature.gov.uk) and Countryside Council for Wales (www.ccw.gov.uk).

These concerns are reflected in policy in each country within the UK as policy statements such as those for England in Box 2.

Box 2. English Forestry Strategy

Woodlands and forests can provide timber, enhance the beauty of the countryside, revitalise derelict and degraded landscapes, reduce pollution, improve health, and enhance wildlife habitats. Woodlands can also generate employment, provide opportunities for sporting and recreational activities, and improve the quality of life in and around towns and cities by screening development and improving the setting for housing and industry. Few other land uses can boast such a diverse range of benefits.

The founding principle of UK state forestry to provide a strategic timber resource in case of war is long gone and the current perception in UK forestry is that forests should provide social benefits which are perceived to be mainly related to provision of amenity and recreation. Nevertheless there remain important production roles for the forests and direct economic links between forests, urban demands for services and rural development. As pointed out by Slee *et al.* (2003) the balance between different demands, products and services varies dramatically between locales even within England and this needs to inform analysis and development of development options and constraints for forest-based rural development.

Forest and tree-based biological products

The recent downturn in incomes from timber as well as increasing interest in natural, 'lifestyle' products has prompted an examination of the potential for income generation from NTFPs across the UK. Reports funded by forestry, economic development and conservation interests have been prepared for England, Scotland and Wales (see list below). The consensus of these reports are that there is significant demand for natural products for natural products and this is set to grow in the near future, however, there are only modest levels of enterprise activity. There are several constraints on development of forest product based SMEs based on UK-sourced materials which are likely to constrain the exploitation of UK NTFP markets. The most significant of these are listed below.

- Processors require large volumes, as cheap as possible and available at on schedules to suit manufacturing timeframes – this is difficult for small scale SMEs to deliver and the fragmented nature of UK forests mean it can be difficult for a collector to access large volumes as this may require agreements with many landowners.
- Urban consumers are not discerning and are hardly aware of which products are made from plants native to the UK, let alone being prepared to demand or pay a premium for UK sourced ingredients.
- The price for wild-collected products is heavily dependant on labour costs. Labour rates acceptable to UK people mean that products cannot compete with imports on price as labour rates are lower elsewhere, particularly in eastern Europe.
- Seasonal and manual labour in rural areas is in short supply and a major impediment to the development of the rural economy. Several larger-scale pickers overcome this problem by importing seasonal labour gangs from outside the UK.
- Market linkages between urban areas and the rural hinterland are very weak and disappearing – there is only one traditional seasonal market left for Christmas foliage in the UK.
- For some products, UK sources are not capable of meeting demand which means imports will still be needed.

Several of the larger SMEs which specialise in collecting NTFPs overcome these problems by taking out licenses to collect over large areas, operating in the grey labour market (cash in hand without paying taxes), using imported, seasonal labour (often from eastern Europe) and not offering woodland owners any income (much collection even under license is effectively free). Until recently, most woodland owners were content to allow harvesting even when it was blatantly commercial, free of charge as a contribution to the local economy. However, farm and forestry incomes in the UK have fallen dramatically in recent years and are unlikely to recover in the short term. This means that woodland owners are now actively seeking alternative forest-based incomes and looking for opportunities to generate income from commercial activity on their land. Farmers are also seeking to diversify their incomes and this presents an opportunity to more closely integrate economic activities on farms and adjacent forests.

The small scale and specialist nature of possible NTFP enterprises means that products do best if they are niche marketed. Scoping available products in a locality and determining which, if any, could be successfully niche marketed, is something which is beyond the capacity of many relatively isolated farmers and foresters. In areas with Objective 1 status (much of rural Wales and Cornwall) there are farm diversification programmes in place to support enterprise development with business advice and soft loans as well as Leader and other development initiatives. Although these have been successfully used to develop NTFP-based enterprises (e.g. mushroom cultivation in woodlands in south Wales support by Leader) there is little strategic development of woodland products and developments in NTFPs depends upon innovation among farmers and woodland managers. There is no lack of innovative thinking among these communities but it seems that many ideas fall foul of the straitjackets inherent in the measures and business plans of the programme managers and fall between the cracks between the agriculture, forestry and horticulture sectors. It takes a particularly innovative business advisor to be able to pitch an idea to the right support programme in the right manner. The lengthy and oftentimes intrusive application process is also off-

putting to new entrepreneurs and opportunities can have passed before application are processed. The spending constraints on grants or loans received e.g. the need to have competitive tenders from a list of approved contractors also pushes up prices so that it is hardly worthwhile taking up grants. As a consequence, most genuinely innovative enterprises and many started by competent entrepreneurs that are likely to succeed are developed and funded without state assistance and this is likely to remain the case. This leaves the development agencies to support those seeking to emulate successful enterprises. However, niche markets for speciality products can be easily overrun and there is a need to protect the interests of existing enterprises as well as avoiding market saturation in a manner that still provides for open marketing of opportunities.

Besides providing the normal SME development support of easy loans, cash grants for computers etc. the following are areas that could be addressed by rural development agencies to promote entrepreneurship in the NTFP sector:

- co-funding or commissioning of R&D on sustained yield management (distribution, biology and productivity) of products with highest potential for SME development;
- support to development of rural labour infrastructure;
- promotion of native and locally sourced products;
- labelling of forest products (organic or UKWAS);
- organisation of marketing initiatives.

Recreation and tourism

Woodlands in the UK are recognised as having been used for recreational purposes since the medieval period; by which time many forests were predominantly used as royal hunting reserves rather than sources of timber. Over the years and particularly after the onset of the industrial revolution, increasing urbanisation moved people away from the countryside with a large proportion of the population being effectively alienated from the country and only the wealthy able to make recreational use of forests. Increasing mobility and affluence through the 19th century, however, meant that more and more urban people could indulge in leisure activities in the countryside and this lead to the formation of groups such as the Forest Ramblers Club in 1884. Demands for recreational access to countryside culminated in the Kinder Scout Mass Trespass in 1931. Since this time the Forestry Commission (FC) has recognised the importance of informal leisure use of state forest land and throughout the 20th century the FC, has been a key provider of forest recreation and tourism opportunities. Initially this was through the development of Forest Parks, the first such park being founded in Argyll in 1935. However, it was not until the 1970s that recreational use of state forests was promoted on a wider scale through the establishment of car parks, picnic sites, walking trails and interpretation. These latter facilities were developed mainly as non-market resources for public benefit. At the same time, a small state run market enterprise, called Forest Holidays, was established by the FC, to provide accommodation (cabins and camp sites) in state forests across the country.

During the 1980s, state-owned forests were threatened with privatisation. However, public outcry in the face of the potential loss of what was regarded as an important recreational resource, was instrumental in preventing this move. Throughout the 1990s, leisure facilities in state forests have been expanded and improved upon to meet the needs of increasingly diverse, specialised and informed groups of users. Some

developments, such as the mountain bike trails, have particularly responded to increasing demand for recreation from wealthy urban consumers. Others, such as wildlife watching facilities, respond to a rising societal concern and interest in biodiversity and the conservation of the natural environment. These facilities have been funded primarily through the revenue gained from the sale of timber. More recently, with the declining profitability of domestically produced timber, grants (from within and outwith the public sector) and, to a lesser extent, visitor charging, have been increasingly important sources of funding for the development and improvement of leisure facilities. At the same time, however, (and in some cases in conflict with the need to generate revenue), recreation in state forests is increasingly viewed in terms of its current and potential benefits for public health and well-being, education, social inclusion and cultural diversity.

Whilst the FC continues to be a key player in forest leisure provision, the last fifteen years have seen a broader range of organisations and individuals providing such services, for example, non-government organisations (like The Woodland Trust), community groups and innovative individual landowners (particularly new forest owners). Centre Parcs, a large scale commercial forest tourism enterprise providing self-contained holiday resort complexes in forest settings, has also entered the market and caters, largely, for urban-based consumer demand.

Large country estates have traditionally been integrated and diverse enterprises and are often very innovative. Having access to large-scale land and capital investment means that they can afford to invest in new enterprises. They are increasingly diversifying into recreation and tourism providing for example, saw mill demonstrations, go-karting and quad biking, pheasant shooting , falconry displays, bed and breakfast and shops selling home produce (see for example, the Rothiemurchus estate in Scotland).

Over the last ten years, the introduction of certification under UKWAS has also emphasised the importance of using forests for a wide range of purposes including recreation. Woodland grants from the FC and the impacts of new access legislation (see later), are also driving forces behind the increasing provision of recreation and tourism activities within privately owned forests. These policy related instruments have been augmented by the declining profitability of domestically produced timber with forest owners and managers becoming increasingly interested in the development of forests as potential sources of recreational and tourism-based revenues.

Definition, classification and relevance of forest recreation and tourism in rural economies

‘Recreation’ and ‘tourism’ are usually seen as being part of the wider ‘leisure’ sector. That is, product and service providers catering for activities which people take part in during non-working hours. Whilst the forestry sector, particularly FC, tends to refer to any leisure activity as ‘recreation’, there are important distinctions between recreation and tourism activities. Following Hall and Page, 2002, the tourism sector can be distinguished from the recreation sector in that it focuses on catering for leisure activities which people carry out during visits which involve an overnight stay away from home. As such, tourism often involves people purchasing accommodation, food and drink and is characterised by the injection of money *into* local economies. The

recreation sector on the on hand caters for people taking part in leisure activities, which do not require them to stay away from home overnight. Recreation too however involves people purchasing goods and services but it is characterised as promoting the circulation of money *within* rather than into local and regional economies (ibid). Clearly there are overlaps between the tourism and recreation sectors in that many of the products and services offered primarily for recreation, are also used by tourists, and vice versa.

In the UK, the FC considers informal leisure to be a public good and users are not charged to enter state forests. There are however, commercial elements within state forest recreation provision. As was noted earlier, in the 1970s the FC established a Forest Holiday business providing cabins and campsites within some of the woodlands under its management. With declining revenue from timber sales, there has been increased pressure on FC to find alternative sources of funding for recreation development and maintenance. This has led to the introduction of charges for certain recreation products and services. Since the 1990s, the FC has charged for car parking at some of its recreation sites with a high level of facility provision. FC visitor centres have also increasingly turned to market enterprises such as shops and cafes to provide revenue for their maintenance. More recently, the development of a number of specialist mountain bike trails has lead to the establishment of bike hire facilities and associated services (such as jet sprays for cleaning bikes) in forests. At a few forests, specialist trails, such as the 'Go Ape' tree top trail at Thetford Forest in the East of England, and forest drives, are also charged for. The FC special events programme, involving activities such as rally car racing, music festivals and laser shows, has also developed in the last five to ten years. Participants and/or spectators are charged to enter these events and as such they generate significant income to the FC. However, some events do fail to cover their costs.

Commercial enterprises are often run in partnership with the private sector and thus can play a role in local rural development, for example, visitor centre shops, cafes and bike hire facilities are often franchised to local entrepreneurs. Many of the mountain bike trails are also delivered with sponsorship from the private sector (see the mountain biking case study). Forest Holidays is also soon to be managed under a public-private sector partnership agreement.

Recreation provision is similar within other (non-state) parts of the forestry sector, with access and trails being provided on a predominantly non-market basis, with certain specialised activities and services, for example, quad bike riding, guided walking tours, accommodation and activity centres, being commercial concerns. As such, recreation and tourism products and services contribute significant incomes to both the state and private forestry sectors. Questions are however being raised about the extent to which the provision of recreation as a non-market public benefit in state forests is undermining the ability of the other parts of the forest sector to develop, particularly commercial recreation facilities (see mountain bike case study for further details).

As well as providing economic benefits (and costs) to land owners, forest recreation facilities also have economic impacts within the wider areas in which they are located. For example, they can help attract visitors to the area, increase the length of time people

stay in an area and also enable the establishment of market enterprises who use the biological and man-made resources of forests to provide a range of leisure services, such as food and drink, guided walking and horse-riding tours and nature photography courses. They also enable the establishment of enterprises providing product and services which more directly form part of the non-market products and services of woodlands, for example bike hire companies in areas where mountain bike trails are located (see mountain biking case study).

There have been several studies of the economic value of forest recreation and tourism in the UK. Willis *et al.* (2003) estimated the annual value of forest recreation to be £392.65 million and the annual value of the forest landscape to be £150.22 million. The FC is currently funding work to be undertaken to explore the economic value (consumer surplus) and economic impacts of different forest leisure activities (for example walking, mountain biking and wildlife watching). In relation to tourism, Hill *et al.* 2003 found that in 2002, forest related tourism expenditure associated with tourism day visits generated around £2.3 billion (3% of total tourism expenditure in the UK). Across six case study areas, an average of 13% of total tourism expenditure incurred by visitors to the countryside was considered to be 'forest associated expenditure'.

Complementing these quantitative studies, has been the Leisure Landscapes research project (Martin forthcoming). This has produced qualitative information relating to the role of forests to local rural tourism economies. It revealed the important role of forests to rural tourism businesses in terms of their contribution to positive tourism area identities and increasing the breadth and depth of holidaymaker experiences. The work also examined the ways in which the biological materials (for example berries and mushrooms) and man-made products and services (for example trails and interpretation) in forests can be utilised by enterprises to generate revenue for example through the provision of guided walking tours, mountain bike hire and wild life watching tours. The study revealed the considerable potential there is to strengthen the relationship between forest managers and local tourism enterprises, through a greater sharing of resources (monetary and non-monetary) to increase the quality of recreation and tourism provision and the benefits gained from such provision to the forestry and tourism sectors. Indeed, one the critical issues facing the forestry sector is how the costs and benefits of non-market forest recreation provision maybe apportioned more equally between land managers and local enterprises.

Property rights regulation system for forest recreation and tourism

Property rights of FC forests rest with the state (the devolved administrations in Scotland and Wales). Non-FC forest property rights rest with a range of private individuals and businesses, community groups and non-governmental organisations. In Scotland, a proposal to increase the opportunities available to community groups and other bodies to purchase or lease National Forest Land is currently under-going consultation (www.forestry.gov.uk/consultations).

The 1919 Forestry Act regulates the use of forestry land as well as national and local land use planning regulations. All state forests are open access resources and thereby allow free public access by foot (with use subject to FC bylaws). A permit system is operated for some modes of access (for example motorized vehicles and in some areas,

horse riding) and for large groups and special events. Generally permits are issued in order to ensure the necessary provisions for public health and safety have been made, rather than to generate revenue. Permit costs therefore tend to only reflect administration costs of the permit schemes. FC also operates a voluntary Forest Code governing the behavior of recreational users of state forests.

More broadly, countryside access is governed by national legislation, with new access legislation currently in the process of implementation. In Scotland, the Land Reform Legislation gives a right of public access (by all forms of non-motorised transport) to all land (including forests and woodlands) and inland water. The 'Scottish Outdoor Access Code' has been developed to set out the law with regard to public and land managers rights and responsibilities within the act. Whist allowing for responsible recreational use of the countryside, the act does not confer the right to hunt, fish or shoot on public access land or to take away anything in or on the land for commercial purposes.

In England and Wales, the Countryside Rights of Way Act makes provisions for a revised network of public rights of way and the designation of 'open land' (within which the public have the 'right to roam'). Unlike the Scottish legislation, the public only have rights of access along public rights of way or within 'open land' and only access on foot is permitted. Although forests and woodlands are generally not covered by the act (except where they constitute 'open land'), the act gives forest and woodland owners the right to designate land for public access 'in perpetuity'. The FC in England and Wales has made a commitment to designate, wherever possible, the land under its ownership for public access. Access provided under the act is governed by the Countryside Code.

Overarching all of these are the provisions of the UK Woodland Assurance Scheme (UKWAS 2000), which is the UK forest certification scheme. This makes provision for the incorporation of recreational services into woodland management.

The inclusion of forests and woodlands in the Scottish legislation and the ability for any owner to designate forests and woodlands as open access resources in England and Wales should serve to increase the supply of forest and woodland for recreation. Whether owners then engage in entrepreneurial activities to exploit these opportunities for commercial enterprise, remains to be seen. The FC in the East of England is piloting a toolkit which provides guidance to those interested in developing forest recreation facilities. If the pilot is successful the toolkit may be rolled out more broadly within the UK.

Green infrastructure and local development

For many years recognition of the social and cultural significance of forests, wooded landscapes and trees in the UK has been a driver for forest policy and strategic management. However, the recognition that the presence of forests and trees in the landscape have a measurable and significant impact on local economies is relatively recent. Slee *et al*. (2003) undertook a study of two regions in England for the Forestry Commission which examined the incomes derived from forestry using a mix of interviews, income and employment multipliers, benefit-transfer and interpretative methods. The results (see Table 11) indicate that the residential halo is many times

greater than timber-based incomes. Likewise, even though recreational facilities within the forests are free, the local economy can turn these into incomes and livelihoods through tourism enterprises.

Table 11. Regional forestry-based incomes (£ millions per year)

Income derived from forest dependant:	**Mid-Bedfordshire**	**Breckland**
Production (wood only)	0.64	3.32
Tourism	3.04	20.45
Residential values	8.33-24.99	6.1-18.3
Non-market informal recreation	1.2-2.46	1.04-1.87
Carbon	0.04-0.11	0.54-1.61

The 'residential halo' is typified by an increase in residential values in attractive i.e. wooded landscapes (in which the trees may be as hedgerows rather than woodlands) which gives rise to a more affluent community which in turn increases revenues for local businesses. Although the extent to which trees influence these values is to some extent a function of proximity to urban areas i.e. it is less apparent in isolated rural areas and very significant in peri-urban areas, it is a general phenomenon and it is generally acknowledged that you have to pay for a view. Forests provide 'green' infrastructure for other activities and hence economic activity. How this is exploited will be conditioned by the character of the local economy.

Although green infrastructure effects are clearly there at present, they do not provide real incomes to forest owners. One way in which owners could capture these incomes streams would be to develop residential or office development within their forests. Indeed, the effect is further enhanced when buildings are hidden within a forest giving each a sense of privacy and intimacy with nature. Several woodland owners in Scotland have recognised the market for forest residential and office developments. However, developments of this type are prohibited under present planning regulations and there is often severe opposition to the zoning of forest land for building development. This does seem a little inequitable when forest-based tourist accommodation is allowed and exploited on state forest land. A further twist to the story is the small, but growing demand for forest burials. This was started as a means of providing protection for endangered conservation sites but has grown beyond this to be expressed as a demand for 'green' burials which often includes the use of biodegradable wicker coffins and memorial tree planting rather than headstones. However, although these types of enterprise development could well generate significant incomes for some owners, most of the economic benefits of halo effects will remain outside the reach of the great majority of owners unless some more institutional means of repatriating cash flows can be devised. It has been suggested that a local forestry tax may be one way to so do this but implementation of such a tax would require substantial changes in public and state attitudes towards the role of forests. In the short term much could be done to balance forestry accounts by inclusion of halo cash flows and to demonstrate that the cost of forest management is actually an investment in the local economy, which is significant, can be measured and deserving of reward through a subsidy that can be recouped through taxation.

In England, the desire to maximise forest benefits for urban communities led to the development of the Community Forest Programme which is a partnership between the Forestry Commission, Countryside Agency, 58 local authorities and many other local and national organisations (http://www.communityforest.org.uk/). There are 12 community forests, all sited close to urban centres with the intention of developing deprived areas using the residential, business and tourism halo effects. The Mersey Forest is the largest of these and has successfully developed forested landscapes which are having an impact on the deprived peri-urban ex-industrial landscapes of the area around Liverpool (see Box 3). This has been achieved by planting of 7.5 million trees to create 2,500 ha of new woodland (64% increase in woodland cover) much of it on derelict brownfield sites (coal tips etc.), 72 km of hedgerow and 1,000 ha of non-wooded wildlife habitat. This has generated 100 new jobs in the area and involved local people in 27,000 woodland and tree based events such as tree planting, seed collection, nature walks etc. Benefits to woodland owners have been grants for tree planting and the additional work has provided a boost to traditional forest-based businesses. Interestingly, timber production has a very low profile in the Mersey Forest and current output of thinning and tree surgery waste is used to make 17 products including bird boxes, gates and cutting boards.

Box 3 The Mersey Forest … for the economy

Trees and woodlands encourage inward investment, create jobs, provide a resource for training, and boost local business income through increased tourism and leisure.

Creating The Mersey Forest is also helping to overcome negative perceptions of the region, one of the barriers to further economic development. An improved physical environment gives renewed confidence to an area, provides more attractive locations for business and housing developments and creates more desirable environments to live in.

Tree lined roads, green corridors and wooded locations have also been shown to be favourable for the housing market and can add around 20 percent to house prices. The Mersey Forest creates the environmental, structural framework within which economic development can take place.

Community forests also impact directly on employment by developing forest industries and stimulating the markets for local timber. In timber related industries alone, the Northwest employs over 37,000 people, with an estimated gross output of £435 million. The potential exists for further expansion, aided by the growth of The Mersey and Red Rose Forests.

The Mersey Forest partnership is also providing training in forestry skills, rural crafts and land management to help stimulate local forest industries and prepare the workforce for new opportunities.

And with over 30 million visits a year to woodlands and forests in the Northwest, The Mersey Forest is already an important part of the region's tourist industry.

source: www.merseyforest.org.uk

Cultural values

The Scottish omnibus survey (questionnaire survey of public opinion on forestry) conducted in 2003 a few questions where added on the collection of NTFPs. This revealed that 24% of the 944 people in the survey had collected some tree or plant material within the last five years. This proportion was remarkably constant across gender, age, income class area and working status. The only differences being more collection among rural people though even 20% of urban dwellers had collected NTFPs at some time. The types of products collected reflected British tastes with a strong preference (54%) for wild berries, leaves, cones, seeds, bark etc. and relatively little collection (16%). Firewood was collected by only 14% of respondents and flowers, herbs, moss, ferns and lichens by 25%. The relatively high level of collection among part-time workers (42%) suggests that they may be using the products to supplement

their incomes or as a substitute for bought products. However, most of the products collected were probably for domestic use and represent the extraction of cultural and perhaps social value from the forest. Although these cultural values do not in themselves generate income they can be used to market both recreational experiences e.g. fungi forays (collection trips) and wild products e.g. 'fruits of the forest' flavours. Increasingly, there are more prosaic cultural products which can be niche marketed, such as rowan twigs as wands, as well as contributing to the continued interest in traditional herbal medicine.

4.2. Case studies of successful marketing strategies

Case study 1: Recreational cycling in Welsh forests

Recent increases in mobility leisure time and disposable incomes have served to diversify and specialise outdoor recreation and an increasingly sophisticated and segmented market for recreational facilities is emerging. This case study examines the impact that the emergence of mountain biking (MTB) has had on forest use in Wales and also how exploitation of these opportunities can contribute to rural incomes and local enterprise development.

The UK has almost no wilderness and forests, even commercial conifer monocultures are a major source of outdoor recreation opportunities for the largely urbanised population. In Wales, much of which is relatively remote from large conurbations there is strong demand and use of forests for recreation with an estimated 11 million visits per year. Much of this is represented by short stay visits i.e. weekend trips by people coming from England. For people living in Wales this translates into opportunities to develop tourism and the rural economy as well as fulfilling local needs for recreational space. The recent 'Woodlands for Wales' strategy expresses these aspirations within its 'Tourism, recreation and health' objective. Stated priorities under this objective are:

- To use woodlands to help create a high-quality visitor experience; and
- To promote health through access to woodlands for all communities.

Cycling has always been a popular recreational pursuit in the UK (the Cyclist's Touring Club was established in 1878) and provides an opportunity for forest-based exercise and holidays. The mountainous landscapes and extensive forests with well-conditioned roads have long been used for informal recreational cycling. Over the past 15 years interest in recreational off-road or traffic-free cycling has increased dramatically (it is estimated there are 22 million mountain bikes in the UK – though most will never be ridden off-road) as disposable incomes have risen and bikes and riders become more specialised.

In Wales, the well established, constructive and sympathetic relationships between club cyclists and the Forestry Commission[2] resulted in partnerships to develop the first specialist mountain bike facilities. The success of the first developments at Coed y Brenin stimulated considerable interest in mountain biking in forests and the adoption in 2000 of the 'Mountain Bike Wales Initiative' prepared by Dafydd Davies the FC Forest Sport Development Advisor, himself a keen mountain biker. The FC developed

[2] In this case study the abbreviation 'FC' is used to denote all forms of state forestry in the UK and Wales.

partnerships with local authorities, New Deal (training and work experience for local unemployed youth), National Park Authorities, commercial sponsors and volunteers to develop facilities in Welsh forests. As with any enterprise, the FC mountain bike strategy considered market segmentation with regard to its competitive advantage and identified its key segments as leisure cycling and mountain biking both of which have large numbers of participants and high scope for growth.

Table 12. gives a few details of the projects, partners and investment levels for each of the five mountain bike site developments, which were supported under the MTB Wales Initiative. The MTN Initiative was a key component of the Wales Tourism Board Cycle tourism strategy for Wales who assisted with the marketing of the MTN product. The developments in mid and north Wales are targeted at weekend users from England, with most local benefits accruing as tourism income while those in south Wales cater for day visitors from Welsh urban centres such as Cardiff where benefits are direct satisfaction of urban demand for local recreational opportunities of which social inclusion is an important element.

Table 12. Mountain Bike Wales Initiative programme 2001-2002

Site	**Investment (£)**	**Commercial sponsors**	**Local partners**	**Main users**
Coed y Brenin	195,000	Karrimor (manufacturer) Red Bull (energy drink) MBR (magazine)	Snowdonia National Park Authority Gwynedd County Council SUSTRANS (national cycle network)	Weekend visitors Local riders
Afan Argoed forest park	70,000	Rocky Mountain (manufacturer)	Singletrack Mind (club) Neath Port Talbot Council Environmental Task Force	Day visitors from nearby urban areas (close to M4 so many will be from England)
Gwydr Forest	130,000	Marin Bikes (manufacturer)	Snowdonia National Park Authority Conwy Borough Council	Weekend visitors Local riders
Cwm Carn	70,000	Whyte Bikes (manufacturer)	British Trust for Conservation Volunteers New Deal Caerphilly Council	Day visitors (from nearby urban centres)
Nant-yr-Arian	110,000	Continental Tyres (manufacturer) Summit Cycles (shop)	Ceredigion County Council WDA New Deal (Ceredigion Training) Cyclists Touring Club	Weekend visitors

As with all investments, and particularly when these are funded by the public, it is important to evaluate the returns on investments. It is not possible from the annual accounts to determine the expenditure and income to FC from mountain biking facilities but the figures in Table 13 demonstrate that in terms of cash these are likely to operate

at a net loss to the FC, though, as shown below, there are significant cash injections into the local economy.[3]

Table 13. FC annual accounts for 'Promote tourism, recreation and health' objective

Accounting year (5th April)	**Net expenditure**	**Income**
1999/2000	4,571,000	Not given
2000/2001	1,952,000	91,000
2001/2002	3,398,000	84,000
2002/2003	4,761,000	222,000

However, it is not the intention of the FC to run recreation in the forests for profit but for social benefits (health, recreation and amenity) and to support nearby rural economies. This raises the issue of how costs and benefits can be distributed more fairly amongst stakeholders e.g. land managers and accommodation providers, local shops and restaurants etc. It has been suggested that a tourism tax levied on local tourist enterprises might provide a mechanism for some of the increased revenue to find its way back to the forest owners to help pay for the provision of recreational facilities. The MTB Wales Initiative has been judged successful as it produced several key outputs as shown in Table 14.

The overall assessment in the FC annual report for 2002/2003 was that the MTN Wales Initiative had a 'very positively impact on local communities, both through increased tourism revenue and the provision of high quality recreational resources for local people.'

Conflict resolution

In the status report prepared by Dafydd Davies in 2000, it was noted that there were nine illegally constructed trails on FC land and very extensive use of unofficial trail networks, i.e. forest roads, tracks and paths in all parts of Wales, but particularly in South East Wales and in the urban fringe forests of Coed y Cymoedd. Many of these sites in the peri-urban area (Cwm Carn) were included in the MTN Wales Initiative with the clubs that used the trails involved in trail design and construction. This has helped to meet obvious local demand, resolve potential conflicts between different forest users (for safety it is important to keep mountain bikers away from pedestrians) and inappropriate use of forest roads and footpaths.

Good working relationships with local clubs and enthusiasts are also important in publicising the existence and quality of new trails and negotiating and encouraging riders to keep to voluntary codes of practice such as the one which prohibits mountain bike riding on the main Snowdonia mountains between 10 am and 5 pm from the 1st May to 30th September. They also provide an opportunity to influence the development of the sport to minimise potential conflicts and ensure 'consumer' aspirations are met in a sustainable manner.

[3] A STSM is looking at this topic in relation to Coed y Brenin

Table 14. MTB Wales outputs

Indicator	**Achievement**
Employment	Over the life-time of the project, 40 people were employed full time. Many of them have continued in work associated with mountain biking.
Training	Through partnership with the New Deal which is a government sponsored training and work experience programme for unemployed local youth, 10 people are now in permanent employment
SME development	Construction techniques developed by Welsh trail builders are acknowledged by the International Mountain Bicycling Association (IMBA) as being the most advanced in the world. Welsh trail builders make inventive use of walking excavators and combine this with hand-built sections to create all weather trails in very difficult conditions in a short space of time. Three of the supervisors of the original trail work teams have gone on to establish their own trail design and construction companies and now work across the UK
Access to countryside	In all 75 km of new trail have been installed in Welsh forests which are likely to be used by an additional 300,000 visitors. It was also noted that developments will provide a very valuable local recreational resource that will encourage current non users to make constructive use of the forest environment and contributing to the Welsh 'Woodlands for Health' programme (http://www.forestry.gov.uk/forestry/activewoods).
Partnerships	As shown in Table 4.2 many different types of partnerships between the private, public and forestry sectors have been created around the development of Welsh mountain biking. A crucial part of the success of the project has been the less obvious partnerships forged between the site managers, local clubs and riders who contributed voluntary labour on trail building as well as suggestions on design and siting of trails.
International recognition	The IMBA in their annual trail report for 2003 stated that 'Wales is now the envy of the mountain biking world'. Wales was awarded 'A' grade (Elite) status which is shared with Idaho, Colorado and South Dakota where the sport originated. All of the FC sites listed in Table 4.2 where listed among the best in the world with Coed y Brenin singled out as best site in UK.
Contribution to local economy	Based on figures for Coed y Brenin site (see Box 5) the cash injection resulting from the MTN Wales Initiative was projected to be in the region of £16 million arising from 200,000 short stay visitors. It is likely that the actual income to the local economy is higher than this as there is also a spend resulting from day visitors and others who are attracted to the footpaths and other facilities at the mountain bike centres. Also there are indications that many mountain bikers have high disposable incomes and are likely to be higher spenders. For example, it is estimated that the What Mountain Bike magazine reaches 118,288 readers half of whom are aged between 25-34 with an average personal income of £28,000 and who estimate they will spend on average £1,352 on their next bike and £343 on related products per year. Many local providers of accommodation recognise the draw of mountain biking. The FC/Wales Tourist Board mountain biking marketing web site (www.mbwales.com) provides links to 64 hotels, B&B and hostels and receives 1.4 million hits per month.

Marketing

In 2004, the FC web site lists 31 facilities for cycling with mbwales.com listing eight major mountain biking centres and other sites listing up to 20 recommended MTB sites in Wales. With an estimated 120,000 cyclists using Welsh trails per year it is probably safe to say that mountain biking has graduated into a mainstream outdoor recreation. The success of mountain biking in stimulating the local economy has resulted in similar developments in the Brecon Beacons National Park (www.mtbbreconbeacons.co.uk) and the Clwydian Hills close to the English border in NE Wales (www.ridetheclwyds.com) and else where in the UK, notably Cumbria and Scotland.

However, although the development of mountain biking in Wales has certainly been effective there have also been failures. Bike hire facilities at Coed y Brenin struggled to generate enough income from seasonal demand to invest in high quality, well maintained bikes demanded by the public. Specialist shops such as Energy Cycles in Llanberis closed due to problems with seasonal demand and also competition from internet sales and shops closer to customer's homes. Even internet equipment e.g. 9feet.com retailers have not been able to attract sufficient income to maintain their independence. Mountain bikers are also very particular and trails considered too tame such as the one provided by the FC in Clocaenog Forest remain unused.

Access rights

Public access to FC land is guaranteed as it is all designated as Open Access land and the intention is to dedicate all footpaths under the Countryside and Rights of Way Act (thus assuring free public access). However, over the past few years the FC in Wales has been selling off parcels of land to raise revenue. Although land earmarked for sale are judged as not delivering significant public benefits there is a concern that the sale may compromise access for cyclists. Pedestrian rights of way are protected by a clause in the property deeds but unless the forest roads are registered as bridleways or byways access by cyclists cannot be similarly protected. In 2004, 25 woodlands are being offered for sale with the intention of raising £1.8 million. This is raising concerns among mountain bikers that the effective privatisation of land will have the effect of cutting some established routes in half.

Public versus private benefits

As demonstrated above, the public sector is able to justify investment in recreational facilities in term of its objectives to provide public benefits. This means that except for car park fees and the value of café franchises, facilities generate no revenue for the FC as the landowner and are virtually free to the user. Since the FC own half of all forested land in Wales, as well as the top-rated sites, it is virtually impossible for private landowners to charge for access to their land or any facilities they may develop. This means that the only way private owners can benefit from the mountain biking is to develop accommodation, cafés, shops etc. to capture some of the cash spent by bikers visiting free facilities on their land. See Box 4 for an account of the experience of one of the few private owners who have developed mountain bike facilities on their land. Although MTN Wales has delivered significant benefits to the rural economy, it has so far done little to ensure that it provides benefits to other, private forest owners. There are two ways of levelling the playing field: (1) For the FC to start charging for access to its trails. However, this would raise serious concerns with social inclusion, as charging

would impact on low-income households and would make facilities inaccessible to urban youth who would continue to make illegal use of woodlands. However, many mountain bikers are affluent and anecdotal evidence suggests some are prepared to pay for high quality facilities. (2) For the government to provide a subsidy towards the costs of developing facilities on private land to achieve social benefits and which the owner can then use as a locus for their own tourist enterprise development.

Box 4 Coed Trallwm

This forest is one of the few in Wales where the landowner is a forester, lives in the forest and uses it as his main income. It is located close to the town-based mountain biking centre at Llanyrtyd Wells which means it is placed close to other cycling attractions. The owner's son is a keen mountain biker and, with help from FC Woodland Improvement Grant, has designed and built three trails. The easy Blue trail is 3 km long with a 95 m climb; the medium Red trail is 4 km long with 140 m of climbing while the difficult Black route is 5 km with 155 m of climbing. The trails are free to use and have received good reviews (www.mtbbritain.co.uk/coed_trallwm.html) and the site is featured on the mtbwales.co.uk site.

The owner has converted seven old farm buildings within the forest into self-catering accommodation sleeping 2-10 people (www.forestcottages.co.uk) and hoped that the mountain bike trails would help to fill them. However, he reports that occupancy of his accommodation is around 25% over the whole year and that few people using them have been specifically attracted by the trails. It was judged that this was because they are too short to fill a days riding so visitors tended to come for just a day and combine a visit with other sites. The owner is responding to this by constructing a car park, visitor centre and café to cater for day visitors. This represents an investment of £80,000 on the part of the owner with a subsidy of £50,000 from the Wales Tourist Board. The intention is for members of the family to operate the new enterprises (café and shop) rather than franchising them as this will provide operational flexibility. The cashflow forecasts for the new enterprises estimate a payback period on the investment of around 7 years based on a projected spend from 4000 visits from cottage occupants and day visitors.

Future development plans are to develop longer routes with the co-operation of neighbouring owners to satisfy those staying longer.

Selected Welsh MTB web sites

www.dragondownhill.co.uk – downhill racing site
www.energycycles.com - north Wales club
www.forestry.gov.uk/cycling - FC site
www.mbwales.com - FC/Wales Tourism site
www.mtbbreconbeacons.co.uk - Brecon Beacons National Park site
www.mtbwales.co.uk
www.mtb-wales.com
www.nwmba.demon.co.uk - North wales club
www.reditreks.co.uk - mountain bike holiday business – Dyfi Valley
www.ridetheclwyds.com - development authority site promoting mtb in Clwydian hills
www.roughrides.co.uk - information for off-road riding in Powys
www.singletrack-mind.org.uk - south Wales club
www.summitcycles.co.uk - shop in Aberystwyth (route sponsor in Nant yr Arian)

Box 5. Coed y Brenin

This area close to the A470 trunk road just north of Dolleglau within a FC (state) owned conifer plantation was first identified as a suitable site for a race course by NWMBA (North Wales Mountain Bike Association) in 1990. Trails were created from 'an unpassable rock strewn jungle' and the first race held in 1991. Sian and Dafydd Roberts who are local mountain bikers and past national race champions set up a mountain bike hire facility on site and later took over the franchise for the visitor centre and café at Maesgwm Visitor Centre. With commercial sponsorship with Red Bull (energy drink manufacturers), parts of the original race route where turned into the permanent all-weather Red Bull trail in 1996 followed by the Karrimor (outdoor equipment manufacturer) trail in 1998. Since then several more specially constructed mountain bike trails have been developed. Most of the routes are designed by experienced local mountain bikers and built by local construction companies using volunteers for handbuilt sections. Good relationships with mtb users are maintained by the FC Recreation Ranger who is himself a mountain biker. Other facilities at Maesgwm are a set of easy waymarked walking trails, car park, toilets, café, visitor centre, shop, bike washing facility, children's playground and an orienteering trail. Other developments are the forest road link with Lon Las Cymru which is the trans-Wales National Cycle Network route from Holyhead to Cardiff and a traffic-free link with nearby towns.

The quality and continued development of Coed y Brenin has resulted in a large and sustained rise in visitor numbers from 14,000 in 1994 to 100,000 in 2001. Events such as training for the UK Olympic team, trade shows, the Fat Tyre Festival and family fun days are held at the site. The Fat Tyre Festival held in 2003 attracted 880 entrants to the 'challenge rides' who had come specifically for the Festival with the majority (61%) coming from England. Relationships are very important in the marketing of such events and even though the mean travel distance was 50 miles, 30% of the visitors to the Fat Tyre Festival had heard of the event by word of mouth.

With the increase in visitor numbers and satisfaction (96% of visitors) the FC has been able to meet its obligation to provide forest-based recreational opportunities. However, the provision of such facilities also provide income opportunities for local enterprises such as hotels, cafés and shops. In 1999 the FC undertook a short study of the cash injected into the local economy by mountain biking. Based on a car park count of 36,193 vehicles and an occupancy rate of 3.3 people per car spending around £40 per night within 15 miles of Maesgwm it was estimated that around £2.5 million was spent in the local area. Other data also suggests that the average distance travelled to the site is 50 miles, so this truly represents a net movement of money into the local economy. The impact of the increasing recognition of linkages between the forest, recreation, tourism and the economy is the number of local establishments that ally themselves with mountain biking (for examples, see www.parcnet.com, www.garthyfog.co.uk).

Strong links and good will between the mountain bikers, FC and local SMEs are important aspects of the success of Coed y Brenin. This was made particularly apparent when on March 3rd 2003 Sian and Dafydd Roberts who ran the café and shop where served a 28 day 'Notice to quit' by the FC. The couple had at that time run the facilities at Measgwm for 12 years and in particular the café from 1995. They are local, native Welsh speakers, well known and popular among mountain bikers, champion mountain bikers themselves and had helped develop the Coed y Brenin trails. It appears that a misunderstanding had developed over the terms of their contract in 2000 and negotiations had reached an impasse. The news of the eviction quickly spread (see www.conti-tyres.co.uk/conticycle/news/news_mar03.htm). The result was widespread protests and a petition supporting Sian and Dafydd was presented to the Forestry Commission. The FC responded with a press release on the 25 March (News release No. 5782) which stated their case and expressed a strong desire to meet with the couple to resolve the dispute and stated that 'Our mountain bike facilities are not driven by profit. Our sole intention is to provide the best possible facilities at Coed-y-Brenin, and we hope the mountain bike community will be able to understand this.' Talks were successful and Sian and Dafydd continue to run the visitor centre which demonstrates the significance of social capital (relationships and good will) in the development and maintenance of successful enterprises.

source: www.forestry.gov.uk/coed-y-breninforestpark
www.mtbbritain.co.uk/coed_y_brenin_news.html

Case study 2: Moss collection

The western uplands of Britain are a key habitat for bryophytes; on non-forested land as blanket bog and as deep carpets of moss in native woodlands and conifer plantations. The richness of bryophyte flora of the western uplands is very high (~1000 species) and is in decline. For example Snowdonia (North Wales) has 550 species including 10 in the Red Data book and has lost at least 10 species over the last century. The rarest bryophytes are restricted to relatively small geographic areas and ancient native woodland sites. Elsewhere and especially in conifer plantation the moss carpets are mostly made up of a few, common species.

Collection of moss (known as 'mossing') is a widespread and established commercial activity. People have been making an income from sale of fresh moss from Wales for many years. Many of the current collectors have been active for 20-25 years with one business established in 1952 involving two generations of the same family. Collection is generally indiscriminate, with the only distinction being between 'yellow', 'green', 'sphagnum', 'blanket' and 'bog' moss. Thick moss blankets are preferred as saleable moss needs to be at least 12.5 cm long. Collection is seasonal and extends from January to September with a peak in March and April.

Moss is collected for sale in horticultural and floristry markets for use as a liner in hanging baskets, in wreathes and generally in floristry. The collected moss is sold into UK and Europe (through Amsterdam) and demand is apparently on the rise along with large-scale, illegal and irresponsible collection especially in Scotland (with two prosecutions for illegal collection in 2003). Incomes and more particularly profits from moss collection are high with moss being sold (to traders) for 75p to £1 a bag. It then retails at around £4.50 a bag to the hanging basket market. On a good site one collector can fill 300-400 bags a day. One collector said he sold 12,000-15,000 bags of moss a year. Another estimated that a good mossing income was around £100 an hour not counting delivery time. However, mossing is hard work and not for everyone.

Until recently mossing was mostly ignored by forest managers and was largely unregulated, probably small-scale and focussed on conifer plantations. However, in the mid-1990's large-scale unregulated mossing was discovered to be taking place in nature reserves and conservation sites. Concerns with the impacts of this on rare bryophytes and the woodland habitats prompted CCW to impose a restriction on all mossing in Wales which included the state forest land administered by the FC. These restrictions caused at least one collector to shift their operations to Scotland and many others became much more wary. However, because mossing provides local employment opportunities woodland managers (e.g. FC, Fountain Forestry and Dŵr Cymru) recommenced licensed mossing on their land.

Mossing licenses are typically for 1-2 years and specify the area over which moss can be collected with some restrictions on harvesting e.g. not to rake the soil. Most contracts specify that the mosser has to have insurance to cover both their employees and third parties. There are various pricing policies for these permits with large differences between collectors and managers. Licences to collect over a compartment range from £500-£1000. However, some collectors, especially with private owners offer a fixed percentage of the value of the moss and some owners find that this provides a better income than timber production. For larger woodland managers the permit income only

just covers the expense of issuing the permit and monitoring activities and it is done for social rather than economic reasons. Most responsible mossers have long-standing relationships with woodland owners.

Experienced moss collectors report that moss can be sustainably harvested from young plantations and under open canopies at 3-5 year intervals. However, there is little quantitative evidence for this and forest managers are reluctant to license an activity that has unknown consequences especially as most forests are now entered into FSC-style certification under UKWAS. The consequence of this is that managers tend to restrict the area and type of land they are prepared to licence for moss collection. For example, the FC in the Coed y Mynydd district in Wales do not permit mossing in areas which are popular with the public because it looks unsightly and also not in protected areas. The main areas permitted are those about to be felled and this amounts to about 20% of the 40,000 ha of forest in the area. About half of this area has been harvested in the past few years and this is leading to supply difficulties for the collectors and increasing competition for access to collection sites. There remains general antipathy towards moss collection and this is not likely to change without some research and the development of best practice guidelines for sustainable harvesting that would be acceptable under UKWAS certification.

Mossing enterprises

Collection of moss is a sensitive issue because of possible conservation concerns and also because it is highly commercial with, sometimes, competition for the best sites. This coupled with much mossing operating in the grey economy means that it is difficult to determine the level of activity or its contribution to forest values. Nevertheless, a short study in Wales (Wong & Dickinson 2003) suggests that in Wales there are less than five SMEs, and maybe up to 50 individual collectors. Nevertheless, it is possible to discern two distinct groups of mossers. There are those who make a living from mossing combined with collection of other foliage or woodcrafts (‘diversified’ livelihood strategies sensu Belcher & Kosters 2004) and those who use it to supplement farm incomes (‘coping’ strategies). A short description of a few mossing enterprises is given below.

Box 6 Booth Moss & Foliage Limited

This company is the largest UK based company specialising in the collection and sale of moss. The company is based in Wales and began collecting in Scotland when the restrictions on mossing were imposed in Wales. The company operates on both state and private land under license and employs regional gangs of collectors with about 5 people in a gang. Much of the moss is exported and the company is reported to send around 50 container loads of moss to the Netherlands per year. The company is successful and has been around for some time and reports an annual profit of between £50,000 and £55,000. The company also collects foliage to supplement moss and is considering expanding into wreath manufacture for value-addition.

Box 7. Goodstock

This is a small enterprise that provides a part-time income (it is supplemented with sales of rustic garden furniture www.goodstock.co.uk) for the proprietor and one employee in mid-Wales. John Spikes, the proprietor collects from his own 32 ha forest and operates in local (private) conifer plantations. Moss is collected by hand and sites are harvested every 3-4 years. There are two distinct markets for the moss; in winter it goes to wreath makers and in summer for hanging basket liners. The moss is sold directly to around 20 florists in the southern of England and generates an annual income of ~£16,000.

Box 8. Farm income diversification

In the prime mossing area of mid-Wales there has been long established seasonal collection of moss by local farmers to supplement their farm incomes. One farmer reported that winter moss collection contributed 25% of his annual income and without it his farm would not be economically viable. The farmers tend to sell the moss to foliage wholesalers from outside the local area who visit on a regular basis and have long-standing relationships with their suppliers. Many of the farmers engaged in mossing have been doing so for many years (> 20) and are aging. There are relatively few younger farmers involved in mossing but other than the fact that the rural population is aging (average age of farmers in Wales is > 60 years) the reasons for this are not known.

In the prime mossing area of mid-Wales there has been long established seasonal collection of moss by local farmers to supplement their farm incomes. One farmer reported that winter moss collection contributed 25% of his annual income and without it his farm would not be economically viable. The farmers tend to sell the moss to foliage wholesalers from outside the local area who visit on a regular basis and have long-standing relationships with their suppliers. Many of the farmers engaged in mossing have been doing so for many years (> 20) and are aging. There are relatively few younger farmers involved in mossing but other than the fact that the rural population is aging (average age of farmers in Wales is > 60 years) the reasons for this are not known.

Marketing and branding

Moss collected in the UK is sold in a number of ways. Directly to local retail outlets (garden centres and florists), through local horticultural merchants e.g. the Northwich market or exported in bulk to Europe. There is very little value addition though some collectors are beginning to experiment with wreath manufacture but it can be difficult to market these as few have access to retail outputs. There is no branding or source identification on retail moss and thus little or no opportunity for traditional marketing or market development for UK-sourced moss. This is increasingly an issue as conservation concerns are prompting campaigns against the use of live moss and prompting the development of alternatives such as dyed wool waste. Imports of dried moss from New Zealand which is labelled as sustainable is also undermining traditional demand for live moss. However, markets for UK sourced live moss could perhaps be stabilized by applying a UKWAS and source label to retail moss backed by a marketing campaign. Implementing such a campaign would require quantitative research to demonstrate the sustainability of mossing, changes to UKWAS to permit labelling of the moss and development of a promotional campaign. The mossing enterprises themselves are probably too small to pay for all of this but it could be funded through government and EU schemes to secure social and economic benefits for woodland owners and to support rural income diversification. Securing incomes and relationships between responsible collectors and woodland owners may also help to police illegal collection and trade of moss.

Research needs:

- quantitative data of resource availability;
- understanding of market trends;
- lists of species being collected;
- regeneration rates of moss;
- impacts of collection on woodland ecosystems;
- appropriate education of moss collectors in terms of business management, manual courses and woodland skills;
- the impact of new forest management systems (i.e. CCF) on moss populations.

5. Forests and ownership

5.1. State of the art and historical development

Britain's woodland area declined from the Roman times until the early 20th century as a result of many pressures but particularly agricultural expansion, the production of charcoal during the industrial revolution and wars. By 1905 woodland cover was about 5% and further losses occurred during the first world war. The crisis in wood supplies during the war led to the formation of a state forest service, the Forestry Commission, in 1919. Its remit was to expand the nation's forest estate by undertaking afforestation in its own right and by offering financial assistance to encourage planting by private land owners. The primary policy objective was to establish a strategic reserve of timber for the nation. During the 1920s and 30s there was a steady growth in the woodland area but this was partially reversed by the fellings that took place during the second world war. In 1947 the UK woodland area totalled 1.4 million ha, 5.8% of the land area. Over past 60 years the forest area has doubled and woodland cover now stands at 11.6%. To minimise its impact on agriculture, almost all the afforestation until the 1980s was in upland areas principally in Scotland, Wales and northern England. These sites are generally best suited for coniferous species and most of the plantation development has been of exotic species, most notably Sitka spruce (*Picea sitchensis)*

From the 1970s, the initial policy objective of creating a strategic reserve of timber was gradually replaced by broader objectives of conservation, recreation, amenity as well as timber production. In the early 1980s, these new objectives resulted in important changes in government policies. The Forestry Commission withdrew from further afforestation and was required to sell some of its woodland. Consequently, the continued expansion of the woodland area over the past 20 years has been largely in the private sector and their share of the forest resource has grown. Important changes were also made to the financial support given to private owners, most notably the withdrawal of certain tax concessions which encouraged large-scale coniferous afforestation, the restructuring of forestry grant schemes to favour the planting of broadleaves rather than conifers and the introduction of new grants to encourage the expansion of farm woodlands. These changes have resulted in a much greater emphasis on new planting (as opposed to restocking) of broadleaved species rather than conifers so that in 2003/4 broadleaves accounted for 80% of new planting compared with only 3% in 1980.

In 1999, constitutional changes led to the formation of governments in Scotland and Wales with certain devolved powers. Forestry is one of the devolved functions and as a result each country is now developing its own distinctive forestry strategies. The non-timber functions of forestry now dominate the strategic objectives of the three countries (possibly less so in Scotland) and each is introducing its own mechanisms, including new woodland grants, to support its priorities.

The development of forestry is Britain over the past 80 years has thus been marked by major changes in both government and society's priorities for forests and woodlands and these in turn have resulted in major shifts in forestry practices. In many respects, these changes reflect the needs of Britain's increasingly prosperous urban society and the multiple benefits woodlands can provide.

5.2. Forest resources

Table 15 shows the changes in woodland area over the last 1000 years. By the time of the Norman conquest in the 11th century, England has already lost most of its forests and cover at this time is estimated at only 15%. By the beginning of the 20th century UK cover had fallen to 4.7%. The expansion of the forest area over the past 80 years described above is clearly seen. The growth has been particularly marked in Scotland where cover has increased from 4.5% to 17% since 1905.

Table 15. Changes in woodland area in the United Kingdom.

Year	**UK**		**England**		**Scotland**		**Wales**		**N Ireland**	
	area		area		area		area		area	
	1000 ha	%	1000 ha	%	1000 ha	%	1000 ha	%	1000 ha	%
1086				≈15						
1350				≈10						
Late 17thC				≈8		≈43				≈1.54
1905	1140	4.7	681	5.2	351	4.5	88	4.2	15	1.14
1924	1211	5.0	660	5.1	435	5.6	103	5.0	13	1.0
1947	1419	5.8	755	5.8	513	6.6	128	6.2	23	1.85
1965	1784	7.3	886	6.8	656	8.4	201	9.7	42	3.1
1980	2175	9.0	948	7.3	920	11.8	241	11.6	67	4.9
1995	2746	11.3	1097	8.4	1281	16.4	287	13.8	81	6.0
2004	2817	11.6	1115	8.6	1330	17.0	286	13.8	86	6.3

Source: Forestry Commission.

Table 16. shows the area of woodland in 2004 by country and ownership class. The total woodland area is 2.7 million ha. Conifers account for 58% of the area and broadleaves 42%. The Forestry Commission owns 29% of the total resource but 44% of the coniferous forest. Virtually all (92%) the broadleaved resource is privately owned and this is principally found in England. Scotland holds two thirds of the coniferous area. The coniferous forests account for 94% of the annual harvest and this largely reflects the results of government policies from 1920 to the 1980s in encouraging coniferous based afforestation. Forestry Commission woodlands produced 54% of the coniferous harvest in 2003, higher than its 44% share of the forest area and this partly reflects the older age class structure of their forests.

Table 16. Forest area and ownership in Great Britain in 2003 (000 ha)

	Conifers	**Broadleaves**	**Total woodland**
		Forestry Commission	
England	154	52	205
Wales	98	11	110
Scotland	440	25	465
Great Britain	692	89	780
		Non-FC	
England	217	693	910
Wales	64	112	176
Scotland	611	254	965
Great Britain	892	1060	1951
		All woodland	
England	370	745	1115
Wales	162	123	286
Scotland	1051	280	1330
Great Britain	1583	1148	2731

Source: Forestry Commission.

Table 17. Species composition of woodlands in Great Britain

Species	**GB**	**England**	**Scotland**	**Wales**
Scots pine	227	82	140	5
Corsican pine	47	41	2	3
Lodgehole pine	135	7	122	6
Sitka spruce	692	80	528	84
Norway spruce	79	32	35	11
European larch	23	14	9	1
Japanese/hybrid larch	111	33	56	22
Douglas fir	45	24	10	11
Other conifer	30	19	5	6
Mixed conifer	18	9	8	0
Total conifers	1406	340	916	149
Oak	223	159	21	43
Beech	83	64	10	9
Sycamore	67	49	11	7
Ash	129	105	5	19
Birch	160	70	78	13
Poplar	12	11	0	1
Sweet chestnut	12	12	0	1
Elm	5	4	1	0
Other broadleaves	120	84	18	18
Mixed broadleaves	160	91	62	8
Total broadleaves	971	648	206	118
Total – all species	**2377**	**988**	**1123**	**266**
Felled	47	15	23	9
Coppice1	24	22	1	0
Open space2	217	72	134	11
Total woodland	**2665**	**1097**	**1281**	**287**

Source: 1995-99 National Inventory of Woodland and trees

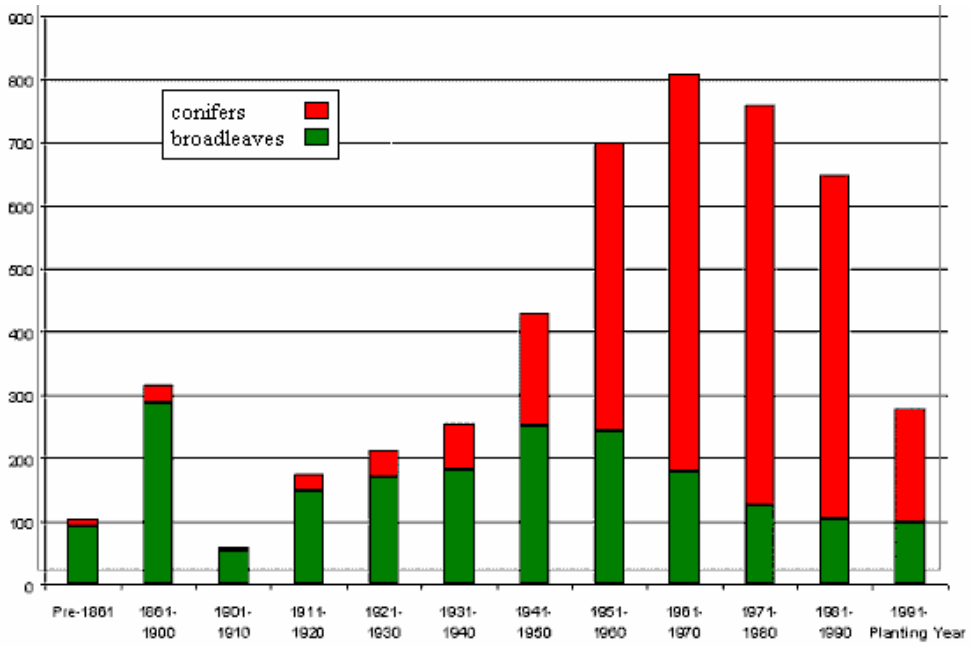
Notes:

[1] Coppice includes coppice with standards.

[2] Areas of integral open space, each less than 1 hectare

Table 17 shows the main species in British forests. Of the softwood species shown only Scots pine is indigenous to Britain and the overwhelming share of exotic species in the forest area is clearly seen. The dominant softwood species are of Sitka spruce, Scots pine and lodgepole pine. Oak is the main broadleaved species.

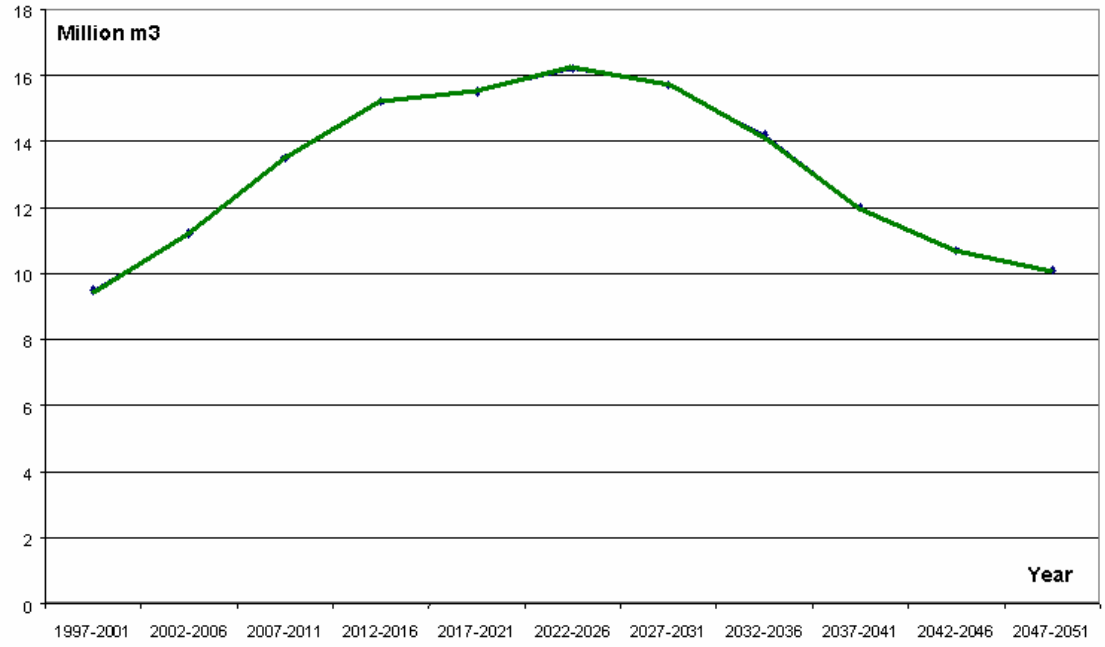
Figure 3. shows the age class structure of the woodlands. The concentration of coniferous afforestation from the 50s to the 80s is clearly seen.



Source: Forestry Commission.

Figure 3. Age profile of woodland in Great Britain

The afforestation of the past 80 years will lead to a growing availability of timber and long term production forecasts are shown in figure 4.. The forecasts are based on current silvicultural and management systems. Total wood supply potential will rise to about 17 million m^3 in about 2020 and after this will fall until the middle of the century before picking up again. This pattern of growth and decline results from the imbalance in age classes of the softwood resource. However, these cycles could be smoothed out by adopting different cutting regimes. The rising production, which will mainly occur in Scotland, should support a considerable growth in the wood based industries.



Source: Forestry Commission.

Figure 4: Forecast of wood production in Great Britain 1997-2050

5.3. Forest ownership

The division between state and private ownership was shown in Table 16. A finer breakdown of private ownership is shown in Table 18.

Table 18. Ownership type of woodland

Ownership type	GB	England	Scotland	Wales
FC	882	223	539	120
Other public body	45	27	13	5
Local Authority	80	61	11	8
Private/ timber business	41	7	28	6
Other private business	273	147	101	26
Personal	1,110	481	533	96
Charity	90	68	14	8
Community ownership or common land	5	4	0	1
Unclassified	18	4	13	1
Total	2,545	1022	1253	270

Source: NIWT 1995-1999

There is considerable evidence of change in forest ownership over the last 20 years. First, the expansion of the state forest component has terminated, largely as a result of changing policy objectives in the forest sector and with respect to privatisation. However, there was only ever relatively modest disposal of state forestry assets in the UK. Second, the tax avoidance motivation to purchase forests has been changed by the Finance Act of 1987, which terminated the tax dodge which allowed the super-rich to invest their earnings tax free in forestry (although forestry continues to receive privileged treatment by the tax system). Third, new forestry has tended to come down

the slope, partly as a function of farm woodland grant schemes and partly through a tendency for landownership to be driven by amenity concerns rather than narrow profitability. Fourth, older pieces of woodland have become increasingly attractive to environmental NGOs

A large number of farmers own woodland, most of whom still live on the farm. The farm population is ageing and there is recognition that intra-familial succession may not take place on smaller farms. Much farmland that comes onto the market is bought by non-farmers for amenity reasons. Woodland is generally thought to create a premium on land values, largely because of its contribution to landscape, amenity and game management. The steady drift towards ownership of farms especially in more attractive and wooded regions (such as the Weald, the Chilterns and the English Marches in England) by entrepreneurs and rich people but as an amenity asset has implications for the development of woodland as a commercial resource.

5.4. Main problems and research questions in forest resources and ownership for enterprise development in the forest sector

- Implications for businesses collecting NTFPs of changing usufruct and landowners rights resulting from recent legislation in England/Wales and Scotland
- Insurance costs for private owners resulting from changes in laws of access to privately owned woodland. Who should meet these costs?
- Valuation of NTFPs . How should they be priced?
- How should the value of non- market benefits e.g. biodiversity, landscape, carbon sequestration be captured (financially) by private woodland owners. What methods should be adopted in determining non-market values?
- How can private forest owners be compensated for potential loss of income as a result of extended usufruct rights arising form recent legislation widening public access? How can personal and commercial consumption of NTFPs be defined?

Cited references

Belcher B. & Kusters K. (2004) Non timber forest product commercialisation: development and conservation lessons. Pp 1-22 in: Kusters K. & Belcher B. (eds) Forest Products, Livelihoods and Conservation. Case studies of non-timber forest product production systems. Volume 1 Asia. CIFOR, Jakarta, Indonesia.

Cobham Resource Consultants (1997) Countryside sports their economic, social and conservation significance. Executive summary and main report published by the standing conference on countryside sports.

Dyke A. (2001) North Pennines Area of Outstanding Natural Beauty - non timber woodland products study.

Dyke A. and Primrose D. (2002) Non timber forest product study. Scottish Forest Industries Cluster.

Forestry Commission (2004) A Growing Resource: a base line study of the economic value of forests and woodlands in the West Midlands. Forestry Commission, Worcester.

Hall M. and Page S., 2002, *The Geography of Tourism and Recreation: environment, place and space,* Second Edition, Routledge, London.

Hill G., Courtney, P., Burton R. and Potts J. (2003) Forests' Role in Tourism: Phase 2. A report for the Forestry Commission, Edinburgh.

Lawrence A. (2003) No forest without timber? International Forestry Review 5(2): 87-96.

Martin S. (forthcoming) Leisure Landscapes: understanding the role of forests and woodlands in the tourism sector. Forest Research, Edinburgh.

Milliken W. & Bridgewater S. (2001) Flora Celtica - sustainable development of Scottish plants. Scottish Executive Central Research Unit, Edinburgh.

Murray M. and Simcox H. (2003) Use of wild living resources in the United Kingdom – A review. UK Committee for IUCN.

Prendergast H.D.V. and Sanderson H. (2004) Britain's wild harvest. Royal Botanic Gardens, Kew.

Reforesting Scotland (2004) Making a livelihood from plants, animals and woods in Scotland.

Sanderson H. and Prendergast H.D.V. (2002) Commercial uses of wild and traditionally managed plants in England and Scotland. Royal Botanic Gardens, Kew. a

Slee, B, Evans R and Roberts D (2003) Understanding Forestry in Rural Development: a Report to the Forestry Commission

UKWAS Steering Group (2000) Certification standard for the UK woodland assurance scheme. Forestry Commission.

Willis K.G., Garrod G., Riccardo S., Powe N., Lovett A., Bateman I. J., Hanley N. and McMillan D. (2003) The Social and Environmental Benefits of Forests in Great Britain. A report to the Forestry Commission, Edinburgh by Centre for Research in Environmental Appraisal and Management, University of Newcastle.

Wong J.L.G. and Dickinson B.G. (2003) Current status and development potential of woodland and hedgerow products in Wales. Report prepared for the Countryside Council for Wales, Forestry Commission in Wales and the Welsh Development Agency.

Strategy documents for UK

Forest Service (1998) Northern Ireland Forest Charter. Northern Ireland Forest Service.

Forestry Commission (2000) A new focus for England's woodlands: Strategic priorities and programmes. Forestry Commission.

HMSO (1994) Sustainable Forestry: The UK Programme. HMSO, London.

National Assembly for Wales (2001) Woodlands for Wales. The National Assembly for Wales Strategy for Trees and Woodlands. Forestry Commission.

Scottish Executive (2000) Forests for Scotland: The Scottish Forestry Strategy. Forestry Commission.

Annex A: Organisations studying forest products' consumption and main publications and information sources.

Wood products:

Service	Web site	Activities
Confederation of Forest Industries (UK) Ltd.	http://www.confor.org.uk/	New organisation to speak for timber industry and develop new markets
Forest Industries Development Council	http://www.fidc.org.uk/	Promotion of multi-objective forest industry in the UK
Forestry Commission	http://www.forestry.gov.uk/forestry/HCOU-4UBJ6C	Surveys of timber supply, prices, employment and public opinion.
Forests and Timber Association	http://www.forestryandtimber.org/	Representative body for people involved in growing and management of trees
Paper Industry Association	http://www.ppic.org.uk/	'Eyes, ear and voice' of UK paper industry
Timber Trades Federation	http://www.ttf.co.uk	Official voice of UK timber trade
TRADA	http://www.trada.co.uk/	Trade directories, standards etc.
UK Forest Products Association	http://www.ukfpa.co.uk/	Represents technical and commercial interests in forest products industry
Wood Panels Industry Federation	http://www.wpif.org.uk/	Represents industrial manufacturers of chipboard, OSB and MDF in UK

Non-wood products:

Institution – Project	Web site	Comments
Basketmakers' Association	http://www.basketassoc.org/	Promotes quality and training in basketry
Berry Scotland	http://www.berryscotland.com	Berry trade and growers network
British Association for Conservation and Shooting	http://www.basc.org.uk	Representative body for country shooting
Community forest network	http://www.communityforest.org.uk	Promotion of peri-urban community forests in England
Department for Environment and Rural Affairs	http://www.defra.gov.uk	Government funding for research into rural affairs
Ethnomedica	http://www.rbgkew.org.uk/ethnomedica	Research group on herbal traditions of Britain
FC 'Wild Woods' data base	http://www.forestry.gov.uk/forestry/wildwoods	Data base of wildlife watching opportunities in GB forests

FC recreation data base	http://www.forestry.gov.uk/forestry/recreation	Data base of forest recreation opportunities GB
Flora Celtica – Royal Botanic Gardens, Edinburgh	http://rbg-web2.rbge.org.uk/celtica/fc.htm	International project on use of wild plants in Celtic countries (most information in database from Scotland)
Forest Education Initiative	http://www.foresteducation.org.uk	Network to support development of forest-based education
Forest Research	http://www.forestresearch.gov.uk/website/forestresearch.nsf/ByUnique/INFD-5XNEY5	Research arm of the Forestry Commission
Game Conservancy Trust	http://www.gct.org.uk	Ecology and management of game focussing on birds
Green Wood Trust	http://www.coppice-products.co.uk/	Database of coppice workers and products
NTFP Scotland	http://www.forestharvest.org.uk	Information and databases on Scottish non-wood forest products (mostly plants)
Partnership for action against wildlife crime	http://www.defra.gov.uk/paw	Public information on wildlife crime
Project Blaeberry	http://www.forestfruits.org	Study of economic potential of wild blaeberries (*Vaccinium myrtillus*)
Royal Botanic Gardens Kew	http://www.rbgkew.org.uk/scihort/ukplants.html	Study of wild plant use in England and Scotland
Scottish Forest Alliance	http://www.scottishforestalliance.org.uk	Support for biodiversity and carbon sequestration projects in Scottish forests
The Deer Initiative	http://www.thedeerinitiative.co.uk	Advises and researches deer ecology, management and supports venison marketing
Wild Mushroom Forum	http://www.snh.org.uk/scottish/species/fungi/fungicode.asp	Sets codes of conduct for mushroom pickers in Scotland
Wild Resources Limited	http://www.wildresources.co.uk	Studies on NTFP potential and sustainable production
Woodturners Association	http://www.britishwoodturners.co.uk	Support to businesses in the automatic wood turning industry

Annex B: Organisations studying small-scale forestry and main publications and information sources.

Organisation	Web site	Activities
Coed Cymru	http://www.coedcymru.org.uk	Promoting of management of broadleaved woodlands in Wales
Cumbria Woodlands	http://initiatives.smallwoods.org.uk/index.php?link=directory.php&id=2008	Project to aid small woodland owners in Cumbria
Heartwoods Project	http://www.heartwoods.co.uk/96_About_Heartwoods.asp	FC programme to develop wood supply chain in Shropshire
Reforesting Scotland	http://reforestingscotland.gn.apc.org	Network encouraging ecological and social regeneration of forests in Scotland
Small Woods Association	http://www.smallwoods.org.uk	Provides advice and support to small woods owners

Annex C: Organisations studying wood processing industries and main publications and information sources.

The following institutions are involved in research and provision of information relevant to the wood processing industries:

University of Wales, Bangor	Wood science and technology, forest products economics
University of Bath	Timber engineering
Imperial College, London	Wood biodegradation and preservation, life cycle analysis
Napier University	Timber engineering
University of Dundee	Wood biodeteriation
Buckinghamshire College	Wood biodeteriation, wood composites
Building Research Establishment	Use of wood in construction
TRADA	Component and product testing
UK Forest Products Association	Sawmilling
Wood Panels Industry Federation	Wood panels
Paper Federation of GB	Pulp & paper
CONFOR (Confederation of Forest Industries	Forestry Sector
Timber Trades Federation	Imported timber products

Statistical publications

Forestry statistics	Forestry Commission http://www.forestry.gov.uk/statistics
Paper statistics	Paper Federation of GB
Timber statistics Industry statistics	Timber Trades Federation Office of National Statistics

The extend of a country's natural forests is a standard for measuring its level of wealth.
TEMA, Istanbul.

Turkey

Prof. Dr. Alexi DANCHEV, corresponding author
Fatih University, Istanbul, adanchev@yahoo.com

Dr. Said DAGDAS
Central Anatolia Forestry Research Institute, Ankara, saiddagdas@yahoo.com

Prof. Dr Mustafa Fehmi TURKER
Blacksea Technical University, Trabzon, mft@ktu.edu.tr

Dr. Bekir KAYACAN
Istanbul University, Faculty of Forestry, Istanbul, kayacan03@yahoo.com.

1. Introduction

The rising discrepancy between increased demand of forestry products and their shrinking supply due to the restricted wood reserves is a common tendency for most of the industrialised and under industrialised economies. There are many reasons for it, which in most of the cases are rather individual for every country. The analysis of these reasons reveals important features for every country and the comparative analysis of these reasons allows drawing conclusions of utmost theoretical and practical significance.

One such interesting example is the forestry sector of Turkey and its role as a supplier of inputs to the technological chain of wood and wood related production. At present the industrial forestry in Turkey is a dynamic sector of the economy completing important economic, social and environmental tasks with national and international significance. Predominant tendency in this sector is the process of serious structural changes and adjustment to the EU standards. (Anonymous Turkish Press, 2004). Forestry sector also takes an important place in the government policy. At the same time it faces serious challenges coming from the national and international factors of development, the controversies of the modern economy and politics and the inertia of natural types of consumption involving wood products in various degrees and levels in consumption.

In general the tendencies in demand and supply of forestry products in Turkey follow the macroeconomic ups and downs and in the short run fluctuate with the main leading indicators. In the long run the increasing demand of wood and other substitute and complement goods stimulates the demand of forestry products, which is facing the shrinking possibilities of the supply based on logging natural forests and wood from industrial plantations. Thus, the economic equilibrium in this sector is shifted more to the demand sector, indicating to the suppliers which are the most demanded products. Due to the international division of labour Turkish forestry sector both import and export wood and wood related products, which stimulates the openness of the national economy.

1.1. Objectives of the study

The aim of the present paper is to outline the basic problems connected with the demand and supply of wood and wood products in Turkey and to define some practical recommendations and urgencies in view of the research carried out in this area.

As a matter of fact however this is very complicated question, coming from the complexity of the technological chain "forestry – consumption". The problem is that forests are source of multiple social benefits, which affects the chain of supply of forestry production and its demand. The boundaries of forestry production and non-wood forestry goods are rather fuzzy, part of this chain passes through the shadow economy and a lot of information about the various wood and non-wood forestry products is simply "missing". In the context of these features the study of the problems of the economic integration of urban consumers' demand and rural forestry production is restricted within the following objectives:

- to outline the tendencies in the consumption of wood and non-wood forestry production.
- to analyse the basic factors influencing consumption of forestry goods.
- to present empirical results of supply of forest products.
- to present recommendations concerning the improvement of the economic integration of urban consumers' demand and the rural forestry production in the country.

The study is concentrated on the forestry goods consumption and the supply of these goods. Many problems related to it remain outside the analysis mainly due to the limited scope of the study and the missing information. What can be stated as certain however is the fact that the process of integration is on-going despite its controversy and its study presents important part of social management and research. From this perspective the analysis is concentrated on the basic sectors of forestry connected with consumption and supply with explicit indication on the multifarious aspects of forestry and some of its basic side-effects without which the study would be incomplete.

1.2. Brief characteristic of the forestry sector in Turkey

Forests occupy 27% of the total land area of the country. It accounts for 20.7 million hectares. About half of this area is productive forestry, the other half are low quality, low productive semi-forests and shrubs. (VIII. BYKP-OÖİKR, 2001). The location of the forests on the territory of the country is presented in Figure 1.

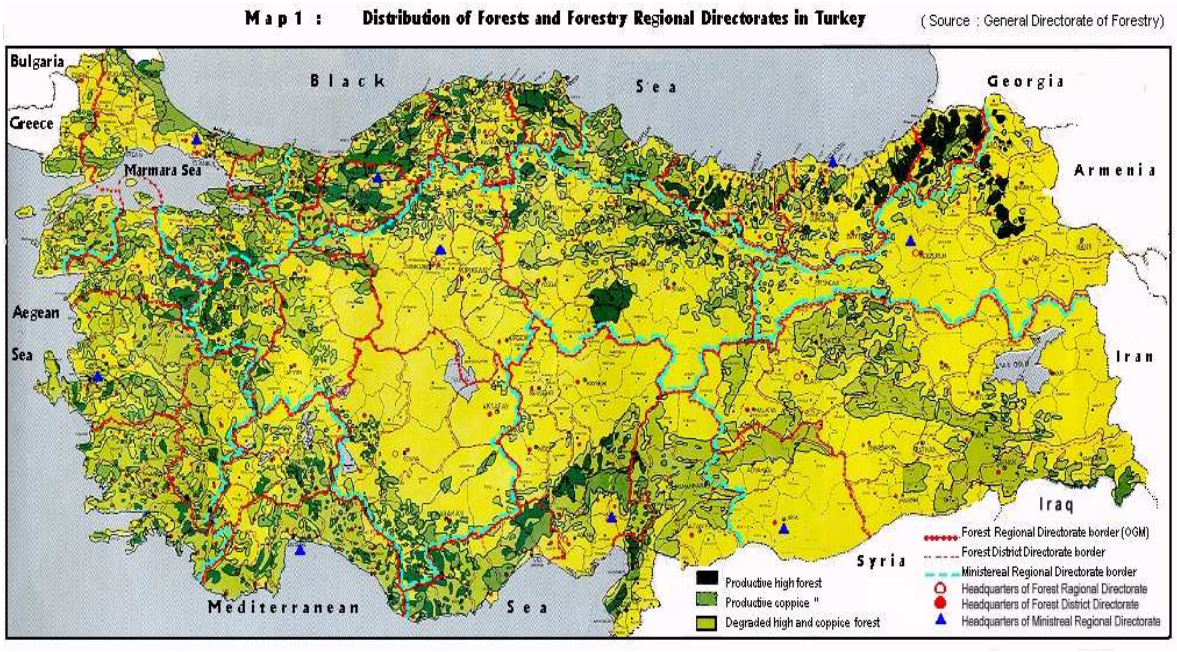


Figure 1. Distribution of forests and forestry Regional Directorates in Turkey.

Forestry sector plays important economic role. It supplies forest products to meet their increasing demand and is a source of significant positive externalities for the national economy. The supply of wood is based on natural and industrial forests with increasing importance of the latter. The basic cultures of industrial forestry are pine, poplar, and eucalyptus plantations. The share of poplar increases very rapidly due to its high productivity and demand, making it attractable for the private sector due to its good profitability.
The basic indicators of forestry in Turkey by 2000 are indicated in Table 1.

Table 1. Basic indicators of forestry in Turkey (ha by 2000 year).

Situation / Activity	**Quantity (ha)**
Forest Area	20.763,000
(Private forests)	18.482,000
Productive Forests	10.027,000
Degraded Forests	10.736,000
Forest Land Use (Public land)	20.745,000
Exploitative Forests	16.650,000
Protected areas	4.095,000
National and Natural Parks, Nature Protected Areas	864,000
Conservation Forest (Mainly erosion control)	3.231,000

Although we outline the demand problems later, we need to indicate since the very beginning that the rising demand of wood on the national and international markets creates problems with the supply of wood products for the national needs, as at present the wood production is not capable to compensate the rising demand for forest products. This is very well evident when we compare total and per capita forests. In comparison with the other countries per capita total forest area in Turkey is not very high due to the increasing population. Despite the big area of forests, it accounts for only 0.32 hectare

per capita, while the same indicator for the USA is 1.13, for Kazakhstan 1.05, for Turkmenistan and Greece 0.92, for Bulgaria 0.40. The story becomes more dramatic when we compare per capita productive forests. For Turkey it is only 0.15 hectare per capita, while for Finland it is 4.53, for Russia, 4.2, for Brazil 3.76, for New Zealand 2.21, for Europe 0.26 and for the world as a whole 0.64. This signals the need of rise of national industrial forestry as one of the paramount tasks of the national economy moreover than Turkey has the necessary resources (land, climatic conditions, water, etc.) to face this challenge successfully.

We analyse later the role of policy to foster forestry sector in the context of overall industrial policy. In general, the present industrial policy in Turkey is concentrated on stimulating high-technology sectors of the economy, which rapid growth reduces the share of traditional sectors as forestry in the economic structure. It does not mean however that this is not a dynamic sector. The survey of the industrial policy for Turkey toward its EU membership indicates that the task of reaching high growth rates and modernisation of economy including forestry is supported by the business and is implemented successfully in many sectors. Thus, for the period 1996 – 2000 the share of low-technology production drops from 73,6% to 72,2% and the share of low-technology exports dropped from 73,3% to 63,2% (industrial forestry production and export are related to this group). At the same time, we observe rise of the share of production and export of medium and high-technology goods. Only the share of the high-technology production in this period increased from 4,8 to 4,9 when the export jumped from 6.6% to 10,3%. This is an evidence of the formation of modern economic structure of production and export of the country. As a result it is expected to stimulate the progressive structural changes in the forestry too (Industrial policy).

Inevitable consequence of it is the fact that during the last decades the share of forestry as a sub-sector in the agricultural sector is decreasing. Only for the period 1997 -1998 this share has dropped from 5.1% to 4.4%. This is due to the positive growth rates in the industrial sector as a whole and diminishing growth rate of forestry sector in particular. In fact, the growing rate of forestry was –3.7 % in 1997, and –2.2 % in 1998 (Anonymous 2000 c, p. 97).
The present tendencies in the industrial forestry in Turkey can be characterized as follows:

- despite the drop of the growth rates of the sector as a whole rise of high productive forestry in the state and private plantations.
- introducing modern technology in cultivation and logging of trees, including genetic improvement of the structure of forestry
- introducing new approaches to the industrial forestry as sustainable logging increased of clear-cut logging, round-wood production, etc.
- increased emphasize on sustainable use of the forests.
- active government policy for rational use of forests aimed at protecting natural forests and extending industrial forestry at the expense of extending plantations on new low productive lands with suitable provenances of species such as Turkish red pine (*Pinus brutia* Ten.), *Eucalyptus camaldulensis* D., *Pinus radiata* D. Don, *Pinus pinaster* Ait, *Pinus elderica* Med., etc. (Cengiz et al., 2002; Dağdaş, 2002; Tulukcu et al., 1987; Tunctaner et al., 1985).

2. Demand aspects of forestry in Turkey

2.1. State of art in demand of forestry products.

The demand of forestry products has long traditions in the Turkish history. The careful attitude to the forests and their sustainable use although not explicitly declared over the centuries is part of the national culture. The modern visions of forestry extrapolate these traditions combining them with the up-to-date policy of sustainable development and its implementation for turning industrial forestry into an efficient and competitive sector. Nevertheless the present modern way of living of both rural and urban population closely related to the consumption of forestry and forestry based products results in extreme depletion of forest resources and disappearance of valuable forestry reserves in some areas.

The up-to-date consumption of forestry products although increasing during the last decades is facing extended protection of forest reserves and creation of new ones, which strongly reduces unsustainable use of these resources. An important feature is also the increasing industrial plantation in non-productive land not suitable for other purposes. This is source of additional wood coming to meet the rising demand of wood and related products. Increasing is as well the role of substitutes both on consumption and supply side of forestry.

The information collected by various statistical institutions and researchers allows shedding light on the problem. Systematic studies revealing the links within the technological chain wood-wood products are limited in number (e.g. the studies by Cakir, 1986 and Kayacan, 2004), Next we try to complete this task by following the logic of technological chain with all its complicated and diversified structures.

2.2. Consumption of basic forestry products.

As a whole for the period 1962 – 2000 the consumption of wood raw materials increased from 3037 thousand m^3 to 11,259 thousand m^3. In 1962 the basic part was log (2,385 thousand m^3), followed by the raw wood used for packing (220 thousand m^3) and mine posts (400 thousand m^3). For the last three decades consumption of log has been relatively stable at about 5-6 million m^3 , while the consumption of pulpwood and of chipwood have consistently increased up to 1519 thousand m^3 and 1850 thousand m^3 respectively (Anonymous 2005; Konukcu, 2001, p. 126).

The analysis of consumption following the technological chain reveals important aspects of the disequilibrium between demand and domestic supply of wood. Our considerations are based on the following scheme of technological chain (Figure 2).

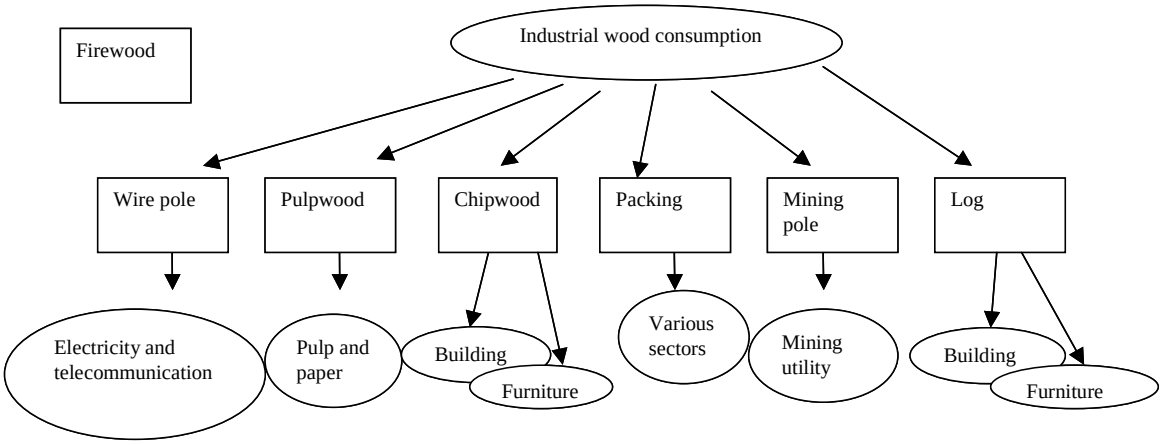
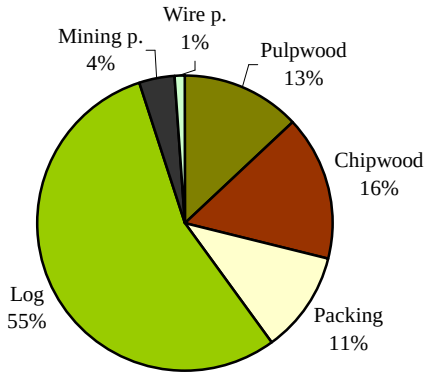


Figure 2. The technological chain of wood consumption in Turkey by 2005.

The scheme is constructed on the assumption that the industrial wood consumption is distributed among the log, firewood, pulpwood, chipwood, etc. Thus we can outline the technological chain of present consumption of wood as firewood accounting for 18,000 thousand m^3 by 2000 and the industrial sectors accounting for 11,259 thousand m^3. The structure of industrial wood consumption is presented in figure 3. The biggest share in it belongs to the log (55%), which is structured in the following way: for building 70%, for furniture 20% and for the others sectors 10% . [ÇEVRE ORMANCILIK SURASI, (2005)].

The next stages of technological chain: the tertiary use of wood in paper, furniture, building, and other sectors are very important for the analysis as they reveal more exact picture of the problems of present demand for wood products in Turkey. The information about these structures requires very detailed research on firms' levels which is a question of further research.



Source: Konukcu, 2001, p. 125.

Figure 3. Structure of industrial wood consumption in Turkey by 2000

This level of consumption has been reached due to the local supply and import of wood from the rest of the world.

The aggregate picture presented above cannot reveal the complex links within the consumption-production of the forestry products in the technological chain and the final goods in the economy. Additional problems arise as we need to take into account the non-wood based forest products, which complicates analysis. The outlining of more complete picture of the chain consumers – producers of forestry wood – non-wood products is possible by means of input-output analysis providing detailed information of the final consumption of wood (see Table 2).

Although the share of forestry sector in the economy is not high the input-output analysis indicates that it is strongly interrelated to a lot of the other sectors. According to the sum of inverse matrix's row elements, the forestry sector is in 24th position. While the share of intermediate demand in total supply of 97 sectors was about 37% in 1996, the average of this rate in the forestry sector is more than the country with 81%. These figures show that the part of forestry sector's outputs which go to intermediate demand is very high compared to the figures of 97 sectors (Turker, 2005).

The contribution of the forestry sector to the added value and production by 1996 is also significant due to the high forward relations of the sector and the application of labour intensive technologies. According to the sum of inverse matrix[1] column elements, the forestry sector is at the 93rd position within the 97 sectors matrix. The increase of final demand due to the forestry sector has, therefore, little impact on the production of the other sectors of the economy.

Table 2: Total Values and Importance of Forestry Sector in National Economy based on the Inverse Matrix (1996).

The Sum of Elements		**Order of forestry in the 97 sectors matrix**
Column j	1.222	93.
Row i	1.868	24

The results of sectoral interaction analysis allow revealing the forward and backward linkages of forestry sector to the other sectors of the economy. While the average forward linkage rate of the other sectors in the national economy was calculated as 0.370, the rate in the forestry sector remained over the overall rate with the rate of 0.810. Correspondingly, while the average of the backward linkage rates of the 97 sectors for 1996 was 0.370, the backward linkage rate for the forestry sector was 0.120 and this rate remained under the overall rate. The conclusion is that while the forward

[1] Inverse matrix given in DIE (2001) is not exactly the well-known Leontief Inverse, since it was derived from the use table coefficient matrix rather than from the *A* technology matrix based on a symmetric industry-by-industry flow table. However, the tendency depicted here might not change dramatically even if we used the Leontief Inverse instead, except that the exact figures and rankings would most probably differ. In fact, Kayacan (2004) reported similar results based upon a 48x48 symmetric industry-by-industry model using the 1996 data.

linkage of the forestry sector is relatively high, the backward linkage rate of forestry sector is low[2]. These results are summarised in Table 3.

Table 3. Interaction rates and importance of the forestry sector in comparison with the other sectors of the national economy (1996).

Sector name	Forward Linkage Rate	Backward Linkage Rate
Forestry	0.81	0.12
97 sectors	0.37	0.37

According to the results, forestry sector can be characterised as a sector that produces mainly intermediate goods and stimulate the rise of production of the sectors, requiring forestry product as input for providing outputs of the final demand. Shortly, the forestry sector is a sector of not high backward linkages, but the forward linkages of which are significant as it gives inputs to a lot of other sectors. Consequently, despite its small share in the national economy the forestry sector can be defined as a sector with strategic importance (Geray, 1993).

There is not detailed information for most of the sectors using forestry product as inputs or for consumption. For example, consumption of fire wood accounts for a big share of all forestry products. Related to firewood are so called energy forests used for energy production. They accounts for 403991 hectares for the period 1963 – 2000 (Konukcu, 2000, p. 47). The exact volume of firewood is difficult to measure as a big part of it constitutes shadow logging in terms of consumption remaining outside the official price system. Part of it is illegal logging by the local population. Taking into account the fact that normally the statistics for this activity is very incomplete, which underestimate the real dimensions, we can expect that the real illegal logging in much higher.

Part of urban demand of forestry products is located in other economic sectors, which influences the economic integration and in future may increase their role generating new demands of forestry products.

2.3. Consumption of non-wood forestry products.

Turkish forests are a treasure of wildlife products. They are source of a lot of non-forestry products (named also secondary forest products (SPO, 1995a), which are substantial part of consumption of some households, especially for the local population[3]. These include medical shrubs, grass and herbs growing in forest and its open spaces, various crops obtained from their leaves, flowers, seeds, stems, roots, gum resins, etc.

The production of non-wood forest products in Turkey is realised in two ways: as planned and unplanned production (SPO, 1995a; GDF, 1995). The planned production has been realised according to the targets determined by the Five Years Development Plans, and depending on the demand of home and foreign markets. Its management and the preparation of the silvicultural plans in this area are based on the budget and the regulations related to logging, production and sale rules of secondary forests products.

[2] Low backward and relatively high forward linkages of the forestry sector in Turkey were also shown by Kayacan (2004) more comprehensively in light of other criteria for direct and indirect linkages.

[3] Strictly speaking we need to include here also the consumption of drinkable water from the forest areas. For technical reasons it remains outside our study.

In particular, this is related to such products as resin, storax, laurel leaf, box-tree, garden stake, fat pine, etc.

On the other hand, other non-wood forest products, which have high potential of exporting and which are cultivated in the forest areas such as pine nuts, chestnut, sage, mushrooms, sumac, lime etc. are supplied mainly without any plan and independently from the market demands.

As a whole, the production of non-wood forest products in Turkey is strongly dependent on the home and foreign demands. As the production potential is high there products are used not only for home consumption, but also for export. Between 1990 and 1998, a total of 300.937 million $ of forest products were exported. A part of $ 294,448,000 of total export revenues was obtained from the non-wood forest products, while the remaining part ($ 6,488,000) was received from round wood (Konukçu, 1999), representing 98% of total forest products exports. (Turker, 2005).

As the foreign demand exceeds the local demand of non-wood forest products Turkey exports much more of these goods than imports. Due to its natural potential Turkey plays an important role in the aromatic and medical plants trade in the world. For instance, between 1990-1999 Turkey exported medicinal plants for 682.7 million dollars [Toksoy, Gümüş and Ayyıldız, 2003, p. 8]. The total export and import of non-wood forest products for Turkey are presented in table 4.

Table 4. Exports and Imports Non-Wood Forest Products in Turkey.

Plan period	Years	Export ($)	Import ($)	Import - Export ($)	Import/Export (%)
I	1963 - 1967	11,279	456	10,823	4
II	1968 - 1972	13,235	500	12,735	4
III	1973 - 1977	34,723	695	34,028	2
IV	1979 - 1983	76,764	256	76,508	-
V	1985 - 1989	177,367,800	5,656,000	171,711,000	3
VI	1990 - 1994	141,720,000	13,861,000	127,859,000	10
VII*	1996 - 2000	119,568,000	27,562,000	92,006,000	23

*Results of the first three years

Source: Turker 2005.

There are evidences that the exploitation of a lot of non-wood forestry products is not-sustainable that causes a loss of biodiversity and endangers the ecosystems in the forests. Although some information can be found in the state forest enterprises concerning the medicine herbs, mushrooms and wild fruits collection, it reflects only part of collected species as a lot of it is gathered by the tourists for own consumption. The collection in most of the cases is not sustainable for many reasons, the most important of which is the lack of collection culture. Biggest part of the collection remains outside the price system. As a whole the information to more precise estimation of the consumption of non-forestry products is not available by now.

The consumption of goods results of animal breeding in the forests accounts for significant part of non-wood forestry products. Animal breeding in the forests is popular in the whole Balkan region. It is a source of income for the local poor rural population

in the mountainous areas. The main breeding animals include sheep, goats, caws, etc. They are source of meet, milk, wool and related products of high nutrition quality.

Thus, we observe another technological chain of primary and secondary products of forestry areas, which constitutes serious part of local consumption. The primary animal breeding results in secondary goods (milk, meat, wool, leather, manure, etc.) all of them part of the local consumption. Although we can expect that the animal breeding in the forests is big in the rural populated mountainous areas, there is not available information about its dimensions. No official statistics could be found for the quantities produced and the prices per unit. The collection of such information can be realised by means of a survey carried out in the villages adjacent to the forests.

Animal breeding can be regarded in some aspects as an opportunity cost of biodiversity loss. The biologists assert that the grazing changes the structure of herbs and thus changes not only the biodiversity among the herbs, but also the food for some wildlife. For example, the manure from grazing stimulates the growth of some herbs having detrimental effects on the herbs used as a food by the wildlife. The conclusion is that the intensive animal breeding in the forests infringes the ecological equilibrium not in favour of the wildlife. A detailed survey is needed to prove this assumption.

2.4. Non-use value of forestry.

The analysis of the modern consumption of forestry products would be incomplete if we do not consider the non-use value of forestry. It is a value reflecting various attributes of forests as goods which may not be used in the traditional sense. These attributes could be formulated from various points of view: from the very fact that forests exist or that they are appreciated by the consumers as alternative future use for them or their children or the next generations. The estimation of non-use values is an expensive and time-consuming procedure requiring specialized research with the application of various methods for non-use values estimation.

Our preliminary observations indicate that forestry sector in Turkey is a source of important non-use values, which are substantial part of the benefits from forestry and are closely related to potential consumption of benefits coming from forestry. According to Bann and Clements the non-use value of forests in Turkey account for about 61.5 % of the total benefits of forests in Turkey (Bann and Clemens, 2001, p. 55-56). Other estimates also indicate that the non-use values of forestry products per hectare exceed the total per hectare benefits (Toksoy, Gümüş and Ayyıldız, 2003, p. 8).

The non-use values are important source for estimation of demand of many forestry related goods as for example recreation in forestry. While most of the resorts are concentrated in the sea areas, the Turkish forests provide an excellent recitation capacity. This activity is highly developed in some areas but as a whole the usage of forest is far below its potential. Producing estimations of such non-use values as existence, bequest, etc. values can be used in planning the growth of recreation in forestry areas.

These kinds of estimations also should be included as a part of analysis of consumption of forestry products as they create long-run effect on consumption. Producing estimations of non-use value of forestry gives a powerful instrument to the decision-makers to assess the benefits (real and potential consumption) of such activities in the forestry sector as creating recreation zones, protected areas, national parks and reserves, tourist zones, etc.

2.5. Shadow consumption of forestry products

The information provided above contents sufficient evidence that the shadow consumption of forestry products is not small. Taking into account the features of national consumption especially in rural population we expect high shadow consumption of non-wood forestry products. This is very symptomatic for the whole region, where the collection of forestry products as mushrooms, medical herbs, etc. is a tradition from old times. Besides, the forests products are as a rule an object of shadow consumption especially in countries where the control over the property rights is slack. The shadow consumption of forestry products may increase however also due to inefficient defining of property rights. It results in consumption of forestry products, which remains outside the existing in the economy price system. This includes consumption of forestry and non-forestry products freely collected from the forestry areas, illegal logging, consumption of non-forestry goods self-produced in forestry areas, etc. The study of shadow consumption requires a lot of specific information as a rule not available in the traditional statistical sources. For this reason we can express only some intuitive considerations on the subject.

The illegal loggings accounts for too big part of the whole forestry in Turkey. Very high is the level of illegal cutting (7,200 thousand m^3), which is comparable with the production in the private sector.

3. Supply aspects of forestry in Turkey

3.1. State of art in supply of forestry products

The supply of wood is based on natural and industrial forests with increasing importance of the latter. The basic cultures of industrial forestry are pine species with increasing share of poplar and eucalyptus plantations. The share of poplar increases very rapidly due to its high productivity and demand, making it attractable for the private sector due to its good profitability.

The supply of forest products depends strongly on the structure of forestry production, its efficiency and links with the other sectors of economy. Its role is multifarious: forestry production is a source not only of inputs for the other sectors, it also created additional jobs especially in areas with high unemployment – a fact additionally increasing the economic importance of this sector. Belonging traditionally to the low-technology sectors forestry is not high profitable segment of national economy and the government support is of paramount importance for its growth and development. From this point of view the analysis of supply of forestry products requires to shed lights on many other problems influencing the further growth of forestry. Part of these problems has been answered in the demand analysis of forestry as it is the other side on the input-output relationships in the national economy.

3.2. Production of forestry products.

A good precondition for the creation of a healthy economy is the pyramidal structure of the industry in terms of the firms size with definitely high share of the small and medium enterprises (SME), which are the core of the business and employment. The industrial structure of Turkish economy corresponds to this requirement. The share of SMEs with up to 250 employees in 2000 is 99.6% of total number of establishments, 63.8% in total employment and 36.0% in value added [Industrial policy].

This pyramid more or less is reproduced in forestry production sector. A general picture of forestry is presented in figure 4, which outlines the basic indicators characterizing forestry sector in physical terms. Correspondingly the increment of woods is calculated as 34,270 thousand m^3, AAC as 17879 thousand m^3, total production as 13,260 thousand m^3, including private production of 7480 thousand m^3, export of 3 thousand m^3 and import of 1,500 thousand m^3.

About 56% of the wood raw materials are produced by the private sector, while the ownership is almost completely public.

In the light of this comparison the production capacity of the Turkish forest sector is not sufficiently high and to meet the challenges of the increased demand and the country import 1,500 thousand m^3 from the rest of the world.

Forestry sector was in a process of progressive structural changes during the last decades. The dynamics of production was increasing during the second half of the XX century reaching its maximum in 1970s with slight fluctuation during the next decades around 4800 thousand $m^{3.}$ In structural aspect the changes were toward increasing the share of goods based on modern for these sector technologies. It is illustrated in Figure 4, and Table 5.

The investments in forestry sector were also dynamic during the last decades reaching its peak in 1977 and 1987 and although slowing down for the next decades as a whole they exceeded the investments in the previous decades. For the present decade we cay say they are relatively stable with expectations to rise due to the need of modernization of this sector. The basic sources for investment were the budget and after 1986 the Afforestation fund, which share in the total investment increased (Ormanlar, p. 85-86).

Table 5. Production of Wood Raw Material in Turkey – private and public in 1000 m^3 for the period 1962-2000.

	Types of product								
Years	**Logs**	**Wire P**	**Mining. P**	**Pulpwood**	**Chipwood**	**Packing W.**	**Total**	**Private share**	**Firewood**
1962	2192	32	505			150	2879	124	
1967	3418	40	386			250	4094	306	
1972	4940	39	563			460	6002	597	
1977	5824	161	545	976	454	470	8430	1157	28000
1982	4470	71	470	935	908	577	7431	1430	28000
1987	5074	190	567	1470	1293	732	9326	2060	24250
1992	4747	122	440	1149	1645	860	8963	2492	20800
1996	4912	89	436	1568	2050	1293	10348	2803	18500
1999	4505	90	456	1610	1791	1183	9635	2570	17800
2000	4723	156	414	1538	1893	1216	9940	2580	18000

Note : About 80 % of the total industrial roundwood comes from coniferous species. http://aks.iujp.dot

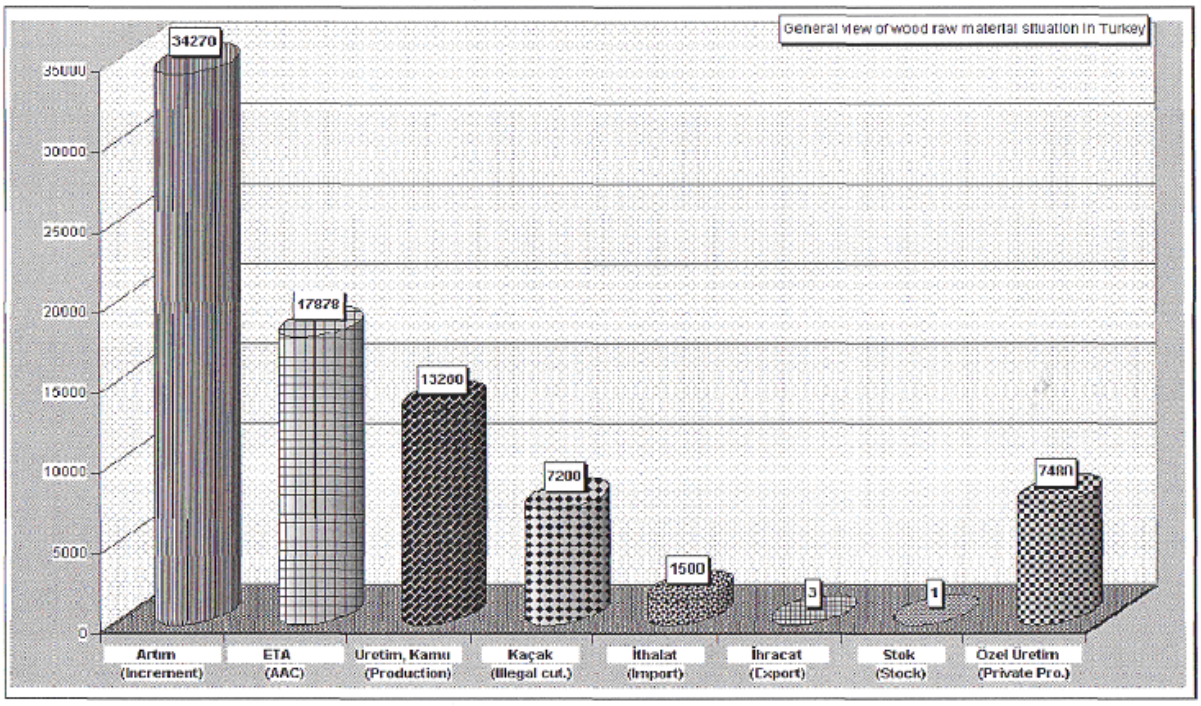


Figure 4. Structure of the forestry sector in Turkey by 2000.

To stimulate the modernisation of the structure of forestry sector the government is encouraging private initiatives within the publicly owned forestry land (government policy in this sector is analysed next). The ownership in forestry is mainly public, but it changes from state to private in terms of increasing the role of private sector in industrial forestry. This rise was impressive during 1990s to reach by 2000 the total amount of 28,476 hectares. By ownership, the private plantations are distributed as about the half belonging to the village legal entities and about a quarter to the real persons and others (Figure 5).

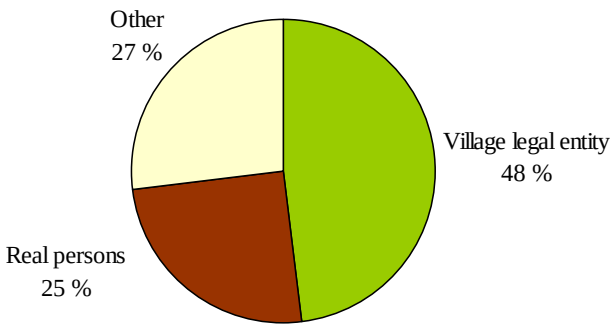


Figure 5. Private plantations in Turkey by ownership (2000)

The supply of forestry products has multiplicative effect for the national economy as it affects not only the production, but also income, employment and the state of environment. According to Turker (Turker, 2005) the production multiplier of forestry sector accounts for 1.222, the income multiplier is 1.377 in the 97 sectors input-output matrix of national economy. This puts the importance of forestry sector in the ranking of all the sectors on the 93rd place in production ranking, and on the 89th place in income ranking. As it was indicated above despite its low place in the ranking due to its forward and backward linkages this sector plays very important role in the national economy.

As the employment is not included in the Inter-industries Treatments Tables prepared by SSI for the year 1996, the employment multiplier of the sectors related to the forestry could not be calculated. The values regarding these sectors were obtained from a research done for Trabzon Sub-Region located in the North-East part of Turkey (Özyurt, 1982). According to this research, in the Trabzon Sub-Region economy, the employment multiplier of forestry sector is 0.291, which puts it at 17th position with regard to the employment effect in 64 sectors. This high ranking is results of the application of labour-intensive technologies in forestry sector.

3. 4. Government policy of stimulating forestry products supply.

Although the government policy in the forestry area has old traditions since the Ottoman times, the government activity in support of forestry accelerated in the second half of the XX century. Since 1950`s there is a rise of plantations and forestry experiments carried out by various government institutions. At present the government policy in forestry sector includes a complicated institutional structure with great influence on decision-making in macro and micro levels. It directly and indirectly affects the supply of forestry products.

Basic provider of the government policy is the Ministry of Forestry (MOF) re-established in 1991, which includes General Directorate of Forestry (OGM); General Directorate of Reforestation and Erosion Control (AGM); General Directorate of Forest

Village Relations (ORKOY); and General Directorate of Forests, Game-Wildlife (MPGM). The merging MOF and MOE in 2003-2004 allowed to improve the efficiency of the main General Directorates and to stimulate the supply of forestry product in more sustainable way.

The legal framework starts with the Constitution, and continues with a lot of forestry laws (the Forest Law No.6831; the forests Law for Supporting Development of Forest Villagers No.2924; the Law on Development of Forest Villagers; the Law for the Establishment and Duties of the Ministry of Forestry No.3800 and the General Directorate of Forestry No.3234; the National Mobilisation Law for Afforestation and Erosion Control No.4122; the Hunting Law No:3167; and the Land Cadastral Law; the Specially Protected Areas Law; and the Law for protection of Cultural and Natural Assets).

As it can be seen for these facts, the government policy stimulating forestry including supply of forestry products is based on detailed institutional system of laws, regulations, rules, etc. The Forestry Law gives "exclusive authority and responsibility for the management of forests" (CP2002 – Turkey, p. 31) to the independent State Forestry Organisation. It prepares important documents outlining the framework of the forestry sector in the economy. Two basic activities are of utmost influence: the Special Forestry Reports and Forestry Master Plans.

Included into the institutional structure are also the Higher Board of Environment; the Environmental Impact Assessment Process; the National Forestry Assembly; and the National Environment Action Plan (including forest resources), which are regarded as "effective mechanisms" for providing the government policy in forestry sector.

The institutional and legislative base of regulation supply of forestry products is in process of improvement and better codification aimed at facilitating the unification with the European standards and implementation of the basic aims of the policy of sustainable development. Afforestation Regulations and Afforestation Fund Regulations (1994) are example of such improvement. The National Reafforestation Mobilisation Law (1995) although removed by 2004 nevertheless was assessed as "the most significant legal and financial arrangement, securing sustainable flow of sufficient amount of financial resources into the Afforestation Fund". The government policy in forestry is improved also by further extending of forestry legislation, stimulating private plantations development, providing financial support to industrial forestry, etc.

The basic policy instruments used to stimulated industrial forestry can be defined as: direct (command-and-control) instruments and economic instruments.

The direct instruments of regulation are expressed mainly in the government initiatives of industrial forestry development. It starts with including this activity in the nation-wide planning process since 1956 as well as in supporting various initiatives of non-government institutions. It is facilitated by the fact that most of the forestry is public property.

Illustration of this regulation is the growth of **planned public investment** in the forestry sector. Figure 6 (Ormanlar, p. 87) reflects the ratio of the planned public investment and their realisation in the planning process starting from the First Five-Years Development plan in 1961 until present. Actually, we observe gradual rise of public investments in forestry reaching its peak in the fifth plan (second half of 1980s) with gradual slowing down until present. Nevertheless, public investments in this sector are high and the ambitions are to increase them in future. It is reflected in the Five-Years Development Plan (2001 – 2005) of the State Planning Organisation aimed at increasing annual average growth of industrial forestry to 56 thousand hectares for the planning period. The public planning is regarded as "the basic and the most important planning tool in Turkish forestry" (CP2002, p.32).

To complete the picture we have to add to it the long-run planning activity within the Forestry Master Plan (covering 1990-2009 period), which is prepared with close co-operation with the National Forestry Programme and Special Forestry Reports (CP2002, p.32).

The dynamic of public investment (the basic source of productive investment) is uneven and not highly correlated with the revenues in this sector[4]. It is an indication of multifarious influences on the link investment – revenues. Really, the results of the simple regression (linear and non-linear) are not sufficient for more profound conclusions; besides, this link has definite lag, which in forestry sector is rather long. On the other hand, however the rise of revenues means higher logging and the need of higher investment for afforestation, which would generate increased investing. The revenue movement in this sector demonstrates more fluctuations in comparison with production, and the difference between revenue and production is slowing down over time which can be regarded as some drop of profitability in forestry sector (Ormanlar, p. 93).

To reveal better the mechanism revenue – investment we need to analyse the structure of sales revenue, which changes seriously during the last decades. We observe rise of the share of general management cost from 10.6% in the total sale's revenue to 35.4% and drop of investment share from 14.9% in 1985 to 4% in 2000. Again, we can see a slight rise of production costs from 27.0% in 1985 to 33.5% in 2000. The share of maintenance cost actually remained the same during the period – from 20% in 1985 to 19.4% in 2000 (Ormanlik, p. 94).

During the implementation of the basic development plans the industrial forestry was regarded as an important intermediate sector having backward and forward linkages with a lot of other sectors. The results of input-output analysis indicated above showed the level of these linkages in general. The government investment in forestry allows shedding more light on the issue in terms of investing process and its forward and backward linkage effects. Thus, the government investment in forestry due to the backward linkage stimulates the rise of supply of seeding production, artificial

[4] The simple least squares estimation indicates that revenue = 240.1700 + 2.322786 investment.
(20.44228) (0.406221) $R^2 = 0.632$
The application of autoregressive conditional heteroskedasticity method reveals low convergence even after 100 iterations.

regeneration, afforestation activity, erosion control, energy forestry establishment, range improvement.

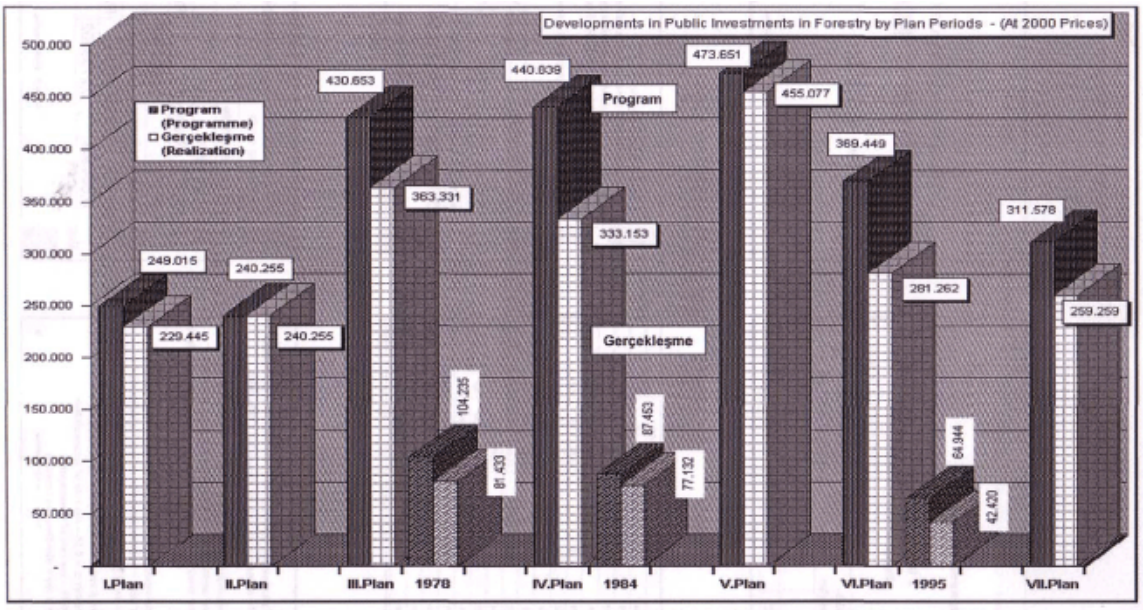


Figure 6. Public investment in Forestry by plan periods (at 2000 prices). The plan periods didn't cover the years of 1978, 1984 and 1995.

Due to the forward linkage the rise of investment in industrial forestry results in the accelerated growth of paved roads, road maintenance works, forest cadastral works and other supporting activities. The backward and forward linkages as a result of the growth of industrial forestry starting from 1939 and continuing through the development plans are shown in Table 6.

Table 6. Realisations in Major Forestry Activities in Turkey for the period 1939 – 2000.

Years	Management	Seeding production	Artificial reg.	Affores-tation	Erosion control	Energy forest	Range imp.	New road pave. road		Road main. works
	ha	Million	ha	ha	ha	ha	ha	km	km	km
1939-62	10697628	361		110529	14806		961	20691	-	-
I.Plan	7388604	517	-	148529	39896	-	7000	16466		.
II.Plan	12415860	561	-	94257	20152	-	5682	16315	2419	2461
lll.Plan	1721628	652	115666	134855	29635	-	13925	19760	4826	4349
IV Plan	4016643	1498	132866	214669	29222	42726	13858	18147	5704	6173
V.Plan	6916084	2782	111150	555894	92052	280182	16214	13323	3712	3554
VI.Plan	6351658	1700	111167	226865	34019	125335	11044	8453	1503	3516
Vll.Plan	10165257	937	105868	131940	134903	51662	18930	8186	1749	4157
	TOTAL	9772	646210	1763472	418797	552352	96229	131616	22527	27362

Source: Konakcu, p. 97

To complete the picture we have to add the fact that various afforestation programs are initiated and supported by government bodies to restrict the rise of depredated forest lands in the country.

Finally by present we have an institutional structure providing the national forestry policy by means of a lot of government, private and non-government organisations. Although the general government policy is carried out by the Ministry of Environment and Forestry, its implementation in real decision is realised with a lot of institutions outside the central government bodies. Thus, the General Directorate of Forestry has prepared Forestry Master Plan to compensate the rising gap between demand and supply for the ongoing period. The General Directorate of Reforestation and Erosion Control (GDREC) manages the process of deforestation and provides assistance in reducing erosion in the country. NGO's are also involved in preventing erosion of the forestry land. Great contribution in this activity has the Istanbul based NGO TEMA, which has initiated projects on nationwide terracing and large scale industrial plantations. (Anonymous Tema, 2004).

Government policy is based on the recommendations provided by a lot of government-funded Research Institutes of the Ministry of Environment and Forestry. The basic features of these research institutions affiliated to the Ministry of Environment and Forestry are presented in Table 7.

Table 7. The Research Institutes affiliated to the Ministry of Environment and Forestry. Italics: Approximate numbers.

	Research Institutes of the Ministry of Environment and Forestry			**Scientific & Technical Staffs**		
No.	Name	Head Office	Year Estab.	Total	MSc	PhD
1	Central Anatolia Forestry RI	Ankara	1952	40	12	8
2	Poplar & Fast Growing Forest Tree Species RI (PFGFTSRI)	İzmit	1962	23	6	4
3	Forest Tree Seeds and Tree Breeding RI	Ankara	1964	16	2	3
4	South-West Mediterranean Forestry RI	Antalya	1992	14	8	8
5	Eastern Mediterranean Forestry RI	Tarsus	1992	7	2	1
6	Aegean Forestry RI	Urla-Izmir	1992	26	2	6
7	Marmara Forestry RI (1)	Istanbul	1992	(7)	(1)	(1)
8	Western BlackSea Forestry RI	Bolu	1992	10	4	0
9	Eastern Black Sea Forestry RI	Trabzon	1992	15	5	2
10	Eastern Anatolia Forestry RI	Erzurum	1992	5	0	1
11	South-eastern Anatolia Forestry RI	Elaziz	1992	11	1	1
12	Forest Soils and Ecology Forestry RI	Eskişehir		9	2	0
	Research and Development Division, RPCD, Headquarter	Ankara		6	1	1
	Total 11 GDRS AR Institutes			182	45	35

Notes: (1): CLOSED in 2004
Source: The Research And Development Chairmanship, February, 2005. Updated by Dr. Said Dagdas.

The economic instruments of the government policy include a broad spectrum of measures aimed at stimulating the private sector to participate in industrial forestry in sustainable manner. Among them we can indicate various grants, subsidies, favourable tax regimes, assistance to providing grants and low interest credits for private forestry plantation growth, guarantying risk, reshaping property rights to enhance industrial

forestry, etc. Some authors (Diner and Koçar S. 1999) recommend external funding of plantations, zero coupon bonds, mortgage certificates and annuity charge bonds as the most suitable financial instruments for the long term. Financing institutions involved in this process are various insurance companies, pension funds and development and investment banks

The stimulation of the private sector participation in the new plantations establishment is of a great significance as it helps not only to increase production of timber but also to create new jobs. It is especially important for the mountainous areas where unemployment is high. The government keeps on giving free allocation of the low productive lands for reforestation of the private sector. Among the other measures we can indicate also technical assistance, free access to a lot of information concerning reforestation, free seedlings. Good examples are the family run poplar plantations providing timber not only to the wood industry but also for other sectors and local needs.

The ongoing programs for privatisation are another from of stimulating private sector participation in industrial forestry.

4. Factors affecting the competitiveness of forest wood/non-wood products chain.

4.1. Comparative advantages of Turkish forestry sector.

The modern consumption creates a broad spectrum of challenges to the industrial forestry, which creates disequilibrium between demand and supply of forest products. The first challenge is the gap between rising national and international consumption of forest products and the shrinking production of forest products. At present, the demand for forestry products is increasing faster than their supply, which widens the gap between supply and demand of wood in the country. It is expected that this tendency will increase during the present decade. Our explanation is that this is due to increased standard of living and export of wood from the country. Table 8 reflects this process in summary.

Table 8. Comparisons between the estimation and realisation of wood production and consumption values (1000 m^3)

Wood		**1995**		**1997**		**1999**	
		FMP	Anon.	FMP	Anon..	FMP	Anon.
		1988	2001	1988	2001	1988	2001
Round	Production	11656	10984	12169	10146	12908	10189
Wood	Consumption	15289	11535	16286	11650	17178	11219
	Deficit	-3633	-551	-4117	-1504	-4270	-1030
	Production	19339	26024	19333	24598	22683	23548
Total	Consumption	34448	27205	34816	25641	33130	24579
Wood	Deficit	-15109	-1181	-15483	-1043	-10447	-1031

Source: Tunctaner 2004

The comparative analysis of the consumption of industrial wood indicates that it is less in Turkey that in the world as a whole and in the big industrial countries. For example, by 2000 Turkey consumed 0.185 m^3 per capita industrial wood, while for the world as a

whole it accounted for 0.263 m^3 per capita, 1,293 for North and Central America, 0.832 for Oceania, and 0.541 for Europe.

Relatively high is per capita fire-wood consumption in Turkey in comparison with the other industrial countries. It accounts for 0.273 m^3, while the same indicator for Africa is 0.693, for North America 0.595, for Sweden 0.473 and for the world as a whole 0.417 (Ormancilik 2001, p 175). It can be explained with the high share of population living in mountainous areas and the high use of chalk wood for preparing a lot of national foods.

4.2. Turkish forestry in the international competitive markets.

Turkey participates actively in the international trade of wood and non-wood forestry products. The export of forest wood and non-wood products is increasing (the export-import of non-wood forestry products was analysed above) as it is indicated in Table 9.

Table 9. Forest Products Export (1990-2000) FOB prices.

	Wood products		**Non-Wood Products**	**Total**
Year	Quantity	Value	Value	Value
1990	2880	1100	26790	27890
1991	1370	940	26680	27620
1992	754	240	31770	32010
1993	863	350	29790	30140
1994	2948	910	26690	27600
1995	1872	780	33160	33940
1996	2599	790	42770	43560
1997	871	316	39740	40056
1998	3150	970	37530	38500
1999	4634	742	39486	40228
1999(New)	4634	742	7472	8214
2000(New)	4272	1305	5875	7180

Source: (Ormanlik, p. 132, http://aks.iujp.dot)

The geographical orientation of the export is to Holland (24.6% of the total export of forestry products by 1999), Germany (23.1%) and England (12.9%). Totally the countries of the EU occupy 77.5% of the total export of forest products (Ormanlik, p. 133).

The import of forest product is more diversified than export. The import of forest products for the period 1990 – 2000 is presented in table 9 below. It shows uneven tendencies in terms of quantities and values. If we exclude import from Russia (35.2% of the total import) all the other country's import is rather small with exception for African states as Gabon (8.2%), Cameron (5.9%), Liberia (3.1%). The total import of forest product form the EU countries by 1999 accounted for 14.9% of the total import of forestry products. The import of forestry product from Bulgaria accounts for 2.4% and from Romania 2.7%. Turkey imports forestry products even from the USA (0.6% from the total forestry import). (Konukcu, p.133)

Table 10. Import of Forest Products for the period 1990-2000 in current prices, (CİF)

	Wood products		**Natural Rubber**		**Other non-woods**	**Total**
Year	1000m^3	1000 $	1000 ton	1000$	1000$	1000$
1990	885	123911	50	44512	3461	171884
1991	1096	131445	70	63469	1810	196724
1992	1357	142860	73	66390	2930	212180
1993	2343	271840	82	74040	3120	349000
1994	1154	134000	65	68900	2540	205440
1995	718	96800	84	135540	4750	237090
1996	1050	133142	87	127648	5318	266108
1997	716	106558	93	99106	12116	217780
1998	970	126462	89	75800	5258	207520
1999	1214	104354	74	49600	5098	159052
1999 (new)	1214	104357	•	31	20060	124448
2000 (new)	1570	128929	-	29	20418	149376

Source: (Konukcu, p. 132. http://aks.iujp.dot).

The application of input-output analysis to the national economy including export and import of forestry allows to shed light on the links between exporting / importing capacity of the country. While the export/import rate of 97 sectors in the national economy is 88%, the export/import rate of forestry sector is 3%. Similarly, the shares of forestry sector's export and import in the total export and import of the national economy are respectively 0.0001 (one in ten thousands) and 0.003 (three in thousands). The results of input- output analysis including export/ import of forestry are summarised in table 11.

Table 11: Export/ Import quantities and rates of forestry and other sectors (1996).

	Exports (Million TL)	**Import (Million TL)**	**Export/Import Rates (%)**
Forestry	350,862	11,819,075	3
97 sectors	3,653,236,279	4,129,894,553	88

Source: Turker, 2005

These results come from the low share of export and import of forestry products in comparison with the other sectors. Geray explains it with the fact that the sector's production is mostly devoted to home consumption, the export opportunities are very limited and this characteristics of the sector might be only changed in a long period (Geray 1986). In another word, the products obtained from Turkish forests can not meet the home demand and this problem is expected to exist for a long period. For these reasons the supply needs are compensated by means of importing. As a whole although forestry products exchange with the rest of the world is dynamic as a whole in comparison with the other sectors forestry can not be included into the list of basic international trade sectors of Turkey (Geray 1993).

4.3. The role of international co-operation.

International co-operation plays very important role in industrial forestry development in Turkey and is a factor influencing demand and supply of forestry products. It extends on bilateral and multilateral base.

The co-operation of Turkish forestry sectors with similar sectors in other courtiers on bilateral basis is extending including not so much the countries of the Balkan region as countries with developed forestry sector. It results in extended exchange of scientists, ideas and other forms of knowledge from joint projects. Turkish-Finnish Forestry Project is a good example of successful bilateral co-operation. Intensive links are carried out with New Zealand and Chile, regarded as leaders in industrial plantations and providing experience indicative in many aspects to the other countries.

Turkey creates a good base for international co-operation by signing and adopting important international documents as the resolutions taken at Strasbourg, Helsinki and Lisbon Ministerial Conferences on the Protection of Forests in Europe, and establishing a National Follow-up Committee consisting of experts responsible for technical coordination of each resolution (CP2002, p.37), which directly affects industrial forestry sector.

This sector is also benefited by the participation of Turkey in the basic international programs related to forestry. For example, the responsibilities of the country coming Agenda 21 and Proposals for Action of the Intergovernmental Panel on Forests/Intergovernmental Forum on Forests (IPF/IFF) are included in to the Main Forestry Plan (1990–2009) (Anonymous 1988).

The country actively participates in such organisations as FAO, GEF, etc. FAO project "Industrial forestry plantation in Turkey" (FAO 2000) played very important role of establishing trials in the area of Marmara and Black Sea costal zone. FAO funded also a project on the development of appropriate methods to be implemented for community forestry, directly related to the industrial forestry. Due to the government support in cooperation with such organisations as FAO a lot of provenances and trials have been established starting from 1970s. (See Tunctaner (2004) for more detailed information).

Another FAO project "Fast Growing Broadleaves Forestry Plantations in Turkey (start 1983) helped to restructure industrial forestry of broadleaves based on the local species with introducing new exotic cultures and to extend the multipurpose broadleaves harvests (Gökdemir and Dağdaş 2004 a-b; Morandini 1983; Şimşek et al. 1996).

Turkey pays specific attention to the implementation of the IPF/IFF (Intergovernmental Panel on Forests/ Intergovernmental Forum on Forests) proposals for action. Project of National Forest Programme prepared by MOF in collaboration with FAO takes into consideration IPF/IFF proposals for action. The aim of the project is to renew and update Forestry Master Plan (covering 1990-2009 period), which is among the priorities of MOF. National Forestry Programme and Special Forestry Reports should provide significant contributions in the preparation of the new Forestry Master Plan (CP2002, p.32).

The Global Environment Facility (GEF) of the World Bank supported the project "In-situ conservation of Plant Genetic Diversity", which helped to establish a system of genetic fund conservation of valuable tree species. The newly GEF project named GEF-III commenced in 2004 for the same aim mentioned.

One of the biggest challenges to Turkish forestry is the on-going process of accession to the EU, which actually started since the membership application of Turkey to the EU in 1987. Since that time there is a process of harmonisation of Turkish with EU forestry legislation. At present important role in this process plays The National Program for Adaptation to European Union Legislation and Regulations" (2001), which includes revision of Forest Law 6831, harmonisation of legislation on manufactured forest products, establishment of adequate land cadastral information system, completing forests cadastral works, development of rural development strategies, in harmony with EU policy, and development of institutional structures for this purpose, establishment of Farmer's registration system including forest villagers, etc. It is expected to influence industrial forestry in terms of improved competitiveness and more efficient co-operation with the industrial forestry sectors of the other European countries.

4.4. Problems and barriers to entrepreneurship and supply of forestry products.

The presented above analysis indicates unambiguously that the present industrial forestry in Turkey is facing many challenges. The biggest challenge for the forests - the ever-increasing world demand of wood facing shrinking supply of timber - is a tendency, which affects also Turkey. With forests reserves and biodiversity close and in some aspects richer than the European ones, Turkey tries to give adequate responses to these challenges. Industrial forests in Turkey are growing to meet the modern economic and social challenges.

Following important challenges to the industrial forestry in Turkey can be formulated from the presented above analysis:

Increased demand and consumption is facing limited supply of forest products. This is a world tendency and Turkey is not exception of it. The rising industrial forestry and import try to complement the gap between demand and supply of wood for the industries and the local population. Three basic aspects of the challenges can be outlined:

- Effective restoration of forests after logging.
- Creation of new high productive forests.
- Improvement of existing wood producing cultures.

Significant research is carried out in direction of extending high productive forestry cultures including adapting of new forestry monocultures. Among the whole lot of example we could indicate the Program of Improvement of Poplar Plantation carried out by the Poplar and Fast Growing Forest Tree Research Institute in Izmit. It includes tree selection, hybridization, commercial cloning, provenance selection, etc. The aim is to create cultures suitable for the concrete climatic conditions of the country starting with irrigated areas and ending up with the dry regions.

The increased demand of forest product imposes priority of modernisation of forest production, paying special attention of all potential suitable areas for industrial plantations. Cadastre and corresponding incentives are used to attract the private producers as it is done in Chile and New Zealand. As a result, the creation of new plantations with high productive cultures is expected to accelerate significantly in the ongoing decade.

The need to foster further the structural improvement of industrial forestry is obvious. It started already with the genetic improvement of existing forests. According to the forestry experts to meet the challenges of the present and future industrial forestry there is a need to create a structure, which is close to the natural forests. This task can be solved by means of plantations formation combining the local and exported sorts of forests, which could adjust to the local climate allowing rapidly growing forests with reduced rotation period. This task is facilitated by the climate conditions of the country permitting to adapt high productive trees from the adjacent or more remote territories. It will require modernisation of the technical base with introducing new methods of transportation of logged wood in a way, which will minimise the disturbance of biodiversity.

Introducing economic incentives is the economic response to the challenges to industrial forestry.
This task is very difficult taking into account the long term period of investment in this sector. Only investors having interest in long term investment can be attracted to put their money in it. Pension funds, insurance companies, etc. can be used if corresponding incentives are introduced as it is already done in other sectors. It would impose adjustments to capital market in the country.

There are problems concerning the implementation deficit in providing government policy of stimulating the structural changes in forestry. Among the basic reasons reducing efficiency of the government policy we can indicate:

- Still high share of low productive long period rotation of industrial forestry plantations
- Increasing migration out of the mountainous areas reducing supply of adequate labour force for forestry.
- Insufficient confidence between state and private sectors concerning the support of private initiatives of forestry plantation extension.

The process of widespread all over the world deforestation is not avoided in Turkey. The basic reasons for deforestation are: rising industrial activity, illegal logging, fires, natural erosion, etc. A lot has been done to halt this process and there is a definite progress in protection of natural forests and the rise of industrial forestry. The clear-cut logging is in a process of replacement with sustainable use and extension of multicultural forests.

The summary of challenges and responses to the forestry sector concerning the demand and supply of forestry products is summarised in table 12.

Table 12. The challenges and the responses to forestry sector concerning the demand and supply of forestry products.

No.	Challenge	Response
1	Increased demand and consumption of forest products.	The drop of production compensated by the rise of import; plans to extend forestry by using new low-productive lands.
2	Increasing world competition.	Stimulating introduction of modern technologies in forestry sector and reducing the cost of production.
3	Deterioration of environment and natural forests.	Providing measure for afforestation and conservation of natural forests.

The presented analysis outlined some of the basic challenges to the industrial forestry in Turkey. Increasing demand of wood and insufficient supply augment the gap and pressure over the natural forests. To fill this gap a lot is to be done. The ongoing policy is aimed at reducing this gap by co-ordinating the link between the producers and the end-users of the wood. Much more detailed study is needed to reveal the whole complex of problems around the demand and supply exchange of forestry and related products.

5. The problem of "missing" information.

At present a lot of information necessary to carry out the complete estimation of economic integration of urban demand and rural supply of forestry goods is still missing. A great part of this "missing" information is of a primary origin and can be collected only from the local community.

The first thing needed for the successful completion of such a collection is to organise dynamic accounting of the natural resources (wood and non-wood resources creating actual and potential consumption) of the forests. It means to organise systematic collection of information of the volume of natural resources of the forests and their change over time. This accounting can be implemented by the local forest administration, although the methodology and the start up of the initial data base collection are to be steered by a competent research institution. Needless to say it has to be computer processed and accessible to the society.

At present the missing information can be classified into three basic groups: information that does not exist, inaccessible information and information that can not be located in the time available.

<u>Information that does not exist</u>

The basic information that does not exist to estimate more precisely the consumption of forestry wood and non-wood products is the representative data of the demand of these goods. To produce this information marketing research studies are to be organized. The following information is needed:

- Consumption (demand side) side of forestry products on the whole technological chain.
- Due to the expected high non-use values of forestry there is a need of valuation of various values created by the forests (general economic, option, existence, bequest, etc. values).

On the supply (production side) side it is desirable to collect information about the production, cost, profits, etc. concerning the whole technological chain of forestry. The indicated results of input- output analysis illustrate the need of more detailed study.

Part of the information does not exist for purely technical reasons. We call it "shadow information". This is the information for example of collection medicine herbs, mushrooms, wild fruits, etc. for own consumption by the local population. At present mainly data for commercially produced and collected wood and non-wood products is available. It represents relatively small part of the whole "shadow" consumption of forestry products used by the local population. A lot of herbs are also collected by the tourists, which not necessarily belongs to the local population. All this "shadow information" remains outside the scope of research.

Inaccessible information

Principally a big part of the information necessary to estimate the supply aspects of forestry products (cost, prices, revenues) is not accessible. Some information which is privately owned is not provided for public access and its collection requires an explicit permission by the owners. Most of the private forestry industry firms prefer to hide high part of this information to avoid taxation. There are cases when such firms even export medicine herbs and other forestry wood and non-wood products without presenting information about the volume of their export.

Finally we expect that the further work within the COST program will allow collecting more information, which at present could not be composed for the available time.

6. Conclusions

The presented hitherto analysis is the first step in summarising the experience and preparing practical surveys for the need of the decision makers both in demand and supply sectors of forestry products. It was indicated that although the forestry sector does not have high share in the overall production in national economy, the environmental and ecological services of the forestry sector increase significantly its importance. Forestry sector supplies products used as inputs and final consumption both for the domestic demand and to a very limited degree for foreign demand. A significant part of the forestry sector's total output goes into intermediate demand, which means that forestry supplies inputs to other industries. Meanwhile, particularly the foreword linkages of the forestry sector underline its strategic importance for the national economy.

Despite a number of studies on various aspects of the growth and development of forestry sector, its real effect on the national economy still remains hidden. There are many reasons for it, including the difficulties due to lack of understanding, information and suitable methodology to expose its real potential in national economic records. According to some studies only 42% of the values of wood forest products are reflected into forestry sector and national balance sheets. For the non-wood forest products it accounts for 8%, for hunting 3.4% and for recreation 0.2%. In other words, the values of the such components of total economic values of forestry sector in Turkey as grazing (21%), carbon storage (14.8%), pharmaceuticals (10.5%) and biodiversity conservation

(0.1%) are not transferred into the sectoral and national balance sheets (Türker, MF, Pak, M, and Öztürk, A., 2002).

In short, while only 53.46% of forestry sector outputs can be calculated as positive externalities in national balance sheets, the rest of the positive externalities with a share of 46.4 % are not included. These figures, albeit arguable, indicate that the share of forestry sector in national economy indicated in the official statistics is lower than its real value. If the real effects of forestry sector can be calculated and reflected into national economic sheets, it is clear that all of the figures of forestry sector related to production, income, employment, sectoral linkages, etc. would be higher.

Such a revision of the general vision of the importance of forestry sector would allow to outline its real share and to demonstrate its vital role as supplier of a lot of valuable natural resources for the national and international economies. Producing more precise monetary valuation of the role of forestry sector would support the need for more intensive investments allocated in forestry sector. It would allow to include in an adequate way the demand and supply of forestry products in the national strategy and policy of sustainable development of the country.

Annexes

Table 1A. Basic indicators of forestry in Turkey (2004)

Situation / Activity	**Measure**
Forest Area	20.763 .000 Ha
(Private forests)	(18.482 ha)
Productive Forests	10.027 .000 Ha
Degraded Forests	10.736 .000 Ha
Forest Land Use (Public land)	20.745 .000 Ha
Exploitative Forests	16.650 .000 Ha
Protected areas	4.095 .000 Ha
National and Natural Parks, Nature Protection Areas	864 .000 Ha
Conservation Forest (Mainly erosion control)	3.231 .000 Ha
Growing Stock (Public)	1.201.204.000 .000 m^3
Annual Wood Increment (Public)	34.270 .000 m^3
AAC (Public)	17.878 .000 m^3
Total Wood Production (2000)	27.940 .000 m^3
Industrial Wood	9.940 .000 m^3
Public Share	7.360 .000 m^3
Private Share	2.580 .000 m^3
Firewood (Legal + illegal)	18.000 .000 m^3
Round wood Export	5 .000 m^3
Round wood Import	1.214 .000 m^3
Afforestation (Cumulative)	1.763 .000 Ha
Energy Forest Establishment (Cum.)	552 .000 Ha
Erosion Control (Cum.)	419 .000 Ha
Range Improvement (Cum.)	96 .000 Ha
Seedling Production (Million Unit) (Cum.)	
Per Capita Total Forest Area	0.32 Ha
Per Capita Productive Forest Area	0.15 Ha
Per Capita Growing Stock	17 m^3
Per Capita Wood Consumption	0.45 m^3
Per Capita Industrial Wood Consumption	0.17 m^3
Ratio of Productive Forests to T. Land area	13 %
Ratio of Protected Areas to total Forest Area	19.7 %
Share of Forest Area to Protect Biological Diversity	3.9 %
Ratio of Net Felling to Annual Increment	91 %
Share of Firewood in Total Wood Production	64 %
Forest Road Density	6.3 m/Ha
Share of the Forestry Output in GNP	0.4 %
Forestry employment (Million man-day)	
Number of Forest Engineers employed by Ministry	3813 Numbers
Number of people died in forest fires (Cumulative)	74 Numbers
Share of Forestry in T. Fixed Investments (Public)	0.8 %
Share of Forestry investments in GNP.	0.06 %
Num. of Faculties offering forestry education and students	9 - (3400) Numbers
Number of teaching staff in Faculties.	147 Numbers
Num. of Forestry Research Centres and researchers	11-182 Numbers

Source: Konakcu M., 2001, Forests and Turkish Forestry. Yayin No. DPT: 2630, Eylul, p. 44.

Table 2A. Revenues and investments in forestry sector.

Years	**Current prices**			**At 2000 prices**			
	Revenue	Investment	% share	Revenue	% increase	Investment	% increase
1980	30,444	3,617	11.9	291,609,195		34,645,594	_
1981	41,039	7,096	17.3	273,229,028	-6.3	47,243,675	36.4
1982	58,945	10,490	17.8	309,910,620	13.4	55,152,471	16.7
1983	97,046	16,466	17.0	395,621,688	27.7	67,125,968	21.7
1984	169,084	22,703	13.4	459,217,816	16.1	61,659,424	-8.1
1985	225,183	31,626	14.0	432,960,969	-5.7	60,807,537	-1.4
1986	351,878	52,805	15.0	484,546,957	11.9	72,714,128	19.6
1987	510,855	102,045	20.0	487,550,105	0.6	97,389,769	33.9
1988	720,037	150,213	20.9	348,180,368	-28.6	72,636,847	-25.4
1989	1,174,864	239,381	20.4	392,812,866	12.8	80,036,444	10.2
1990	1,686,374	279,440	16.6	372,662,866	-5.1	61,751,967	-22.8
1991	2,431,935	379,785	15.6	303,369,967	-18.6	47,376,004	-23.3
1992	4,239,646	202,292	4.8	334,602,350	10.3	15,965,337	-66.3
1993	6,885,267	391,032	5.7	311,868,056	-6.8	17,711,788	10.9
1994	11,746,648	401,106	3.4	263,263,834	-15.6	8,989,518	-49.2
1995	27,916,104	1,351,716	4.8	370,526,109	40.7	17,941,116	99.6
1996	44,152,649	3,506,533	7.9	320,410,166	-13.5	25,446,465	41.8
1997	70,784,946	4,069,337	5.7	270,133,504	-15.7	15,529,633	-39.0
1998	112,103,682	5,259,250	4.7	247,525,941	-8.4	11,612,471	-25.2
1999	151,841,682	6,021,648	4.0	216,374,393	-12.6	8,580,848	-26.1
2000	227,601,438	11,036,568	4.8	227,601,438	5.2	11,036,568	28.6

Table 3A. Industrial wood production and consumption data, 1995-2004 (1000 m^3).

	1995	**1996**	**1997**	**1998**	**1999**	**2000**	**2001**	**2002**	**2003**	**2004**
Production	10984	10548	10146	10315	10442	10590	10078	11305	10670	11496
State	*8046*	*7529*	*7046*	*7148*	*7242*	*7328*	*6778*	*8005*	*7320*	*8196*
Private	*2938*	*3019*	*3100*	*3167*	*3200*	*3262*	*3300*	*3300*	*3300*	*3300*
Consumption	11535	11602	11650	11542	12051	12784	11008	12453	12190	13000
GDO	*7743*	*7413*	*7451*	*7104*	*7351*	*7642*	*6778*	*8109*	*7420*	*7950*
Private	*2938*	*3019*	*3100*	*3167*	*3200*	*3262*	*3300*	*3300*	*3300*	*3300*
Import-Export	*854*	*1170*	*1099*	*1271*	*1500*	*1880*	*930*	*1044*	*1398*	*1750*

Sources: Ormancılık Özel İhtisas Komisyonu Raporu (DPT, 2001) ve Orman Genel Müdürlüğü verileri, 2005

Table 4A. Production of Wood Raw Material in Turkey (1000 m^3) Public and private sectors (1962-2000).

Year	**Logs**	**Wire P**	**Mining P.**	**Pulpwood**	**Chipwood**	**Packing W**	*Total*	*Private*	**Firewood**
1962	2192	32	505			150	2879	124	
1967	3418	40	386			250	4094	306	
1972	4940	39	563			460	6002	597	
1977	5824	161	545	976	454	470	8430	1157	28000
1978	6295	*162*	*539*	*987*	*460*	*376*	*8819*	*1200*	*28000*
1979	5680	157	537	1032	620	466	8492	1294	28000
1980	5557	116	601	880	543	590	8287	1360	28000
1981	5703	118	638	1116	720	500	8795	1617	28000
1982	4470	71	470	935	908	577	7431	1430	28000
1983	4725	96	491	1281	1183	668	8444	1550	26500
1984	*5148*	*114*	*499*	*1462*	*1213*	*751*	*9187*	*1590*	*24500*
1985	5092	264	530	1572	1184	665	9307	1900	24500
1986	5016	243	608	1480	1450	771	9568	2034	24500
1987	5074	190	567	1470	1293	732	9326	2060	24250
1988	4940	150	554	1520	1453	750	9367	2061	24000
1989	4800	60	518	1882	1524	760	9544	2100	23400
1990	4810	60	513	923	1652	800	8758	2200	22500
1991	4610	99	465	1043	1640	780	8637	2142	21000
1992	4747	122	440	1149	1645	860	8963	2492	20800
1993	4710	126	378	1470	1660	954	9298	2432	19600
1994	4511	114	449	1577	1600	950	9201	2489	19200
1995	*5150*	*134*	*497*	*1558*	*1950*	*1220*	*10509*	2486	*18700*
1996	4912	89	436	1568	2050	1293	10348	2803	18500
1997	4700	53	444	1369	2110	1334	10010	3036	18300
1998	4667	36	483	1588	1990	1300	10064	3014	18100
1999	4505	90	456	1610	1791	1183	9635	2570	17800
2000	4723	156	414	1538	1893	1216	9940	2580	18000

Note : 1) About 80 per cent of the total industrial roundwood comes from coniferous species.
Kaynaklar: 1) OGM, DPT
Sources: 1) General Directorate of Forestry (OGM), State Planning Organazition (DPT)

Acronyms and Abbreviations

AAT (ETA)	Allowable cut.
ARD	Associates in Rural Development, Inc.
IUCN	International Union for the Conservation of Nature and Natural Resources
MoE	Ministry of Environment
MoF	Ministry of Forestry
GEF	Global Environmental Facility
SSI	State Statistical Institute
USAID	United States Agency for International Development

References

Anonymous 2005: Orman Ürünleri ve Orman Ürünleri Endüstrisi Çalışma Grubu Raporu (6. Grup). Preliminary Report for "Forestry Production and Industry of Forestry Products". 1. Çevre ve Ormancılık Şurası, (21-25 Mart 2005, Antalya).

Anonymous 1988: Ormancılık Ana Planı-1990-2009, Tarım Orman ve Köyişleri Bakanlığı-Orman Genel Müdürlüğü-Araştırma Planlama ve Koordinasyon Dairesi Başkanlığı Yyaın Nu.: 3, Ankara, 176 pp..

Anonymous 1999: Report. National Poplar Commission of Turkey (1996-1999), Ankara.

Anonymous 2000 a: FAO 2000-Global Forest Resources Assessment, Forestry Paper 140, Rome.

Anonymous 2000 b: Orman Ağaçları ve Tohumları Islah Araştırma Müdürlüğü 1999 Yılı Çalışma Raporu ve 2000 Yılı Çalışma Programı. Çeşitli Yayınlar Serisi Nu.: 2, Ankara.

Anonymous 2000 c: Sekizinci Beş Yıllık Kalkınma Planı. Türkiye-Avrupa Birliği İlişkileri Özel İhtisas Komisyonu Raporu, DPT Yayın Nu.: 2545, ÖİK: 561 Ankara, 224 pp..

Anonymous 2001: Sekizinci Beş Yıllık Kalkınma Planı. Ormancılık Özel İhtisas Komisyonu Raporu, DPT Yayın Nu.: 2531, ÖİK: 547, Ankara, 539 pp..

Bann, C. and Clemens, M., 2001: Türkiye'de Orman Kaynaklarının Yönetimi ve Ormandan Faydalanma İle İlgili Dışsallıklarda Alt Sınır (Minimum) Değerlerinin Tahmini ve Bu Bilgilerden Yararlanılması Konusunda İlgili Öneriler (Ormancılık Sektör İncelemesi Küresel Örtüşme Programı Çalışması Final Raporu). T. C. Orman Bakanlığı-Dünya Bankası, Nisan 1999, Baskı: İksir Tanıtım Ltd. Şti., Ankara, 65 pp..

Cakır, 1986. Regional planning and importance of forestry sectors : The case of Bolu Regional Forest Directorate (Bolgesel planlama ve ormancilik sektorlerinin onemi: Bolu Bolge Mudurlugu ornegi), unpublished Ph.D. thesis, Istanbul University Graduate Institute of Sciences, 200 pages, Istanbul, Turkey.

Cengiz, Y. et al., 2002: Kızılçam Orijin Denemelerinin 10 Yıllık Sonuçları: Orijin-Çevre Etkileşimi ve Tohum Transferi Üzerine Etkisi «Results of provenance study at age 10 on *Pinus brutia*: Provenance-site interactions and defining breeding zones». Orman Bakanlığı Yayın Nu: 158, Batı Akdeniz Ormancılık Araştırma Müdürlüğü Yayın Nu.: 016, 144 pp..

Çevre Ormancılık Þurası, 2005, Orman Ürünlerý Endüstrýsý Komýsyon Raporu, p. 1.

Dagdas, S., 2002: Fourteen year old results of Turkish red pine (*Pinus brutia* TEN.) Provenance test in Central Anatolia (Ankara) (Some recommendations for fast-growing plantations). Management of Fast Growing Plantations, International IUFRO Meeting, (11-13 September 2002), Proceedings, Ministry of Forestry, Poplar and Fast Growing Forest Trees Research Institute, Izmit-Turkey, p. 250-260, 335 pp.

Dagdas, S., 1998: Türkiye'de Merkezi Yönetimin Taþra Kuruluþlarý-"Ormancýlýkta Bölge Kuruluþlarýnýn Yeniden Düzenleme Çalýþmalarý", Türkiye ve Ortadoðu Amme Ýdaresi Enstitüsü-Kamu Yönetimi Lisansüstü Uzmanlýk Programý, (Yüksek Lisans Tezi (Thesis of Master of Arts)), 116 pp.

Die, 2001. The Input-output structure of the Turkish economy, State Statistics Institute, publication no. 2488, Ankara, Turkey.

Diner A & Koçar S. 1999: "I-214" Melez Kavak Ağaçlandırmalarında Ara Tarımın Kavakçılık Ekonomisine Etkileri. Kavak ve Hızlı Gelişen Orman Ağaçları Araştırma Enstitüsü, Teknik Bülten No: 189, İzmit.

Gökdemir, Ş. & Dağdaş, S.; 2004 a: Iç Anadolu Bölgesinde Çoğul Amaçli Ağaçlandirmalarda Kullanilabilecek Yaprakli Türler: Onyedi Yillik Sonuçlar-I (Species tests of the broadleaved tree species to be used in multipurpose plantations in Central Anatolia- (*Seventeen-year old results*), Orman ve Ekonomi Dergisi, Yıl: 3, Sayı: 15 (Mayıs-Haziran 2004), 32 pp., Dizgi ve Baskı: Berkay Matb., Ankara

Gökdemir, Ş. & Dağdaş, S.; 2004 b: Iç Anadolu Bölgesinde Çoğul Amaçli Ağaçlandirmalarda Kullanilabilecek Yaprakli Türler: Onyedi Yillik Sonuçlar-Ii (Species tests of the broadleaved tree species to be used in multipurpose plantations in Central Anatolia- (*Seventeen-year old results*), Orman ve Ekonomi Dergisi, Yıl: 3, Sayı: 16 (Temmuz-Ekim 2004), p. 19-25, 32 pp., Dizgi ve Baskı: Berkay Matb., Ankara

Görcelýoðlu, E., Kurtoðlu, A., and Özgen, Y., 1998: Cumhuriyetimizin 75. Yýlýnda Ormancýlýðýmýz Sempozyumu Bildiri Kitabý, 21-23 Ekim 1998, Ý.Ü. Yay. Nu.: 4187, Ý.Ü. Or. Fak. Yay. Nu.: 458, p. 117-124, Ýstanbul, 810 pp..

Morandini, R., 1983: TUR/82/003 – Fast-Growing Broad-leaved Forestry Plantations in Turkey-Consultancy on Genecology. İzmit, Ankara, Rome, 52 pp..

Kayacan, 2004. Economic impact analysis of forest-related goods and services (Orman kaynaklarina iliskin mal ve hizmetler kapsaminda ekonomik etki cozumlemesi), unpublished Ph.D. thesis, Istanbul University Graduate Institute of Sciences, 220 pages, Istanbul, Turkey.

Konakcu M., 2001, Forests and Turkish Forestry. Yayin No. DPT: 2630, Eylul,

Şimşek, Y., Tosun, S., Atasoy, H., Usta, H. Z., Uğurlu, S., 1996: Türkiye'de Çoğul Amaçlı Ağaçlandırmalarda Kullanılabilecek Yapraklı Türlerin Tesbiti Üzerine Araştırmalar – (*A study on determination of the broad-lived tree species to be used in multipurpose plantations in Turkey*). Ormancılık Araştırma Enstitüsü, Teknik Bülten Serisi No: 260, Ankara, 77 pp..

T.C. Çevre ve Orman Bakanliði, 2004: Ulusal ormancilik programi. Türkýye ulusal ormancilik programinin hazirlanmasi projesý (TCP/TUR/0066 (A)), T.C. Çevre ve Orman Bakanlýðý-FAO, Ankara.

T. .C. Orman Bakanliði (The Republic of Turkey - Ministry of Forestry), 1999 a: Osmanli Ormanciliði Ýle Ýlgýlý Belgeler-I (Documents on Ottoman Forestry. At the 700th anniversary of the Foundation of Ottoman State"). Orman Bakanlýðý Yayýn Nu.: 094, Printed by: GIPTA A.Þ., ISBN 975-8273-20-5, Ankara, 241 pp..

T. .C. Orman Bakanliði (Ministry of Forestry), 1999 b: Ministry of Forestry Research Master Plan-2000-2005. Policy and Strategy for Forestry Research and Development, Ankara, May 1999, 28 s.

Toksoy, D., Gümüş, C., and Ayyıldız, H., 2003: Türkiye'de Orman Kaynaklarının Durumu ve Tıbbi Bitkilerin Ticareti Üzerine Bir Değerlendirme. Orman ve Ekonomi Dergisi, Yıl: 2, Sayı: 8, p. 7-14, 32 pp., Dizgi ve Baskı: Berkay Matb., Ankara.

Tulukcu, M., Tunctaner, K. and Toplu, F., 1987: Marmara ve Batı Karadeniz Bölgelerinde Halepçamı (*Pinus halepensis* Mill.) ve Kızılçam (*Pinus brutia* Ten.) Orijinlerinin Karşılaştırılması Üzerine Araştırmalar. Kavak ve Hızlı Gelişen Tür Orman Ağaçları Araştırma Enstitüsü Yayınları, Teknik Bülten Nu.: 137, İzmit, 33 pp..

Tunctaner, K., Tulukcu, M., and Toplu, F., 1985: Türkiye'de Endüstriyel Ağaçlandırmalarda Kullanılabilecek Sahilçamı (*Pinus pinaster* Ail.) Orijinlerinin Seçimi Üzerine Araştırmalar. Kavak ve Hızlı Gelişen Tür Orman Ağaçları Araştırma Enstitüsü Yayınları, Yıllık Bülten Nu.: 21, İzmit.

Tunçtaner, K. Sustainability of Industrial Forest Plantations in Turkey, http://search.yahoo.com/search?p=industrial+forestry+research+Turkey&ei=UTF-8&fr=FP-tab-web-t&fl=0&x=wrt access date 02/10/2004.

TurkishPress.com http://www.turkishpress.com/turkishpress/news.asp?ID=21833 (access date 20/10/2004)

Türker, M. F, PAK. M., Öztürk, A., The review of non-wood forest products management in Turkey from the point of five year development plans and Forestry main plans.

Türker M. F. Determination of Importance of Turkish Forestry Sector in National Economy Using Input-Output Analysis (Forthcoming publication)

WANA NARS Study (1999) Turkey.

http://ekutup.dpt.gov.tr/ormancil/konukcum/forest.html