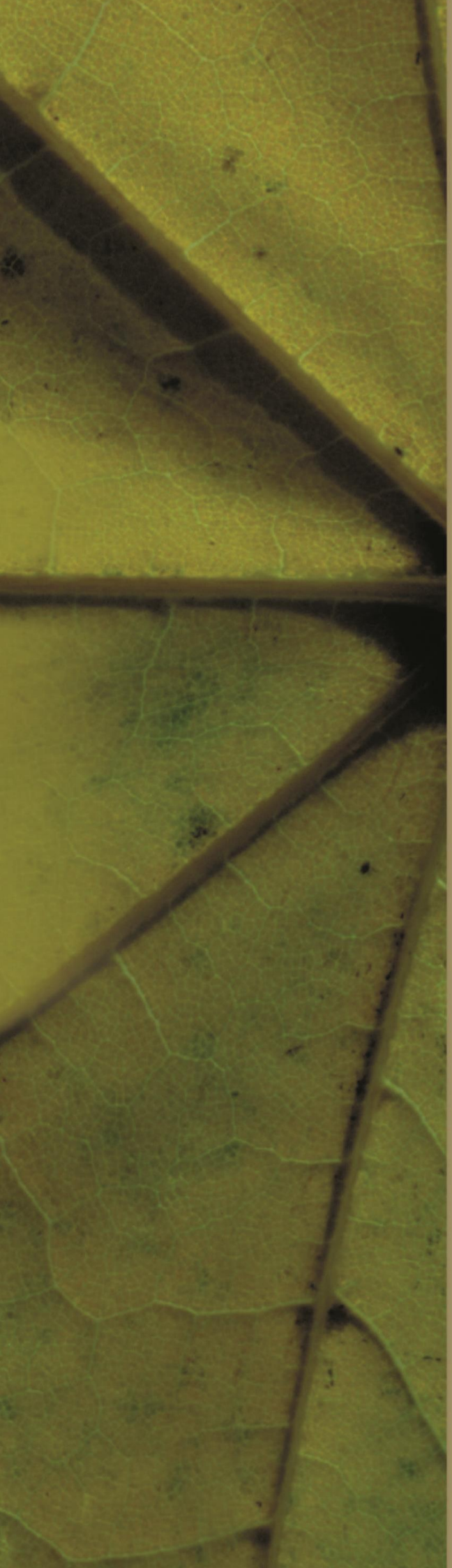

Acta Silvatica & Lignaria Hungarica

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 1

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Forest Sector Entrepreneurship in Europe: Country Studies

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Forest sector entrepreneurship in Europe – summary of country studies of COST Action E30

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University of Joensuu, Finland

What is COST action E30?

COST is an intergovernmental framework for European co-operation in the field of scientific and technical research, allowing the co-ordination of nationally funded research on a European level. COST is formed of Actions, which cover basic and pre-competitive research as well as activities of public utility.

COST action E30 *"Economic integration of urban consumers' demand and rural forestry production"* is one of the largest COST actions thus far under the domain on forests and forestry products. COST action E30 has 21 participating countries: Austria, Bulgaria, Croatia, Denmark, Finland, France, Germany, Greece, Hungary, Iceland, Ireland, Italy, Lithuania, the Netherlands, Norway, Poland, Portugal, Romania, Sweden, Switzerland and United Kingdom.

The main objective of COST action E30 is to gain better understanding of the problems and possible solutions to forest-based entrepreneurship in small-scale forestry, wood processing, and non-wood forest products and services aiming at improved employment and income in rural areas. The Action has three working groups (WG):

- small-scale forestry
- wood processing industries
- non-wood forest products and services

In these working groups, the action focuses on:

- competitiveness of forest – wood / non-wood / services – consumer chain
- barriers and prospects of entrepreneurship
- problems and opportunities for enterprise development

The action has been implemented in two phases. Action phase one was aimed to build a strong state-of-the-art on information relevant for action working groups and the action research questions. The state-of-the-art information was used to determine key issues for in-depth analysis in action phase two. The country studies presented in the two volumes of *Acta Silvatica & Lignaria Hungarica* are based on the work in the action phase one.

Forests, enterprises and rural economic development

Forests provide a fundamental basis for ecologically, socially and economically sustainable development in all European countries. At the centre of the actions supporting sustainable forest management are the decisions of approximately 15 million small-scale forestry holdings, covering nearly 40 million hectares of land in EU. These forests provide a substantial share of the resources used for employing more than six

million people in forestry and wood processing industries in Europe, and an uncounted number of other people in processing and services in non-wood forest sector. The role of enterprises and entrepreneurship in economic development is likely to increase in the future because of the limited possibilities to expand public sector activities in most European countries. Especially in the forest sector, small- and medium-scale enterprises (SMEs) play a central role in the employment of people in local processing, recreation and forest-based tourism activities. Enterprises in forestry–-wood/non-wood-processing/services–-chains, if innovative and competitive in the markets, may bring value added to rural areas and closest to the origin where trees are growing.

The COST action E30 rationale is based on the challenge to gain better knowledge on the value added chains which link (especially urban) consumers' demands and the supply of various and increasingly numerous forest products and services from rural areas. This can be seen as a promising means to improve business opportunities, employment and income in the rural areas. The key in finding a better linkage between consumption and forest production is to develop entrepreneurship to utilise the existing forests and forest resources.

Theoretical background for the country studies

From a theoretical point of view, the closest link to economic development in rural regions (since such a discipline as rural economics does not exist) is regional economic theories and multidisciplinary field of rural studies (Terluin 2001). Although inputs to the topic of economic development in rural areas may be found in other branches of economics such as development economics, land use economics, natural resources economics and industrial economics, for this action the *regional economic theories* were considered to provide a solid theoretical framework. The variety of regional economic theories reflects the varying emphasis of interests in explaining development, a certain historical stage of development, the different intellectual environments and the evolution of theoretical ideas, as defined more in detail in Tykkyläinen et al. (1997) and Hyttinen et al. (2002). The regional development theories and their relative importance in implementing regional development strategies have changed in the late 20th century as illustrated in Figure 1.

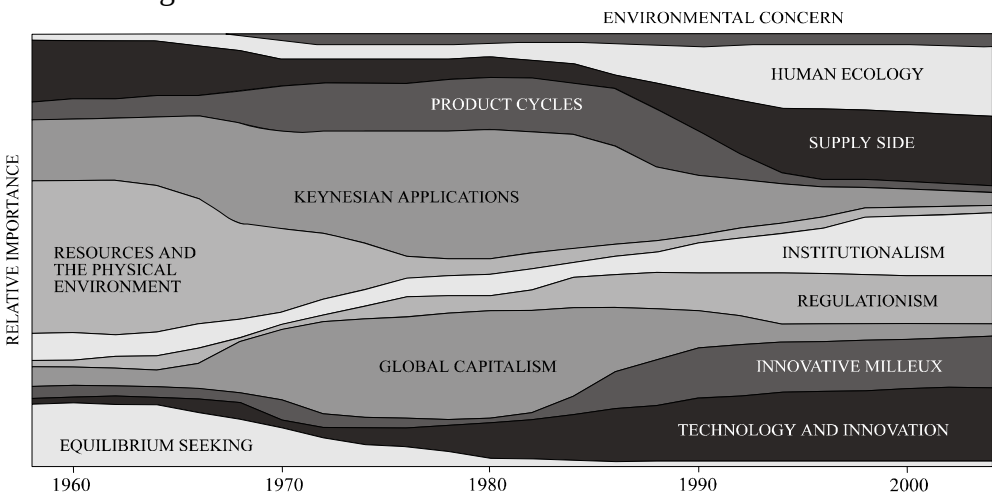

Figure 1. Importance of development theories in the late 20th century (Hyttinen et al. 2002).

Another way of classifying theories on regional economic development is found in Terluin (2001), where the competitiveness of companies is considered a key element for regional economic development and the theories on regional development are classified accordingly. The result of Terluin (2001) is the grouping of regional economic theories into 'traditional models', 'pure agglomeration models', 'local milieu models' and 'innovation models' (Table 1).

Table 1. Classification of theories on regional economic growth by Terluin (2001).

Models	Theories
Traditional models	Neo-classical growth theory Keynesian approach: Export base theory
Pure agglomeration models	Cumulative causation theory Growth pole theory
Local milieux models	Endogenous growth models Theories based on the changes in the organisation of labour
Innovation models	Incubator theories Product life cycles Theory of innovative milieu Porter's theory on competitive advantage of nations Storper's theory –- region as a nexus of untraded interdependencies

Common for many regional economic development theories is to emphasise innovations in explaining economic development. In general, innovation research is mainly done by disciplines and sub-disciplines of economics and/or policy such as institutional economics, political economics, and evolutionary economics as well as in economic geography and regional sciences. These disciplines have developed several concepts, which are used in innovation research. Systems of innovation, path dependencies, tacit knowledge, learning organisation, cultural theory, network theory and governance are some of these building blocks of innovation models (see Kubeczko and Rametsteiner 2002).

The concept of systems of innovation, which is the main research field in institutional economics, builds a general approach to analyse the whole system of fostering or hampering innovation. This system concentrates on the relation between the different actors in the innovation process rather than on single actors. In the system of innovations, considerable research efforts have been undertaken in the last decade on 'National Innovation Systems, NIS', as well as on the nature of the innovation process at the local and regional level, i.e. 'Regional Innovation Systems, RIS'. Most of the contributions on the nature of innovation in the RIS refer to innovative dynamics based on technological change, organisational learning and path dependency. In this respect, interactive regional innovation systems are focused, in contrast to the old types of linear innovation systems. Third branch of research analyses is 'Sectoral Innovation Systems, SIS'. This approach looks at the firm level, inter-firm level aspects as well as the institutional level aspects both of market and non-market relations within a sector.

Innovation models on the business to business (b2b) -level use the network concept as a key-element. Networks are introduced as intermediate organisational forms between markets and firms when these fail in efficiency and efficacy. Trust, demand or supply specificity and possibilities for co-operation are at the basis of a choice for supplier-producer and buyer-subcontractor network relationships. Extended family networks, co-operative networks, etc. have formed the organisational structure of small local production systems where the market has been earlier unavailable.

Among the most relevant theories for the COST action E30 focusing on rural economic development via enterprise development is Porter's theory on the comparative advantage of nations. This theory has been also used to explain not only national but also regional economic development (see Porter 2000, 1998a). Porter's theory is based on a question why do firms based on certain nations or regions achieve international success in distinct segments and industries. Porter (1990) presents a 'diamond model' which is a broad explanatory framework for economic development, based on competitiveness of enterprises in a nation (or a region). The 'diamond model' has been widely used to illustrate countries' or regions' international competitiveness (Hazley 2000). According to Porter, four characteristics of a firm environment are instrumental to the firm's competitiveness:

(i) factor conditions,
(ii) demand conditions,
(iii) related and supporting industries, and
(iv) firm strategy, structure and rivalry.

Together with political and legal conditions, technological and macroeconomic conditions and coincidence, these factors impact the competitiveness of a single firm (Porter 1990).

Although the innovation system approach perspective requires information on production conditions, it also places considerable emphasis on institutions at different levels and interactions in terms of structures and functions of the institutions as well as material and knowledge flows. In terms of information the following details are required:

(i) company structures and interactions, including business to business networks and intra-firm structures and interactions
(ii) structures, interaction and instruments used by organisations/institutions such as administration, research, education & training, extension and consultancies
(iii) economic frame conditions in terms of factor inputs, markets and competition.

Structure of the country studies

The discussion on the theoretical background of regional/rural economic development above was used in the action to build a common framework for country studies on the state-of-the-art of information relevant to action working groups and action research questions. The country studies follow approximately the same structure as presented below:

PART 1: Consumption
1.1 State-of-the-art and historical development on the consumption of forest products and services
1.2 Forest products' and services consumption
1.3 Market demand for forest products and services
1.4 Main problems and research questions in consumption for enterprise development
Annex: Organisations studying forest products' consumption and main publications and information sources

PART 2: Small-scale forestry practices
2.1 State-of-the-art knowledge and historical development
2.2 Small-scale forest holdings
2.3 Small-scale forestry practices
2.4 Policy framework and production conditions
2.5 Supporting and limiting factors for enterprise development in small-scale forestry and barriers to entrepreneurship
Annex: Organisations studying small-scale forestry and main publications and information sources

PART 3: Wood-processing industries
3.1 State-of-the-art and historical development
3.2 Wood processing industries
3.3 Wood processing industries' practices
3.4 Policy framework and production conditions
3.5 Supporting and limiting factors for enterprise development in wood-processing industries and barriers to entrepreneurship
Annex: Organisations studying wood processing industries and main publications and information sources

PART 4: Non-wood forest products and services
4.1 State-of-the-art and historical development
4.2 Case studies of successful marketing strategies

PART 5: Forests and ownership
5.1 State-of-the-art and historical development
5.2 Forest resources
5.3 Forest ownership
5.4 Main problems and research questions in forest resources and ownership for enterprise development

Summary of findings from the country studies

Key findings of the country studies can be summarised as:

- in forest – wood / non-wood / services – consumer chain, the consumer demand is not properly understood or instruments to follow the changes of demand developed
- entrepreneurial thinking and managerial skills are underdeveloped in many parts of the chain
- forest ownership is fragmented and the attitudes and values of the forest owners diversified; thus it is uncertain how the private forests can maintain their role to support timber demand in the future
- the possibilities to internalise indirect benefits that forests provide to the well-being of the forest owners is significantly underdeveloped
- traditional wood manufacture culture dominates in the production and R&D, although the increase in demand may be especially in green products and services in the future
- industries in mechanical wood processing, non-wood forest products production, as well as in forest-based services are small and non-integrated; this has led to the lack of innovations, marketing power etc.
- industries and institutions in forestry are mainly oriented in increasing the efficiency of forestry – wood chain rather than in developing new product innovations.

Small-scale forestry

It is obvious according to the country studies that in small scale (non-industrial private) forestry the demand to satisfy multiple objectives in the same forest area is increasing throughout Europe. This provides a challenge especially for those areas and countries where timber production is the main objective in forest management. The key questions in these areas are how to manage forests in the future to satisfy the various demands and how to avoid the risk of losing potential for timber production.

Another challenge for small-scale forestry is the decreasing interest of the forest owners on the economic return on land. In Europe the size of the forest holdings and the net contribution to owners' well-being is often small. This leads to little or no motivation of forest owners to actively manage their forests.

Still, a third challenge to traditional timber production exists. The new or 'urban' demand on forests is often based on the recreational, amenity and landscape services that forests contribute rather than on timber production. This is antagonistic to traditional production forestry in densely populated areas, in particular, but also increasingly elsewhere.

From a viewpoint of timber production, all the defined challenges call for joint research efforts on the attitudes and values of forest owners. The results of such work should give a better understanding on the forest owners' interests on their property, factors behind their interests and description on the means on how timber production objectives could gain more attention in decision-making. Also, the role of forest owners' associations and co-operatives should be studied more closely.

From a viewpoint of non-timber production, it would be equally important to study which concrete benefits and how the multifunctional management of forests can bring to the forest owners. In some areas the indirect impacts of forests on economic well-being and business life are clear. This can be seen as a 'halo' effect of forests to other businesses in the economy, for example in cases where forests support the value of environment, tourism, housing or manufacturing (Slee 2005). Often the problem is, however, that the indirect benefits cannot be transformed to direct benefits for the forest owners.

Wood processing industries

The challenges to especially small- and medium scale wood processing industries in Europe include productions' low profitability and low technological development. This has resulted in relatively low levels of investments and too few innovations in the production.

From the point of view of the industrial management, the SMEs in wood processing industries often suffer from weak networking. This includes both the weak networking between enterprises and research institutes as well as between different enterprises. There is clearly less cluster formation in mechanical wood processing industries with SMEs, unlike in chemical wood processing industries. Also the internalisation of the production is insufficient. In the future, there could thus be changes in efficiency improvement with structural development and integration in mechanical wood processing.

Research needs to support the future development of SME wood processing industries to include the analysis of reasons and consequences of the delocalisation of mechanical wood processing industries, and the studies on evolving business branches (like timber frame industries, forestry contracting and bioenergy production). Equally important would be to gain better understanding on the market demand for forest and wood products, especially since this was reported most often as a weak point in the functioning of forestry – wood – consumer chain in the conducted country studies.

Non-wood forest products and services

In general, there exists great potential to develop non-wood forest products and services (NWFP&S) sector and new entrepreneurship in this particular field in Europe. This is due to a rising demand for individual, green and even luxury products together with improvement in citizens' welfare.

The obstacles for the development are, however, numerous. For example, the legal framework and forest policies are often constructed to support timber production rather than the production and use of forest on non-wood purposes. This is clear if looking, for example, the supporting structures in the societies, such as education, consultancies, legislation etc., which easily tend to favour timber production.

Another obstacle to develop NWFP&S sector and the new entrepreneurship is because of many of these products and services are public goods. For example, the everyman's right common especially in the northern Europe, allows collecting forest berries, mushrooms etc., as well as a free access to forests, regardless of the forest ownership.

This leaves fewer opportunities to utilise the demand on NWFP&S or to develop new entrepreneurship on forests.

Beside the free access and undefined property rights, a major obstacle for enterprise development with NWFP&S is the lack of new innovations and market information on the demand of these particular products and services.

COST action E30 phase two

The state-of-the-art information from the country studies was used to identify key issues for a further in-depth analysis in action phase two. These issues and themes, under which specific articles will be prepared and published by June 2006, are illustrated in Table 2.

Table 2. Issues and themes of Action sub-groups in phase two.

	Issues and themes
Cross-cutting issues	Consumer demand for forest products Ownership and property rights
WG1: Small-scale forestry	Attitudes and values Forest owners associations Legislation, policies and projects
WG 2: Wood processing industries	Delocalisation of industrial activities Timber frames Forestry contractors and bioenergy Demand for forest products
WG 3: Non-wood forest products and services	NWFP&S definitions Indicators 'Competence for change' Innovation Marketing

Acknowledgement

The country studies presented in this publication (in two volumes) are based on the work of approximately 100 researchers in 19 countries. The work was based on wide networks of researchers at national and international levels, following the mission of COST to support scientific networking and capacity building. The coordination of the country studies was at the responsibility of COST action E30 management committee members. The country studies were discussed in two working group meetings under the guidance of action working group chairmen. Dr Laszlo Jager from the West Hungarian University did the technical editing of the country studies. Ms Saija Miina coordinated the delivery of reports and other information. On behalf of COST action E30 management committee, I wish to thank all who have contributed to the preparation and publishing of these country studies. I hope that researchers, graduate students as well as policy makers and administrators in forest sector find these studies useful.

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Summary

In Austria, per capita consumption of wood products is comparatively high and has increased considerably during the last decades. One reason is the high apparent consumption of wood by Austrian intermediary products producers. It is also an effect of an increasingly wood friendly culture in wood construction, a society that has overall positive attitude to wood as a material, amongst others. Consumption of wood products is to some parts dependent on the image of these products in the eyes of consumers, especially vis-à-vis substitution products. Here, the shift to urban societies, technological developments and competitive behaviour of substitute producers have for some time left wood with a not-so-favourable image of being old-fashioned. Recent PR campaigns have successfully tackled this problem. The fact that Austria has a diverse landscape ranging from plains to high alpine regions creates a wide range of recreational, environmental and protective services. However, these are generally not exploited on a commercial basis but embedded in legal and customary rights and often provided by the state.

Forestry and forest-based industries are important sectors for Austria. The wood working industry accounts for a share of 20% in the production sector, is very export-oriented and comparatively competitive. The wood working industry is one of the most important contributors to the balance of trade of Austria. A main barrier to entrepreneurship and enterprise development in forestry is the high fragmentation of forest ownership and the decreasing share of income and time spent in forest management by an increasingly considerable part of forest owners. On the other hand, demand for wood as a raw material by the processing industry is high and increasing. In addition bioenergy is a growing factor for raw material demand. Further increasing also seem to be amenity values and demands for non-wood utilisation of forests, including recreation. Policy implications for these trends are many, and a range of issues is already covered by policy programmes, such as support for horizontal co-operation or on bioenergy as well as research on innovation policies and strategies.

Wood processing industries in Austria are competitive on a world market, and under stiff world market prices, in a range of commodity products, including sawn wood, paper and panels, amongst others. Most of these industries have gone through a consolidation phase, with decreasing numbers of mills and larger production volumes. Recent efforts by these traditional industries have focused on opening up new markets and new sources for raw material. A range of product concepts was developed to a more industrial and standard type of production, including laminated beams by sawmills and prefabricated houses. However, the typical barriers to innovation and entrepreneurial behaviour abound. The majority of firms are small-scale family firms, there is a low knowledge generation and application capacity within firms, lack of venture capital, etc. Overall, the share of the forest sector in the Austrian GDP has decreased during the last decades. On the other side, per capita consumption of wood and wood products has increased considerably during the last decades and is much higher than in the EU or world average. Research is increasingly being recognised as a main source of long-term competitive advantage and a series of programmes have recently been initiated to support research efforts and better networking amongst related institutions, which has been a somewhat weak point in the past. Some major efforts towards innovation and strengthening competitiveness in the wood working industry include among others innovations in wood composites and in logistics as well as the use of computer tomography in sawmilling.

NWFPS have not only been of high relevance in history (resin tapping, leaf and litter). Today some older uses are still important (hunting and fishing, cattle grazing, gravel digging), and new uses add to these: protection against natural hazards, kerbing of drinking water, horse-back riding, or mountain biking. The forestry sector itself has contributed by some specific services, e.g. forest pedagogics and the erection of biomass-based village heating systems. The examples of nature conservation services and village heating systems show that forest owners find ways to market new services from the forest. In the case of district heating, in Austria especially farm forest owners' co-operatives do not only provide wood chips but run the plants themselves and thus benefit directly from the value added produced. Although the income from NWFPS in Austria is still almost negligible (without considering bio-energy), there seem to be high latent potentials. Competitiveness is affected negatively by small forest properties and high labour costs, but positively by the image of forests as regional resources, and a

good institutional support in many provinces. Barriers to entrepreneurship are found as follows: timber-dominated education, missing entrepreneurial orientation in education, mental barriers of forest owners to new forest uses (services), farmers' focus on agricultural production, missing income interests of „new" or urban forest owners, and a generally limited entrepreneurial orientation of owners (most owners are only interested in secure capital investment; hunting etc.).

1. Consumption

Summary

In Austria, per capita consumption of wood products is comparatively high and has increased considerably during the last decades. One reason is the high apparent consumption of wood by Austrian intermediary products producers. It is also an effect of an increasingly wood friendly culture in wood construction, a society that has overall positive attitude to wood as a material, amongst others. Consumption of wood products is to some parts dependent on the image of these products in the eyes of consumers, especially vis-à-vis substitution products. Here, the shift to urban societies, technological developments and competitive behaviour of substitute producers have for some time left wood with a not-so-favourable image of being old-fashioned. Recent PR campaigns have successfully tackled this problem. The fact that Austria has a diverse landscape ranging from plains to high alpine regions creates a wide range of recreational, environmental and protective services. However, these are generally not exploited on a commercial basis but embedded in legal and customary rights and often provided by the state.

1.1. State of the art and historical development

In Austria, per capita consumption of wood products is comparatively high and has increased considerably during the last decades. However, these facts don't give indication about the consumption by private households. Data for private consumption is difficult to find and to isolate. Indication for private consumption could be found in input-output tables for the Austrian economy.

Regarding the demand and consumption of non-wood forest products (NWFP) and services some studies dealing with the attitudes of the Austrians or the urban population with respect to forests, forests products and services were consulted. In general, it is difficult to distinguish between urban and rural consumption of forest products and services. There is a clear trend towards increased demand for forest-related services.

1.2. Forest products' and services consumption / General information

The **population** of Austria comprises approximately 8 million inhabitants (8,053,106 in 2002), of whom about 1.55 million (1,550,874 in 2002) or 19.26% live in the **capital city** – Vienna (Statistik Austria 2004). **Urban population** accounted for 65.8% of total population in 2001. This number is below the average in the European Union, where the share of urban population amounts to 80%. While the total number of urban population increased slightly over the last decade (from 5,128,422 in 1991 to 5,285,263 in 2001) the share of urban population in total population remained constant. Table 1 shows the distribution of the Austrian population across different size classes of communes. There is one city – the capital Vienna - with more than one million inhabitants and four cities with more than 100,000 inhabitants (Graz, Salzburg, Innsbruck, Linz).

Table 1. Number of communes by size classes of communes (in 2003) and share in population (in 2001)

Size classes (inhabitants)	Number of communes (2003)	Population (2001)	
		total	%
-,500	173	57,746	0.7
501 - 1,000	426	317,612	4.0
1,001 - 1,500	543	675,734	8.4
1,501 - 2,000	346	605,286	7.5
2,001 - 2,500	242	538,595	6.7
2,501 - 3,000	159	433,747	5.4
3,001 - 5,000	253	949,859	11.8
5,001 - 10,000	144	953,094	11.9
10,001 - 20,000	49	622,440	7.7
20,001 - 30,000	12	290,383	3.6
30,001 - 50,000	4	168,389	2.1
50,001 - 100,000	3	204,116	2.5
100,001 - 200,000	3	439,558	5.5
200,001 - 500,000	1	226,244	2.8
+1,000,001	1	1,550,123	19.3

Source: Statistik Austria 2004, 43

The **Gross Domestic Product** (GDP) of Austria in 2003 amounted to 224.3 billion euro. The average **GDP per inhabitant** amounted to 27,760 euro. Without taking into account income differences between urban and rural population, this means an 'urban GDP' of 148 billion euro and a 'rural GDP' of about 76 billion euro (http://www.statistik.at/fachbereich_02/vgr_tab1.shtml, own calculations). Table 2. shows the structure of **household expenditure** in 1999/2000. Housing accounts for the largest share of household expenditure (23.5%). Further large expenditures include transportation (15%), food (about 13%), and recreation, sport and hobby (12.3%). Expenditures for furniture, household equipment and repairs amounts to 7.1% of the monthly expenditures. The distribution of household expenditures in Austria differs only very slightly from the EU-15 average.

Table 2. Monthly expenditures of private households 1999/2000 (Konsumerhebung)

Categories of expenditures	Expenditure in euro	Share of total expenditure (%)
Total household expenditure	2,437.3	100.0
Habitation, heating, lighting	572.6	23.5
Transportation	365.6	15.0
Groceries, Non-alcoholic beverages	322.9	13.2
Recreation, sport, hobby	300.5	12.3
Other expenditures	212.4	8.7
Furnishing	172.5	7.1
Clothing, shoes	160.3	6.6
Cafe, restaurants	135.4	5.6
Alcoholic beverage, tobacco products	66.4	2.7
Communication	64.8	2.7
Health	57.8	2.4
Education	6.4	0.3

Statistik Austria, www.statistik.at/konsumerhebung/deteilergebnisse.shtml (26.07.2004)

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

Table 3. Apparent consumption in Austria for main wood product categories, including main trends over the last decade

Product Name	Unit	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003
Roundwood	**1000 m³**	**17006**	**17089**	**19404**	**18525**	**19718**	**19930**	**18467**	**20243**	**20924**	**20176**	**21436**	**23886**
Wood fuel, including wood for charcoal	1000 m³	3271	3450	3506	3207	4080	3570	3288	3201	2981	3053	3202	3498
Industrial roundwood (wood in the rough)	1000 m³	13735	13639	15898	15318	15638	16360	15179	17042	17943	17123	18234	20388
Chips and particles	**1000 m³**	**n.d.**	**n.d.**	**n.d.**	**n.d.**	**n.d.**	**n.d.**	**n.d.**	**n.d.**	**3904**	**3816**	**4002**	**4363**
Wood residues	**1000 m³**	**n.d.**	**n.d.**	**n.d.**	**n.d.**	**n.d.**	**n.d.**	**n.d.**	**n.d.**	**2027**	**2029**	**2116**	**1928**
Sawnwood	**1000 m³**	**3746**	**3640**	**4028**	**4192**	**5123**	**4609**	**4931**	**5356**	**5697**	**5463**	**5417**	**5282**
Wood-based panels	**1000 m³**	**1084**	**1064**	**1142**	**1030**	**896**	**899**	**889**	**1052**	**1022**	**1294**	**1311**	**1357**
Veneer sheets	1000 m³	30	26	33	42	39	37	34	27	27	30	27	30
Plywood	1000 m³	110	98	96	83	86	88	91	99	60	38	102	111
Particle board	1000 m³	877	848	921	818	691	665	684	816	913	889	882	907
Fibreboard	1000 m³	67	92	92	87	80	109	80	111	22	337	300	309
Wood pulp	**1000 m.t.**	**1794**	**1795**	**1958**	**1949**	**1852**	**1902**	**1973**	**1906**	**2022**	**1892**	**2040**	**2116**
Mechanical woodpulp	1000 m.t.	381	387	420	408	362	381	379	371	394	380	382	423
Semi-chemical woodpulp	1000 m.t.	59	61	66	50	50	21	10	26	5	4	5	10
Chemical woodpulp	1000 m.t.	1211	1201	1322	1327	1275	1348	1420	1336	1442	1319	1435	1457
Dissolving grades woodpulp	1000 m.t.	142	147	150	164	165	152	164	173	181	189	218	226
Other pulp	**1000 m.t.**	**1**	**6**	**4**	**1396**	**1442**	**1483**	**1521**	**1559**	**1679**	**1620**	**1631**	**1718**
Recovered paper	**1000 m.t.**	**1273**	**1125**	**1181**	**1263**	**1235**	**1235**	**1732**	**1787**	**1980**	**1890**	**1884**	**1986**
Paper and paperboard	**1000 m.t.**	**1413**	**1550**	**1640**	**1688**	**1795**	**2052**	**1985**	**2136**	**2333**	**2349**	**1899**	**1769**
Graphic paper	1000 m.t.	533	580	568	744	776	902	767	857	904	1001	569	379
Sanitary and household papers	1000 m.t.	83	86	89	88	103	109	113	109	113	114	104	108
Packaging materials	1000 m.t.	751	836	932	809	869	930	991	1052	1188	1104	1086	1105
Other paper and paperboard	1000 m.t.	46	48	51	47	46	111	115	118	128	130	140	177

Source: UNECE TIMBER database, as of July 19 2004, own calculations; Consumption = production/removal + imports - exports

Table 3 shows the **consumption for main wood categories** over the last decade in Austria. However, apart from fuel wood, most of these data do not represent end consumption by private households, but are used as intermediate goods for further production. Overall, the construction industry is the biggest consumer of sawnwood and panels. Within the category paper and paperboard the distribution of consumption has

shifted over the last years: While consumption of sanitary and household papers, packaging materials and other paper and paperboard increased, the consumption of graphic paper decreased considerably during the last few years. Consumption in roundwood increased considerably as well. Overall, a slightly increasing consumption in most wood products could be observed in Austria over the last decade.

Data on the consumption of wood and wood products by private households could be derived form input-output tables from Statistik Austria. The consumption of wood and products of wood by private households amounted to 365 million euro at purchasers' prices in 2000. This accounts for a share of 0.3% in overall household consumption. Private households consumed pulp, paper and paper products of a value of 542 million euro at purchasers' prices, that is about 0.5% of household consumption. Furniture and other manufactured goods amounted to 6,106 million euro or 5.4% of household consumption (note that this category does not only include products from wood. However, differentiated data could not be found) (Statistik Austria 2004).

Data on the consumption of wood products by urban population is hardly available. However, it is assumed that urban population consumes a disproportionate share of the total Austrian paper consumption.

Compared internationally, Austria consumed 7% of the coniferous sawnwood, 3% of panels and 3% of paper in the European Union – 15 in 2002. World shares were about 1-2%. Overall, the per capita consumption of wood products in Austria is higher than the EU average and many times above the world average (Schwarzbauer 2004, 46). Between 1965 and 1998, Austrian domestic wood consumption (measured in roundwood equivalents) has more than doubled (+118%). During the same period, European consumption has only increased by 30%, and world consumption by 25% (Schwarzbauer 2004, 5). For the future, international studies by the UN-ECE/FAO predict further increases in production of and demand (consumption) for wood products in Austria (Schwarzbauer 2004, 5). However, as mentioned before, this does not necessarily mean an increasing consumption of wood products by Austrian private households, rather these trends indicate an increase in the further processing industries.

Data on the **consumption of non-wood forests products** (NWFP) in Austria is only partly available. Mostly only data on the production of non-wood forest products is available (see chapter 4). Austrians consumed on average 0.8 kg game and rabbits per capita in the year 2002 (2. Lebensmittelbericht). This means an overall consumption of about 6.4 million kg game and rabbits by the Austrian population per year.

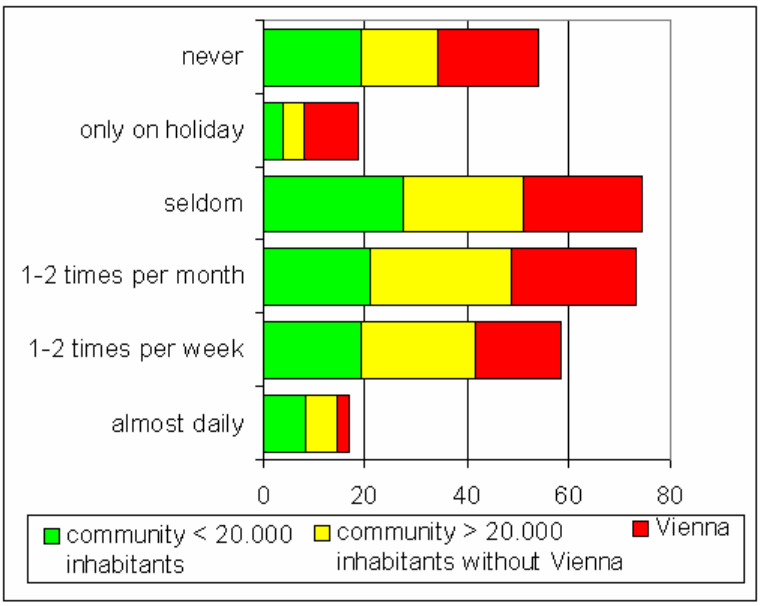
It is allowed to collect berries and mushrooms up to a certain amount per day (see Chapter 4). However, no data are collected on the amount of collected mushrooms and berries.
In the year 1999 Austrian households consumed about 2.2 million Christmas trees, of whom 1.7 million were bought and 0.5 million were given (www.weihnachtsbaum.at).

Over the last years a number of **forest services** has gained higher importance. These are above all recreational and environmental services. The provision of these services has mostly been forced by a strong demand from society. For example, the right for horse-

back riding on forest roads and trails or the right for the use of land for skiing tracks have been offered for many years while riding mountain bikes is a younger development and forest roads have been opened on contractual basis with tourist clubs for about 10 years. Other recreational offers are still rather rare but comprise, e.g. renting of mountain cabin or cottages, use of rivers for water sports, etc.

A study on the attitudes of the population of Vienna to their forest (Wiener Wald) showed that there is an increasing trend in the exercise of sports in the forest (Bürg, Ottitsch and Pregernig 1999). Thus, there is expected to be an increasing demand for recreational services in the future.

The microcensus survey of Statistik Austria (Statistik Austria 1998) gives indication about the frequency of forest visits and the differences in behaviour of rural and urban population. Over 80% of the Austrian population visit forests for recreational purposes. 18.6% of the Austrians stated that they never visit the forest (see Figure1).



Source: Statistik Austria 1998.

Figure 1: Frequency of forest visits by community size

As Figure 1. shows there is a remarkably higher share of inhabitants of Vienna visiting the forest only in holidays than among the population of other community sizes. On the other side, only a very little share of the inhabitants of Vienna visit the forest daily.

An important service of forests is the provision of water. For example, the capital of Austria - Vienna obtains its drinking water from especially protected forests for watersheds (Quellschutzwälder). The overall water consumption in Austria is about 2.6 billion m^3 per year. On average, Austrians consume 145 litres water per day and capita (Österreichischer Walddialog 2004).

About ten years ago a new specific service has been developed by foresters and is offered by forest enterprises, namely forest education. Forest education activities are aimed at teaching nature and forest matters to the broad public. Clients are school children but also adults.

Data on the overall **number of secondary residences** in Austria is difficult to find. Only, data for single regions could be easily found. For example, in Upper Austria there were 17,000 secondary residences in 2001, that is about 8.4% of all residences in Upper Austria (Sozialbericht 2001, own calculations).

The main **market surveys** on demand of wood, non-wood and services by the Austrian population are:

- Bürg, Josef; Ottitsch, Andreas and Michael Pregernig 1999: Die Wiener und ihre Wälder. Zusammenfassende Analyse sozioökonomischer Erhebungen über die Beziehung der Wiener Stadtbevölkerung zu Wald und Walderholung; Schriftenreihe des Instituts für Sozioökonomik der Forst- und Holzwirtschaft, Band 37, Universität für Bodenkultur Wien.
  This study is not a classical market survey, but surveys the attitudes and activities of the inhabitants of Vienna regarding the forests. These attitudes comprise for example the satisfaction with infrastructure in the forest or with the supply of services. The study can therefore be used for an estimation of urban demand for forest related services.
- Rametsteiner, Ewald 1998: Einstellungen zu Wald, Holz, Umwelt und Nachhaltigkeitszeichen in Österreich und Europan. Ergebnisse einer Repräsentativumfrage in Österreich und deren internationaler Vergleich; Schriftenreihe des Instituts für Sozioökonomik der Forst- und Holzwirtschaft, Band 34, Universität für Bodenkultur Wien.
  This study comprises the attitudes of the Austrian population to forest, wood, sustainability and certification of wood.
- Schwarzbauer, Peter 1996: Long-Term Supply and Demand Projections for Wood Products in Austria. A Contribution to the Study 'European Timber Trends and Prospects: Into the 21st century'; Schriftenreihe des Instituts für Sozioökonomik der Forst- und Holzwirtschaft, Band 27, Universität für Bodenkultur Wien.
  This study covers the long-term projections for the general demand for wood products in Austria, however this does not tell much about end consumption and does not explicitly cover demand by urban population.
- Schwarzbauer, Peter 2004: Marktstudie: Die österreichischen Holzmärkte. Größenordnungen-Strukturen-Veränderungen, Universität für Bodenkultur, Department für Wirtschafts- und Sozialwissenschaften, Institut für Marketing und Innovation, Wien.

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

Main problems result from the scarce data availability for final consumption of wood products and the production and consumption of non-wood forest products and services. In addition, no differentiations are generally made between the consumption and demand of rural and urban population.

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

Organisations

University of Natural Resources and Applied Life Sciences, Vienna (BOKU), Department of Economics and Social Sciences

Kompetenznetzwerk Holz - FFF Forschungsprojekte Holz, Wood K Plus: Kompetenzzentrum Holz, Forschungsprogramm Holzverbundwerkstoffe und Holzchemie

Main publications and information sources:

Bundesministerium für Land- und Forstwirtschaft, Umwelt und Wasser 2003: 2. Lebensmittelbericht Österreich, Wien.

Bürg, Josef; Ottitsch, Andreas and Michael Pregernig 1999: Die Wiener und ihre Wälder. Zusammenfassende Analyse sozioökonomischer Erhebungen über die Beziehung der Wiener Stadtbevölkerung zu Wald und Walderholung; Schriftenreihe des Instituts für Sozioökonomik der Forst- und Holzwirtschaft, Band 37, Universität für Bodenkultur Wien

Rametsteiner, Ewald 1998: Einstellungen zu Wald, Holz, Umwelt und Nachhaltigkeitszeichen in Österreich und Europa. Ergebnisse einer Repräsentativumfrage in Österreich und deren internationaler Vergleich; Schriftenreihe des Instituts für Sozioökonomik der Forst- und Holzwirtschaft, Band 34, Universität für Bodenkultur Wien.

Schwarzbauer, Peter 1996: Long-Term Supply and Demand Projections for Wood Products in Austria. A Contribution to the Study 'European Timber Trends and Prospects: Into the 21st century'; Schriftenreihe des Instituts für Sozioökonomik der Forst- und Holzwirtschaft, Band 27, Universität für Bodenkultur Wien.

Schwarzbauer, Peter 2004: Marktstudie: Die österreichischen Holzmärkte. Größenordnungen-Strukturen-Veränderungen, Universität für Bodenkultur, Department für Wirtschafts- und Sozialwissenschaften, Institut für Marketing und Innovation, Wien.

Oberösterreichische Landesregierung 2003: Sozialbericht 2001, Linz.

Statistik Austria 1998: Mikrozensus Dezember 1998, Statistik Austria, Wien.

Statistik Austria 2000: Input-Output-Tabelle 2000, Statistik Austria, Wien.

Statistik Austria 2004: Statistisches Jahrbuch 2004, Statistik Austria, Wien

Internet resources:

- UN-ECE timber database : http://www.unece.org/trade/timber/Welcome.html
- Statistik Austria: http://www.statistik.at
- http://www.weihnachtsbaum.at

2. Small-scale forestry practices

2.1. State of the art knowledge and historical development at country and regional level on small-scale forestry and its related policy framework

The following overview shows the development of management units over the recent decades without different categories.

Table 4. Development of management units over the recent decades

Year	Management units	Area (ha)	Agricultural area (ha)	Forestry area (ha)	Average area (agr .+ for. in ha)
1950	432,848	8,135,744	4,080,266	2,988,586	16.3
1960	402,286	8,305,565	4,051,911	3,141,725	17.9
1970	342,169	8,307,527	3,896,027	3,205,920	20.8
1980	318,085	8,321,226	3,741,224	3,281,773	22.8
1990	281,910	7,535,201	3,500,298	3,227,069	24.2
2000	217,508	7,518,615	3,389,905	3,260,301	30.9

The total **private forest area** accounts for 80% of the total Austrian forest area. The Federal Forests of Austria (ÖBF AG) manage around 15% of the forest area. Other public forest area accounts for 5% of Austrian forests.

Table 5. Forest holdings in categories with forest area only in 1999

Categories	Forest area		Number of units	
	ha	%	n	%
2 - 5 ha	14,809	3	3,879	28.3
5 -10 ha	29,902	5	4,478	32.6
10 - 20 ha	31,510	6	2,410	17.6
20 - 30 ha	18,649	3	824	6.0
30 - 50 ha	23,898	4	669	4.9
50 - 100 ha	29,981	5	494	3.6
100 - 200 ha	61,308	11	488	3.5
200 - 500 ha	87,581	16	319	2.3
500 - 1,000 ha	55,372	10	96	0.7
> 1,000 ha	194,839	37	67	0.5
summary	547,849	100	13,724	100

Table 6. Share of agricultural and forestry economy to national GDP from 2000 to 2003

Year	Total GDP	GDP agriculture+ forestry		GDP forestry	
	Mrd. €	Mrd. €	%	Mrd. €	%
2000	206.67	2.89	1.4	0.69	0.3
2001	212.51	3.02	1.4	0.69	0.3
2002	218.33	2.94	1.3	0.79	0.3
2003	224.27	2.94	1.3	0.88	0.4

Table 7. Distribution of forest area according to type of purchase

Type of purchase	Total number	Share	Total area (ha)
Major purchase	68,363	40%	948,054
Secondary purchase	96,260	56%	785,880
Juristic persons	6,303	4%	1,526,367
Total	170,926		

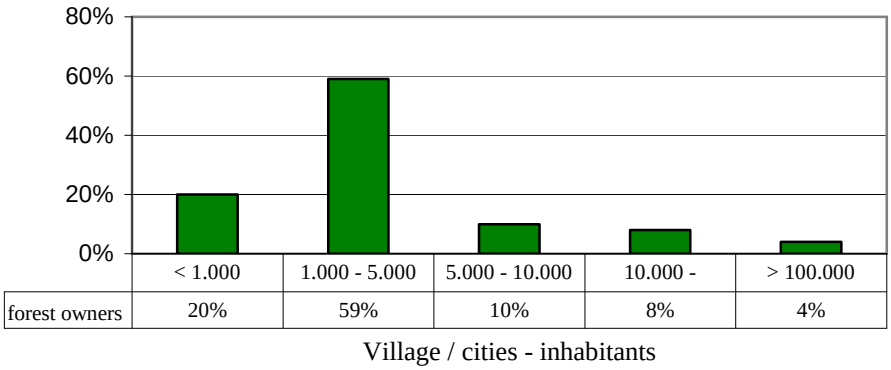


Figure 2. Forest owners domicile

The following overview shows volume and share of wood harvesting in Austria; information about smaller units is not available.

Table 8. Volume and share of wood harvesting according to forest holding size

Categories	Wood harvesting		Utilisation
	Standing gross volume	%	Standing gross volume per hectare
Small-scale forestry	9,046,000	48.1	4.8
200 - 1,000 ha	1,900,000	10.1	5.7
> 1,000 ha	4,727,000	25.2	7.9
Public management units	441,000	2.3	5.0
ÖBF AG	2,683,000	14.3	6.1
Summary	18,797,000	100	5.6

Non-wood products for example hunting, fishing, tourism, forest service, gravel, Christmas trees, contracting nature conservation.

Table 9. Income from non-wood forest products

Year	Non-wood forest products, million euro (nominal)
1988	11
1992	16
1996	18
2000	17
2003	20

There are no essential studies or statistics on **non-wood activities** of forest holdings available. Basically non-wood goods are of low importance for small-scale forestry. Only a few of them emphasise non-wood products such as selling Christmas trees, gravel, fishing.

Regional differences for example in Styria do exist from southern to northern regions. In the north you can find farms with larger wood areas than in southern regions. The next thing is the closer relationship between farmers and landowners of northern Styria to their land and forest compared to low benefits in southern Styrian regions caused by smaller harvesting areas. Therefore people in this region have to find work in other professions.

23 Small-scale forestry practices

Timber harvesting per year and hectare amounts to 4.8 standing gross volume while the annual increment is about 10.4 standing gross volume in small-scale forestry. This results in 46% utilisation. This low utilisation percentage is caused by a low interest to gain profit from managing small-scale forestry. The timber harvesting report (HEM, Holzeinschlagsmeldung) also shows that 25% of total timber harvesting volume in Austria's small-scale forestry is used for self-consumption.

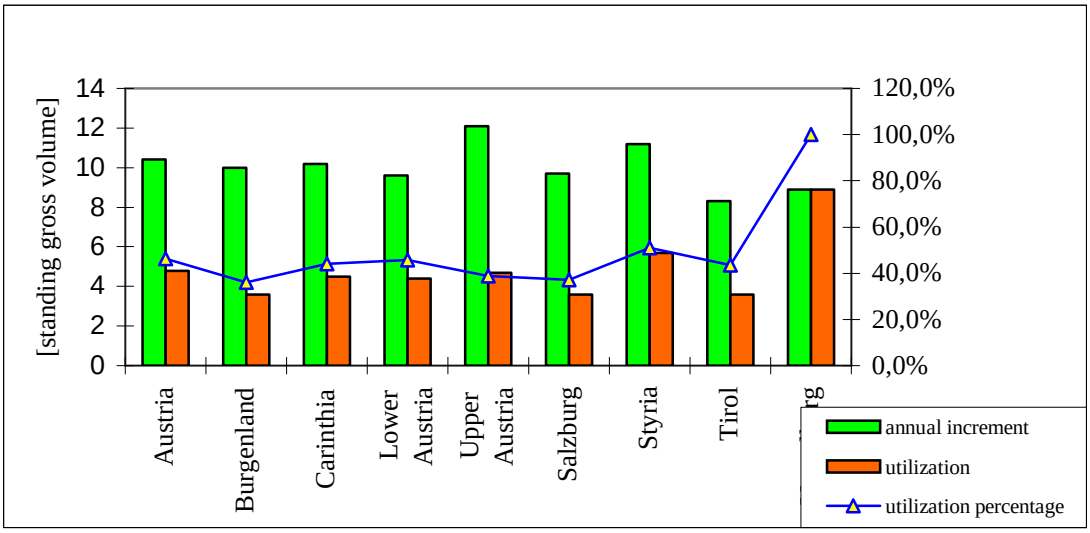


Figure 3. Annual increment, utilization and utilization percentage in Austria and regions

In **small-scale forestry practises** there is a low degree of mechanization (chainsaw and tractor skidding). The main trend for small-scale forestry in Austria in recent decades is that there is a growing number of owners without relationship to the property and that there is a shift from primary income from forestry to secondary income from forestry.

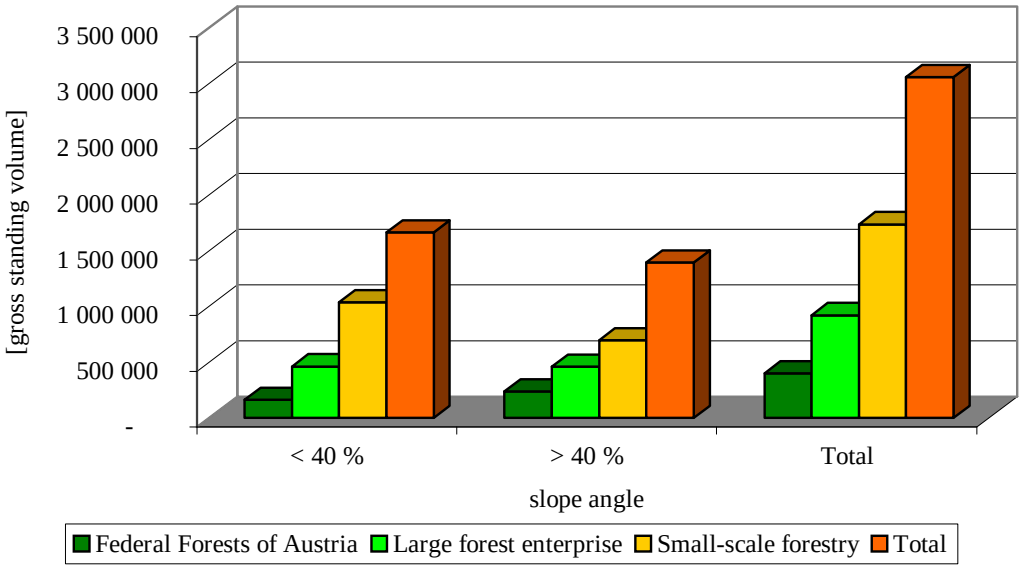


Figure 4. Distribution of commercial forest areas correlated to slope

Considering **forestry techniques** in harvesting, less than 40% of small-scale forest owners use harvester and forwarder, tractor and winch while over 40% use the cable crane.

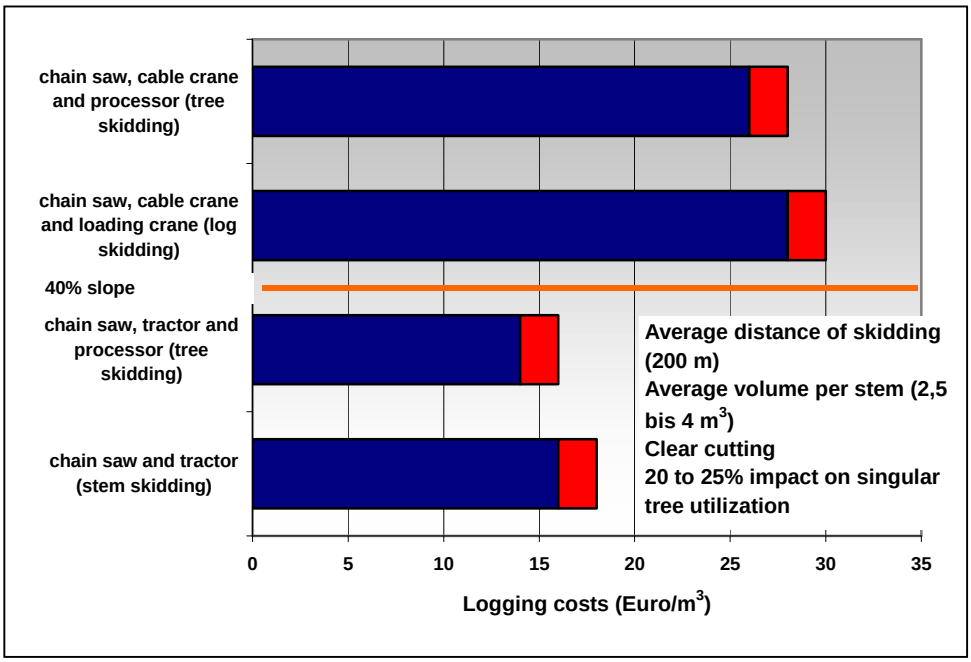


Figure 5. Logging costs depending on different harvesting methods and slope

Table 10. Austrian forest management association (Waldverband Österreichs)

	Number of members	**Forest area, ha**	**Sold timber volume, m³**
Austria	51,574	805,681	2,249,268
total share	30%	24%	15%

The main goals and activities of the Austrian Forest Management Association are:

- joint timber sale;
- increasing utilisation percentage for sustainable timber supply of saw mills;
- offering forest services;
- jointly using logistic projects;
- using Pan-European Forests Certification (PEFC);
- supply of biomass for wood heating projects.

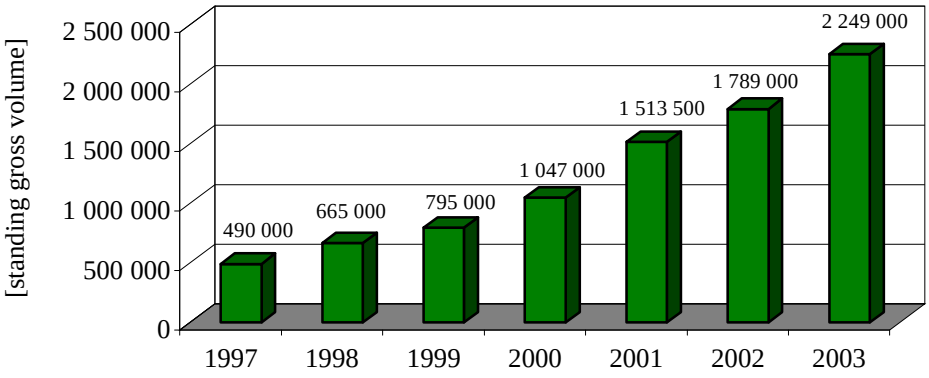


Figure 6. Total timber sale of the Austrian Forest Management Association

On average the **share of self-consumption** in small-scale forestry production amounted to 26% in the years 1974-1999, according to the timber harvesting report (HEM). In 2003 the share of self-consumption was 24% according to timber harvesting report (HEM).

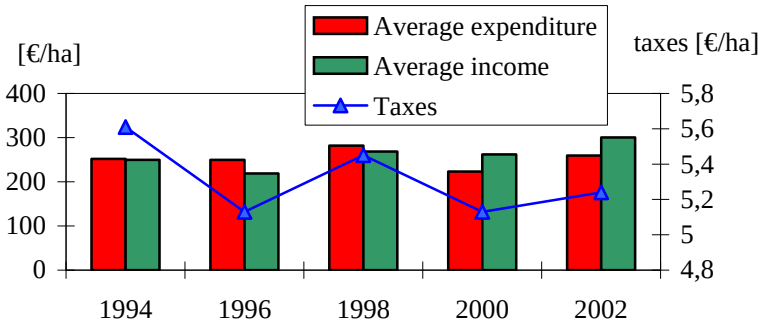


Figure 7. Costs and benefits of small-scale forestry related to annual felling volume

Usually no accounting records about **owners´ investments** in small-scale forestry exist because of the sporadic utilization. Additionally, there is no obligation for small-scale forestry to account investments. But since 1999 owners´ investments in small-scale forestry have been accounted (see Table 11).

Table 11. Investments in small-scale forestry per hectare related to annual felling volume

Years	Investments in euro per hectare related to annual felling volume
1999	52.52
2000	31.73
2001	50.65
2002	37.62

The average share of working days in forestry in total family working days (Familienarbeitstage) 2000 was 6.4% in 2000. The share of forestry yield on total yield was about 5.0% in 2000.

A main characteristic of **innovation behaviour** is building forest management associations and joint ventures for investments, working groups, etc.

In the main, the Austrian forest owners are divided in private forest owners, Federal Forests of Austria (ÖBF AG) and public forests. Small-scale forestry owners are mainly pooled in **forest management associations**. Large Styrian firms, for example, have concentrated their timber sale in one forest management association called “mountain forest” (Bergwald) as member of the Association of Styrian Forest Owners (Waldverband Steiermark).

In Austria there are about 843 **long-distance biomass heatings** with a total output about 1005 MW existing (including all locations with more than 100kW). Most of them are managed by forest owners.

In the case of **wood energy contracting** farmers act as contracting entrepreneurs. They sell “heat” and so they are no longer raw material suppliers. Under this scheme, a group of farmers invests in the complete biomass plant including any building measures and rents the heat customer’s cellar. They are responsible for ensuring proper functioning, maintenance and repair of the heating system. The customers are buying the heat and pay a one-time connection charge and the heat price measured by a heat meter. The money for energy supply remains in the region – valuable jobs in forestry and trade are kept respectively created.

One essential safety factor for heat customers in such models is that the Association of Styrian Forest Owners (Waldverband Steiermark), as the umbrella organisation of forest owners, assumes liability for non-collection for the farmer-operator group when supplying to public customers and multi-storey residential buildings.

The first wood energy contracting project in Styria was completed at the end of 1995, in the middle of 2003 the hundredth Styrian wood energy contracting project has opened.

In these 100 projects with 10.5 MW heat output, about 30 000 m³ wood chips from domestic forests are used to produce comfortable and renewable heat.

Actually there are no studies or statistics on the **form of timber procurement** existing. But generally it works as in the following described:

- First a written contract (Schlussbrief) is made between forest owner and timber demander about tree species, quantity, assortments and price;
- Timber is mostly supplied after cut into lengths; it's not very common to sell timber on stand to harvesting companies;
- Recently it is very useful in small-scale forestry to sell timber within a forest management association: The community negotiate with a few varying timber demanders written contracts as described above. So if the forest owners (members) like to sell timber, they only have to contact their association and inform themselves about the valid contracts, before cutting trees. Therefore it's up to the community to co-ordinate especially the removal of timber to each purchaser.

Timber markets, in principle, work as described above. The most important thing in making a written contract is to fix the quantity and price within the opponents and to fix time of delivery. Usually they are valid over a period of a couple of months. Contracts are legally binding for both (supplier and demander). There also exist a policy for timber-business; it is called the Austrian "Holzhandelsusancen". This should be the foundation for each contract.

A special case is the auction market (Wertholzsubmission) – in Austria there exist three of them for a few years. It is a market only for top qualities of broad-leaved logs. The emphasis is to offer hardwood (the share of broad-leaved trees in Austria is very low, it is close to 20 percent) in a concentrated form. This results in advantages for supplier and demander: for demanders it is possible to get a lot of best qualities within a short time and the suppliers are able to get adequate prices.

2.4 Policy framework and production conditions

Legislations that regulate and influence activities in small-scale forestry are:

- Forest Act;
- environmental legislation;
- the Austrian Civil Code (ABGB - Allgemeines Bürgerliches Gesetzbuch);
- water right.

District governments (Bezirksverwaltungsbehörden) directly influence small-scale forestry by watching the application of the Forest Act. Chambers of agriculture and forestry consult forest owners in all forestry interests.

Financial incentives respectively financial supports are provided for:

- forest road building;
- innovation and information;
- silviculture;
- forest management associations;
- forest engineering.

District governments and regional chambers for agriculture and forestry take directly influence on small-scale forestry production. Main tasks of regional chambers are for example to support farmers and landowners in managing their forest and agricultural areas, building forest streets or establishing forest management associations. At least chambers inform about financial supports and help to receive them. District governments take care of the Forest Act, laws for conservation of nature and water concerning forest management.

Research institutions and their main competencies:

- University of Natural Resources and Applied Life Sciences in Vienna (BOKU, Universität für Bodenkultur Wien). Main competencies: science and teaching.
- Austrian Federal Office and Personal Centre for Forests (BFW, Bundesamt und Forschungszentrum für Wald). Main competencies: science concerning different parts of forestry (forest engineering, forest street building, job security), Austrian Forest Inventory (Österreichische Waldinventur), forest genetics, etc.
- Education and training institutions (Forstliche Ausbildungsstätten, FAST)
    - FAST Pichl
    - FAST Ossiach
    - FAST Ort

Education and training institutions:

- University of Natural Resources and Applied Life Sciences in Vienna (BOKU, Universität für Bodenkultur Wien)
- Technical Forestry High School in Bruck/Mur in Styria (Höhere Technische Lehranstalt für Forstwirtschaft)
- Forstfachschule Waidhofen an der Ybbs
- Two education and training institutions (Forstliche Ausbildungsstätten, FAST) FAST Ort and FAST Ossiach are part of the Austrian Federal Office and Research Centre of Forests BFW (Bundesamt und Forschungszentrum für Wald). FAST Pichl in Styria is part of the Landeskammer für Land- und Forstwirtschaft in Steiermark.
- Forstliche Kursstätte Hohenlehen, Hollenstein an der Ybbs

Extension services and consulting institutions can be pooled in chambers for agriculture and forestry. Also rural and development institutions like the LFI (Ländliches Fortbildungsinstitut) are part of the chambers.

National state forest services have to watch the application of forest act. Chambers of agriculture and forestry consult the owners of forest areas concerning different forest interests.

3. Wood-processing industries

Summary

Wood processing industries in Austria are competitive on a world market, and under stiff world market prices, in a range of commodity products, including sawn wood, paper and panels, amongst others. Most of these industries have gone through a consolidation phase, with decreasing numbers of mills and larger production volumes. Recent efforts by these traditional industries have focused on opening up new markets and new sources for raw material. A range of product concepts was developed to a more industrial and standard type of production, including laminated beams by sawmills and prefabricated houses. However, the typical barriers to innovation and entrepreneurial behaviour abound. The majority of firms are small-scale family firms, there is a low knowledge generation and application capacity within firms, lack of venture capital, etc. Research is increasingly being recognised as a main source of long-term competitive advantage and a series of programmes have recently been initiated to support research efforts and better networking amongst related institutions, which has been a somewhat weak point in the past.

3.1. State of the art and historical development

On average, there is a good data situation on wood-processing industries in Austria. Since the EU accession of Austria, data are collected monthly (previously periodically). However, these data only include enterprises with 20 or more employees. Results of production and other statistics are not extrapolated to all enterprises (including <20 employees). Therefore, there are problems in finding data on SMEs with less than 20 employees. Further, some data are collected on a random sample basis (20% of all enterprises) and comprise 90% of value added.

Overall, the data and information stock and availability reflects the structure of the Austrian woodworking industry, i.e. strong sectors are quite well covered, fragmented sectors are considerably less well covered.

Regarding innovation activities and cultures in the wood-processing industries as well as the contribution of these industries to rural development there exist large information gaps. But research in and for the woodworking industry has risen over recent years (e.g. WoodKplus, FFF, other initiatives). Main challenges for wood-working industries comprise for example strong diameter wood as a technical, economic and ecologic problem.

Furthermore, continuous supply situation, prices and co-operation along the forestry-wood chain has considerable potential for improvement, e.g. by more integrated logistics concepts.

3.2. Wood processing industries

Wood processing industries contribute about 3.9% to the Austrian **GDP** (in 2002). This means a slightly decrease in economic importance over the last decades (contribution to GDP in 1976 = 4.1%). However, within the production sector the wood industry could increase its share (from 16.3% in 1976 to 19.8% in 2002) (Schwarzbauer 2004, 7). Table 12 shows the contribution of forestry, woodworking industry and paper industry

to GDP in the years 1976 and 2002. Only the paper industry could increase its contribution to GDP by 0.2%.

Table 12. Contribution of the Austrian wood industry to GDP 1976 and 2002

Sector	**1976**	**2002**	**% change 2002/1976**
Forestry	1.0	0.4	- 0.6
Woodworking industry	2.3	1.9	- 0.4
Paper industry	1.8	2.0	+ 0.2
Wood industry in total	4.1	3.9	- 0.2

Source: Schwarzbauer 2004

Although the share in GDP decreased, production of wood products increased over the last decades and Austria remains a quite important producer of wood products in the world. For example, in roundwood production, Austria ranks 8th in Europe and 40th worldwide. In coniferous sawnwood production Austria ranks 4th European-wide and 8th globally. In 2002, Austria produced 14% of the coniferous sawnwood in the EU-15, 8% of wood based panels and 5% of paper and paperboard. World production shares are between 1% (paper) and 4% (coniferous sawnwood). The per-capita production of coniferous sawnwood is twenty-five times higher than the world average, fourteen times higher for wood based panels and eleven times higher for paper and paperboard. Per capita fuel wood production is far above the EU average and even higher than the world average (Schwarzbauer, 2004, 5).

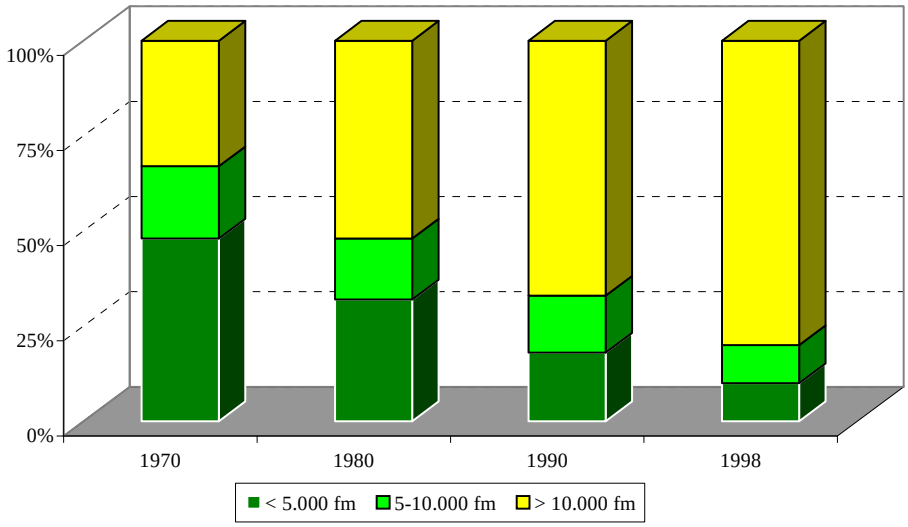
In 2002 sales by the Austrian wood industries amounted to 5.15 billion euro. The wood industries comprise about 1,750 enterprises of which 1,400 are sawmills. Most of these enterprises are medium-sized. They employ 30,878 people (companies >20 employees). The wood industries are an extremely wide-ranging economic sector. Of greatest importance in terms of production are the sawmilling industry, the furniture industry, the construction sector, the board industry and the ski industry.

In most important woodworking industry sectors (sawmill, pulp/paper, panel) a concentration tendency could be observed over the last years: While on the one side, the number of mills as well as the number of production locations decreased, the production capacity, productivity and number of employees in remaining sites increased on the other side.

Furthermore, international orientation increased in wood-processing industries. Imports increased and exports partly increased. There is a tendency to expand value added production, i.e. a shift from secondary to further processing (e.g. furniture). In addition, many firms established new production facilities in Central and Eastern European Countries.

There are large differences in the **structure of wood industries** sectors with regard to the **number of companies** and distribution of sizes. While the Austrian sawmilling industry counted 1400 companies in the year 2002, the paper and paperboard industry and the panel industry counted only 30 respectively 39 companies. About 1200 companies in the sawmilling industry are small-scale, with a total number of employed people of about 10,000.

In the last decades a major concentration process has occurred in the Austrian wood industry, mainly due to technological developments. The number of sawmilling companies decreased by over 70% between 1964 and 2002 (in 1964 there were 4 965 companies, in 2002 1400). In the paper industry the number of companies decreased from 78 in 1964 to 30 in 2002 that is over 60% (Schwarzbauer 2004, 34). Only in the panel industry the number of companies increased from 33 companies in 1964 to 39 companies in 2002. Above all it were small companies in the sawmilling industry that disappeared. This trend caused a loss of craftsmen culture in the wood industries. In 1998 1-2% of all companies produced about 50% of the total sawnwood (Schwarzbauer 2004, 34).



Source: Quelle: Fachverband der Sägeindustrie (1966, 1999) cited in Schwarzbauer 2003.

Figure 8. Share of production of annual production of different sawmill sizes in%

The production sold by the Austrian sawmilling industry in 2002 amounted to 1.84 billion euro. Exports of sawn softwood reached the record quantity of some 6.3 million m³. Approximately two thirds of all exports go to Italy.

The Austrian particleboard, fibreboard and MDF Industry is an important part of the Austrian wood working industry. This industry has experienced rapid growth during the past few years. Nine sites are the locations for the following main producers: Egger, Funder, Kaindl, Homogen, Novopan. In 2002, the value of the particle and fibreboard produced amounted to 668.4 million euro while the production of MDF board amounted to 105.6 million euro (The Austrian Wood Industries 2003).

In 2002, sales by the construction elements industry amounted to 1.51 billion euro. The production of windows, the most important branch contributed 340.9 million euro in 2002 while the production of prefabricated wooden houses had a production value of 333 million euro. Regarding doors, production in 2002 was at 231.5 million euro. Wood floorings (parquet and strip floorings) had a production of 134 million euro. The

production of glued laminated timber elements in 2002 was at 159.4 million euro (The Austrian Wood Industries 2003).

In 2002, the Austrian furniture industry produced furniture in the value of 1.33 billion euro, of which 380.6 million euro (23.6%) was exported. The volume of the Austrian domestic market in 2001 amounted to 1612 billion euro.

The Austrian paper industry is a major industry branch of the Austrian forest sector, with a turnover of about 3 billion euro. In 2002 27 companies were operating in Austria with 29 mills, down from 31 companies and 33 mills in 1990. The paper industry employed 9560 persons in 2002, down from 12300 total manpower in 1990. This industry is highly export oriented, with 84% export, up from 76% in 1990. A further main component of the paper industry is the high rate of recovered paper collection (52% of total paper consumption is apparently collected). About 40% of total paper consumption is recovered paper utilisation (The Austrian Wood Industries 2003).

More than 60% of the alpine skis produced worldwide came from Austrian factories. The quantity sold last season is estimated to be some 4.5 to 4.6 million pairs of skis. In 2001, Austria exported alpine skis to the value of almost 200 million euro (The Austrian Wood Industries 2003).

The demand for wood pellets increased continuously during the last years due to a boom in combined heat and power plants. In 2004 sales of pellet furnaces increased by 20%. However, the production of pellets grows even faster. For 2005 a production of about 450 000 t is forecasted, while the Austrian consume will amount to only 250 000 t. It is envisaged to export a large share of the pellets to Italy and to increase domestic consume, for example by promotional means.

In 1999 the Austrian forestry and forest sector industries, excluding the furniture sector, produced an **added value** of about 5 2 billion euro. To this value added the woodworking industry contributes about one third, followed by the printing and publishing sector with about 30%.

The Austrian forest sector is characterised by two main value flows: the first leads from the "roundwood and raw wood" via "sawn and planed timber", "veneer and wood panels" and "turnery and wooden products" to the sector of "wooden furniture and carpentry". A small percentage goes directly into the building sector. This value flow ends for the most part in final usage. The second value flow goes from the sectors "roundwood and raw wood" via "sawn and planed timber" and the sector "pulp and paper" into export. One third of the value from "pulp and paper" flows into "processing of paper and paperboard" and to production of "printing and publishing". From there the flow ends up again in end usage (Eder 2000).

The wood industries are highly export oriented with an **export share** of almost 60%. Sawn softwood, wood-based panels and skis are the most exported articles. In 2002, the total export volume was 4.08 billion euro. With 65.6% (2.68 billion euro), the European Union is the most important buyer of Austrian timber products. The two main export

destinations are Germany and Italy. In all, products amounting to 2.32 billion euro were imported. The foreign trade surplus in 2002 was at 1.77 billion euro.

Table 13. Distribution of wood exports and imports in 2000

Wood export (2000): 2.49 billion euro.
- 45% sawn wood (1.11 billion euro)
- 20% chip and fibre panels (490 million euro)
- 18% construction joinery (436 million euro)
- 11% veneer, finger joints and other (276 million euro)
- 4% round wood (94 million euro).

Paper export (2000): 2.88 billion euro.
Furniture from wood (seat and office furniture) and prefabricated houses: 457 million

Wood import (2000): 1.45 billion euro.
- 34% round wood (494 million euro)
- 19% sawn wood (276 million euro)
- 16% construction joinery (225 million euro)
- 12% veneer, finger joints and other (174 million euro)
- 9% chip and fibre panels (131 million euro)

Paper import: 1.42 billion euro
Furniture from wood (seat and office furniture)
and prefabricated houses: 828 million euro

Table 14. Austrian foreign trade of the forest sector 1966-2003 (billion ATS)

Year	Product	Import	Export	Trade balance
1966	Total Austrian trade balance	60.5	43.8	-16.7
	Wood, wood products	0.9	3.4	+ 2.5
	Paper	0.8	2.8	+ 2.0
2003	Total Austrian trade balance	1,098 5	1,079.8	-18.7
	Wood, wood products	18.9	39.1	+20.2
	Paper	28.2	53.0	+24.8
Change	Total Austrian trade balance	+1715	+2365	+12
2003/1966	Wood, wood products	+2000	+1050	+708
(%)	Paper	+3425	+1793	+1140

Note: currency in ATS (13,7603 ATS = 1 euro), Source: Schwarzbauer 2004, 10

3.3. Wood processing industries practices

In the wood working industries small enterprises dominate. In 1995 on average twelve employees were employed per enterprise. However as outlined above, there are large differences in the structure and sizes of enterprises. There are few larger enterprises in the panel industries on the one side and many small-scale enterprises in sawmilling industry on the other side (see Chapter 3.2.)

The **employment** structure of the woodworking industry is presented in Table 15. About one third of the employees in the forest sector works in enterprises with less than 20 employees.

Table 15. Employment in the Austrian forestry and forest sector

Sector	Employees (1000 person)
Forestry	14.1
Forest sector (> 20 employees)	59.0
Of which: Sawmilling	6.0
Panels	3.5
Construction	13.7
Furniture	21.7
Other wood products	5.7
Paper	8.4
Forest sector (< 20 employees)	32.3
Of which: Sawmilling	4.9
Construction	7.2
Furniture	17.9
Other wood products	2.3
Forestry and forest sector combined	105.4
Total employment Austria	3 447
Share of forestry and forest sector	3%

Source: Schwarzbauer 2003

Table 16. Investment 1993-2000 in selected forest sector industries

	1993	1994	1995	1996	1997	1998	1999	2000
	in million ATS current prices							
Paper producing industry[1]	2 084	2 538	5 406	4 028	8 508	3 668	2 650	3 352
Paper processing industry[2]	733	664	628	797	560	935	1 017	1 097
Sawmilling	604	834	1 102	2 573	1 660	1 134	5 517	3 181
Wood processing industry	1 894	2 599	1 528	1 726	2 205	1 962	2 294	2 096

Notes: 1: In German: Papiererzeugende Industrie
2: In German: Papierverarbeitende Industrie

Source: Fischer 2001.

As Table 16 shows there are large fluctuations in the investments in forest sector industries. Overall investments increased during the last decade. Especially the sawmilling industry experienced a large raise in investments.

In terms of cost structure, only the **profitability** of the sawmilling and panel industries are to a good part dependent on the cost structure of raw material input. Costs for forest products input in 1990 was slightly higher than 50% in these sectors, followed by wages and other costs. In the panel industry, costs for wood material amounted to 20% in 1990 (Eder 2000).

In the wood working industry there are some sectors that are quite innovative and competitive. These sectors comprise the paper industry and wood processing industry. Altogether small enterprises innovate less than large companies.

The wood industry has increased its activities for research and development in the last years. Until recently the wood research scene in Austria was characterised by a number of small research groups that were hardly connected.

In recent years some major initiatives and support programmes were established to promote co-operation on research and innovation in the forest sector. For example, the 'Wood K Plus Centre' combines research at universities with industrial research on wood composites and wood chemistry. The Austrian Wood Cluster (Kompetenznetzwerk Holz) aims at bundling the relevant research groups for the industry. The whole field from cutting the tree to the end product is covered.

The Austrian Wood Research Society (OEGH) (Holzforschung Austria) supports research and testing in the field of wood technology and strives towards the dissemination of research results into practice.

In recent years co-operation and networking in the forest sector has also increased through **cluster initiatives** ('Holzcluster'). Several regional clusters (e.g. 'Holzcluster Steiermark', 'Holzcluster Kärnten') exist that provide a platform for co-operation, research and innovation in the forest sector.

3 4. Policy framework and production conditions

Three Austrian **ministries** are addressing key areas of relevance to the forest sector (apart from the finance ministry). These are the Austrian Federal Ministry of Agriculture, Forestry, Environment and Water Management (BMLFUW), the Federal Ministry for Economic Affairs and Labour (BMWA), and the Federal Ministry for Transport, Innovation and Technology (BMVIT). A further important **institution** is the Austrian Standardisation Institute.

The main **private institutions** active in the forest sector are institutions from the Austrian Federal Economic Chamber and platforms created by these institutions. The main branches of the Austrian Federal Economic Chamber comprise:

- Fachverband der Holzindustrie Österreichs
- Fachverband der Papierindustrie
- Bundesgremium Holz- Baustoffhandel
- Bundesinnung der Zimmermeister
- Bundesinnung der Tischler
- Präsidentenkonferenz der Landwirtschaftskammern Österreichs

There are a multitude of other institutions active in the sector. This comprises institutions such as the „proHolz Austria" platform or the Kooperationsabkommen Forst-Papier-Platte (FPP). Important further alliances or associations include:

- Hauptverband der Land- und Forstwirschaftsbetriebe
- Österreichischer Holzleimbauverband
- Verband Österreichischer Hobelwerke
- Verein Österreichischer Bau- und Fensterkantelerzeuge
- Österreichischer Biomasse-Verband
- Pelletsverband Austria
- Österreichischer Fertighausverband

The main **reform policies** affecting the wood industry development are the accession to the EU of Austria in 1995 and the enlargement of the EU in 2004. In addition the law on green electricity caused a boom in the establishment of combined heat and power plants. This, in turn, promotes the production of wood pellets.

There are a range of **financial support initiatives and institutions** that are also active in investment support for the sector. The most important ones are the:

- Austrian "Wirtschaftsservice Gesellschaft" as a specialised bank for enterprise support that runs a range of special programmes for investment and inducement of innovation;
- the Austrian Council on Research and Technology Development and
- the Austrian Kommunalkredit AG, a special-purpose bank to provide low-interest, long-term finance for the Austrian local authorities.

The main **research institutions** for the forest sector comprise:

- Holzforschung Austria
- Institut für Stahlbau, Holzbau und Flächentragwerke, TU Graz
- Institut für Tragwerkslehre und Ingenieurholzbau, TU Wien
- Institut für Stahlbau, Holzbau und Mischbau, Universität Innsbruck
- University of Natural Resources and Applied Life Sciences, Vienna: Institute of Wood Science and Technology
- Bundesamt für Wald
- Kompetenznetzwerk Holz - FFF Forschungsprojekte Holz
- Umwelt- und Innovationszentrum Judenburg
- Kompetenzzentrum Holz, Forschungsprogramm Holzverbundwerkstoffe und Holzchemie

The main **education and training institutions** are:

- University of Natural Resources and Applied Life Sciences, Vienna
- Holztechnikum Kuchl, HTBLAs in Mödling, Graz, Hallein, Imst, Wien, Bruck/Mur

The main **extension services** and consulting institutions are:

- Bundesamt für Wald and training institutions in Ossiach and Gmunden
- Civil engineers and technical bureaus as consulting institutions

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

Barriers to entrepreneurship have been well captured by the EU Community Innovation Survey 3 – they are mainly related to risk, costs, sources of funding, adequately trained and educated personnel, and proper information on markets and new developments.

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

Organisations

- University of Natural Resources and Applied Life Sciences, Vienna (BOKU)
- Technical University Graz, Institut für Stahlbau, Holzbau und Flächentragwerke
- Technical University, Institut für Tragwerkslehre und Ingenieurholzbau
- University Innsbruck, Institut für Stahlbau, Holzbau und Mischbau
- Joanneum Research
- Holzforschung Austria (Austrian Wood Research Society)

Main publications and information sources

Eder, Asta 2000: Holzströme in der österreichischen Volkswirtschaft: Untersuchung der Verflechtung der österreichischen Forst- und Holzwirtschaft an Hand von Input-Output-Tabellen; Schriftenreihe des Instituts für Sozioökonomik der Forst- und Holzwirtschaft Band 41, Universität für Bodenkultur Wien.

Fischer 2001: Betriebswirtschaftliche Kennzahlen der Holzwirtschaft; Diplomarbeit, Universität für Bodenkultur Wien.

Schwarzbauer, Peter 2003: Skriptum Holzmarktlehre, Universität für Bodenkultur.

Schwarzbauer, Peter 2004: Marktstudie: Die österreichischen Holzmärkte. Größenordnungen-Strukturen-Veränderungen, Universität für Bodenkultur, Department für Wirtschafts- und Sozialwissenschaften, Institut für Marketing und Innovation, Vienna.

The Austrian Wood Industries 2003: Austrian Woodworking Industry Sector Report 2002/2003, Vienna.

4. Non-wood forest products and services

Summary

NWFPS have not only been of high relevance in history (resin tapping, leaf and litter). Today some older uses are still important (hunting and fishing, cattle grazing, gravel digging), and new uses add to these: protection against natural hazards, kerbing of drinking water, horse-back riding, or mountain biking. The forestry sector itself has contributed by some specific services, e.g. forest pedagogics and the erection of biomass-based village heating systems. The examples of nature conservation services and village heating systems show that forest owners find ways to market new services from the forest. In the case of district heating, in Austria especially farm forest owners' co-operatives do not only provide wood chips but run the plants themselves and thus benefit directly from the value added produced.

Although the income from NWFPS in Austria is still almost negligible (without considering bio-energy), there seem to be high latent potentials. Competitiveness is affected negatively by small forest properties and high labour costs, but positively by the image of forests as regional resources, and a good institutional support in many provinces. Barriers to entrepreneurship are found as follows: timber-dominated education, missing entrepreneurial orientation in education, mental barriers of forest owners to new forest uses (services), farmers' focus on agricultural production, missing income interests of „new" or urban forest owners, and a generally limited entrepreneurial orientation of owners (most owners are only interested in secure capital investment; hunting etc.).

4.1. State of the art and historical development

Historical NWFPS that are hardly utilised any more in Austria are the collection of **resin** (Austrian black pine in lowlands, cembra pine and larch in mountain areas), and the collection of **leaf and litter** and the cutting of **foliage and branches** for agricultural purposes (animal fodder and bedding). Other historical forest uses that are still relevant are the collection of **berries and mushrooms** as well as **livestock grazing** and **hunting**. Historical uses of the forest are often carried out on farmers' forest land or they are rights that farmers hold in State forests or forests of other owners. Since mid of the 19th century, the hunting rights are allocated to the land owners and thus can be rented to others with the exemption of small parcels (below a minimum area that may be used as a hunting district in itself) that are taken together to a local hunting community (cooperative) by law.

In mountainous areas the role of forests in **preventing natural hazards** has been known since centuries. Forest law regulations provide for the securing of these protective forest services since the Empire's Forest Act in 1852. The regulations, adapted in the Forest Act of 1975, are still valid today and provide that beneficiaries have the right to demand necessary forest measures to maintain the protective services but have to pay for the costs. As these regulations are hardly implemented, subsidy programmes grant money for forest restoration measures in protective forests (Weiss 2000a).

Kerbing of **drinking water** sources is very important and has a long tradition as many communal drinking water systems are provided from forest areas. Connected with this tradition is the fact that usually the forest owners don't receive any reimbursement for the water although ground and spring water is generally regarded as private property.

Since decades a range of other "modern" forest uses are known: **quarrying** and **digging of gravel** (e.g. for house building and road construction), **renting** of forest land or buildings, etc.

Relatively new forest services are **various recreational and environmental services** (see e.g. Mantau et al.); the provision of these services has mostly been forced by a strong demand from society. While the open public access to all forest land in Austria was secured by the Forest Act since 1976, other – additional – recreational services are offered by forest enterprises on a free basis or for payments. The right for horse-back riding on forest roads and trails or the right for the use of land for skiing tracks have been offered earlier; riding mountain bikes is a younger development and forest roads have been opened on contractual basis with tourist clubs since some 10 years. Other recreational offers are still rather rare but comprise, e.g. renting of mountain cabins or cottages, use of rivers for water sports, etc.

Some ten years ago a new specific service has been developed by foresters and is offered by forest enterprises, namely **forest pedagogics** (Voitleithner 2002). Forest pedagogics activities want to teach nature and forest matters to the broad public. Clients are school children in the first place but also adults. The focus of such services may be more on the educational or more on the adventure side. Therefore, it is difficult to classify these activities as educational or recreational.

Since recently **nature conservation** on forest land is seldom realised through official directions but rather on contractual basis. Nature conservation services are usually paid for by public institutions today, mostly by the provincial governments that are in charge of nature conservation matters, or by other public institutions (e.g. the federal forest research institute for the Austrian forest reserves network). The legal status of the protected forest land through these projects may be only the time restricted contract (10 or 20 years), a nature conservation area by decree or even a National Park. In the case of the Natura 2000 framework, the protected areas are decided but contracts and management plans are still to be developed (Kautz 2002). Examples where forest enterprises offer actively their land and where private institutions pay for the services are very rare (Neuwirth and Weiss, forthcoming).

One might also mention the production of **heating** energy on forest biomass basis as a forest-related service, as Austrian forest owners often do not only provide the raw material (wood chips) but also run e.g. district heating plants (Weiss, forthcoming; Kubeczko et al., forthcoming).

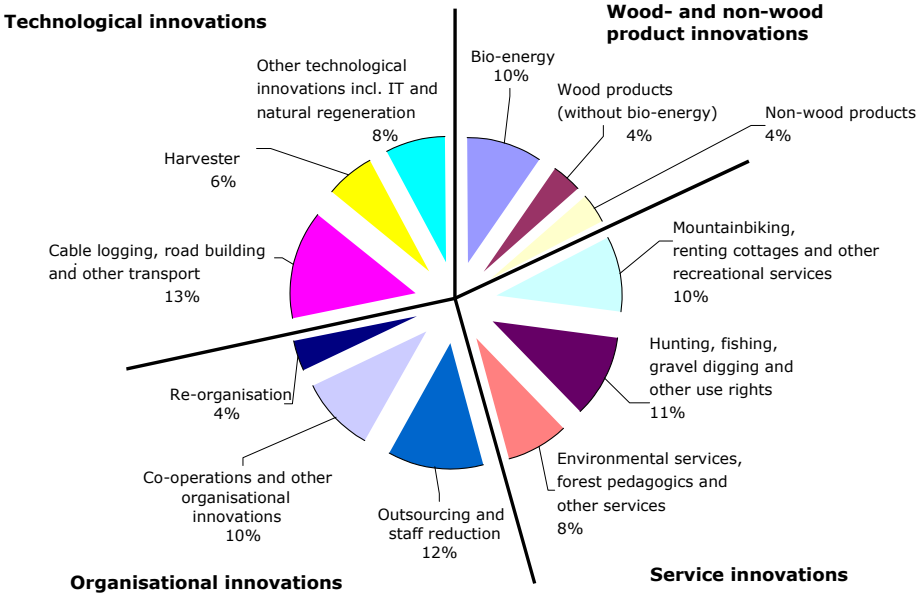
In future, new applications of chemical compounds from trees for technical, cosmetic and chemical - pharmaceutical applications in industry might be used. NWFPs (or, better non-timber products) in that field may be defined as all parts of the tree. Besides of wood these are bark, foliage, fruits and also "residents" of the trees (mistletoe, fungi).

The focus lies on by-products, that primarily occur during silvicultural activities, e.g. during harvesting and in the sawmill. Ingredients such as terpenoids, phenolic compounds (phenols, polyphenols, flavonoids, lignans, tannins), alkaloids, essential oils, resins, gum rosin, terpentine, etc. show a big potential of being industrially used (see Box 1).

Box 1. Taxol as a possible new non-timber forest product

Taxol is a plant - derived anti cancer drug. Its anticancer properties were discovered during clinical trials conducted by the National Cancer Institute (NCI) of the United States. The compound was first isolated from the bark of the Pacific yew, Taxus brevifolia, but was also found in the bark and needles of Taxus throughout the world. Another promising alternative to taxol because of its greater yield in plant parts is taxotere, a related compound, which is produced by extraction of the needles of Taxus baccata, the European yew. For market penetration their production, conversion, processing, preparation (price!), demand within the industry (chemical industry, wood adhesives industry, cosmetic industry,..) as well as their market potential in Austria must be studied. This shall lead to one or more concrete product developments with identification of the potential to convert the product into a pilot scale production. This would play an important role in the generation of value added for the Austrian forestry sector in order to strengthen sustainable incomes and create additional jobs in rural areas. The research field furthermore intends to raise the awareness of the forester for NWFP and their utilisation potentials. The Joanneum Research - Institute of Sustainable Techniques and Systems began to study in that field of research recently. Results on concepts on technological processes and economic preconditions are still at the beginning.

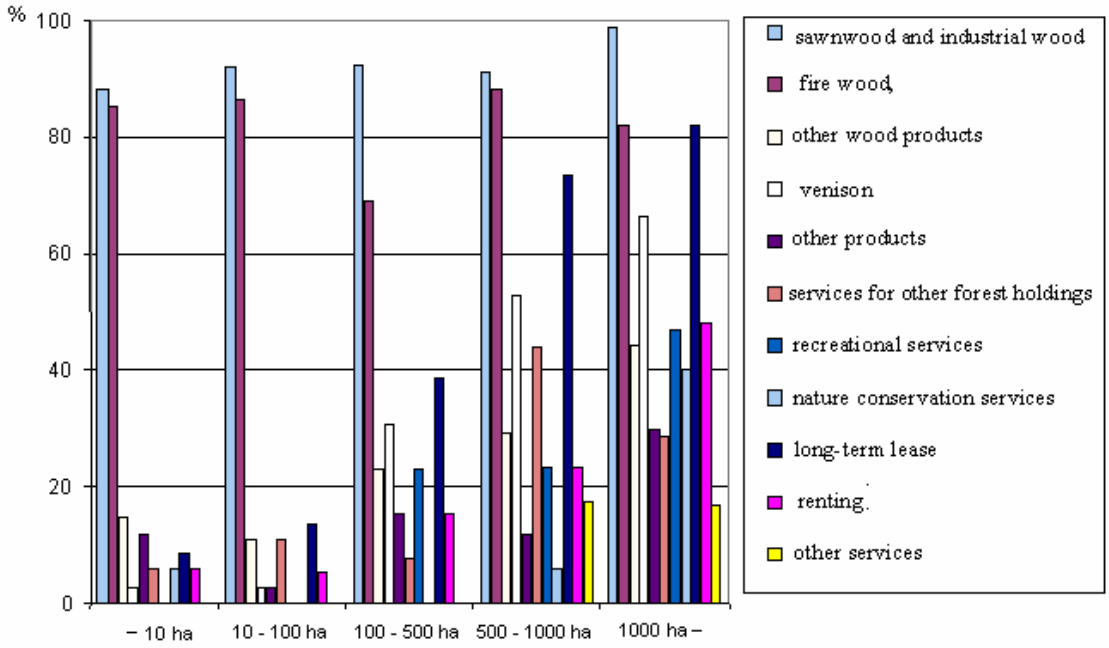
A recent survey among forest holdings on innovation and entrepreneurship has asked for the role of different products and services in forestry. The results show that 33% of all types of innovations (technological, organisational, products and services innovations) concern NWFPS (see Figure 9).



Source: Translated from Rametsteiner and Kubeczko 2003: p. 70.

Figure 9: Distribution of innovations of Austrian forest holdings across different types of innovation

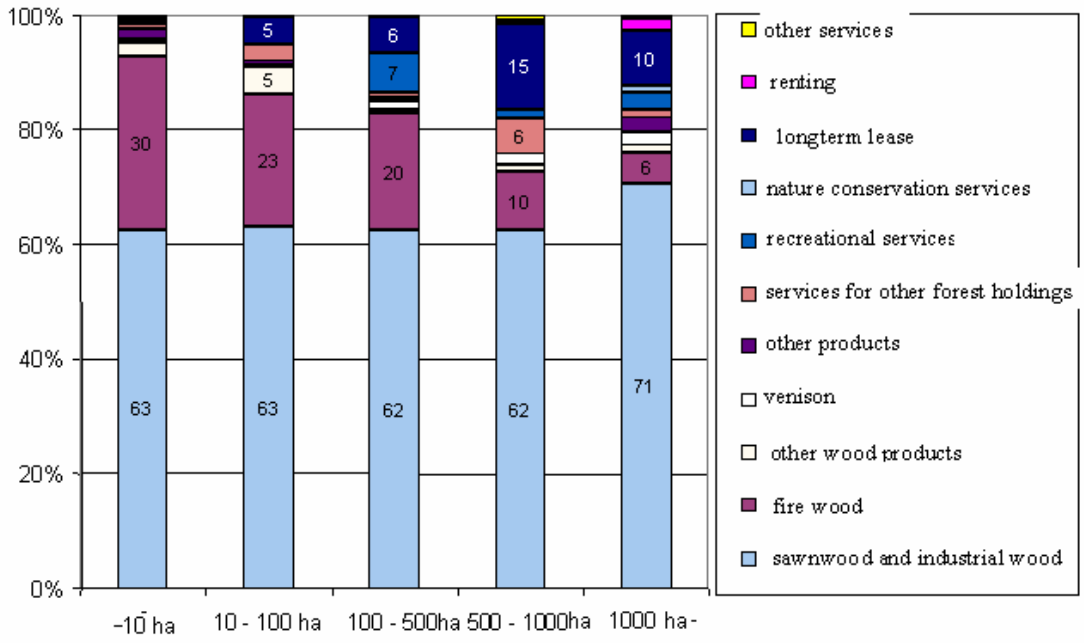
The mix of forest products and services offered by Austrian forest enterprises is quite broad. There are significant differences in this mix between small and large forest holdings; while small (farm) forest owners rarely offer many more products and services besides of timber, larger forest enterprises are quite active (Figure 10).



Source: Rametsteiner and Kubeczko 2003: p. 65

Figure 10. Product mix of Austrian forest holdings for different size classes

The main income of Austrian forest owners is clearly generated by timber (and fuel wood). According to the survey, a quarter of the income of medium forest holdings is generated by NWFPS (Figure 11.). Examples for a much higher share of this category are known from forest holdings that are located close to bigger cities. In larger holdings still a considerable share of income are NWFPS. In smaller forest enterprises this category is not so important.



Source: Rametsteiner and Kubeczko 2003: p. 66 (products and services as above)

Figure 11. Income generation of products and services in Austrian forest holdings of different size classes

In the Austrian forest act a restricted number of forest functions is **defined:** timber production, protective functions, welfare functions and recreation. Other forest products and services are not defined as forest functions by law and partly are regulated in other laws (e.g. nature conservation laws, hunting laws). The forest law in general sets the goal of timber production as the main purpose of forestry and thus restricts other activities in forests. The utilisation of forest land for other purposes is generally forbidden; exemptions are made for protective and recreation services and in certain cases for nature conservation (Weiss 2000b).

The agriculture and forestry sector enjoys some exemptions from the trade law regulations (Gewerberecht): up to a limited extent, farmers may be active in certain production fields, e.g. in tourism, food trade, etc. without being registered as such an enterprise. The range of these minor activities has been broadened recently offering more economic opportunities to farm forest owners.

A **classification of forest products and services** is used in the Eurostat programme "economic accounts for forestry". The results of this programme can be used to assess the relevance of NWFPS for rural economies. According to the database the value at producer prices of NWFPS is some 18 million euro/year (without hunting). In comparison, the value for wood is some 900 million euro/year. The data for this programme origin primarily from the Farm Accountancy Data Network, produced in Austria by the LBG Wirtschaftstreuhand and are reported in the Austrian Report on Agriculture (Grüner Bericht). The database comprises all forest holdings from 1 ha to 200 ha which covers about half of the forest area in Austria. Bigger forest holdings

contribute only little to the amount quoted above, respective values being derived from the accountancy network of bigger forest enterprises, which is maintained by the Forest Owners Association (HVLFÖ).

The Global Forest Resources Assessment of the Timber Committee at UN-FAO has no data for Austria. The IEEAF of Eurostat and the MCPFE (minister conference of the protection of forests in Europe) deal with indicators for other products and services of the forest but does not focus on market relations.

Details concerning the quantification of NWFPS have been documented by Grieshofer. Data might be found in the regional reports produced in course of the PEFC certification programme in Austria (6 regions).

A **general problem in studying NWFPS** shall be stated here, namely the fact that many of such activities are often excluded from the forest enterprise into new economic entities (e.g. companies Ltd.) if they exceed a certain turnover or if forced or suggested by trade or tax laws.

With regard to **property rights definitions**, the functions of forests as defined in the forest law have some indirect effects on the provision of forest services via the market. The Austrian forest act defines four **forest functions**, namely timber production, protective functions, welfare functions and recreation. While timber production is fully accepted as a private good, the other three services are partly defined as public goods: forest management in protective forests and in forests important for welfare services, e.g. drinking water protection, is partly restricted. Everybody has access to forest land for recreational purposes. According to the forest law, also mushrooms and berries may be collected by everybody for personal use if the forest owner not explicitly prohibits this use.

Water (ground water, springs and creeks) are generally by law regarded a private good in Austria. Further regulations, however, restrict the marketing considerably as public water providers have access to the water resources without compensation.

Nature and landscape conservation laws (that are in the competence of the federal provinces) in different ways restrict forestry activities for the purpose of nature conservation. In some federal provinces, the collection of mushrooms is restricted, e.g. to every second day. This regulation for some part is for the benefit of the land owner, however, landowners are not exempted from the regulation.

The **main information sources** for NWFP&S in Austria comprise:

- statistical information sources: EAF (economic accounts for forestry);
- databases:
    - EU RES-project on (Mantau et al.);
    - FADN (farm accounting data network);
    - GFRA (global forest resources assessment, FAO – by now no data for Austria available);
    - IEEAF (indicators);
    - Grüner Bericht.
- Studies:
    - Rametsteiner, Kubeczko 2003: Innovation und Unternehmertum in der österreichischen Forstwirtschaft. Wien: Universität für Bodenkultur.
    - Web sites: BMLFUW (ministry of agriculture, forestry and water management: www.lebensministerium.at);

The main **scientific organisation** studying non-wood forest products and services is the Department of Economic and Social Sciences at BOKU, covering economic (Sekot), market (Schwarzbauer, Meixner), and policy aspects (Rametsteiner, Weiss). Further activities in the field are known of the Austrian Institute of Regional Planning ÖIR (Schremmer), the Bundesanstalt für Bergbauernfragen and the IFF (University Klagenfurt). Natural science basics are studied, besides of the Department of Forest and Soil Sciences at BOKU, the Austrian Environmental Agency UBA (Hackl) and the Austrian Federal Forest Research Institute BFW. Single activities are known from other Universities (e.g. studies on the market potential of tourism use of forest buildings at WU). Data on the value of protective services of the forest may come out of the ongoing research programme FloodRisk.

4.2. Case studies of successful marketing strategies

Case 1. Nature conservation services of forests

Technically seen, nature conservation services of forests may be divided by using different criteria. With regard to the conservation object different forest types may be mentioned. With regard to the scale of the object, whole landscapes may be protected (e.g. national park), or smaller patches of forests, single forest stands, groups of trees or even single trees (e.g. tree monuments). With regard to the conservation goal, the service may be divided into the conservation of naturalness or biodiversity, or may be divided into total protection of the area or the maintenance of a particular management. Conservation goals that are related but are not nature conservation in the narrower sense, are drinking water protection, protection against natural hazards, etc.

In a project of the EFI PC INNOFORCE work programme on forest-related environmental services, classifications using different criteria are used, including the following (Table 17).

Table 17. Classifications of forest-related environmental services used in Innoforce Task 2.2.

		Conservation object									Conservation target							Ecosystem conservatn.			
		forest land	(single) trees	agricultural land	bog/moor	water	garden/park	rock/desert	snow/ice	cultural landscapes	protection of soils	water protection	protection against air pollution	climate protection	landscape conservation	traditional management practices	ecosystem conservation	naturalness	bio-diversity - genes	bio-diversity - species	bio-diversity - habitats
Market arrangement	sporadic payment																				
	long-term contract																				
	Certification																				
	Subsidy																				
	Purchase																				
	prize/award																				
Market partners	private to private																				
	private to public																				
	public to private																				
	public to public																				

In the Innoforce work, the nature conservation services are classified with regard to ecological as well as market dimensions. Regarding ecological aspects, conservation object and conservation goals may be used for a typology. Regarding market aspects, the kind of market arrangement and the involved market partners (private/public) may be used. A more detailed and developed categorisation is used in the Innoforce work (case studies database).

There seems to be a **high latent potential** to offer nature conservation services of forests, however, many forest owners are reluctant to utilising this potential. Forests in Austria covering half of the terrain, they are of interest for nature conservation in various respects. In general, this ecosystem/land use type is relatively “natural”, as a recent study about the degree of anthropogenic influences on forest ecosystems shows (literature): 35% of Austrian forests are strongly influenced or “artificial”, 25% are natural or very near to the natural state. Some of those ecosystems that are of particular interest for nature conservation are forests, or stand in close relation to forests (bogs, riperian zones, canyon forests, etc.). Forests are frequently the motive of campaigns of

nature conservation groups and have been the major ecosystem type of various recently protected lands or ongoing campaigns (national park, biosphere reserve, etc.). Most Austrian national parks have at least major shares of forest land.

Regarding **technical characteristics** of production it has to be noted that total protection will be differently administered than the maintenance of certain management practices. With total protection monitoring will be necessary and the main tasks are the protection of the forest against disturbance (e.g. public access, etc.) and to make sure that no hazards start from the protected area to other areas (e.g. bark beetle outbreak, avalanches, etc.). Specific management practices may demand certain skills and knowledge. Such management practices are often close-to-nature management, e.g. uneven-aged management, or traditional forest management, including grazing by livestock.

As mentioned, significant shares of Austrian national parks are forest; one of the most important instruments used in forest-related nature conservation are **total protection** areas (national parks, nature conservation or landscape protection areas, protected trees, etc.). Regarding the maintenance of sustainable management, **certification** initiatives should be mentioned. In Austria, two certification schemes are relevant: the Forest Stewardship Council (FSC) and the Pan-European Forest Certification scheme (PEFC). Whereas only few cases exist in Austria for FSC certification, practically the whole forest area of Austria is PEFC certified. Therefore, both are not very market relevant at the moment. FSC certification seems to be a market advantage because there is a certain demand and only little offer. PEFC certification seems to be without market effect as there is no discrimination to non-certified timber.

Of the Austrian territory 46% are forests. Almost a quarter of the national territory is under some nature conservation regime (23%), and 12% of these are forests. So, also about a quarter of Austrian forests is protected for nature conservation (26%). Most of this area, however, does not mean management restriction in forests. In sum, 3% of Austrian forests can be classified as a strongly protected area with the management objective “biodiversity” (according to the classification of the MCPFE category 1; UBA forthcoming).

Areas of protected forests
- Nature or landscape conservation: 26%
- Nature conservation: 3%

Areas of certified forests
- FSC: 4 004 (5 sites) (source: UNEP-WCMC, WWF, FSC & GTZ 2004)
- PEFC: practically all forest area.

In principle, all types (public and private) and all sizes of forest holdings are active in the **“product chain”** of nature conservation offers, however, larger companies seem to be more active as they are generally more active in market-oriented forest management (see Figure 10 and Figure above). With exception of the Austrian Federal Forests, all forest companies in Austria are medium or small or – most of them – micro (family) enterprises.

Most Austrian forest owners are not particularly active in offering nature conservation services, and, such activities are usually confined to contracts with the government. There are only very rare examples of market oriented activities. This behaviour is proven by the fact that only few owners actively pursue certification activities; the PEFC certification project is an activity, which was initiated and implemented by a forest owners' interest group (chamber of agriculture) without explicit and active involvement of the single forest owners.

One example for pro-active behaviour is the initiative BIOSA (Biosphere Austria, Box 2), an initiative of the non-obligatory land owners' interest group (Hauptverband der Land- und Forstwirtschaftlichen Betriebe Österreich, HVLF) that is actively pursuing nature conservation projects. This association of forest owners offers forests for conservation measures to governments or private sponsors.

Another example are the **Austrian Federal Forests** (Österreichische Bundesforste AG, Box 3) that also actively have contacts to nature and landscape conservation authorities and nature conservation groups. They implement nature conservation contracts with governments or joint projects with interest groups where they partly receive payments for conservation services, partly offer such services for free and where they sponsor nature conservation campaigns (sponsoring activities for PR reasons).

The majority of nature conservation projects can be seen **domestic**, although it is not in principle excluded that international sponsors or other organisations get active in nature conservation in Austria. In some cases, money from supra-national bodies might be used for nature conservation projects (EU structural funds, e.g. Interreg programme). Austrians may be active and paying for nature conservation abroad. One such project is known: the rainforest of the Austrians sponsored by private donations. In case of trade of certified forest products the market is principally international. There is, however, no detailed information available about domestic and international trade with these commodities.

In nature conservation, traditionally regulatory **policy instruments** have been applied by Austrian provincial governments (who are responsible for this policy field). Such instruments are national parks, nature or landscape conservation areas, natural monuments, etc.). Since recent years, however, the policies almost exclusively use contractual solutions. However, with regard to forests, the provinces to a very different extent include forest land into their programmes of contractual nature conservation. Historically, land owners only received money as a compensation for protected areas (and often only, if they took the case to the court). Today, contracts are usually negotiated on a voluntary basis.

The **Austrian forest law** itself provides for regulations to maintain forest land. Recent forest policy is oriented at maintaining or supporting rather "natural" forests (close-to-nature management), however, policies rely rather on financial means than regulations in this respect. Policy instruments include monitoring (Austrian forest inventory), subsidies (reforestation of natural mixed stands) and informational instruments (e.g. campaigns for close-to-nature management, state prize for exemplary forest management, etc.). The forest law is not particularly supportive or impeding with regard

to nature conservation projects. The recent amendment of the Austrian forest act, however, included the term of habitat conservation forests which makes it easier for forest owners to dedicate forest land for nature conservation, not being forced to maintain traditional forest management, at which the forest law in principal is oriented (so, e.g. reforestation is demanded after a number of years, forest protection measures are demanded in case of pests, etc.).

In practice, **forest agencies** are not very active in promoting nature conservation services of the forest, as traditionally this goal is not regarded a "forest management" goal. Forest agencies are rather used to block demands of nature conservation groups in forests as these commonly demand such services without payments. Research and education, in principle, exists at University level, but translation into practice is limited. It seems, however, that the situation is changing presently.

Nature conservation provides only small shares of **income** for forest holdings (see Figure 11.), however, it can gain small but significant shares in certain cases or if the company is active in this field. The Austrian Federal Forests, for instance, run two of their management units exclusively for nature conservation purposes (national park management). A considerably higher share of forests of the Austrian Federal Forests are under some conservation scheme than other Austrian forests, namely 46% of all of their land (Österreichische Bundesforste AG, no year). In the case of the Austrian Federal Forests it can be said that certainly a small but significant share of income is through nature conservation, when thinking of two management units with some 30 employees that are financed by national park funds, and a range of nature conservation projects on contractual basis. Alone in the forest nature reserve programme of the Austrian government 49 projects covering 2700 ha are on their land. The company, on the other hand, also dedicates preserved land areas without compensation, e.g. for the bog preservation programme of the WWF, and has a yearly budget of between 200,000- and 500,000 euro for ecosponsoring purposes.

Contracts in the most cases are made between the land owner and governmental bodies. Forest owners mostly provide the management by their own staff. This is even true in the case of national park zones on areas of the Austrian Federal Forests: two management units are particularly dedicated to the management of the national park areas, including all tasks like monitoring ecosystems or guiding visitors. In certain cases, land owners co-operate with nature conservation groups or universities, e.g. in a bog preservation programme of the Austrian Federal Forests with the WWF and the University of Vienna, or in a bog preservation project (Drescher-Schneider et al. 2000) of private forest owners in Styria and a research project. The latter project, like other conservation projects is managed by the above mentioned association BIOSA.

Box 2: The BIOSA initiative of Austrian land owners

BIOSA (Biosphere Austria) is an association of Austrian land owners that offers nature conservation services to public bodies or private organisations. BIOSA was founded in 1995 and has the goal to defend forest owners' competency and to defend their property rights in nature conservation issues. By actively offering contracts forest holdings strive to improve their image in the public and to maintain their influence on the management of their land. BIOSA is supported by the association of Austrian land owners. It designs and manages the projects and negotiates with possible financiers. Most areas are offered in the province of Styria and most projects are financed by public bodies. However, the organisation presently also strives to develop ecosponsoring projects.

Box 3: Nature conservation activities of the Austrian Federal Forests

Nature conservation as an issue has gained high attention within the Austrian Federal Forests Inc. (Österreichische Bundesforste AG) in the last twenty years. Almost half of their land is under some nature or landscape conservation regime, a quarter is strongly protected (nature conservation areas or national park). In history demands for nature conservation was defended, but today the company presents itself with a "green image". It wants to be a "competent partner" in the field of nature conservation and proves that in a number of joint programmes with various nature conservation groups (WWF Austria or Österreichischer Naturschutzbund) and the government (e.g. forest reserves network Austria). The company itself is active as a sponsor of nature conservation activities. The strategy of the company today is to offer nature conservation areas for compensation. This strategy was successfully employed in the case of two national park projects, where the company is compensated for the areas and receives a yearly budget for the (nature conservation oriented) management of their areas. In two "national park" management units a staff of 35 is employed. The company also manages a range of contractual nature conservation projects that are usually paid by governments. The goal of the company is not so much to make profit from nature conservation but to keep the land under their management, possibly with compensation and to improve their public image.

It can be said that forest holdings in the majority act as **necessity driven** entrepreneurs. Initiatives for environmental or nature conservation projects are usually set by the demand side, e.g. nature conservation groups or the provincial governments. There are, however, a few examples where also the forest owners actively offer such services, e.g. the Austrian Federal Forests or the land owners' initiative BIOSA.

In conclusion, it can be said that one of the most relevant aspects in the development of environmental services of forests is the fact that most Austrian forest owners are used to stand in opposition to nature conservation groups or agencies. On political level, nature conservation is demanded in forests without compensation schemes, e.g. by regulatory means. There is an **interest conflict** between as well as an **ideological opposition** of "users" and "conservationists" as the commercial utilisation stands against the preservation of nature.

A few examples of forest owners active in nature conservation show that the conflict may (at least partly) be solved through common projects of both groups with compensation schemes. It seems that successful examples of co-operation between the groups may act as impulses for better communication between the potential market partners.

So, in sum, **strengths** of the forest sector are the disposal of close-to-nature ecosystems and the technical competence of foresters and their experience in natural resource management. **Weaknesses** are the ideological prepossessions of both foresters against nature conservationists, and vice versa, of conservationists against foresters. The

resulting limited relations between the forest sector and nature and environmental conservation groups and, as a result, a limited understanding of the needs of the potential customers on the side of the forest owners and managers. In general, it can be added, that in the forest sector there is little understanding of new emerging needs of urban groups of our society. The sector acts and thinks rather resource-oriented than demand-oriented. **Opportunities** are seen if relations of the forest sector with potential clients are further developed. Forest holdings might offer all different kinds of environmental services, including bio-diversity conservation, water, carbon sequestration and many others through different market mechanisms (certification, ecosponsoring, eco-tourism, contractual management, etc.). **Threats** are only seen with stagnating economic development.

Open questions refer to the stated opposition of groups of land owners and conservationists that might also be potential market partners. Possibilities for their co-operation in various forms should be investigated in more detail. Relevant topics are different fields of co-operation are different market arrangements, for instance, contractual nature conservation, eco-sponsoring, certification, etc. For some of the many possible market arrangements first experiences in practice could be studied in more detail, but some forms of marketing nature conservation services have even not yet been tried much. Another question of interest could be the role of the "Austrian forest dialogue", an ongoing national forest programme process, on the co-operation of and communication among the potential market partners.

In course of the EFI PC Innoforce a **database** of cases of forest-related environmental services has been developed. This database could be further developed and could also be used in the COST Action E33. The database describes cases on about one page, including short description of the projects and a range of information like conservation goals, market arrangement and market partners, financing, etc. Such a database could be used for comparisons between different types of environmental services or between countries.

Case 2. Wood chips production and biomass based district heating systems

The cases on wood product innovations represent innovations in different stages of the production process, and not exclusively in the "forest" stage. Forest owners have much innovation potential if looking beyond the forest production itself. Austrian farmers do not restrict themselves to the production of wood chips – they also offer **biomass based district heating systems** for entire villages.

In this case we present a new field of activity of forest owners in Austria, namely the **production of energy from forest biomass**. Forest holdings and often farmers' co-operatives do not only produce wood chips but also run district heating plants themselves. By this they do not just offer the non-timber product of wood chips, but they diversify into energy production and offer the service of heating to public and private buildings. The district heating systems are often established in rural settings, including just few buildings, central parts of villages, or even parts of larger cities.

The potential of Austrian forests to provide biomass is great. Almost half of the country's territory is covered with forests, but only **two thirds** of their increment is

harvested. Non-harvested wood assortments are particularly small-diameter wood that is not easily marketed. For these assortments the biomass market is a new opportunity.

The **production** of forest biomass for energetic use is usually not the main product of a stand. Exemptions are forests on bad sites that are not able to produce quality timber (e.g. dry sites of broad-leaves) or so-called "energy-woods" that are planted on formerly agricultural land. Biomass usually comes from thinnings and/or is residues of harvesting activities in general. The wood material of smaller diameters or bad quality which is not usable for sawnwood is usually first stored on the site of the timber depot in the forest, chipped and transported to the costumers. Costumers (e.g. district heating plants) provide for storage room with capacities between 2 or 6 months. District heating plants usually dispose of open but roofed storage rooms were the material dries before usage.

Different **technical processes** are available for producing the heat. Besides of conventional furnaces also other technical solutions have been developed for large scale bio-energy systems. Larger systems, furthermore, increasingly combine biomass with solar energy (which is particularly used in the summer period when the solar system replaces the biomass system), and combine heat with electricity production. Different technical solutions have been developed for the electric power generation and there are several research programmes active in this field at the moment. Austria is a leading country in the bio-energy field.

A specific problem to be solved is the logistical problem of wood transport, especially with large scale bio-energy systems. At the moment a few larger bio-energy plants (> 20 MW) exist and around ten are in the planning stage. In one example, a site in Vienna, 62 MW shall be produced, needing 625,000 m^3 of wood chips per year (see Box 4).

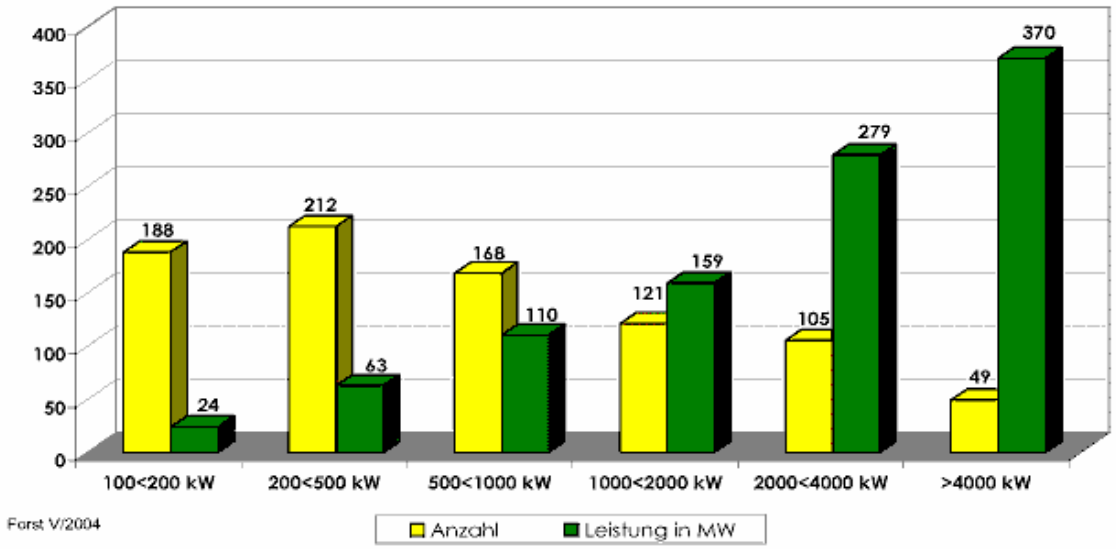
By the end of 2003, 843 biomass-based district heating systems with a capacity of 1005 MW existed (see Table 18 below; Jonas/Haneder 2004). According to estimations, some 600 systems with capacities <100 kW have been established during the last years (EVA 2004).

Table 18. Biomass district heating plants in Austria, data for 2003

Federal province	Number of plants 2003	kW	MW	kW/1000 pop.
Burgenland	39	54,962	55	198
Kärnten	84	140,810	141	250
Niederösterreich	207	242,870	243	157
Oberösterreich	154	153,262	153	112
Salzburg	73	74,120	74	143
Steiermark	206	209,696	210	174
Tirol	41	94,430	94	141
Vorarlberg	39	34,710	35	99
Total	843	1,004,860	1 005	124

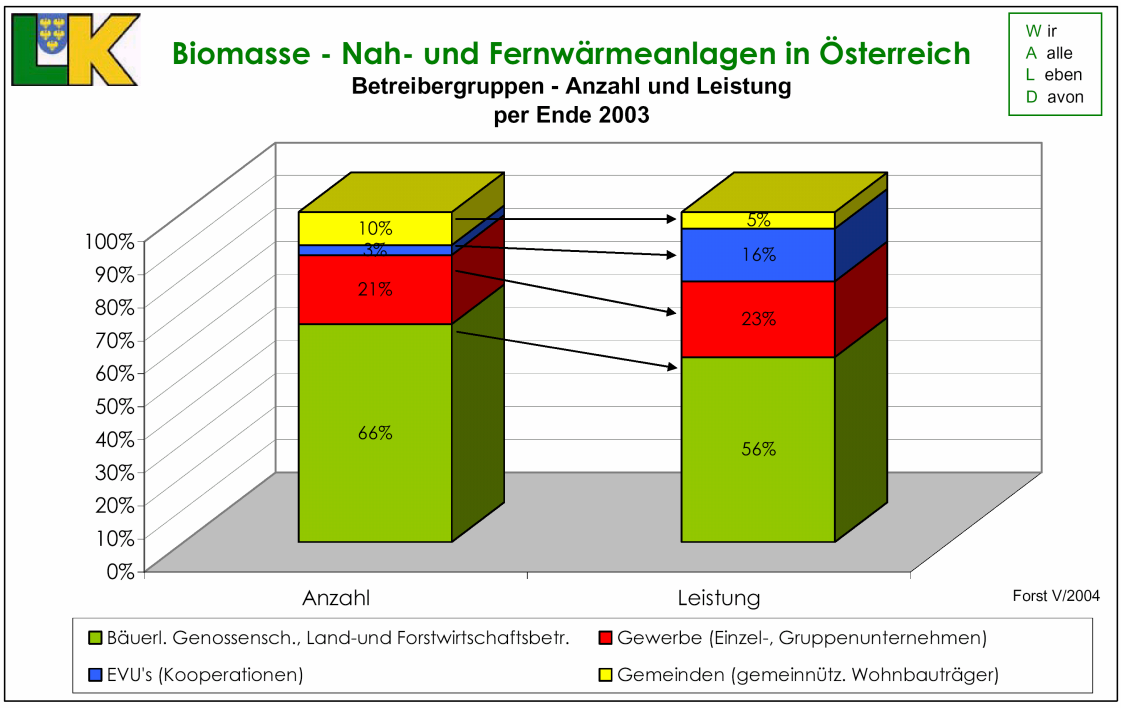
Source: Niederösterreichische Landwirtschaftskammer; http://www.lk-noe.at/

Biomass district heating systems in Austria are in the majority run by **farmers' co-operatives**. They run 66% of these systems by numbers, which corresponds to 56% of their capacity (see Figure 12 and Figure 13 below). Other carriers are industry (21% by numbers), communes (10%) and power companies or co-operations with those (3%).



Source: Niederösterreichische Landwirtschaftskammer; http://www.lk-noe.at/

Figure 12. Size distribution of biomass district heating systems in Austria (number and capacity)



Source: Niederösterreichische Landwirtschaftskammer; http://www.lk-noe.at/

Figure 13. Biomass based district heating systems in Austria as of end 2003

The **farmers' co-operatives** are usually made up of local farm forest owners that produce up to 100% of the heating material from their own forests for the plant they run (wood chips). Often they additionally buy residues from sawmills or other wood industries because of their cheap prices. Farm forest owners were pioneering in the technology of biomass-based district heating systems. For a case of such a pioneer see Box 4 below.

Box 4: Heating co-operative Grossraming – a biomass district heating pioneer in Austria

The "Heating Co-operative Grossraming" (Heizgenossenschaft Großraming) was founded in 1985 by 30 farmers. The plant provides heating for the whole of the closed settlement area of the village Grossraming, being some 80 objects. The capacity of the plant is 2 5 MW and it is fueled to 85% by wood chips from the farmers' forests. The rest are residues from a nearby sawmill. The project was initiated by the mayor of the commune together with an entrepreneurial farmer. The mayor was a farmer himself and his motives were to reduce air pollution and to use local resources. The farmer collected the necessary know-how, organised the implementation of the project and is president of the co-operative and manages the plant. The interest of the commune was crucial as a number of public buildings were the first and largest clients of the plant, by this guaranteeing the profitability of the plant. Furthermore, the commune has to approve the erection of the building and the pipe system as the responsible authority.
Most important support for the project came, besides of the commune, from a public regional development agency which helped in economic calculations and in applying for funding from the national funds for regional development. Further support was given by the chamber of agriculture, which contributed organisational know-how. The Raiffeisen association (the biggest Austrian farmers association) supported the establishment of the co-operative. The total cost of the plant were some half a million Euro from which 15% were financed by the regional development funds and another 15% by the agricultural innovation funds, a public funding source as well. The remaining 70% were borne partly by the co-operative partners (farmers) and partly by bank credits. The necessary technical know-how was provided by the farmer who collected it from literature and from visits to companies (various wood-processing industries and Vienna district heating system).

In the category of industrial carriers besides of wood-processing industries also **larger forest companies** are found. Some of them were pioneers in this innovation just like farm forest owners. The Austrian Federal Forests do also engage in bioenergy projects. Their largest project is the partnership with the biomass-based combined heat and power plant in Vienna, being the largest biomass project in Europe at the moment (see Box 5 below).

Box 5. The city of Vienna and the Austrian Federal Forests Inc. plan the largest biomass project in Europe

In the year 2006 Europe's largest biomass project shall start in Vienna. The project is a combined heat and power plant based on forest biomass. Carrier of the project is the city of Vienna, the heating material is provided by the Austrian Federal Forests Inc. on the basis of a long-term contract. The electrical capacity will be 12 MW, heat will be 39 MW. Technical efficiency will be 82% (use of energy). The maximum capacity will be 62.5 MW. Investments are between 40 and 45 millio euro.

Since 6 years the Austrian Federal Forests Inc. are building a new business field "biomass". This goal is realised together with a partner from the energy business in form of a joint venture, the "Strom und Wärme aus Holz", SWH (power and heat from wood). The SWH is engaged in a number of projects where the Federal Forests not only deliver raw material but also participate in the plants, mostly combined heat and power plants.

Increasingly **power companies** engage in bio-energy. Especially large plants are carried by regional power companies, often together with city governments, as farmers' co-operatives cannot bring the bank credits for such undertakings. In several cases, farmers' co-operatives run district heating systems together with power companies. In these cases they are not only **contracted** for delivering the heating material but also run the plant. The power companies in these cases are responsible for financing the plant and consumers care. It has been shown that farmers sometimes shy the investment risk or that the potential clients do not give them enough trust

Pioneer biomass plants were **co-financed** by regional development funds and agricultural innovation funds. Very soon after the first examples a special budget title was launched, particularly supporting farmers' co-operatives engaged in biomass projects. Around 30 to 50% of investments of such endeavours are borne by public funding, through EU rural development programmes, today.

The forestry institutional system was the main driving factor for a **rapid diffusion** of the innovation. The **chambers of agriculture** in some provinces of Austria engaged not only in lobbying for a budget title but also in distributing the knowledge among the farmers. They built up knowledge in their own organisation as well as supported the foundation of "biomass associations". Through these activities it is relatively easy to get the necessary knowledge for starting with a biomass project today. Nevertheless, it will be highly important also in future for the chambers and biomass associations together to **promote** the idea as today such farmers have to be motivated to become active that are **not so entrepreneurial** or risk-taking as the first pioneers. It will also be a challenge for the agricultural sector to stay in the business as power companies have started to engage as well. These competitors have the advantage that they are often trusted better by the public and by communes, i.e. by the potential clients, to be able to run such plants professionally and reliable.

At the moment a **boom of biomass-based power plants** can be registered in Austria. This is for one part possible through a range of projects that were realised in recent years, but the main impulse for this development is a new directive for so-called "eco-electricity" in Austria, on which basis a fixed (and higher) energy price is guaranteed for ecologically produced electricity, among others on the basis of biomass. This policy is part of the EU goal to increase the share of renewables in the domestic energy supply.

The particular situation in Austria, where two thirds of the biomass district heating plants are run by farmers' co-operatives, makes sure that a **greater share of the value added** is appropriated by the land owners. In such cases, where the forest owners only deliver biomass, the profit is smaller. It seems that in larger projects, however, a partnership with a power company is advisable.

The main **strength** of the Austrian forest sector in biomass use is their unused biomass potentials. Another strength can be seen in the good organisation of the sector, e.g. by chamber organisations, wood associations, etc. A particular strength of Austria is the high technical development of bio-energy that has been reached through recent years. **Weaknesses** are seen in the high labour costs, making the profitability difficult. A weakness is the degree of disintegration of forest ownership (many small parcels of forest ownership). One of the challenges will be to get access to the wood resources on land of non-traditional or "urban" land owners. **Opportunities** are the further use of wood biomass and the engagement of forest owners in district heating and/or combined heat and power plants. This is especially promising before the background of the Kyoto protocol coming into force next year and EU policies for increasing the share of renewables in energy supply. **Threats** exist in an unstable political environment, which means that the future of ecological energy policy seems unclear.

The future of sustainable development and sustainable energy policy is the **open question**. As the profitability of the new business highly depends on political framework conditions, policy-makers, primarily in Brussels, make the future development. **Research needs**, besides of technological questions and logistic concepts, are on the one side related to the mobilisation of biomass resources from non-industrial private forest owners, and on the other side to policy-making in the field of sustainable energy production. Cross-country co-operation in research and practice are **recommended**, as Austria takes a leading position in biomass use. The EFI PC Innoforce may contribute to this purpose by its research and its network.

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UNEP-WCMC, WWF, FSC & GTZ 2004: Information on Certified Forest Sites endorsed by Forest Stewardship Council (FSC). Downloaded from website: http://www.certified-forests.org/ on October 14, 2004.

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Weiss, Gerhard, 2000b: The Principle of Sustainability in Austrian Forest Legislation - Analysis and Evaluation. In F. Schmithüsen, P. Herbst and D.C. Le Master (eds.): Forging a New Framework for Sustainable Forestry: Recent Developments in European Law. IUFRO World Series v. 10, pp. 39-57.

Weiss, Gerhard forthcoming: Die Rolle von Innovationssystemen in der Entwicklung und Verbreitung von Biomassefernwärmeanlagen in Österreich. In: Centralblatt fd ges. Forstwesen Wien.

5. Forests and ownership

Summary

As already pointed out in Chapter 2, the existing structure of forest ownership and management poses a series of important challenges to enterprise development, including the fragmented structure of ownership (a multitude of small forest holdings), an increasingly small fraction of work and investment that is invested into forest and forest work by smaller owners, who over time become more distanced from forest work. In addition, goals and strategies of owners of smaller forests are usually not geared towards innovation or entrepreneurship but towards maintaining capital in a "business-as-usual"-fashion. Recently, outsourcing of work and the build-up of forest co-operative arrangements were two major trends by which those affected try to address the issue.

5.1. State of the art and historical development

In general, there is good date availability of forest development and ownership characteristics in Austria. The BFW collects data in regular intervals on forest area and management and the Austrian Federal Ministry of Agriculture, Forestry, Environment and Water Management (BMLFUW) publishes data on an annual basis (Waldbericht).

Around 47% of the Austrian land area is covered by forests of which 85.5% is available for wood supply. Most of the forest area is managed by private forest owners of whom the majority owns forest holdings smaller than 200 ha. The forest area continuously increased over the last decades as did the forest area managed by private forest owners. In addition, more and more forest owners do not live near to their forest asset any more. About 0.4% of the Austrian employees are employed in forestry. The forestry sector is characterized by a high unemployment rate of about 12%.

5.2. Forest resources

In Austria around 47% of the **land area** (3,960,000 ha) is covered by forests. Thus, Austria is one of the most densely wooded countries in Europe. The region Styria is the most densely wooded area in Austria with a share in forest area of 61.1% of the total land area, or around one million ha. The area of Vienna is least covered with forests (21.7%). The total **growing stock** amounted to around 1 094 million m³ in 2002. The average volume per hectare of forest land is about 325 m³ in Austria. That is the highest volume per hectare in the EU-15. The highest average **volume per hectare** is found in the region Vorarlberg with 385 m³ and the lowest volume is found in the region Burgenland with 252 m³. The annual **increment per hectare** is on average 9.3 m³. The following table provides detailed data for the regions of Austria.

Table 19. Forest area, growing stock, volume and increment

Federal State	Area (ha)	Forest area (ha)	Share (%)	Growing stock (1000 m³)	Volume/ ha (m³)	Increment /ha/year (m³)
Burgenland	396,591	133,000	33.5	32,544	252	9.3
Carinthia	953,301	578,000	60.6	164,368	324	9.8
Lower Austria	1,917,413	764,000	39.8	216,795	298	8.9
Upper Austria	1,197,955	494,000	41.2	157,486	355	10.7
Salzburg	715,391	371,000	51.9	94,436	337	8.6
Styria	1,638,822	1,002,000	61.1	293,709	338	9.8
Tyrol	1,264,720	515,00	40.7	109,420	316	7.2
Vorarlberg	260,140	97,000	37.3	23,729	385	8.6
Vienna	41,495	9,000	21.7	2,693	311	6.8
Austria	**8,385,828**	**3,960,000**	**47.2**	**1,094,731**	**325**	**9.3**

Sources: BFW, Waldinventur 2000-2002

The area of **forests available for wood supply** (*Ertragswald*) amounts to 3.37 million ha, that is about 85.5% of the total forest area of Austria. Forests not available for wood supply cover around 14.5% of the forest area. This area is not available for wood supply due to conservation/protection reasons.

Around two thirds of the Austrian forest area is covered by conifers, of whom spruce is the majority. Table 20 gives an overview over tree species in Austria and their shares in forest area and volume.

Table 20. Occurrence of tree species in Austrian forests

Tree species	Forest area (1000 ha)	Share (%)	Volume (1000 m³)	Share (%)
Conifers (total)	2255	66.9	8,867,599	81.0
Spruce	1810	53.7	673,794	61.5
Fir	78	2.3	47,977	4.4
Larch	155	4.6	73,182	6.7
Pine	189	5.6	86,540	7.9
Other conifers	23	0.7	5,267	0.5
Broad-leaved	802	23.8	207,971	19.0
Beech	323	9.6	101,470	9.3
Oak	66	2.0	26,685	2.4
Other hard-wood	269	8.0	49,122	4.5
Soft-wood	144	4.3	30,694	2.8
Unstocked areas, gaps and bushes	313	9.4		
Total	3371	100	1,094,730	100

Source: BFW Waldinventur 2000-2002

Afforestations in 1998 amounted to 11,676 ha in Austria, that is about 0.3% of the forest area.

Table 21. Afforestation in 1998 in Austria and its regions

Federal State	Afforestation in ha
Burgenland	335
Carinthia	1,121
Lower Austria	3,900
Upper Austria	1,638
Salzburg	441
Styria	2,965
Tyrol	813
Vorarlberg	173
Wien	192
Austria	11,676

Source: BMLFUW 2004

There is no data available for the **stock and accessible yield of non-wood forest products** in Austria.

5.3 Forest ownership

Private forest holdings (private forests and community forests) manage 2,938,491 ha forest area that is about 80% of the Austrian forest area (data for 2002). The majority of private forest holdings is smaller than 200 ha and manages 1,804,137 ha or 50% of the Austrian forest area (BMLFUW 2004, own calculations).

Publicly owned forest holdings (community forests/forests as assets; provincial forests; federal Austrian forests-ÖBF and other publicly owned forests) manage 698,918 ha of the Austrian forest area that is about 20% of the total forest area. Most of this area (522,700 ha) is managed by the Federal Austrian Forests (Österreichische Bundesforste). Table 22. shows the trends of forest area managed by different ownership categories and forest holding size over the last decade.

Table 22. Forest area in ha managed by different types of forest holdings

Year	Private forests < 200 ha	Private forests > 200 ha	Community forests	Community forests (forests as assets)	Provincial forests	ÖBF and publicly owned forests	Total
1993	1,647,297	776,226	341,567	76,389	44,622	589,210	3,475,311
1994	1,607,174	765,394	341,311	75,410	45,387	573,660	3,408,336
1995	1,665,919	781,422	343,180	76,380	46,358	578,969	3,492,228
1996	1,685,020	781,917	343,153	77,746	51,771	546,354	3,485,307
1997	1,636,520	722,420	333,862	80,440	44,139	537,687	3,355,068
1998	1,687,205	726,659	333,449	80,546	44,052	542,898	3,414,809
1999	1,729,039	773,702	335,772	81,387	44,060	575,658	3,539,618
2000	1,770,979	770,542	333,830	81,629	44,082	575,577	3,576,638
2001	1,786,268	776,632	359,051	89,391	41,810	564,459	3,617,611
2002	1,804,137	785,488	348,866	90,666	39,101	569,151	3,637,411

Source: BMLFUW 2004

The **right to collect and sell NWFP from public and private forests** is regulated by the Austrian Forest Act 1975. The Austrian Forest Act (1975 and amendments) only

allows the collection of non-wood forest products such as fruits, seeds, mushrooms, twigs, earth, turf or other soil constituents in small quantities. Article 174 makes it an administrative offence to collect without authorisation fruit or seed of woody plants for the purpose of profit, mushrooms to a quantity of more than two kilograms per day, or conduct or participate in mushroom or berry collection events (UNECE/FAO 2004).

Nature and landscape conservation laws (that are in the competence of the federal provinces) in different ways restrict forestry activities for the purpose of nature conservation. In some federal provinces, the collection of mushrooms is restricted, e.g. to every second day. This regulation for some part is for the benefit of the land owner, however, landowners are not exempted from the regulation.

5.4 Forest Production

Table 23 shows the annual wood harvesting by forest ownership categories. The Federal Austrian Forests (ÖBF) harvested about 13% of all harvested wood in 2002. Forest holdings larger than 200 ha harvested about 33% and forest holdings smaller than 200 ha harvested about 54% of the wood. This distribution reflects the distribution of forest area among the different ownership categories and size classes.

Table 23. Wood harvesting by private and publicly owned forest holdings

Year	Federal Austrian Forests	Private forest holdings		Total	Federal Austrian Forests	Private forest holdings		Total
		> 200 ha	< 200 ha			> 200 ha	< 200 ha	
	1000 m^3 under bark				%			
2003				17 055				
2002	1 931	4 958	7 957	14 845	13.0	33.4	53.6	100
2001	1 848	4 898	6 720	13 466	13.7	36.4	49.9	100
2000	1 692	4 722	6 862	13 276	12.7	35.6	51.7	100
1999				14 083				
1998				14 034				
1995	2 046	4 629	7 130	13 806	14.8	33.5	51.7	100
1990	2 044	5 225	8 441	15 711	13.0	33.2	53.8	100
1985	2 026	4 518	5 081	11 626	17.4	38.9	43.7	100
1980	2 067	4 358	6 308	12 733	16.2	34.2	49.6	100

Source: BMLFUW 2004, Statistik Austria 2004

Regarding the annual harvesting of non-wood forest products data is only hardly available. A study of the UNECE on Non-Wood Goods and Services of Forests gives some estimation for the annual production of foods from forests for 1995:

- Mushrooms: 66,000 Kilograms
- Berries: 1,900,000 Litres
- Christmas trees (number): 134,000

The number of harvested game in 2003 amounted to 989,005 (BMLFUW 2004).

Game and fishery accounted to 9.9% of **total revenue of the Federal Austrian Forests (ÖBF)** in 2002**.** The **annual harvesting of fuel wood** in the year 2003 amounted to 3 336,173 m³ that is about 20% of total removal. According to the forest management plan around 1.2% (~ 46,000 ha) of forest area is forest area with **recreational function** .

Forestry contributes 0.88 billion euro to the Austrian **Gross Domestic Product**, that is a share of 0.4% (2003) (Statistik Austria). The share of forestry in the GDP has decreased over the last decades. In 1976 forestry amounted to about 1% to the Austrian GDP.

The share of forest-based industries in the Austrian GDP was 3.9% in 2002, down from 4.1% in 1976. Overall, the share of forestry and forest-based industries of the GDP decreased from 5.1% in 1976 to 4.3% in 2002 (Schwarzbauer 2004, 7). The furniture manufacturing industry had a production in value of 1.33 billion euro in the year 2002.

5.5. Employment

In 2001 14,000 persons were employed in forestry, that is about 0.4% of all employees in Austria (Schwarzbauer 2004, 9) (number of employees in Austria: 3,523,000).
115 500 persons were employed in the forest based industries in 2001, that is a share of 3.3% in total Austrian employment. (Schwarzbauer 2004, 9)

In the furniture industry about 10,500 people are employed, that is about 0.3% of all employees. The **unemployment rate** in agriculture and forestry in 2003 was about 12.7%. This rate is nearly three times as high as the average unemployment rate of 4.4% in Austria in 2003. The unemployment rate in the sector ”wood and wood products” amounted to 8.2% and to 7.7% in the sector “paper and paperboard” in 2003 (Source: BMWA 2004).

No data could be found on the **share and amount of seasonal workers in forestry** in Austria.

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

Main problems for enterprise development in the forest sector arise from a small average forest holding size and consequently the high fragmentation of forest ownership in Austria. The small forest holding size implicates that there is hardly full-time engagement in forestry work by forest owners and that only a little share of income is earned from the forests. Most of the forest owners in Austria, especially the owners of small forest holdings, pursue a ‘business as usual strategy’ with regard to the management of their forest area. The prevailing goal is to maintain capital, while increasing profit is much less important Rametsteiner and Kubeczko 2003). In addition, there is a growing number of urban or absentee forest owners. These frame conditions are overall not supportive for entrepreneurial behaviour and enterprise development in forestry.

Main information sources:

BMLFUW 2004: Nachhaltige Waldwirtschaft in Österreich. Österreichischer Waldbericht – Datensammlung, Wien.

BMWA 2004: Der Arbeitsmarkt im Jahr 2003. Analysen, Prognosen, Forschungsergebnisse, Wien.

Bundesamt und Forschungszentrum für Wald (BFW): Österreichische Waldinventur 2000-2002, available at: http://bfw.ac.at/700/700.html.

Rametsteiner, Ewald und Klaus Kubeczko (2003): Innovation und Unternehmertum in der österreichischen Forstwirtschaft. Universität für Bodenkultur, Wien.

Schwarzbauer, Peter 2004: Marktstudie: Die österreichischen Holzmärkte. Größenordnungen-Strukturen-Veränderungen, Universität für Bodenkultur, Department für Wirtschafts- und Sozialwissenschaften, Institut für Marketing und Innovation, Wien

Statistik Austria 2004: Statistisches Jahrbuch 2004, Wien.

UNECE/FAO 2004: Forest Legislation in Europe: How 23 countries approach the obligation to reforest, public access and use of Non-Wood forest products.

Bulgaria

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Summary

This paper has been assumed that Bulgaria has significant resources and potential for further forestry production, which are not used effectively. The identified main barriers to entrepreneurship in the forestry, wood processing and non-wood products and services in Bulgaria are the low level of production and demand for forest – wood product services, and respective national policy. The lack of consensus for enterprise development in the forestry in Bulgaria defines a broad area of questions to be answered. Among them are which model for innovation system in forestry to be chosen? Which is the effective strategy for further integration to EU forestry structures, what kind of effective marketing strategies for Bulgarian products to develop in order to increase foreign consumers' demand? What kind of instruments to be introduced in order to increase sources for purchasing modern forest machinery, building forest roads and forestation? What kind of incentives to be implemented in order to improve quality of local production and to protect industrial property rights? How to speed processes of standardisation and certification?

1. Consumption

Summary

The consumption of forest related products and services have taken important place in Bulgarian rural consumption traditions. The approximately big share of urban population (67.4%) and structure of household expenditure distribution in the country are factors, which affect positively the forest products' and services consumption, while the level of income is factor with a negative influence. The bigger share in forest-related products and services consumption obtains round wood consumption, paper and paperboard apparent consumption, and packaging materials apparent consumption,

which characterises market demand for forest products' and services in the country. It has to be taken into account that export plays an important role in developing market demand in the country. The largest share of Bulgarian export of forest sectors and groups belongs to veneer sheets; plywood, lamin board, particle board, fibre board and other panels and board, followed by sawmilling & planing of wood; impregnation of wood. All forest sectors and groups export more than 1/3 of their turnover. The most foreign consumption oriented production is those of veneer sheets, plywood, lamin board, particle board, fibre board & other panels and board, which have exported more than 2/3 of the turnover.

1.1. State of the art and historical development

The consumption of forest related products and services has taken important place in the Bulgarian economic development. This has its roots on the one hand in the strong historical traditions of forest product and services consumption, and in the stable raw materials' base and developed skilled work force, on the other. The challenges of recent decade developments have affected forest related products and services consumption and have raised new problems.

Now there are many important research questions on the country and regional level with no satisfied answer. Among them are how to increase the level of internal market demand for forest related products and services, and for non-wood forest products and services by urban population, which are the specific problems of entrepreneurship in the firms in the sector. Recreational use of forests in Bulgaria is known field but because of changing the property system in Bulgaria – it needs more comprehensive investigations.

1.2. Potential for forest products' and services consumption in the country

The level of the demand of forest products and services is defined by country's (rural and urban) and foreign consumption. The main factor defining the country's forest products' and service consumption is its population. The population in Bulgaria is 7, 621 million inhabitants as of 2002[1]. The largest share is urban population - 67.4% of total one (2001). Over the last decade there is a tendency of decreasing the urban population, defined by the negative influence of demographical and brain drain factors. While the average annual growth rate of urban population is 0.3% for the period 1990-1995, it is negative –1.2% for the period 1995-2000. Nevertheless the urban population determines comparatively good potential for increasing the forest products' and service consumption in the country. A significant share of the forest products' and services consumption is concentrated in the capital. 1,096,389 Bulgarians live in the capital city Sofia (2002), which is 14-4% of the total population. There are 22 cities with more than 50,000 inhabitants, of which 8 cities are with more than 100,000 inhabitants, which defines the potential for increasing the forest products consumption in the Bulgaria.

Another factor affecting the level of forest products' and services consumption is the overall level of consumption in the country, defined by the gross domestic product per capita and expenditures distribution. For 2001 the gross domestic product per capita is 3,743 leva[2], which is 1923 euro per inhabitant. The total average per capita income is

[1] The data in this part is obtained from the National Statistical Institute

[2] According to the Bulgarian Law, the national currency LEV is fixed to Euro. 1 Lev = 0.511249 Euro.

1,830 leva. Its distribution by source shows that the most important sources of income are the wages and the salaries – 631 leva, the pensions – 377 leva, and household plot (in 2001). In spite of the level of consumption in the country is low comparatively to the other European countries, the low prices of national forest products' and services could increase their share in national consumption structure.

Household expenditure distribution in the country also affects forest products' and services consumption. The total household expenditure in 2001 is 4,249 leva, of which 4,031 are the overall expenditures, and 3,546 are consumer ones. The major part of consumer expenditures – 1,758 leva, is for food and non-alcoholic beverages, followed by those for housing, water, gas and other fuels – 465 Leva. The conclusion is that consumer expenditures take big share in household expenditure distribution in Bulgaria. This confirms the above assumption that the low prices of forest products' and services could contribute to increasing their share in overall consumption expenditures.

At the end we may conclude, that the large amount of population, and household expenditure distribution are factors, which affect positively the forest products' and services consumption, while the level of income is factor with a negative influence to its level.

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

The market demand for forest-related products and services is characterised by apparent urban consumption in the country and abroad. The internal market demand for wood product categories in the country is shown in Table 1.

Table 1. Consumption of some forest products in Bulgaria

Products/years	1998	1999	2000	2001	m^3/1000 inhabitants
Roundwood consumption (1000 m^3)	2,975	4,176	4,529	3,769	479.1
Sawn softwood consumption (1000m^3)	176	128	107	95	12.1
Sawn hardwood consumption (1000m^3)	44	-70	-42	-36	-4.6
Practice board consumption (1000m^3)	119	35	126	130	16.5
Plywood consumption (1000m^3)	22	23	12	31	3.9
Fibre board consumption (1000m^3)	55	19	195	241	30.7
Chemical wood pulp consumption (1000 m.t.)	42	30	31	27	3.5
Paper and paperboard consumption (1000 m.t.)	201	196	211	239	30.4
Graphic papers consumption (1000 m.t.)	40	62	77	83	10.6
Sanitary and household paper cons. (1000 m.t.)	…	21	9	11	1.4
Packaging materials consumption (1000 m.t.)	…	99	110	124	15.8
Other paper and paperboard consumption (1000 m.t.)	…	14	15	21	2.7

Source: UNECE/FAO TIMBER database, 2002

Round wood apparent consumption has performed the largest share of forest products consumption in Bulgaria – 479.1 m^3 per 1000 inhabitants in 2001. Paper and paperboard apparent consumption per 1000 inhabitants is 30,700 m.t. Packaging materials apparent consumption is also well developed in the country.

Table 2: Production and export of the Bulgarian wood sector

Sectors and Groups	**Gross Output (1000 US$)**			
	1997	1998	1999	2000
Saw milling & Planing of Wood; Impregnation of Wood	22,669	39,255	45,061	44,175
Veneer Sheets; Plywood, Laminboard, Particle Board, Fibre Board & Other Panels and Board	47,469	43,982	55,631	49,733
Builders' Carpentry and Joinery	18,366	14,981	18,360	14,391
Wooden Containers	4,348	5,174	7,590	6,735
Other Wood Products; Cork Articles, Straw, Plaiting Materials	6,135	6,090	7,292	9,647

Source NSI, NKID

The foreign market demand for forest related products and services is an important factor, which influences those product and services development in small and opened economies like Bulgarian one. This hypothesis is confirmed by the fact that the largest share of Bulgarian forest output is exported. All forest sectors and groups export more than 1/3 of their turnover. The most foreign consumption oriented production is those of veneer sheets, plywood, laminboard, particle board, fibre board & other panels and board, which have exported more than 2/3 of the turnover.

Table 3. Production and export of the Bulgarian wood sector

Sectors and Groups	**Turnover (1000 US$)**			**Export (1000 US$)**			
	1998	1999	2000	1997	1998	1999	2000
Sawmilling & Planing of Wood; Impregnation of Wood	43,401	48,045	49,819	13,565	19,201	20,552	19,011
Veneer Sheets, Plywood, Laminboard, Particle Board, Fibre Board & Other Panels and Board	44,330	60,360	53,734	28,049	31,245	35,381	37,014
Builders' Carpentry and Joinery	15,473	19,083	14,382	3,879	4,593	7,252	5,192
Wooden Containers	5,623	8,155	7,166	986	1,622	2,117	2,891
Other Wood Products, Cork Articles, Straw, Plaiting Materials	6,538	7,553	10,982	4,037	5,656	5,178	4,616

The main factor for higher level of forest products and services demand is urban consumption. The prevailing population in Bulgaria is urban - 67.4% of total one, which might lead to bigger share of consumption. The fact, that many people having secondary residence – cottages, stimulates forest products and services consumption.

Table 4. Share of export in wood production

Sectors and Groups	**Export/Turnover (%)**			
	1997	**1998**	**1999**	**2000**
Saw milling & Planing of Wood; Impregnation of Wood	61.2	44.2	42.8	38.2
Panels and Board	63.9	70.5	58.6	68.9
Builders' Carpentry and Joinery	21.5	29.7	38.0	36.1
Wooden Containers	21.8	28.8	26.0	40.3
Other Wood Products; Cork Articles, Straw, Plaiting Materials	65.1	86.5	68.6	42.0

At the end we may assume that the market demand for forest-related products and services in Bulgaria is defined mainly by external (foreign) apparent urban consumption. Taking into account the figures, less important is the apparent urban consumption in the country. But here it has to be considered, that many people, living in towns, have secondary residence – cottages, which stimulates forest products and services consumption.

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

The main research questions for enterprise development in the forest in Bulgaria can be summarised as follow:

- how to develop internal and external market for forest – wood product / services;
- how to attract more investments in forest establishment for utilisation of productive potential of the forest – land asset;
- how to improve the quality of forest related products and services;
- how to develop effective marketing strategies for forest related products and services.

The current research has identified several concrete areas of lack of information, which exposes the necessity of a large scale investigation of the problems of the consumption of forest related products and services by population.

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

Organisations, studying forest products' consumption and their speciality.

There are some organisations, studying forest products' consumption, but this activity is not enough well developed in the country. Significant efforts are needed to cover this gap.

Organisations, studying forest products consumption	**Addresses and Contacts**
University of Forestry	10, Kl. Ohridski str. 1756 Sofia Fax:(+359-2) 622830 Tel.: (+359-2) 8223429
Bulgarian Academy of Science – Forestry Institute and Institute of Economics	3 Aksakov Str., 1040 Sofia fax: 359-2- 9882108 phone:359-2-9890594x404
Ministry of Agriculture and Forestry	Directorate Forestry Dep. Forest Utilisation &Marketing Sofia, Vazrazhdane sq. Tel.: (+359-2) 9881412
Chamber of Wood Processing:	Tel.: (+359-2) 9634299
College of Management Institute for Ecological Agriculture Trojan	Tel.:(+359-2) 77 59 67 Tel: College: (+359-670) 2 89 22

Main publications and information sources on forest products consumption in the Bulgaria

NSI Republic Bulgaria, 2000- 2002

Annual report of the National Forestry Board 2002, journal FOREST, 2003/6 (Годишен отчетен доклад на Националното управление по горите за 2002г. – сп. "Гора", бр.6, 2003г.)

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2. Small – scale forestry practices

Summary

The small - scale forestry practices, applying modern technical achievements, have obtained a big potential to contribute to the increasing of consumption and living standards of the population, which makes them important subject to be investigated. Historically have taken modest place in Bulgaria. This state-of-the art is defined by the fact that the numbers and scale of small-scale forests is very limited (the small-scale forests are at about 9 % of the forest reserve of the country and are of a scale of 1-2 decars up to 10 hectares). From the other hand the share of the small-scale forests products towards the national and regional gross domestic product – GDP is very small.

The entrepreneurship in small-scale forests is hampered by the lack of well developed forest market in the country, by the problems with restitution of forests and land of the forestry reserve, by the bad claims of the municipalities for ownership over the former "baltalatzi" (forests, given in the past, by the state to the municipalities to use). In addition, the market of forestry goods and services is restricted to the use of wood only. The high level of fragmentation of the forest property due to the process of restitution is another barrier to small-scale forest entrepreneurship development. As a result, the share of wood harvesting from the small-scale forests compared to the total wood harvesting of the country is not statistically outlined. For the very moment the functions of these forests are mainly recreation, protection, landscape, bio-variety, hunting tourism. The non-wood forest products (mushrooms, herbs, forest fruits, etc.) are not well performed in the small-scale forests, while the recreation and hunting tourism have major impact in their development.

The basic economic and management characteristics of current small-scale practice are connected with the process of restitution and privatisation, and also with the timber wood harvesting to a limited extent. Practices, connected with the regeneration of the small-scale forests are very limited, because the financial supplies (either private or bank credits) are almost impossible. As far as it concerns the wood harvesting, small amounts of wood are obtained mostly in the forest co-operatives in the Rhodopy Mountains. The harvested small-scale forests' wood is preliminary used for firewood and quite seldom for timber. The wood harvesters are mainly the owners themselves, and the wood is used mainly for their own needs. The small-scale forests' harvest of wood assortments is extraordinarily minor to produce basic characteristics of the small-scale forests' wood market.

2.1. State of the art of the topic in the literature

The small - scale forestry practices have taken modest place in Bulgarian history, in spite of they contribute to the increasing of consumption and living standards of the population. May be this is one of the reasons for the lack of information for small - scale forests on the territory of the country, in addition to the limitations of the research programs of the institutions and organisations, dealing with research and investigation of forest ecosystem and forestry have never performed a systematic investigation. Nevertheless there are some programmes, which are used for fragmentary assumptions. One of them is the Bulgarian – Swiss Forest Program, which has organised investigations about the small forests in the agricultural land and the plains, and about the single centurial trees. The results have concerned the genetic and species variety in

these ecosystems, but not economic aspects of their development. On the other hand these types of forests cannot be determined as a small-scale in the particular circumstances. The studies and programs concerning the restituted private forests, realised in the frame of the German – Bulgarian Forest Program /GBFP/ are also insufficient for the purposes of our study. The information gathered about the above mentioned problem is almost fully based on an expert assessment of forest science specialists. In addition, we have to mention, that the term small-scale forest has different meaning in the different European countries and the conclusions provided have to be précised. The observation says that for the countries with large forest recourses and centurial traditions in forest uses the small - scale forests consist of about 100 ha. For the Bulgarian circumstances, a small scale - forest consists of up to 10 ha. That is why it is difficult to rely on comparisons and conclusions in that respect. The provided further results of the study are aimed to contribute to improvement of the understanding of small-scale forest practices in the country.

2.2. Small-scale forest holding[3]

The small-scale forests obtain very small share in the country – about 9 % of its forest reserve. The forest reserve of Bulgaria amounts up to 3 980 032 hectares[4]. The state forestry reserve of the country is 85.93 % of the total area of the forests, 8.1 % - private property, 5.3 % - property of the municipalities, 0.45 % - property of religious communities and 0.22 % - property of corporal bodies.

The small-scale forest holdings in Bulgaria have different historical origins. The economic reform, started about 14 years ago put the privatisation and restitution of the agricultural and forest territories in the agenda of country.
Now the area of the small forests differs, depending on the origin, and varies from 1 – 2 decares to 10 hectares for the restituted forest massifs. The borders of these forests are usually other forest massifs and territories.

Over 95 % of the private forests are of small area – up to 10 ha, i.e. almost all the forests of the private forest owners are included in the investigated category – the small-scale forests. And if we include small state forests here (bellow 1 % of the total), the small-scale forests would be assessed as of about 9 % of the forest reserve of the country, according to an expert opinion.[5]

The regional distribution of the small-scale forests along the territory of the country is characterised by a concentration mainly in the Balkan Range. Most of them are situated in the Sofia District, in the regions of Lovetch, Veliko Tarnovo, Montana. The most of the undersized parcels are situated there.

The share of the small-scale forests products towards the national and regional gross domestic product – GDP is very small. The provided survey shows, that the entrepreneurship in small-scale forest ownership is hampered by the lack of forest market, by the problems with restitution of forests and land of the forestry reserve, by

[3] Here we consider the area of a forest, held by one person or firm.
[4] Annual Report of the National Forestry Board for 2002, "Gora"magazine, issue 6, 2003.
[5] The authors express their gratitude to Assoc. Prof. Dr. N. Stoyanov" University of Forestry in Sofia, for his co-operation and expert assessments in the process of investigations.

the bad claims of the municipalities for ownership over the former “baltalatzi” (forests, given in the past, by the state to the municipalities to use). Another problem is that the market of forestry goods and services is restricted to the use of wood only. The fragmentation of the forest property due to the process of restitution is another barrier to small-scale forest development. This state of the art in addition to the other reasons also is defined by the fact that some of the owners are not yet legally owners and are excluded from the wood harvesting. Concerning the process of the forest ownership reform, the restitution of the forestry reserve land and woods is completed up to 95 % - 98 %. But in fact the restitution is completed only in of about 14 % of the forests, which is a barrier for entrepreneurship development there.

As a result, the share of wood harvesting from the small-scale forests compared to the total wood harvesting of the country is not statistically outlined. The harvested small-scale forests’ wood is preliminary used for firewood and quite seldom for timber. The wood harvesters are mainly the owners themselves, and the wood is used mainly for their own needs. The small-scale forests’ harvest of wood assortments is extraordinarily minor to produce basic characteristics of the small-scale forests’ wood market. For the very moment the functions of these forests are mainly recreation, protection, landscape, bio-variety, hunting tourism. The non-wood forest products (mushrooms, herbs, forest fruits, etc.) are not well performed in the small-scale forests, while the recreation, hunting tourism have basic impact for developing them.

2.3. Small-scale forestry practices

The basic current small-scale forestry practice in the country is characterised on the first place by the process of restitution and privatisation, and by the timber wood harvesting to a limited extent. Practices, connected with the regeneration of the small-scale forests are very limited, because the financial supplies (either private or bank credits) are almost impossible. As far as it concerns the wood harvesting, small amounts of wood are obtained mostly in the forest co-operatives in the Rhodopy Mountains.

Micro economic and legal framework, as well as the lack of experience creates barriers to the private forest owners in the process of formation of strategy of the economical realisation of their property. The increased forest products’ and services’ demand and the newly formed relations and interests in the process of their production and regeneration, maintain the difficulties in the performance of the management process of the forests.

The restitution of the land and forests from the forestry reserve has created small and scattered property. That fact, together with the lack of attitude towards the forests as a specific type of property, settles obstacles for effective management. That exposes the necessity of land consolidation of the territories of the municipalities or the forestry. Otherwise the small-scale forests will gradually lose their functions and that will lead to further development of the erosion process, reduction of bio variety and the change for the worse of the ecological situation as a whole. At the present moment, with minor exceptions, the private owners have not organised their own associations and delegations for common decisions. The share of the private forests is the most expanded in the Rhodopy Mountains and there is the only place, where the floristries and the so-formed forest co-operatives interact actively.

There is an experience of association in forestry practices in the country. There are 10 – 15 forest associations and forest co-operatives. That reflects the higher level of protection and maintenance of the forests, orientation towards eco-production and the higher quality of the manufactured goods up to the demands of the European market. It is also a prerequisite for utilisation of the opportunities for co-financing and protection of forestry owners' interests.

The wood harvest of the small-scale forests is preliminary used for the self-satisfaction of the owners' necessities. But the proper statistic data is not available, as receipts and expenditures, as well as the average income per hectare are not included in the actuarial reports. The expert assessment declares that the investment activity is nearly absent in the restituted small-scale forests. The deficiency of private resources and the severe bureaucracy prevent the private forest owners to apply for credit granting in order to afforest and maintain their property; to build forest roads and to purchase forest machinery, etc. Since August, 2003, the "SAPARD" program, measure "Forestry" has given the forest owners the opportunity to apply for credits, but the conditions and first of all the requirement for large forest massifs, make the application of the small forest owners impossible.

The newly formed pluralistic ownership, according to some opinions, defines the necessity of actualisation of the forestry projects and their organisation in a Single forestry fund. Presently there is no financial procedure in function for the private forest structure. The structural organisation of the private forests is financially supported and maintained, as before the restitution process. The only exception is the cadastral mapping of the forest according to the type of property.

According to inquiry investigations of the Timber and Furniture Industrial Branch Association and GTZ, the innovational activity of the forest owners is hindered by the absence of knowledge, experience, state aid and private resources for the performance of the necessary undertaking for the commencement of economic activity and attainment of economic realisation of the forest property. The shy innovational behaviour is very seldom available. It is a resultant dimension of the credit system status and the status of the legislation basis in the atmosphere of an unstable macro economic environment, and also it is an outcome value of the yet infant undertakers' experience and the insufficient knowledge of variable financial instruments. Purposes that differ from the mentioned above are not registered as a platform for any forest owners associations, which is a barrier to find quicker political solution of existing problems.

At the end we may conclude, that the main current small-scale forestry practice in the country is characterised on the first place by the process of restitution and privatisation, and by the timber wood harvesting to a limited extent. The harvested small-scale forests' wood is preliminary used for firewood and quite seldom for timber. The wood harvesters are mainly the owners themselves, and the wood is used predominantly for their own needs. The small-scale forests' harvest of wood assortments is extraordinarily minor to produce basic characteristics of the small-scale forests' wood market. The innovation activities are very limited in the sector. The lack of statistic information, and surveys, which concern the aims and the plans for cultivation of the small-scale forests, affects efficiency of management of the small-scale forestry in the country.

2.4. Policy framework and production conditions for small-scale forestry practices

The legal framework for regulation of the relations, connected with the restitution of the forests and the land in the forestry reserve is based on the Law for the restitution of forests and forest fund lands and the Regulations for Implementation (passed at the end of 1997). The governmental bodies, dealing with restitution are the Ministry of Agriculture and Forestry and the Land Commissions. Regional Commissions for inquiry control of the filled applications for the private forest territories, has been constituted in order to solve the problems in verification of the interest in lands and forests.

The presently existing legislation providing and directly connected to the uses of wood from the Bulgarian Forestry Reserve are as follows:

- Restoration of Ownership over Forests and land in the Forestry Reserve Act, ROFLFRA, published in the State gazette of Bulgaria, issue 110/ 25.11.1997; revised, issue 33 and 59/ 1998; amended, issue 133
- Forestry Act. Published in the official gazette of Bulgaria, issue 125/ 29.12.1997; amended, issue 133/1998; issue 26/1998; issue 29 and 78/2000.
- Hunting and Game Protection Act. Published in the official gazette of Bulgaria, issue 78/ 26.09.2000;
- Rules on the implementation of the Restoration of Ownership over Forests and land in the Forestry Reserve Act. Published in the official gazette of Bulgaria, issue 41/1998; amended, issue 105/1999;
- Regulation on the Implementation of the Forestry Act. Published in the official gazette of Bulgaria, issue 41/1998;
- Regulation of the Right of usage of wood.
- Ordinance № 32 of the Valuation of forests and the land in the Forest Reserve. Published in the official gazette of Bulgaria, issue 3/12.01.1999;
- Regulation on the Licenses of physical and legal personalities for pursuit of private forestry practice. Published in the official gazette of Bulgaria, issue 80/14.07.1998;
- Regulations on the Terms and Procedures for the Administration of the Restituted Agricultural Land. Published in the official gazette of Bulgaria, issue 76/27.08.1999; etc.

The appropriate state economical regulation for the direction of the restored owners to a positive attitude towards their property is still missing. Up till now there has not been presented any direct opportunities to the forest owners for financial support, because the objects of accrediting can be only investment projects of small and medium sized enterprises (SME) in the branches of industry, transport, processing of agricultural production and tourism, and the necessary condition is the establishment of employment and the export orientation of the production. The investment programs of the State Fund "Agriculture" and "SAPARD" Program are also accessible only to SME – agricultural producers. Intermediary and consultation support of international bilateral programs is granted to SME only, and not to physical personalities, municipalities and Boards of Church Wardens.

The Bulgarian Swiss Forest Program (GTZ) promotes the national policy towards the forests and the legislation. It contributes for the balance of the ecological, economical and social functions of the forests by their long-term and natural management. The

German – Bulgarian Project for promotion of the private forest restitution (DBFP) has a very significant role for the development of the small-scale forest property.

The institutions that are responsible for the regional development and the small-scale forest property are the Ministry of Agriculture and Forestry – the Ministry has worked out a National Plan for Development of Agriculture in the Rural Districts for the period 2000 – 2006; Ministry of Regional Development and Public Works – the Ministry has worked out regional plans for development, based on the municipal strategies and the National Forestry Board, as a state control authority.

The private forest owners are able to enjoy the services of expert consultants from: the National Forestry Board, the Regional Forestry Boards, the State Forestries, the Forest Institute, the German – Bulgarian Project for promotion of the private forest restitution (DBFP) The Forest University, the Bulgarian Swiss Forest Program (GTZ).

The German – Bulgarian Project for promotion of the private forest restitution (DBFP) gives the private forest owners the opportunity for "training" in the forestries in order to form an adequate attitude towards the forest. Science and educational institutions in the sphere of forestry are also the Forest University, Forest Institute of the Bulgarian Science Academy and the Bulgarian-German Center for Professional Training.

The owners of private forests may look for support by the above-mentioned organisations in order to obtain expert assessments and researches, and also by the Regional Development Agencies. But the inquiries still declare that the necessary relations of co-operation and support between both sides in the process of optimisation of the small-scale forest property uses are not established yet.

The National Forestry Board, as a section of the Ministry of Agriculture and Forestry performs the state control functions in the forestry sector; it manages a policy of protection and extension of the forests, the stable forest development, the protection of the biological diversity and multifunctional uses. The Regional Forestry Boards realise the State Policy for the Management of the Forest Reserve and the control over the forests and the land in the forest reserve.

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

The supporting factors for enterprise developments in small-scale forestry are very few, and would by summarised in one word – enthusiasm. But this is not enough and practically development in this area is blocked.

The main problems and research questions for enterprise development in small –scale forestry and barriers to the entrepreneurship have concerned: a) development of market for forest – wood product / services; b) identification and attraction of considerable investments in forest establishment for utilisation of productive potential of the forest – land asset; c) how to increase sources for purchasing forest machinery; build forest roads and forestation; d) how to increase the quality of introduction of harvesting regulation; e) to improve the quality of introduction of the level of competency of the "new" forestry owners, or to find new forms for effective forestry management; f) how

to make state policy towards transformation of ownership and management system in forest sector clearer. The change of the policy approach of the recent government and lack of ideas for implementing new one leads to blocking the reform and stagnation in the forest sector.

Conclusion

The above analyses make clear the necessity of a large scale investigation of the problems of the small-scale forests – contribution to the consumption, quality and standard of production, property, markets, quantity of the wood harvests and services, investments, innovational policy, management and organisation, co-operation, etc. The possible solutions could be similar to the countries from Central Europe with small-scale restituted forest holdings like Bulgaria: Romania, Hungary, Poland and Slovenia. The topics of the future research could be focused on: forest owners and their attitudes and actions; where forest owners' actions connect to entrepreneurial activity elsewhere in the economy, whether in timber or non-timber supply chains or through halo effects, especially in locally based activity; recognition of wood and non-wood elements as potential contributions to this entrepreneurial activity; recognition of a regulatory environment which might constrain or enable entrepreneurial action; and recognition that there is often a structure of forest owners' associations which can help small-scale forest owners overcome some of the obstacles of small-scale forestry.

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

Organisations, studying forest products consumption	Addresses and Contacts
University of Forestry	10, Kl.Ohridski str. 1756 Sofia Fax:(+359-2) 622830 Tel.: (+359-2) 8223429
Bulgarian Academy of Science – Institute of economics, Forest Institute	3 Aksakov Str., 1040 Sofia fax: 359-2- 9882108 phone:359-2-9890594x404
Ministry of Agriculture and Forestry	Directorate Forestry Dep. Forest Utilisation &Marketing Sofia, Vazrazhdane sq. Tel.: (+359-2) 9881412
Chamber of Wood Processing:	Tel.: (+359-2) 9634299
College of Management Institute for Ecological Agriculture Trojan	Tel.:(+359-2) 77 59 67 Tel: College: (+359-670) 2 89 22

Main publications and information sources on forest products consumption in the Bulgaria

NSI Republic Bulgaria, 2000- 2002

Annual report of the National Forestry Board 2002, journal FOREST, 2003/6 (Годишен отчетен доклад на Националното управление по горите за 2002г. – сп. "Гора", бр.6, 2003г.)

Annual report of the National Forestry council 1997 – 2001.

National policy and strategy for sustainable development in forest sector in Bulgaria, Sofia, 2003, Ministry of agriculture and forestry, (Национална политика и стратегия за устойчиво развитие на горския сектор в България – София, 31.01.2003г., МЗГ)

Midterm strategy for development "Action 2005" – Joint initiative of Bulgarian business and the policy for Bulgarian forest industry development, May, 2003 (Средносрочна стратегия за развитие " Акция 2005"- Съвместна инициатива на бизнеса и политиката за развитие на българската дървообработваща и мебелна промишленост, София, май 2003г.)

Bulgarian-Swiss Forestry Programme (BSFP) – Sylvica foundation, 2002, Public opinion and awareness for close-to-nature and sustainable forest management

Report of National forestry fund (NGF) for manufacturing and realization, 2000- 2002

Collecting and marinating data base for WFI, S, 2001.

Development Strategy for WFI till 2005 / Action 2005/, S. 2003.

Vachkovski, C., Dimitrov, C., 2003, Forests and forestry in Bulgaria in XX century, (Инж. Христо Вачовски, инж. Стамен Димитров, ГОРИТЕ и горското стопанство на България през XX век, София, 2003)

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Chobanova, R., D.Ivanova, K.Mihova, V.Koleva, G.Hristova, H.Doichinova, K. Bonev, R.Tzolova, T.Terzieva (2005), Economic integration of urban consumers'demand and forestry production in Bulgaria, Economic research, 2005, book1, 117-149.

Ivanova D., G. Christova, V. Koleva, 2001, The furniture market in Bulgaria- reality and perspectives, Svishtov.

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Ivanova D., 2001, Marketing surveys in WFI, Sofia.

Ivanova D., I. Paligorov, N. Stoyanov., 2002, The market of raw material in Bulgaria, Sofia.

Yovkov, Iv. 1991, Managing economic processes in territorial structures, Sofia, (Йовков, Ив., Управление на икономически процеси в териториални структури, София, 1991г.)

Yovkov, Iv. 1992, Bulgarian Forestry in the beginning of transition to market economy, Sofia (Йовков, Ив., Горският сектор на България в началото на прехода към пазарна икономика, София, 1992г.)

Kostov, P., Enchev, E. 1987. Non-wood forest products use. Zemizdat, Sofia.

Vachovski, H.,S.Dimitrov, 2003. Forests and Forestry in Bulgaria during XX century. Sofia, 352 pp.

3. Wood-processing industries

Summary

The main factors affecting the competitiveness of forest – wood / non-wood / services – consumer chain from the point of view of entrepreneurship are: the old and amortised equipment and technologies; shortage of investments for scientific researches; insufficient information about credit programs; the low ability for planning and managing the investment processes, the production and the risk; the low quality of the production; poor knowledge of the international standards; lack of functioning laboratories for testing the production; the low level of the co-operation between the enterprises; lack of regional formations (clusters); the lack of partnership between the industrial enterprises and designers and scientific centers; inadecuate financial support of the know-how transfer.

The barriers to entrepreneurship concern too high collaterals required by the banks; the high interest rates; the lack of information about different financing possibilities; the inadequate system for risk assessment by the banks; the insufficient bank products. To guarantee sustainable development of the sector, we consider that possible policy implications can be: a) stimulation and financial support of the scientific and research activity; restoration of the relations between the science and the production; b) Supporting the formation of regional sectoral complexes (clusters) and the building of business incubators, in order to increase the economic potential especially in rural regions in Bulgaria and its approach to European economic environment.

3.1. State of the art and historical development

Woodworking and Furniture industry in Bulgaria has traditionally an important meaning for the Bulgarian economy. This has its roots on the one hand in the rich history and on the other on the stable raw materials' base. The enterprises from the branch produce wide range of semi-manufactured products of timber both for the domestic and foreign market.

During the last years in the branch "woodworking and furniture industry" becomes some serious changes, according to:

- Increasing of the number of the enterprises with activity dealing and trade with wooden products and furniture;
- Change in the property and juridical status of the companies;
- Uniting of the enterprises in branch organisations, defending their interest in front of the official institutions and participating in the legislation frame;
- Increasing of investments and TFA – techniques and technologies, including foreign investments;
- Appearance of co-operative enterprises and est.

All of this makes the branch attractive and interest object for research, as for a domestic, also for international projects.

3.2. Wood processing industries

Historical development. The historical development of Woodworking and furniture industry passes over several stages, corresponding to the evolution of the processing factors. Till the 70-s in the economy centrums in the country are founded outstanding enterprises with big volume of output, basic founds and labour force. After 1970,

aiming more completely utilisation of the resource and solving others arisen social, economical and others problems are formed small and medium size enterprises in the undeveloped economical regions. Up to the structural reform in 1988, as a private owner of the forest the country was determinating the size of the forest, which was utilised on the base of needs for domestic and foreign market. The given public subsides make the economical status of the enterprises worse and these leads to disruption of their traditional manufacture – business links, and the high per cent interest of the bank loans, contribute for drop of the industrial production. The crisis in the woodworking, cellulose-paper and furniture industry find an expression in not fully utilisation of the manufacturing capacity and in the impossibility for financing of the repairing and innovations. The development of the economy and rehabilitating of the private property is an alternation of the forms of management of the production. For the period 1995 – 1998 in woodworking and furniture industry were founded over 4500 small private economical characters.

Structure of the enterprises, number of employees, sales, turn over, regional allocation. The companies in the branch are relatively regularly allocated within the Bulgarian territory. The total number in 1997 is 2718, where 2612 are in private sector. Based on the National Statistic Institute data there are 1710 woodworking enterprises and 1008 furniture in 1997. 1654 of them are private in woodworking sector and 958 – in furniture. Their allocation by regions is shown in the Table 5.

Table 5. Number and allocation of the enterprises – 1997

No	Region	Total	Woodworking	Furniture
1	Blagoevgrad	254	174	80
2	Bourgas	111	80	31
3	Varna	110	64	46
4	Veliko Tarnovo	85	54	31
5	Vidin	24	16	8
6	Vratsa	25	9	16
7	Gabrovo	118	56	62
8	Dobrich	38	18	20
9	Kurdjaly	25	20	5
10	Kjustendil	38	21	17
11	Lovech	220	130	90
12	Montana	51	39	12
13	Pazardjik	227	177	50
14	Pernik	21	16	5
15	Pleven	64	35	29
16	Plovdiv	215	125	90
17	Razgrad	27	14	13
18	Rousse	103	45	58
19	Silistra	50	39	11
20	Sliven	65	51	14
21	Smoljan	136	123	13
22	Sofia - city	239	67	162
23	Sofia - region	103	90	13
24	Stara Zagora	133	73	60
25	Targovishte	41	27	14
26	Haskovo	65	40	25
27	Shoumen	101	79	22
28	Yambol	29	18	11
	TOTAL	2718	1710	1008

Among active enterprises existed in the year 2000, 97 percent are small-sized (1-50 employees), 2 percent medium (51-150 employees) and 1 percent large (more than 151 employees), and 99 percent of them are private owned[6]. Based on a survey made by the SFB Capital market JSB in 2002, there are 5,545 woodworking companies, which are divided into following sectors as it is shown on the next Table.

Table 6: Woodworking companies by sectors

Production type	**Number**
Cutting out, edging and impregnation of wooden material	2,041
Manufacture of plywood and wooden plates	141
Manufacture of woodworks, structures and details from wooden material for the construction	1,880
Manufacture of packing from wooden material	165
Manufacture of other products from wooden material	1,286
Manufacture of products from cork, straw and materials for knitting	32

The biggest is the share of the companies of "Cutting out, edging and impregnation of wooden material", following by "Manufacture of woodworks, structures and details from wooden material for the construction ". The smallest is the share of producers of "Manufacture of products from cork, straw and materials for knitting ".

With the relative share of 7.0 percent of the gross output in the manufacturing industry, has gradually extended its the share from 5.7 percent among all manufacturing industries in Bulgaria during the period 1997-2000, as only the volume of production of " Manufacturing of timber and wooden products" has increased with 26 per cent.

As for the turnover, its trend of share change during the period 1997-2000 it has increased by 15.7, as the increase of the turnover only in the sector " Manufacturing of timber and wooden products " for the same period is a 43.5 %. During the period the number of employees has decreased with 22.5 % or with 3,806 real workshops and during 2000 they were 13 099 employees.

In spite of this more effectively utilisation of the labour force in the branch is ensured an increase of the GVA and of the productivity of the labour. The average salary is increased with 47.5 % for the period 1997-2000, while for the same period the growth of the BDS is only 2.2%. In 2002 the production of raw materials exceed 293 millions lv., witch is with 2.4% more of the levels reached during 2000 and with 26.4% from those in 1998. The data for the individual industries are systemised in Table 3, Annex 2. The total volume of production of the woodworking industry for the period 1998 – 2000 increased with 23,4% as the manufacturing of veneer and plywood are with biggest share – 40%, followed by the timber – 34.5% and details for construction (mainly doors and windows)- 12.5%. Based on the SFB Capital market JSB/2002 survey the companies operating in the furniture industry are 3,351, which are divided into following sectors.

Table 7: Number of furniture companies

Sectors	Number of companies
Manufacture of chairs and seats	299
Manufacture of office and trade furniture, excl. chairs	306
Manufacture of kitchen furniture, excl. chairs	688
Manufacture of other furniture	1,986
Manufacture of frames and mattresses	72
Total	3,351

The biggest is the share of the enterprises from “manufacturing others kind of furniture”, followed by “manufacturing of furniture used in kitchens, office furniture. The manufacturing of furniture during this period continues to increase and in 2000 is 194 millions lv. The share with clients orders is too big. With material of foreign clients are manufactured about 45% in 1999 and during 2000 - 40% from the production. The analysis shows that the growth is due mainly of the increasing of manufacturing of tubular furniture. The manufacturing of furniture of massive wood is various and it depends from the needs of the market.
The dynamic of the structure of the furniture industry is shown on table 5. After the big increase of the manufacturing of office furniture in 1999, compared with 1998 – with 48%, during 2000 it decreased with 19%. It is observe an increasing in the manufacturing of furniture used in kitchens in 1999 with 27 %, witch bears a positive correction in 2000 with 7%. The tendency in the manufacturing of furniture used in bedrooms, living rooms, dining- rooms is towards decreasing. With relative share of 1.2% from the production of the processing industry in country in 2000 the branch has the smallest share from all branches, in spite of this that there is a growth of current prices of 22.7%.

The turnover during the period 1997-2000 has an increasing with a 33.2% as a biggest is in the manufacturing of furniture, which share is 75%. The volume of the production and the turnover have a growth, appropriate 35.3% and 42.5% for the period 1997-2000. The same is the situation for the GVA, which increased with 17.9%. During the period 1997-2000 the number of employees in the furniture branch have decreased with 18.5% or with 4400 real workshops. In 2000 the employees were 19,174 or 3.4% from the total number of the employees in the processing industry. In spite of this the productivity of the labour during the same year is increased with 39.1%. Higher is the work load in the sector “manufacturing of furniture” – 77.4% from the total workshops. The average annual salary in the branch, which accounts to 851 USD, is about 30% lower from the average for the processing industry in 2000. The rate of the gross operative profit have decreased from 15.0% in 1997 to 12.9% in 2000, as a result of the comparatively high rate of increasing of the average salary - with 34.6% for this period.

Table 8. Manufacture of furniture over the period 1998-2000 by sorts:

Products	**1998**	**1999**	**2000**
Office furniture from solid wood	83,682	123,482	68,437
Kitchen furniture	132,751	96,928	103,712
Bedroom furniture (complex)	91,652	76,413	86,499
Furniture from solid wood for living-rooms and dining-rooms	149,342	126,415	136,669
Chairs - total	1,217,924	1,573,314	1,572,090
Non-upholstered chairs	532,507	575,229	793,167
Trestles	28,049	12,007	16,502
Tubular furniture (excluding office)	457,022	731,219	1,117,311

Macroeconomic Indicators of the Bulgarian woodworking and furniture industry are shown in tables 9 and 10.

Table 9: Macroeconomic Indicators of the Bulgarian wood sector

Sectors and Groups	**Gross Value Added (1000 US$)**				**Labour Productivity (US$)**			
	1997	1998	1999	2000	1997	1998	1999	2000
Sawmilling & Planing of Wood; Impregnation of Wood	4.600	6.819	8.844	5.927	1.166	1.234	1.635	1.103
Panels and Boards	12.462	9.790	12.086	8.299	2.368	2.506	3.616	2.934
Builders' Carpentry and Joinery	3.909	4.109	5.445	3.585	762	1.249	1.814	1.286
Wooden Containers	948	1.108	1.588	1.401	966	1.287	1.345	1.367
Other Wood Products; Cork Articles, Straw, Plaiting Materials	2.013	2.198	2.183	2.129	1.268	1.582	2.040	1.960

Source: NSI, NKID

Table 10: Macroeconomic Indicators of the Bulgarian wood sector

Sectors and Groups	**Number of Employees**			**Average Salary (US$)**			
	1998	1999	2000	1997	1998	1999	2000
Saw milling & Planing of Wood; Impregnation of Wood	5.527	5.408	5.372	536	631	672	735
Panels and Boards	3.907	3.342	2.829	901	1.353	1.481	1.413
Builders' Carpentry and Joinery	3.289	3.001	2.787	444	665	717	675
Wooden Containers	861	1.181	1.025	580	606	791	745
Other Wood Products; Cork Articles, Straw, Plaiting Materials	1.389	1.070	1.086	476	736	819	694

Macroeconomic Indicators of the Bulgarian woodworking and furniture industry are shown in Tables 12 and 13. The wood industry is stable at a little lower level from the line of GVA share equals gross output share. In fact, the share of GVA has been catching-up with that of gross output during the same period. For the period 1997-2000 the turn over have increased with 15.7%, and GVA - with 2.2%. In the sector “manufacturing of timber and wooden products” for the same period have been market growth of the turnover - 43.5% and of the GVA – 10.8%. The negative process in the furniture sector gives an expression in the decreasing of GVA with 12.0% during the period 1997-2000. in the frames of the branch , the GVA of the sector “manufacturing of furniture” for the period 1997 – 2000 have an increase in a amount of 17.9%.

Table 10. Macroeconomic Indicators of the Bulgarian furniture sector for the period 1997-2000 in 000 US$

Sectors and Groups	**1997**	**1998**	**1999**	**2000**
Gross Output (1000 US$)	67,572	81,095	84,942	91,422
Turnover (1000 US$)	65,200	83,489	88,825	92,926
брутна добавена стойност (1000 US$)	20,436	23,921	25,023	24,100
Labour Productivity (US$)	1,167	1,479	1,726	1,623
Export/Turnover (1000 US$)	31,478	35,278	39,151	48,224
Export/Turnover (%)	48.3	42.3	44.1	51.9
export (1000 US$)	7,614	10,358	10,893	11,877
Number of Employees	17,512	16,179	14,497	14,850
Average Salary (US$)	607	803	859	817

Source: NSI, NKID

3.3. Wood processing industries practices

Companies by juridical status and types of their registration. During the last years were founded great number of micro- and small family and craft companies, which were registrated more frequently as a Self-employed (SP), which leads to big increasing of the number of the companies – juridical and physical person in the branch. By the type of the juridical registration in all sectors in the woodworking industry the highest is the share of SP- 78% or 4334 numbers. Analogical is the situation in the furniture industry – the leading place is taken from SP with total number of 2507. Detailed information for the grouping of the companies from woodworking and furniture industry by their juridical registration is given in the Tables 11 and 12.

Table 11: Companies by juridical status and types of their registration, (Sole traders (ST), Self-employed (SP))

	Cutting out, impregnation of wood	**plywood and wooden plates**	**timber elements, construction frames**	**packing from wooden material**	**other timber products**
JSC	21	14	25	1	3
SPJSC	0	1	3	0	0
SPLtd	83	27	87	8	53
SP	1,621	59	1,468	107	1,052
Branch	1		1	0	1
Co-operation	26	1	46	7	9
Ltd.	234	37	178	33	109
Partnership	53	2	67	8	52
Others	2	0	5	1	5

Table 12: Group of the companies by registration

	Chairs and seats	**Office and trade furniture**	**Kitchen furniture**	**Other furniture**
JSC	7	12	7	45
Others	2	1	1	10
SPJSC	1	0	1	3
SPLTD	15	24	32	101
SP	239	209	552	1507
Branch	1	0	0	2
Co-operation	4	3	10	21
Ltd.	21	43	61	214
Partnership	9	14	24	83

The gross increasing of the number of the companies during the last 10 years is explained with the lowest barriers for entering in the branch (low initially expenses for starting of business in the branch, availability of great number of experts in the country, low levels of the salary in the branch and est.). The intensively competition is high, especially after the appearance of foreign presence in the market.

In the last years, and especially after 1997 and 1998, is observed a big interest from foreign investors for buying of separate stakes and also of whole enterprises. As an examples can be given: "Bules" - JSC Bourgass, "Orion luks" - JSC Sofia, "Pirinska mura" - JSC Bansko, "Hemus" - JSC Troian, "Ludogorie" - JSC гр.Kubrat, "Shwedski kibrit" - JSC Kostenec.

The statistic information about the direct foreign investments by countries and sectors for the period 1998 – 2001 marks the following tendencies:

- Growth of the absolute investment's rate (excepting 2001)
- Increase of the countries investing in Bulgaria
- Increase of the direct foreign investments in woodworking and furniture industry – totally over the period are invested 105,6 million USD
- Relatively small share of direct foreign investments in the sector in comparison with total investments in the country.

By a expert estimations the biggest foreign investors in the woodworking and furniture industry for the period 1998-2001 are:

1.IKEA - Sweden
2. KRONOSHPAN – Austria
3.GROSS – USA

In 2001 the timber production (without furniture) exceeds BGN 293 million. It is higher in comparison with 2000 with 2.4 percent and 1998 with 26.4 percent. So far the National Statistics Institute has processed only the information from the extraction observations. The information of it is used mainly for calculation of indexes of producer's prices with which is re-calculated the volume of the production at comparative prices.

The information on the whole nomenclature of the observations for manufacture of timber and its products, according to preliminary data and to the shortened nomenclature the manufacture in 2001 is, as it shown in the Table 13:

Table 13: Survey on timber manufacturing – 2001

Manufacture of:	**Measure**	**Quantity.**
Timber – cut and sawn	m^3	11,043
Oak, wooden parquet boards and details	m^2	105,835
Oak, beech and others.	m^2	0
Parquet, boards and details, profiled	m^2	290,231
Wooden traverses for railroad	m^3	0
Three-ply	m^3	43,417
Timber panels	m^2	169,437
Plywood sheets	m^3	4,148
Windows, double windows	m^3	26,076
Doors and frames, ledges	m^2	70,998
Ordinary timber pallets	pcs.	818,015
Cases, boxes and crates	kg	291,203
Rolls for cables of wooden material	kg	448,339

In 2000 the production of the furniture industry at current prices is BGN 194 million, which is 1.2 percent of production of the processing industry. The share of deals by clients' orders is quite big. With materials of foreign clients in 1999 are produced about 45 percent and 40 percent of the production - in 2000.

The analysis shows that the growth is due mainly to the enlarged manufacture of metal and tubular furniture. The manufacture of solid furniture is not regular and depends entirely on the orders for export and for sales at the domestic market.

Commercial characteristics. The realised export from the woodworking industry has increased with 17.3%, but his relative share from the total export of the processing industry is still smaller then the manufacturing indexes. Therefore it will be considerable to make the conclusion for the export orientation of the branch. The biggest is the increase in the sectors "manufacturing of raw material and wooden products" and "manufacturing of veneer, plywood and plates", respectively with 36% and with 32%. In the furniture branch is worth to be mention the growth of the export, realised from the "manufacturing of furniture" - 53.2%.

Over the period 1998 – 2001 the import of timber and its products constantly grew. This increase is different in various product ranges. The biggest is an increase in cases, boxes, crates and other packing, where the basic index is 4.09, while the lowest level has increase in three-play, plywood flatnesses and laminar wooden material –1.28. The negative rate registered two products ranges - Firewood (0.51) Plywood sheets and specific plywood (0.54).

The import of furniture has a lower pace of increase in comparison with timber products import. The highest basic index is in other furniture –1.74, while the lowest is in Furniture used in kitchens (1.11), as well as chairs and seats (1.12). In the export of timber for the period 1998-2001 the higher levels are reached in 1999 - 99,989,000

USD. The veneer, plywood, laminar wooden materials and the plates from wooden fragments and fibres are more frequently exported groups and they increase the export with more over 30%. After 1999 the volume of the export begins to decrease and in 2001 is with 6% lower, compared with 1998.

During the period 1999 - 2001 the export of furniture from wood is constantly growing and during 2001 have been exported 50.1 million US$, as the higher levels of exported groups are **chairs and seats** and **other furniture** are 30.5 per cent. The biggest quantities Bulgarian furniture are exported to USA - 19.8%, Great Britain - 18.4%, France - 8.2% and Germany 8%. The study of the structure of the export according to the Customs rate shows that about 45% of the export is a re-export of products, after processing materials of foreign clients. The biggest growth is in the first quarter of 2002 is marked in the furniture used id bedrooms- 616 thousand US$ (69.4%) and chairs and seats - 1.467 thousand US$ (23.0%). It is observe a decreasing of the export of office furniture - 118 thousand US$ (26%). The dinamic of the export and the basic domestic markets are shown in tables 10, 11 and 12 in Annex 2.

Technical characteristics of the production. For providing of the production competitiveness in domestic and foreign markets, by law the quality of the products are regulate with Legislation concerning technical norms of the products and the relevant technical standards. In contrast to many states, where the national standards are compulsory and have a statute as a law or regulation, in Bulgaria the technical standards are advisable**..** In the sector woodworking and furniture industry exists about 350 Bulgarian state standards and about 120 European (EU and ISO), which should be implemented as BDS EN and BDS OSO. In Figure 1 the standards, related the production of woodworking and furniture industry are presented.

The consumer's protection in Bulgaria is settled by a specialised Law of consumer's protection and rules of trade, as well as by operating sub legal framework. The control is made by the Commission of trade and consumer's protection and the Ministry of Economy. Legally, the consumer's protection is well regulated in the field of woodworking and furniture industry. The existing legal framework protects consumers basically in panels' utilisation, made by unhealthy sticked resins and glues, paints and varnishes. Legally is ensured also the consumer's protection against furniture production and its quality, as well as the harmlessness of utilised materials.

The technical innovations, made in the period 1998-2001are reduced to building of new lines for production of WB (wafen boards), used in construction and production of packings and line for the plates from wooden fragments. Also are modernised some technical parts of existing installation, aiming current maintaining. The production of seats and backs is enlarged.. Leading Bulgarian enterprises are concentrating their efforts during the period towards installing of: woodworking centres with numerical program control for working of furniture details on all stages of manufacturing process ,contemporary machines for sawing plates; contemporary canting machines .

Management and education. By an expert opinion, one of the problematic directions, in which must be fine a decision for the companies of the branch is the qualification of the managers and the businessmen in the fields of management and marketing. Because

of the specific of the branch, where are most SME, in the biggest part of the companies the property is not speared from the management. The owners of the biggest part of the new founded companies are experts from the branch, who doesn't have the required qualification and management skills. Only in the big enterprises the management is separate from the property and it is given to special engaged management teams. As a main problems in the management, can be mention the follow:
1. Scanty knowledge for modern and rational methods for production and management;
2. Low effectiveness of the production, connected with weakness of the organisation;
3. Necessity of increasing the qualification of the staff, especially in implanting of new techniques and technologies in the manufacturing.

3.4 Policy framework and production conditions

The well-developed legal and sub legal system in Bulgaria, elaborated by Ministry of environment and waters, Health ministry, Ministry of regional development includes the common laws of environment preservation as well as the relevant regulations and orders. Here are included the law for environment preservation; the law for limitation of the waste harmful influence on the environment; the law for purity of the atmosphere; the law for preservation of water and soil from waste; the law for people's health; the sub legal framework, which defines content of wood dust in the atmosphere, the limits of admissible concentrations of harmful substance in the air and in the working environment, values of harmful emissions within the exhaust gases from drying installations and burning of industrial wastes. Important for the branch are the norms for physical load down of the workers and hygienic-physiologic and ergonomic requirements for optimal organisation of the working process and place. These norms are compulsory concerning organisation and physiologic work standardisation.

Expert consultations and market researches can be done by Bulgarian association of regional development /BARD/, Bulgarian Association for Management Development and Entrepreneurship (BAMDE), Bulgarian Association of Management Consulting Organizations (BAMCO), Bulgarian Industrial Association (BIA), Bulgarian Chamber of Commerce and Industry (BCCI)/, experts from Forestry University and /GTZ/.

Connected with the enlarged of the export, since 1998 firstly for the EU countries and after for the rest countries, the export taxes for some round and sawn timber materials are removed. Since 2000, the export regime is strongly liberalised. It is put in operation registered regime for the export of raw unprocessed timber (customs tariff 4403). It concerns coniferous and wide leave timber with diameter in the thin end more than 4 cm, excluding destroyed by fire timber. For burned timber, there are disallow regime. The conditions and rules for registering of export transactions are defined by Regulation No4, article7-PMS 233. Registering of export transactions for unprocessed timber and firewood is accomplished by Forestry Ministry. It is necessary to be presented documents for the company, the goods and for the transaction.

The unprocessed round and sawn timber materials, which are from local tree types are free of taxes and duties for export and import. Different types of boards (particle, fiber, OSB etc.), plywood, veneer, windows, wrap page, furniture and other timber products are free of export taxes, bur for the import there are duties from 2.5-3 percent up to 20.5 percent, depending from the country, conformable to the Customs tariff of Bulgaria.

The companies from the branch formulate the main problems in the fields of the finance in the following descending order, by a degree and importance:

- Too high collaterals required by the banks;
- High interest rates;
- Lack of information about different financing possibilities;
- Inadequate system for risk assessment by the banks;
- Not developed bank products.

These problem areas are especially relevant for the micro and small companies, which are typically characterised by:

- Insufficient assets suitable as collaterals;
- Higher risk, hence higher interest rates required by the banks;
- Poor credit record because of relatively short market presence;
- Small loan amounts, which lead to relatively higher processing costs;
- Poorly developed market strategy and lack of export orientation;
- Lack of adequate accounting.

The analysis of the financial data, provided by the National Statistical Institute, substantiates the above mentioned obstacles through the following conclusions:
The companies from the woodworking sector demonstrate negative and further shrinking profit margins; the same indicator for the companies in the furniture industry is fluctuating between 2.7 percent and -2.7 percent.

The debt ratio of the companies from the branch, expressed as total debt divided by total assets, shows a stable trend of growth. This proves an increased capability for attracting external funds; it leads to higher risk levels though. This is especially true for the woodworking industry, where in the last years the debt to equity ratio exceeds 3. The furniture industry shows good possibility to serve its debts – in the period 1997-2001 the ratio 'Times interest earned' exceeds 5. Quite unfavourable is the trend of this ratio for the woodworking industry, where it dropped under 1 in 2001.

Regional policy. The woodworking and furniture enterprises are allocated non regularly on territory of the country, as the capacity are concentrated mainly on territorial and raw materials principles. As an example typical regions, in which are concentrated the manufacturing of wooden products and furniture in the country are: Troyan – Teteven, Veliko Tarnovo, Velingrad – Batak – Peshtera, Bourgass and ets. Technical and consulntance help the businessmen can take from Agency for regional development and from Agency for SME, Branch chamber of woodworking and furniture industry.

Institutions for education and science. The education and science institutions are allocated mainly in the towns with big woodworking and furniture enterprises and regions with rich of raw materials. In the region of Pazardjik there are 7 specialised schools, region of Plovdiv – 7, in region of Smolian -6, in Blagoevgrad – 5, town of Sofia – 4,the region of Stara Zagora – 5. Specialists with tertiary education are trained in the Forestry University in the profiles „Forestry economy", "Wood-processing and furniture manufacture industry" and "Engineering design". Post graduate, qualification and re-qualification courses in the field of "Wood-processing and Furniture manufacture

industry" are organised at the Forestry University. The University research sector provides for scientific and contractual projects for the teaching and technical personnel. There is a research and design sector, laboratory for wood modification and a wood-work shop.

Institution for forestry science in the field of "Forestry" and "Timber processing industry and furniture production" are as follows: 71 secondary specialised schools, Forestry University, Forest Research Institute, and some non-profit organisation amomg them are Branch chamber of woodworking and furniture industry, Federation of Bulgarian wood processing and producers of furniture at the Bulgarian chamber of handicrafts, Bulgarian Forestry chamber, Union of independent Bulgarian professional foresters, Bulgarian German centre for vocational Training (DBBZ).

Degree of bureaucracy, support of SME. Credit lines for supporting of SME from the woodworking and furniture industry are offered by: Hebros Bank Programme 'PERSPECTIVES' Developed in conjunction with EBRD Raiffeisen Bank, AD jointly with Soros Economic Development Fund "Soros", Encouragement Bank, CRS Bulgaria, German Credit Institution KfW ; National Network for Micro-funding; PHARE Programme; UNITED BULGARIAN BANK; CARESBACK–Bulgaria; Programs of the Dutch goverment – "PSO" и "PSO+"for economical development; Program of foundation "FAEL"; Program SAPARD and some others programs of Ministry of labour and social politic. A inquiry survey made by Branch chamber of woodworking and furniture industry shows that the businessmen are not acquaint and doesn't search actively information for the international projects and programs, aiming supporting the enterprises of the branch.

Annex C2: Organisations studying wood processing industries and main publications and information sources.

Organisations, studying wood processing industries are as in Annex A and B.

Main publications and information sources.

NSI Rebublic Bulgaria, 2000- 2002

Report of NGF for manufacturing and realization, 2000- 2002

Development Strategy for WFI till 2005 / Action 2005/, S. 2003.

Chobanova, R., D.Ivanova, K.Mihova, V.Koleva, G.Hristova, H.Doichinova, K. Bonev, R.Tzolova, T.Terzieva (2005), Economic integration of urban consumers'demand and forestry production in Bulgaria, Economic research, 2005, book1, 117-149.

Collecting and marinating data base for WFI, S, 2001.

Ivanova D., G. Christova, V. Koleva, The furniture market in Bulgaria- reality and perspectives, Svishtov, 2001.

Ivanova D., V. Koleva, Investments and ways for development of small and medium enterprises in woodworking and furniture industry, Sofia, 2002.

Ivanova D., Marketing surveys in WFI, Sofia, 2001.

Ivanova D., I. Paligorov, N. Stoyanov., The market of raw material in Bulgaria, Sofia, 2002.

4. Non-wood forest products and services

Summary

There are many definitions for NWFP&S. Here they are defined as Non-wood products for direct use – nuts, fruits, resin, game; Supporting services – grazing, bee-breeding, sport hunting, recreation; Life-supporting conservation, climate regulation, game supporting, erosion control, soil fertility insurance, amenities supplying, etc.

Historically Bulgaria has traditions in production and consumption of non-wood products. Resin from conifers, lightwood, medical herbs were widely used for domestic and sale purposes, as well as mushrooms, forest fruits, hip (*Rosa canina* fruits), blackberries, raspberries, blueberries, lime flowers, and more recently *Sambucus* flowers and fruits. A lot of herbs are used in traditional medicine. Part of them is for personal use the rest are exported. Changing of property rights over forests and forest areas did not affect significantly collecting non-wood products as species and quantity. There were some years between 1990-1996 when the recreation use was reduced, but recently it has been increased again. Despite the restoration of private property rights of some forest areas, real ban on entering these forests exists in very little percentage of them. Real strictness exists in some categories Protected areas (Natural or Biosphere reserves). One of the problems, which have arisen in the last decade, is poaching (timber harvesting, game hunting, plants, illegal grazing, etc.).

Small firms (of a family or other small communities) use to collect of NWFP and in some cases, are involved in the next processing like drying, packaging, etc.. They are performed in the further stage of processing and distribution export, if there is such one, but usually firms with more capitals, assets, contacts, etc. are performed there. Innovation in the field is at a low level. Most of methods used are close to traditional (which makes them environmentally friendly, but sometimes risky). Improvements made are connected with drying machines better build and organised stock building with ventilation, better packaging with appraiser materials and correct informing for purposes, dates of fitness, etc. There are possibilities for financial support from some EU and other Programs. More and more people know about that, but there is not enough knowledge about the applying process, as well as direct contacts with responsible experts. It is identified a need of training and education in both directions – how to organise the firm and work with respect to quality of the product and final consumer, and second – with respect to regulations and norms, including environment and nature protection.

4.1. State of the art and historical development

Historically Bulgaria has traditions in using non-wood products. Resin from the conifers, lightwood, medical herbs were widely used for domestic and sale purposes, as well as mushrooms, forest fruits, hip (*Rosa canina* fruits), blackberries, raspberries, blueberries, lime flowers, and more recently *Sambucus* flowers and fruits. Most of mushrooms and forest fruits, as well as herbs are collected for export. A lot of honey is produced in bee-gardens in forests.

Table 14. Collected non-wood forest products (NWFP) 1961-2000 (in *tons*)

NWFPs	**1961**	**1965**	**1970**	**1996**	**1998**	**2000**
Herbs	6835	8222	7285	-	-	624
Blueberries	213	454	274	182	51	126
Raspberries	525	1032	276	-	6	64
Cornel-fruits	1230	331	481	534	20	52
Blackberries	646	1432	355	182	39	360
Mashrooms	3329	1651	2651	422	2342	1288
Resin	1154	2945	2616	-	-	-
firewood	16844	11901	14843	-	-	-
Hay	-	-	-	1504	666	1395
Lime flower	-	-	-	703	239	1049

Source: Forestry Board and branches reports (Vachovski, Dimitrov, 2003)

Tendencies in collecting non-wood forest products could be summarized as follow: nearly giving up collecting resin and lightwood, some fluctuations in harvesting mushrooms, herbs, forest fruits, depending on buying up.

Table 15. Collected non-wood forest products 2002-2003 (in *tons*)

Resource	**Measure**	**Volume 2002**	**Volume 2003**
Christmas trees	Numbers	69,330	38,892
Fruits			
Shell nuts (walnuts, hazelnuts)	tons	10,303	12,653
Mellow fruits	tons	1,619	2,026
Rosa canina fruits	tons	398	204
Lime blossoms	tons	267	427
Herbs / dry	tons	8,022	6,670
Wild mushrooms, incl.:	tons	7,410	3,825
Edible boletus	“	4,325	187
Chanterelle	“	758	509
Agaric	“	947	495

Source: Stoyanov, D. 2003.

After 2000 some positive tendencies in collecting NWFP have taken place. Some data about revenues demonstrate doubling in 2001 (2,013,060 BGN) compared to 2000 (1,071,084 BGN) and nearly four times more in 2002 (3,898,795 BGN) (Stoyanov, D., 2003).

A lot of herbs are used in traditional medicine. Part of them is for personal use the rest are exported. **Changing of property rights** over forests and forest areas did not affect significantly collecting non-wood products as species and quantity. There were some years between 1990-1996 when the recreation use was reduced, but recently it has been increased again. Despite the restoration of private property rights of some forest areas, real ban on entering these forests exists in very little percentage of them. Real strictness exists in some categories Protected areas (Natural or Biosphere reserves). One of the problems, which have arisen in the last decade, is poaching (timber harvesting, game hunting, plants, illegal grazing, etc).

NWFP&S definition, classification and relevance in rural economies

NWFP&S are defined as products from the forests for direct use, some kinds for indirect use. Recently is assessed life-supporting role of the forests, usually defined before as surroundings (habitat)-forming function. NWFP&S could be classified in different ways:

A)

1. Resources and raw materials for "industrial processing": resin yield out of coniferous tree species, tanning extract from bark and sumac, cork, needles and stumps;
2. Resources of wild berries, herbs and mushrooms; walnut yields (of walnut plantations), lime blossoms from forest stands and plantations, etc.
3. Fodder resources: a) herbaceous resources for pasture and hay harvesting; b) fodder yield of tree species, seeds, etc.; c) bee pastures. And another classification:

B)

1. Non-wood products NWFP for direct use – nuts, fruits, resin, game
2. Supporting services NWFP&S: grazing, bee-breeding, sport hunting, recreation
3. Life-supporting functions of the forests NWFS - water-preserving, habitat-supporting, biodiversity conservation, climate regulation, game supporting, erosion control, soil fertility insurance, amenities supplying, etc.

Third classification divides NWFP&S depending on further use:

1.Collecting for industrial purposes – resin for production of colophony, bark;
2.Collecting for food and medical purposes – mushrooms, forest fruits, herbs;
3.For farm purposes – hay harvesting, grazing, bee-breeding,

The country has a significant number of plants – 741 plants of Bulgarian flora are used as sources for drugs; nearly 20 plants supply forest fruits; 10 species of mushrooms have industrial and trade importance. NWFP collected for personal needs are not paid. Collecting for production must be paid according to regulations and fees. (There could be observed illegal actions).

According to the regulatory legal framework in force (The Forests Law, The Forestry Code, etc) the NWF Resources are not included in the forestry management plan unless explicitly demanded by the customer. Consequently, these resources are neither subjected to a detailed inventory nor are accounted for as the stands, which results in a gap in the scientific data in the Forest Fond reports. Some general and very oblique indicators account for their usage, as production utilised over a certain period of time. Such a report, however, is along very broad lines and is far from being precise. The present stage in the forestry development in Bulgaria calls for an entirely new approach to the inventory of these resources which should include:

- An application of some scientific methods for the inventory of the nonwood forest resources. Teams of scientific researchers have already worked out such methods.
- A total and deatailed inventory of the nonwood resources over a ten year period.
- A setting-up of a new regulatory framework for the utilisation of nonwood forest resource.

Property rights regulation system (access)
As a result of political and economic changes in the country after 1989 Bulgarian forest branch underwent a stage of reforms from state property to market economy and restoration of private property. Very few of private forests are banned for access. The others – state, private, municipal – could be used under the regulations and follow the prescriptions of the professional project (arrangement of actions and activities). The situation is still unstable and it requires appropriate decision-making and policy.

4.2. Case of successful marketing strategies

The firm BIOSTART Ltd, Velingrad, which works closely with the Agency for Regional Development, is an example for successful marketing strategy in Bulgaria. Its activities could be summarised as follow:
(a) Project "Mountain EcoKiss", funded by UK Ministry of Environment, Food and Rural Affairs for wild-fruit production;
(b) Education for unemployed local people for environmentally friendly collecting of herbs and forest fruits under the Project JOBS – a joint initiative of the Bulgarian Ministry of Labour and Social Policy and the UNDP supporting job creation and small business development;
(c) Establishing of an Educational-Production Centre and initial production of jams from wild-grown fruits;
(d) Ecotourism in the Rhodopi region.

Results of the projects and the initiatives are: creation of the Soil Association Global Partnership *Certified Biostart Ltd, Velingrad for organic farming & production (22000 ha);* training of more than 60 women and children from socially weak position to work environmentally friendly. Realisation of the production is in Germany and Italy; introduction of the initiative *Bulgarian HERBS* for small business development in herb sector in Bulgaria.
The another successful firm BARET is a kind of consulting one and it works mostly in natural areas. They had created an Eco Path Tran with the necessity for this establishment steps, small wooden bridges, indicative tables, etc.

NWFP&S definition, area of production, harvesting level, technical characteristics of production
NWFP for industrial purposes is an important activity, which could make a significant contribution to the economic development. But now such kind of products is not collecting in the country – it nearly stopped quite big harvesting between 60-s and 80-s of XX century. NWFP could be a source is conifers and they grow in the mountains. They could be collected for food and medical purposes – mushrooms, forest fruits, herbs. These kinds of products are harvested for two main reasons: for domestic (family) use, and for sale – internal and external market. NWFP could be collected for farm purposes. Here hay harvesting, grazing, bee breeding – traditional in fluctuation levels are among better performed.

It might be summarised that the quality for all these groups of products is usually high (environmentally clean conditions, qualitative trees and forests). At the same time – technologically most of the works are traditional and quite primitive.

Recently few relatively big companies and a great number of small firms do the use of NWFP in Bulgaria. For using natural resources they have to pay tariff fees (arranged by a law and an instruction of the Ministry of Agriculture and Forestry). The control of using natural resources is not enough effective and there could be observed some damages on the habitats. The way of processing could be described in the following way: herbs are dried, some of them for use in the country (15-20% for local use) and bigger part – for export. Mushrooms are manufactured – dried, salted and frozen mostly for export.

"Product chain" organisation:
When collecting of NWFP is for domestic purposes – the amounts are small. The problem arises of the situation that but more people and households harvest fruits and herbs for domestic purposes. There are no significant damages on trees, habitats, nature.
When NWFP collecting is for sale, some differences appear: (a) some people turn their "hobby" into "profession" – they collect more then they need and they sell the surplus. The way of collecting looks traditional - low amounts, good quality, less damages. (b) Some individuals looking for a job and money, harvest products and offer them to the purchaser. (c) In some cases registered firms, which have prior knowledge of the demand for some products, organise the work. They engage some people to collect the products for them. There are several ways of going to the consumers further: (a) these firms could "close the chain" with drying, making mixtures, conserving, packaging and supplying to sellers such small drugstores, etc. The whole process is under the regulation of sanitarian authorians, as well permissions for product quality. Another way is (b) connecting with bigger firms which collect materials and produce the final product; and third (c) collecting NWFP for export: exporting companies are usually bigger; they work with many kind of products depending on demand and possibilities to export.

The first stage of harvesting, collecting, and in some cases drying, packaging, etc. is done by small firms (family or others). The further stage of processing and distribution export, if there, is by SMEs, too, but usually firms with more capitals, assets, contacts, etc. There is a tradition in exporting some NWFP – mushrooms, bee-honey, herbs. There are a lot of foreigners visiting Bulgarian forests for recreation – winter and summer. Ecotourism, hunting-tourism is also form of indirect use. (More detailed information further in preparing the report)

Policy framework: The development of the sector of NWFP&S is regulated by the Decree of Council of Ministers No 93&94 – about approving tariffs for non-wood products charges –beginning from 29.05.2000, published State paper No46 /06.06.2000.

Characteristics of technological and organisational innovation behaviour in non-wood production, processing and service industries
Innovation in the field is at a low level. Most of methods used are close to traditional (which make them environmentally friendly, but sometimes is risky). Available improvements are: Drying machines better build and organised stock building with ventilation, better packaging with appropriate materials and correct informing for purposes, dates of fitness, etc.

Conclusions

The NWFP&S in Bulgaria have a big potential to be developed in the future. There are possibilities for financial support from some EU and other Programs. More and more people know about that, but there is not enough knowledge in the applying process, as well direct contacts with responsible experts. Entrepreneurship in the field is not very high. Despite low expenditure their return is not very high. There is very high interest in tourism as a business.

Official sources	**Projects**	**Expert opinion**
Www.nug.bg	НГПС	
Kostov, P., P.Enchev, 1987. Non-wood forest products use. Zemizdat, Sofia. 1987	НСОГР ГС	
Home.digesta.com		
Ministry of Agriculture and Forests, National Forest Board		Division “Forest use and marketing”
1.Ministry of Agriculture and Forests, National Forest Board		1. Division “Forest use and marketing”
2. National Board for Plant Protection		2.Division “Phyto-sanitary control”
Www.mzgar.government.bg	ЗГ	

5. Forests and ownership

Summary

The forest resources and their ownership structure are important factors, affecting forestry production. The share of forest is 32.9% in total land area in Bulgaria. The share of exploitable forest area (forest which is available for wood supply) is 87.02%.

The forest ownership in Bulgaria is predominantly large scaled and public. The last years of economic transformation has affected the prevailing ownership relations in the forest sector. The structural and economic changes, directed to introduction of market economy, have defined new priorities in the forestry sector development connected with the restoration of the economic activities in the state-owned forests and comasation of the forests of small forest owners. As a result the forest industry overcame the state monopolism but went to the opposite extreme. The negative effects of the transformation in this period are: decreased production; insufficiency in quantity and quality raw material for the existing processing capacities; lost markets for the production of the wood processing industry; problematic credit allowance.

It is concluded that to overcome the negative effects, the reform must be directed towards increasing competitiveness of Bulgarian forest related products and services and reaching a level of their annual growth and export by 10%.

5.1. State of the art and historical development

The forest and forest utilisation is an important source for economic development. The challenges of recent changes in ownership have affected forest and forest utilisation. They have raised new problems in addition to the existing ones. The last years of transformation were a period of structural and economic changes, directed to introduction of market economy, defining new priorities in the forestry sector development: restoration of the economic activities in the state-owned forests; comasation of the forests of small forest owners; interruption of experiments in the management of the forestry sector; attention to the Bulgarian experience and traditions in forestry. The forest industry in the transition to market economy after 1989 overcame the state monopolism but went to the opposite extreme. Now there are many important research questions on the country and regional level with no satisfied answer.

5.2. Forest resources

The wooded land, growing stock, average volume of forest per hectare, and exploitable forest area defines forest resources in the country. The land area in Bulgaria is 10,895,000 ha, of which 3,903,000 ha are wooded land and 3,590,000 ha are forests. The share of forest in total land area is 32.9%. The predominantly coniferous forest is 792,000 ha, predominantly broad-leaved forest is 2,421,000 ha, and mixed forest is 376,000 ha. The growing stock is 467.3 million m^3 (o.b.), broad-leaved forest – 193.5 million m^3 (o.b.), other wooded land and trees outside forest – 44 million m^3 (o.b.). The average volume per hectare of forest land is 13 m^3/ha. The mean net increment is 3.34 m^3 per hectare.

The share of exploitable forest area (forest which is available for wood supply) is 87.02%. The share of forest area affected by restrictions in harvesting (the share of forest which is not available for wood supply) in the country is as follow: 7.4% because of conservation/protection reasons and 5.5% because of economic reasons.

5.3. Forest ownership

The unfinished process of restitution is a barrier to provide enough clear picture of ownership of forest and other wooded land. But according to official information, the ownership is predominantly large and public. The number of holdings of forest and other wooded land in public ownership is 3,903,000 ha. The distribution of numbers of holdings in public ownership in size classes show that there are only 2 size classes presented in the country. The prevailing size class is those of 1001 – 100,000 ha. It is performed by 91.9 holdings in Bulgaria. 18,1 holdings belong to the size group 501 – 1,000 ha.
The share of forest ownership[6] is as follow:

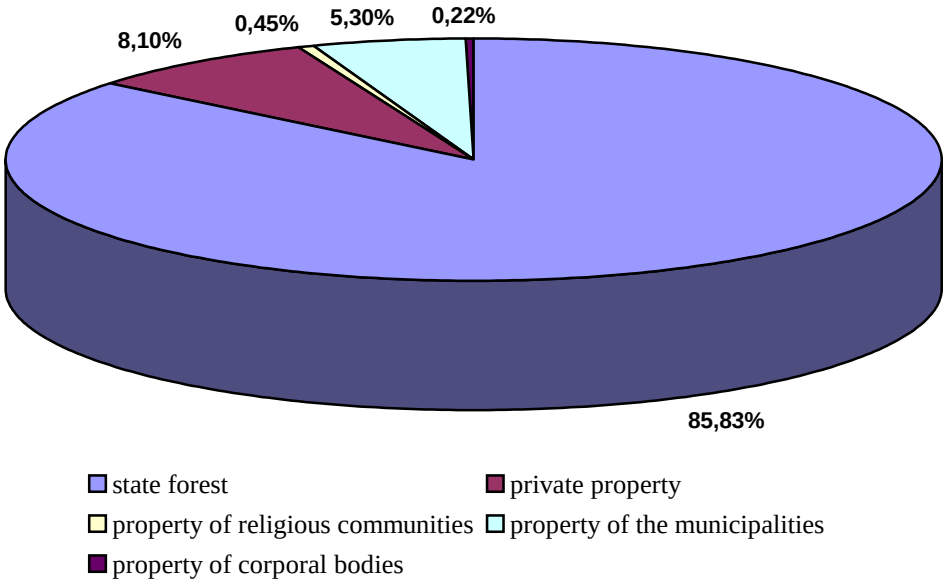

Figure 1 Percentage distribution of the forest fund of Bulgaria on types of ownership

The major part of the forest ownership is state one – 85.83%. The property of private persons is 8.1% of total. 5.3% is the share of municipalities, 0.45% - of religious communities and 0.22% - of other legal entities.

The trends of forest ownership depend on the processes of restitution and privatisation. It is difficult to make any projections at this moment, because of the lack of clear political will and legislative base. The same reason is the right to collect and sell NWFP from public and private forest to be not enough well defined in the country, either.

[6] Annual Report of the National Forestry Board for 2002, “Gora”magazine, issue 6, 2003.

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

The main problem and connected research questions for enterprise development in the forest in Bulgaria concern development of an effective National strategy towards forestry, wood processing and non-wood products and services. The lack of clear vision and of consensus in this respect defines a broad area of questions to be answered. Among them are what kinds of policy to be followed in the forest sector? Which model for innovation system in forestry to be chosen? What kind of institutional infrastructure for the forest sector development to be supported? Which is the effective strategy for further integration to EU forestry structures, what kind of effective marketing strategies for Bulgarian products to develop? What kind of instruments to be introduced in order to increase sources for purchasing modern forest machinery, building forest roads and forestation? What kind of incentives to be implemented in order to improve quality of local production and to protect industrial property rights? How to speed processes of standatrization and certification? What kind of model of training and education to be followed in order people to be able to solve the above problems?

Conclusions

The economic integration of urban consumers' demand and rural forestry production in Bulgaria is on low level. The main problem and connected research questions for enterprise development concern providing of an effective National strategy towards forestry, wood processing and non-wood products and services. The lack of clear vision and of consensus in this respect defines a broad area of questions to be answered. Among them are those of development of an effective innovation strategy for further integration to EU forestry structures, for promoting Bulgarian products and services. Integral part of this strategy are identification and application of instruments for increasing the sources for purchasing modern forest machinery, building forest roads and forestation, improvement of the quality of local production and protection of the industrial property rights, speeding the processes of standardisation and certification. Development of innovation networks and new ways of corporate governance seems to be the modern tools for new strategy implementation.

Croatia

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Summary

The main characteristics of the wood assortments sale are: a tendency of growth of quantity and a stagnation of value in the last three years, a growth of the share of sales on the basis of annual contracts and contracts lasting several years with domestic buyers, a growth of stacked wood export and problems with the collection of payments from domestic buyers.

Industrial wood processing is the significant segment of Croatian economics. The basis of its development is the exploitation of domestic natural resources and traditionally it is export-oriented. To confirm the strategy and revitalisation of industrial wood processing, its characteristics are very important.

The values of Croatian forests have been calculated on the basis of annual production of all forest goods and services. In the case of non-market values, the sheer existence of the forests has been taken into account and the flow of various services have been estimated based upon the actual state of forests, separated between its continental and Mediterranean part. It should be emphasised that there is the case of annual opportunity costs. Regarding the market values, the GDP for each group of goods and services has been monetarily estimated by means of the actual market prices which sometimes vary within the country.

1. Consumption

1.1. State of the art and historical development

Table 1. The Republic of Croatia, basic information for 2003

Land area, according to the graphic data base, situation as on 31 December 2002(1)	56,594 km^2
Surface area of territorial sea and interior sea waters(2),	31,067 km^2
Population, 2002 mid-year estimate	4,443,000
Population density per km^2	78.5
City of Zagreb, population, 2001 Census	779,000
Territorial constitution, situation as on 31 December, 2003:	Counties 21(3); Towns 124; Municipalities 426; Settlements 6,742
Gross domestic product per capita(4) (estimate at current prices)	6,377.4 US $
Average monthly paid off net earning	3,940 kuna (525.3 euro)
Average monthly gross earning	5,623 kuna (749.7 euro)
Retail prices (as a measure of inflation, average), 2003/2002	1.5%
Consumer price index, 2003/2002	1.8%
Coverage of imports by exports (5)	43.4%
Imports per capita(5)	3,196 US$
Exports per capita(5)	1,387 US$
International reserves of Croatian National Bank, end of period(6)	8,191.3 million US$
External debt, midpoint exchange rate(6)	23,672.0 million US$
Midpoint exchange rate(6), end of period	6.1185 HRK/US$

Notes:
1) Source: Surveying and Mapping Authority of the Republic of Croatia
2) Source: Faculty of Life Sciences and Mathematics, Geographical Department
3) Including the City of Zagreb
4) Data for 2003 are provisional (sum of quarterly data)
5) Provisional data
6) Source: The Croatian National Bank

Quarterly Gross Domestic Product estimate - the real Gross Domestic Product for the second quarter of 2004 is by 3.8% higher than in the same period of 2003 - based on the quarterly estimates, the annual GDP for the year 2003 showed an increase of 4.3%, as compared to the year 2002. Republic of Croatia has: 4,437,460 inhabitants (31 March 2001) and 448,532 agricultural households (1 June 2003).

The value of wood assortments sale depends on a number of elements: volume and structure of production of net wood mass according to the sorts of wood, technical, quality and thickness structure, supply and demand on the domestic and foreign markets, type of sale, place of delivery, quality of treatment and measurement, level and intensity of state regulation of commodity flow and domestic prices of wood assortments, exchange rate, etc. The situation on the wood market constantly changes, the demand for certain sorts or quality of wood falls or grows, the structure of buyers according to their purchasing power gradually changes, the intensity and extent of state regulations changes. There are always changes, although not drastic ones, with significant consequences on the amount of reserves of finished products, business results, even the financial stability and liquidity of the Company “Croatian Forests” Ltd.

The fact that strict regulations are not amended, especially the Regulations on Forest Management, does not make it any easier.

The income from selling wood assortment has a significant influence on the economic and commercial operations of the Company and it makes 75% of the financial income. The wood assortment is sold on domestic market (87%) and exported (13%). A half of the value of work on the biological reproduction and a significant part of long-term investments are financed with this income. Unfortunately, the selling of wood assortments is for the major part carried out in non-market conditions, i.e. at administratively regulated fixed prices. The principle of the distribution of the round wood buying rights (according to certain criteria) is being applied using the pricelist approved by the Ministry of Economy.

1.2. Forest products and service consumption

The main characteristics of the wood assortments sale are: a tendency of growth of quantity and a stagnation of value in the last three years, a growth of the share of sales on the basis of annual contracts and contracts lasting several years with domestic buyers, a growth of stacked wood export and problems with the collection of payments from domestic buyers.

Of the total production of 580,000 m^3 of sawnwood, exports account for 315,000 m^3. Total imports of sawnwood amounted to 180,000 m^3, of which 150,000 m^3 is coniferous wood. Forests and forest industry products, including wooden furniture, accounted for 7% of total exports in 2001, while imports represented 3.8%.

During the period of several years there has been an emphasised trend of growth of sold round wood quantities, but also oscillations in cubic wood sale, mostly between 1.45 and 1.85 billion m^3 per year. The average selling prices in the last five years have been maintained at about 41.73 euro/m^3, depending on the structure of the sold assortments. The average round wood selling price has been moderately oscillating between 65 and 71 euro/m^3. A moderate growth of cubic wood prices has been achieved with a greater share in export causing, however, higher transport charges to the place of delivery, when compared with the sales using only wood roads. A more significant round wood export would have a positive effect on business results, but it is very limited. The annual growth of prices of material, energy, services, spare parts, salaries and other expenses has been bigger, and only a growth in volume, i.e. quantity of sold wood assortments and a greater extent of work in forest cultivation enabled positive business results of the Company.

Table 2: Sale of wood assortments

Year	Round wood			Stacked wood			Total		
	1000 m^3	1000 euro	euro/m^3	1000 m^3	1000 euro	euro/m^3	1000 m^3	1000 euro	euro/m^3
1996	1,434	102,358	71.4	1,500	24,014	16.0	2,934	126,372	43.1
1997	1,527	103,758	67.9	1,605	24,109	15.0	3,132	127,867	40.8
1998	1,553	105,425	67.9	1,415	20,502	14.5	2,968	125,927	42.4
1999	1,710	113,980	66.7	1,530	19,686	12.9	3,240	133,666	41.3
2000	1,853	120,205	64.9	1,701	24,891	14.6	3,554	145,096	40.8
2001	1,798	120,334	66.9	1,587	25,140	15.8	3,385	145,474	43.0
2002	1,833	121,914	66.5	1,778	27,214	15.3	3,611	149,128	41.3

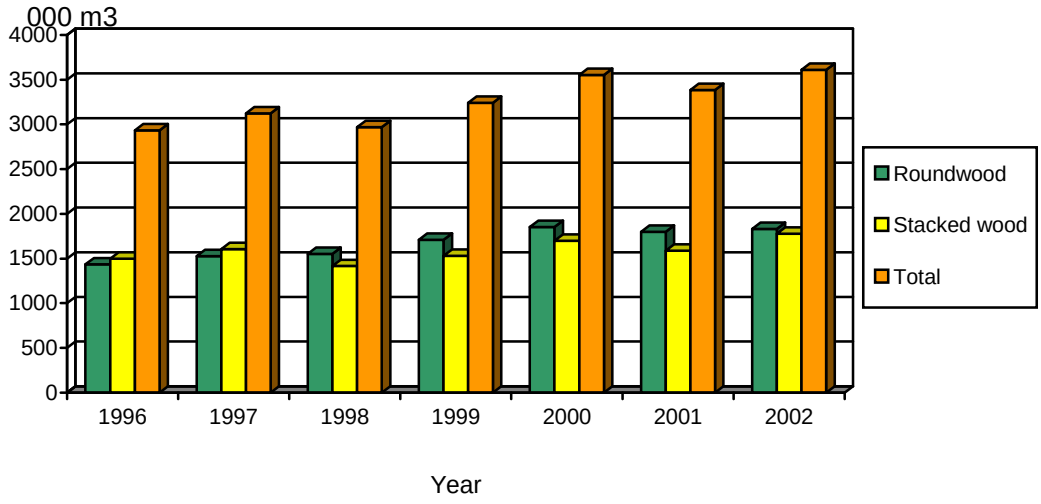

Figure 1: Presentation of sold quantities of wood assortments

The planned income from selling wood assortments in 2002 has not been realised, and the main reason is a 8.7% drop of sales of stacked wood. The realised average selling price of 40 euros/m^3 is 4.4% lower than planned, which results in lower income. Falling behind of the realised prices in comparison with the planned prices of round wood and stacked wood has had several causes and the main ones are: a growth of wood sales to domestic customers according to annual contracts or contracts of several years (the prices are approved by the Government of the Republic of Croatia according to the pricelist, progress payment in several months, and even rebates for some products), lower sales in auctions, and partly a poorer quality structure of the produced wood assortments (assortment structure, dry wood, previous growth).

Table 3. Consumption of furniture and other wood products of the Republic of Croatia in 2003 (euro)

Product	**Production**	**Export**	**Import**	**Consumption (P+I-E)**
Furniture	322,585,752	157,556,577	236,506,002	401,535,177
Other wood products	336,200,528	253,934,565	187,927,499	270,193,462

Figure 2: Consumption of furniture and other wood products of the Republic of Croatia from 1996 - 2003

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

Table 4. Personal consumption, average by households

Consumption group	Average annual personal consumption in a household, euro			Personal consumption structure, %		
	2000	2001	2002	2001	2002	2003
Personal consumption – total	7,682	8,174	8,729	100.00	100.00	100.00
Food and beverages	2,470	2,752	2,807	32.15	33.67	32.15
Alcoholic drinks and tobacco	298	332	347	3.89	4.07	3.98
Clothing and footwear	774	747	773	10.08	9.13	8.86
Housing and energy*	1,024	1,095	1,197	13.33	13.39	13.71
Furniture, equipment and maintenance	377	461	482	4.91	5.64	5.52
Health services	161	165	194	2.09	2.01	2.23
Transport	938	940	966	12.20	11.49	11.07
Communication	212	284	420	2.76	3.48	4.81
Recreation and culture	515	478	560	6.71	5.85	6.42
Education	56	68	59	0.73	0.83	0.68
Hotels and restaurants	282	243	276	3.68	2.98	3.16
Other good and services	574	609	646	7.47	7.46	7.41

***Expenditures of housing exclude the imputed rent.

In year 2002 total personal consumption was 8,729 euro, and for furniture, house equipment and maintenance is 482 euro, with trend of growth.

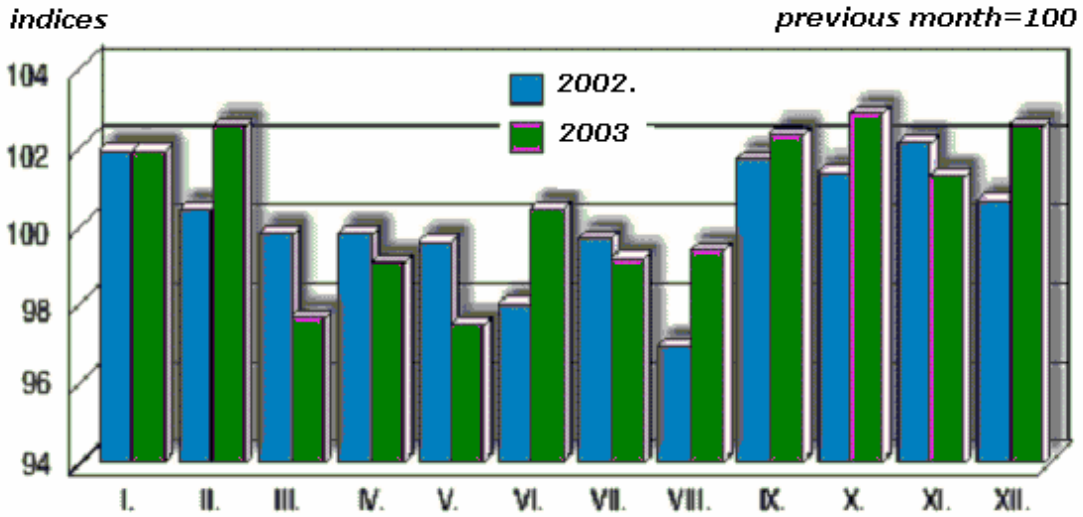

Figure 3: Producers price indices of agricultural, forestry and fishing products

In the researched period, the sale of wood assortments provided the income required for the Enterprise business activities as well as for simple and extended biological forest regeneration. However, these funds were not sufficient for the investments. This will cause technological lagging as well as the increase of business operating costs in the period to come. Therefore, it is necessary to continue with acquiring non-accessible forests in order to increase the production of the main forest products and harmonise the prices of wood assortments with the prices on the European market.

The Project of Restructuring of "Hrvatske šume", p.o. Zagreb is expected to ensure the increase of income of other forest products and other activities. The solution of these problems will probably facilitate the access of the Republic of Croatia to WTO. The above facts and problems require certain changes in the Croatian law (Forest Act, Law on Hunting, Law on Water Resources, Environmental Protection Act) related to forestry, hunting, water resources management and environmental protection.

The income from wood assortments sales have a significant influence on the economic and financial operation of the "Hrvatske šume" Company ltd. They provide 75% of the business income and are realised by sales on the domestic market (87%) and export of wood assortments (13%). Domestic wood processing industry is going through a transformation. Because of the new conditions caused by a planned membership in the European Union, there will be a greater pressure from foreign furniture producers, and consequently the structure of wood assortments trade. More attention will have to be paid to the marketing in forestry in the future, and following world trends in the production of furniture, as well as supply and demand of the wood products on the European market. The population should be informed about new products and services in forestry, which will influence prices of certain products. Adjusting to new needs for natural resources, it is necessary to predict new trends in forestry and wood processing, which are only indicated at the moment.

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

Table 5. Main problems and research questions

	Strategic actions	Priority
A 1.	Undertake an inventory of unused biomass as potential energy source	I
A 2.	Identification of unused land, selection of the most favourable species and technology for the establishment of plantations	I I
A 3.	In co-operation with other sectors, defining and achieving incentives for biomass based on the implementation of the Kyoto protocol	I I
A 4.	Utilisation of biomass as a principal energy source in forested areas	I I
B 1.	Incorporate provisions into legal framework which facilitate the development and utilisation of non timber forest and forest land products	I I
B 2	Co-ordinate supervision regarding the implementation of regulations related to the utilisation of non timber forest and forest land products	I I
C 1.	Identify, evaluate and define the management principles for all non timber forest and forest land products	I
C 2	Undertake a national inventory of non-timber forest and forest land products	I
C 3.	Promote the economic utilisation of value added non-timber forest and forest land products	I
C 4.	Evaluate and assess the potential for the development of urban forestry	I I
D 1	Prepare a specific timber industry strategy	I
D 2	Support the development of institutional capacity to implement timber industry strategy	I
D 1.	Support the establishment of monitoring timber and timber products markets	I
D 2.	Promote measures for the creation of a recognisable trademark for Croatian timber and timber products.	I I
D 3.	Promote initiatives for the implementation of the highest quality standards	I I
D 4.	Intensifying quality control of delivered raw materials and imported finalised products and harmonisation of legislative regulations which define the quality control issues	I

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

Faculty of Forestry, University of Zagreb, Svetošimunska 25, HR-10000 ZAGREB
Tel: ++38512352555, www.sumfak.hr
Croatian Chamber of Commerce, Rooseveltov trg 2, HR-10000 ZAGREB
Tel: ++38514561555, e-mail: hgk@hgk.hr, www.hgk.hr
Croatian Employers' Association, Pavla Hatza 12, HR-10000 ZAGREB
Tel: ++38514897555, e-mail: hup@hup.hr, www.hup.hr
Ministry of Economy, Labour and Entrepreneurship, Ulica grada Vukovara 78, HR-10000 ZAGREB, Tel: ++38516106111, e-mail: info@mingorp.hr, www.mingorp.hr
Ministry of Forestry, Agriculture and Water Management, Ulica grada Vukovara 78
HR-10000 ZAGREB,Tel: ++38516106111, e-mail: office@mps.hr, www.mps.hr
Forest Research Institute, Cvjetno naselje 41, HR-10450 Jastrebarsko
Tel: ++38516273000, e-mail: ured@sumins.hr, http://jaska.sumins.hr

2. Small-scale forestry practices

2.1. State of the art and historical development

Privately owned forests account for 461,137 hectares or 19% of the total forest area in Croatia and 11.7% of the growing stock. The number of owners is 599,056 and the average size of the property is 0.76 hectares. In practice, with some exceptions, private forests remain essentially unmanaged. The sector is characterised by:

- high degree of fragmentation not only in size of plots but also due to the fact that many owners reside in the cities,
- lack of sylvicultural skills and forestry tradition,
- insufficient number of owner associations,
- the majority part is degraded and major investments are needed.

2.2. Small-scale forest holding

Despite the fragmented nature and relatively small average holding, private forests have the potential to contribute more in terms of wood production and other forest services. It is highly unlikely to happen unless remedial actions are put in place as for example incentives for the establishment of owner associations, introduction of government subventions for management of private forests. There is one association that provides a useful model and indicates that such associations can work. There is one owners association on the territory of Medvednica (Sljeme), which includes 360 owners, who own 200 ha, which represents an average holding of 0.55 per owner, and it can serve as a useful model and evidence that associations like this can function.

2.3. Small scale forestry practices

According to the data on the working equipment and workforce, the entrepreneurs are divided into four groups. Table 6 shows the share of groups in the list.

Table 6. Basic structure

Group	Entrepreneur's frequency	
	N	%
Entrepreneur with employees and working equipment	197	36.62
Entrepreneur with employees, no/not mentioned working equipment	61	11.34
Entrepreneur with no/not mentioned employees, with working equipment	130	24.16
Entrepreneur with no/not mentioned employees and with no/not mentioned working equipment	150	27.88
Together	538	100.00

In the group no employees and no working equipment the notes "workers as required" and "equipment available as required" are very common. In case of contracting the provision of services, such contractors would probably engage temporarily the required workers and working equipment. In the Croatian entrepreneurial practice, and not only in forestry, it is quite usual to engage workers for temporary services. Entrepreneurs usually choose the workers with social welfare settled on some other grounds (retirement, waiting for work in an employment bureau, sick-leave). Very often, entrepreneurs take advantage of non-employment and low price of work at the expense

of workers, temporarily and/or permanently employed. Apart from unemployment, such conditions are also favoured by inefficient legal system, inadequate engagement of work inspection and lack of trade unions capable of protecting the workers' rights.

According to the number of employees and number of working equipment, and taking into consideration the notes in the list, the following forms of entrepreneurs in the Croatian forestry have been established:

- Part-time contractors with no machines and employees;
- Self-employees with one or two machines and no workers;
- Minor contractors with one or two machines and one or two employees;
- Contractors with work groups of 2 to 4 workers;
- Entrepreneurs – managers with work groups of 5 to 15 workers and significant mechanisation or working equipment;
- Enterprises dealing with the provision of services but not only in forestry, with significant mechanisation and a considerable number of employees, e.g. owners of building mechanisation.

Table 7. Data on workforce and working equipment of forestry entrepreneurs

Category	**Number, N**	**Average per entrepreneur**
Employees	998	1.9
Workers	977	
Engineers	21	
Chain-saws	608	1.1
Stihl	10	
Husquarna	2	
Not-classified	596	
Adapt. farm tractors	230	0.4
IMT	42	
Zetor	9	
Torpedo	9	
Steyr	2	
Universal	2	
Ursus	2	
Not-classified	164	
Skidders	215	0.4
LKT	91	
Timberjack	23	
Not-classified	101	
Horses	591	1.1
Forwarders	9	
Yarders	2	
Tractor assemblies	9	
Build. mechanisation	13	
Trucks	17	

The survey of a general entrepreneurs' power in terms of human resources and technical-technological equipment has been obtained by breaking down and counting the employees and working equipment by groups according to the list (Table 7).

This list has shown that 1/5 of all employees were employed by only three enterprises, whose main activity was not the performance of forest works. This means that the average number of 1.9 employees per enterprise is somewhat lower and could correspond to the average number of chain-saws (1.1). With approximately 0.9 mechanised means for wood extraction, it becomes clear that here we deal with small groups and it can be assumed that an average entrepreneurial unit is made of 1, 2 or 3 cutters, and if required hookers, of which 1 or 2 are operators of forest mechanisation.

A large number of entrepreneurs stated to have at their disposal different tools and devices for manual and motor-manual work, and the possibility of engaging workers as required. Such result should be related to the beginnings of entrepreneurship development when due to the risk of engaging third-party capital (related to insecurity of making long-term contracts involving serious business transactions), the entrepreneur rarely decided to employ a higher number of employees and purchase his own and, as a rule, expensive forest mechanisation.

2.4. Policy framework and production condition

The law prohibits selling of state owned forests or forest lands to third parties or granting concession(s) for management of these resources. It is strategically important for the long-term development of forestry sector that state assets remain the property of the government. This will ensure that multiple forest amenities are available to society and public purpose activities are maintained and funded.

Over the past 10 years, the majority of countries in Europe have either amended as is the case in European Union countries or rewritten their forest legislation as is the case for transition countries. Their experience in redrafting forest laws has shown that the drafting of sound and workable law requires genuine involvement of all categories of stakeholders. Without this involvement, the prospects of the existing laws to reflect reality are slim.

Currently any physical or legal entity can be established as forestry contractor, even if they have no professional qualification, competence or training. The quality and competence of forest contractors directly impacts on the activities in forests and forest lands. Many countries require either that forest contractors be registered or obtain national competency certification for their activities. It is necessary to insist on forestry contractors to be registered legal entities and to own certificate for their activities. In order to implement the aforementioned and taking into account the experiences of other professions, the establishment of forestry chamber becomes a necessity.

Table 8. Policy framework

Strategic actions		**Priority**
1.	Simplify management plans for private forests and secure funds for their implementation	I
2	Establish additional extension services to provide technical guidelines and facilitate associations of private owners	II
3.	Support and promote measures to ensure the sustainable management in private forests	III

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

Current format and regulatory requirement for forest management plans are based on large management units and are not suited to small average private owner holding. Entrepreneurs in the Croatian forestry represent minor, poorly equipped, family enterprises, usually with no permanently employed workers, and without typical means of forest work, if any. Entrepreneurial organisations have short life, entrepreneurs' fluctuation is high and the number and type of services they provide are restricted.

The significance of entrepreneurs in the Croatian forestry is indisputable and considerable. Each year they perform on average 14% of felling and 44% of wood skidding. They take part in reforestation activities with a share of approximately 10%, and in wood transport with approximately 70%.

Forestry entrepreneurs, despite their ever increasing presence and significant share in the performance of production tasks, have not been properly organised or qualified so far and hence they could not have a stable role in the production segment of the Croatian forest management.

For upgrading the forestry entrepreneurship, it is necessary to provide a comprehensive system of information on forestry contractors and services they provide. Such system has not been established yet in the Croatian forestry, and this represents a serious defect in making a high-quality analysis of the actual position of forestry entrepreneurship and possibility of its upgrading.

2.6. Organisations studying small-scale forestry and their speciality

Faculty of Forestry, University of Zagreb, Svetošimunska 25, HR-10000 ZAGREB
Tel: ++38512352555, www.sumfak.hr
Ministry of Economy, Labour and Entrepreneurship, Ulica grada Vukovara 78, HR-10000 ZAGREB, Tel: ++38516106111, e-mail: info@mingorp.hr, www.mingorp.hr
Ministry of Forestry, Agriculture and Water Management, Ulica grada Vukovara 78
HR-10000 ZAGREB,Tel: ++38516106111, e-mail: office@mps.hr, www.mps.hr
Croatian Forestry Association

3. Wood-processing industries

Wood-products sector consists of a great number of small enterprises and quite a small number of big manufacturers. In 2003 there were 530 saw-mils and only 96 of them had more than 24 employed workers. The situation in furniture industry is similar with only 48 out of 234 enterprises which have more than 24 employed workers, and ten leading enterprises achieve 83% of the sector income.

Industry of wood processing in the Republic of Croatia shows negative economic trends in the last ten years, which is manifested in diminishing production, overall revenue, exports, number of employees and rising loses. However, the quality of infrastructure, raw materials, workforce and tradition of marketing on specific markets and reached level of privatisation (almost all companies have been privatised) in the industry of wood processing is satisfactory, which is good basis for assessment of development prospects, but insufficient for initialising a new development cycle in this branch of industry.

Technology has lagged behind other countries in Europe, especially in the sawmilling and furniture sectors. There are three pulp and paper enterprises producing refined mechanical pulp, paper, carton, corrugated paper etc. and one small particleboard mill producing product for the home market. Hrvatske šume, limited company, Zagreb, is dominant supplier of roundwood to the Croatian timber industry and supplies over 94% of the roundwood used. This situation will continue indefinitely into the future, due to the scale, quality and fragmentation of private forest supplies.

Total installed capacity in the sawmilling industry is estimated at 6.3 million m^3 of logs on an 8-hour shift basis based on a survey by Croatiadrvo and while this may be an overestimate, it is some 3 times more than the annual allowable cut in our forests. The industry and exports have traditionally depended on Europe, particularly the Italian market. Raw material and products exported to Italy are further processed and to other European markets.

Main method of procurement of roundwood by the sawmill industry is by annual and five-year contracts. Public auctions account for only 10% of all roundwood sold to the sawmills. The use of contracts has increased significantly since 1996. Prices are reviewed annually and approved by the Ministry of Economy. Prices have remained fixed for the last five years and have not responded to end market movements. All roundwood is harvested directly by HŠ or by contractors.

3.1. State of the art and historical development

Figures 4 presents dispersion of sawmills in Croatia, which have been taken in to the observation by questionnaire.

Croatian technology is behind other European countries modern technologies and this sector has got a lot of obsolete equipment especially in saw-mills and in furniture industry. The part of the wood products sector in GDP was 1.4% in 2002, with only 0.5% industrial manufacture of furniture, 0.4% of wood-pulp and paper and 0.5% of wood and wood manufactured products. The part of wood sector in GDP is estimated at additional 1%.

Figure 4. Present dispersion of sawmills in Croatia

The sector is an important source of jobs especially in rural areas and in 2002 there were 29,300 employed people with 11,500 who worked in wood processing, 11,600 in furniture manufacture and 6,200 in wood-pulp and paper industry. Croatian woods are a leading provider of roundwood for the wood industry in Croatia because they provide with more than 94% of exploited roundwood. This situation has been going on because of the rate, quality, and split provision of private woods.

The total capacity of the saw-mill industry is estimated at 6.3 million m^3 of saw logs based on eight-hour working shifts. This means that the possible capacity is more than three times bigger than the allowed annual cutting in Croatian woods. Industry and export traditionally count on Europe, especially on Italian market. Raw materials and products which are exported to Italy are further processed and exported with added values to other European markets.

Basically, the saw-mill industry provides roundwood through annual and five-year contracts. Public auctions account for only 10% of total roundwood sold to the saw-mills. The usage of raw material provision through contracts has significantly grown up since 1996.

Table 9. Number of sawmills in each counties in Croatia

Counties	Number of sawmills	Counties	Number of sawmills
Zagrebačka	29	Požeško-slavonska	7
Krapinsko-zagorska	4	Slavonsko-brodska	4
Sisačko-moslavačka	18	Zadarska	2
Karlovačka	42	Osječko-baranjska	25
Varaždinska	15	Šibensko-kninska	-
Koprivničko-križevačka	7	Vukovarsko-srijemska	12
Bjelovarsko-bilogorska	25	Splitsko-dalmatinska	2
Riječko-goranska	52	Istarska	6
Ličko-senjska	22	Dubrovačko-neretvanska	-
Virovitičko-podravska	4	Međimurska	2

The saw log prices are reconsidered only with the previous consent of Ministry of economics. The prices have been unchanged for the last seven years and they haven't been influenced by market trends. The industry started its work easily since there were no problems to deliver second-hand machines from countries like Italy. Moreover, the industry is split and that prevents the development of competitive advantages in sense of range and depth of entering the market.

The common ground between Croatian woods and industry is a low flow of market information. The low flow of exchanging information between the saw-mills is caused by the annual production plan which is not worked out in detail as far as different sorts of goods are concerned. To plan in advance in this surrounding is very hard, even impossible.

Such a centralised approach where the wood prices are defined by the Ministry of economics in spite of the market trends of supply and demand for round wood , has a significant influence on the competition and success of industry and on the competence of Croatian woods to co-ordinate demand with supply. In the meantime the strategy of wood and paper development industry has been brought out, so we expect the establishment of clear market relations when round wood is sold among all the partners from Croatian woods to ultimate raw material users.

Croatia is the marginal provider on the international market and most customers are quite unfamiliar with its products and supplies. Other countries experiences have proved that the development of strong and positive market image of some exporters is the process which requests a few years of systematic and persistent effort.

The estimated capacity of saw-mills and allowed annual cutting has almost reached the overreaching factor three. This situation can't keep up over the long term and there should be some kind of rationalisation to be conducted with the emphasis on those enterprises that can achieve the added value and show the competence of effective business.

Under the current trend of market globalisation, competition is becoming stronger and requirements for high quality combined with acceptable prices are gaining in importance. Since its beginnings, the Croatian wood industry and furniture manufacture has been oriented to exporting its products on the world market, the reason being that the Croatian market is too small to absorb all the resources and potentials contained in this field.

3.2. Wood processing industries

In 2003 Croatia manufactured the beech tree sawdust in the greatest amount (267,720 m^3 or 41.1%), and then the oak tree sawdust in the amount of 168,685 m^3 or 25.9%. The manufacturing amount of conifer tree sawdust is 103,171 m^3 or 15.8% and there are 2,858 m^3 (0.4%) of sawn thresholds. 109,102 m^3 or 16.8% is the amount of some other manufactured trees sawdust.

As far as plywood veneer and chipboards are concerned, the chipboards are manufactured in the greatest amount (61,376 m^3 or 55.8%). There is a smaller amount of manufactured plywood veneer sheets (28,910 m^3 or 26.3%), and the least manufactured are plywood boards and compressed wood blocks, boards, bands, etc.(6,359m^3 or 5.8%, i.e. 13,355 m^3 or 12.1%).

If we analyse the parquet manufacture in Croatia, conclusion is that the oak tree parquet is manufactured the most (2,704,308 m^2 or 79.9%). The manufacture of the beech tree parquet is 280,301 m^2 or 8.3%). Then, there is the ash-tree parquet with the manufacture of 272,226 m^2 or 8.0% and the manufacture of other trees parquet is 129,431 m^2 or 3.8%. In the table there is the aggregate value of export and import of primary wood processing from 1994 to 2003.

Table 10. Aggregate value of export and import of primary wood processing (1994-2003)

Year	The aggregate value of export (1000 euro)	The aggregate value of import (1000 euro)	Export/import ratio
1994	177,814	37,764	4.7
1995	175,060	54,867	3.2
1996	176,623	85,828	2.1
1997	199,858	110,963	1.8
1998	191,576	105,680	1.8
1999	212,832	88,403	2.4
2000	245,259	106,239	2.3
2001	230,105	134,981	1.7
2002	235,229	161,949	1.5
2003	253,934	187,927	1.4

If you consider the furniture and other final wood manufactured products, in 2003 Croatia manufactured chairs and seats in the greatest amount (2,063,834 pieces or 53.5%), other household furniture (dining rooms, children's rooms, bedrooms - 1,034,214 pieces or 26.8%), furniture for business and trade accommodation (481,017 pieces or 12.5%), armchairs, two-seaters and three-seaters (147,099 pieces or 3.8%) and kitchen furniture (130,545 pieces or 3.4%).

In the following table there is the aggregate value of export and import of furniture in Croatia from 1994 to 2003.

Table 11. Aggregate value of export and import of furniture (1994-2003)

Year	The aggregate value if export (1000 euro)	The aggregate value of import (1000 euro)	Export/import ratio
1994	116,795	45,354	2.6
1995	117,047	72,135	1.6
1996	95,807	73,085	1.3
1997	110,506	124,739	0.89
1998	95,483	132,880	0.72
1999	98,736	116,405	0.85
2000	112,719	124,369	0.91
2001	139,478	164,983	0.85
2002	154,917	216,334	0.72
2003	157,557	236,506	0.67

3.3. Wood-processing industries practices

Croatia is a small, export-oriented country. However, due to its structure, export consists of predominantly raw materials and semi-finished goods, for which importers do not require companies to join the ISO system. It is to be expected that furniture producers will also become export-oriented. The first step will be to join world chains, followed by the implementation of the ISO 9000 system.

Apart from the above, the quality of a product, combined with its competitive price, will become one of the decisive factors with which the Croatian wood industry and furniture manufacture will compete with the countries of Central and Eastern Europe on the ever more demanding European Union market.

Table 12. Number of companies in timber processing, furniture manufacture and paper processing

Field of wood production	Number
Production of sawn products and boards	**274**
1.1. Sawn products	251
1.2. Veneer and boards	21
1.3. Impregnation	2
Production of final wood products	**601**
2.1. Chairs and seats	32
2.2. Kitchen furniture	17
2.3. Office furniture	48
2.4. Mattresses	4
2.5. Other furniture	17933
2.6. Production of packaging	211
2.7. Wood construction elements	77
2.8. Production of other wood products	
Pulp and paper production and processing	152
3.1. Pulp and paper production	11
3.2. Paper processing	141

The size of a company is commonly measured with several parameters, such as:
- the number of employees;
- the amount of the realised total income;
- the amount of the realised profit;
- the value of fixed assets;
- the company share on the market of certain products and services and similar.

Each of these parameters has some advantages, but the one relating to the number of employees has more advantages than the others. In the last few years the structure of wood industry in the Republic of Croatia has changed profoundly in favour of small companies at the expense of large companies. This fact is further accentuated by the data showing that about 70% of the companies in the Republic of Croatia employ up to 20 workers.

Three groups of small and medium-sized companies in the wood industry in Croatia should be differentiated in terms of their roles. The first group includes traditional small companies that produce goods and services intended for the local market. The second group is made up of small companies – co-operators of large companies which compete directly on the regional, national or international market, but are faced with competition by other home producers. The third group consists of small independent companies which are present on the foreign market independently. It is the companies in this group that should become the leading exporters.

As mentioned, Croatian wood processing and furniture manufacturing firms have certified ISO 9000 quality management systems. In the year 2003 only 9 Croatian firms have certified ISO 9000 systems. That makes less then 1% (0.88%) of all wood processing and furniture manufacturing firms in Croatia.

A total of 758 firms of all industrial and service branches have certified ISO 9000 quality management systems. It means that wood processing and furniture manufacturing firms make only 1.19% of all ISO 9000 certified firms in Croatia. At the same time only 57 firms in Croatia have certified ISO 14000 environmental management system, and none of them is in a wood processing and furniture manufacturing branch. All those 57 firms have certified ISO 14000 in addition to ISO 9000 system.

3.4. Policy framework and production conditions

Industrial wood processing is the significant segment of Croatian economics. The basis of its development is the exploitation of domestic natural resources and traditionally it is export-oriented. To confirm the strategy and revitalisation of industrial wood processing, its characteristics are very important:
- very high share of domestic raw materials in all phases of processing;
- permanent export-orientation;
- growing and a long term tendency of the world demand for all phases of wood processing products;
- a large dispersion of enterprises and profitable centres in all Croatian counties;

- possibility of a high degree of employment in small areas where it is often the only source of income and where there are no infrastructure, other raw materials and technical staff to organise some other manufacture (a combination of individual agriculture and wood processing);
- relatively low investment value of individual manufacturing objects and of the employed person;
- quite ecologically acceptable activity.

The results that have been achieved in the sector of industrial wood processing are certainly the outcome of its comparative advantages (high share of domestic raw materials, relatively low investment value of certain manufacturing objects, etc.). But these comparative advantages are not enough for future existence and development. So, there is a future need to stimulate its competitive competence oriented to final manufacture.

To define an acceptable development, we have to take into consideration the current conditions of Croatian wood processing industry, its structure and dynamics, technological level, world trade involvement, international competition, employment, natural, human and capital potentials. The current condition of most above listed components of wood-products sector is unfavourable.

So far approach has been based on the old paradigm - from saw logs to final products and price consideration. A new paradigm has to be introduced – from the market and final products to saw logs and other inputs. Theoretically, the task is to fully activate the wood resources in wood processing manufacture to achieve the highest degree of final stages and export.

The approach and function which stimulate industrial development of these branches and a new system of measures, instruments and hypothesis must be systematic and not partial as now. The expected result is a new industrial policy of the sector whose function is the export and development of final wood products and which is effectively co-ordinated with wood policy.

Except the task to stimulate the export, there has been a constant fall in domestic furniture sales on domestic market, so it would be useful to connect manufacturers and traders, and invest into the trade centres where Croatian furniture will be sold.

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

The industry can be characterised by low barriers to entry, given the relative ease to acquire second hand machinery from countries such as Italy. In addition, the industry is fragmented, which prevents the development of competitive advantage in terms of scale and market penetration.

The interface between Hrvatske šume, limited company, and the industry is characterised by low market information flows. An example of this low level of information exchange is that the sawmills are given no detailed annual plan of

production in terms of species and assortments. In this environment, it is difficult if not impossible for the sector to plan ahead.

This centrally planned approach, where timber prices are set by the Ministry of Economy with no reference to either market developments or demand/supply for roundwood, has significant impact on the competitiveness and performance of the industry and on the ability of Hrvatske šume, limited company, to match supply with demand. For the future it will be important to establish clear and transparent market relations in the sale of roundwood along the lines of partnership between Hrvatske šume, limited company, and end users of the raw material.

In a current situation where Croatian exports to southern Europe are further processed and re-exported to higher value added markets reduces the net contribution of the sector to the national economy. Domestic industry has the potentials for developing direct trade links with these end use markets. Certification of forests and wood-processing industry chain is a useful tool in this process.

The Republic of Croatia is a marginal supplier to international markets and its products and supply potential are relatively unknown among buyers apart from a few exceptions. Experience of other countries has shown that developing a strong positive market image for a new exporter is a process which takes years of systematic and persistent effort by the industry.

The factor of exceeding the rated capacity of the sawmills and estimated annual allowable cut is almost three. This situation is untenable in the long run and some rationalisation will have to occur with increased emphasis on those companies that can add value and demonstrate an ability to operate efficiently.

4. Non-wood forest products and services

Croatia has a heterogeneous territory, as a result of its particular location at the junction of the Panonian, Alpine-Dinaroides and Adriatic-Mediterranean spaces, within the northern temperate zone. It occupies 56,540 km^2 and is divided into: the central part (34.8% of total area), the eastern part (19.6%), the mountainous region (14.0%), the northern littoral (10.8%) and the southern littoral (20.8%). The Mediterranean karst area stretches on 21,429 km^2, that is 38% of the total country area. Croatia has 4.38 million inhabitants, about 32% of which live in the Mediterranean-littoral area (Central Bureau of Statistics, 2001).

The country is shaped like an overthrown 'V', directed from the west to the east. The southern branch, the longest and narrowest, extends along Adriatic coast between Kotor Bay now in Montenegro, and Savudrija, at the Slovenian border, north of Istria peninsula (Castellan and Vidan, 1998). Three regions can be distinguished: Mediterranean or Adriatic region, Panonian region, and, between them, the mountainous region.

The **Adriatic region** comprises the Adriatic coast, with its 1,185 islands, islets and rocks. The small coastal fields are cultivated with leguminous and fruits, particularly vineyards and olives. The autochtonous vegetation is formed by Mediterranean plants. The climate is represented by mild winters, warm and dry summers. Precipitations are rare, however reaching 800 mm in the southern islands, up to 1,500 mm in the Rijeka region. Due to the mild climate, the coastal region (Primorje) is densely populated; regions around Rijeka, Zadar and Split go beyond 200 inhabitants/km^2.

The **Panonian region**, located in the north, covers half of the country area, with 66% of the population. It includes the huge plain between the rivers Sava and Drava, divided by hills and plateaus up to 500 m altitude. To the west and north from Zagreb, Croatian territory reaches the foot of Slovenian mountains hardly beyond 1,000 m. This region has a continental climate, with sharp differences between temperatures in winter and summer.

The **mountainous chain** of Dinara situated between the Adriatic and Panonian regions, is well endowed with forests (beech and fir) on its western part. Climate is characterised by abundant precipitations exceeding 3,000 mm. To the south-east, between the coast and inland, extends the beautiful mountain of Velebit. The whole region, except for the littoral part, is scarcely populated, especially after the war of independence (1991-1995).

4.1. State of the art and historical development

Table 13. presents the estimates of forest values grouped into direct and indirect use values, option, bequest and existence values as well as negative externalities linked to Croatian forest and its Mediterranean part. A more detailed description of the methods and indicators employed is given in the following sections.

Table 13. Values of Croatian forests

Valuation method/output	Total quantity	Total value (1000 euro)
Direct use values (total):		**684,016**
Market price valuation:		
Timber for trade (million m3)	2.3	188,260
Firewood (million m3)	2.4	331,600
Net growth of standing timber stock (million m3)	4.8	97,044
Forest fruits: chestnuts, walnuts, berries, other	...	7,583
Mushrooms (t)	1,000	2,000
Truffles (t)	20	1,600
Medicinal herbs and plants (t)	2,000	1,000
Fibrous materials (t)	2,500	1,000
Honey (t)	1,000	2,000
Surrogate market pricing: Fodder and forage (t of fodder)	261	13,066
Consumer surplus (benefit transfer, CVM, TCM):		
Recreation (no. visitors)		28,758
- in forest reserves		986
- in national parks		27,771
Hunting (no. hunters)	47,000	10,105
- Local hunting	42,000	9,030
- Foreign hunting	5,000	1,075
Indirect use values (total):		**180,078**
Cost-based method :		
Water protection and erosion control (million ha)	2	2,078
Carbon sequestration (tC)	8.9	178,000
- in forest soils	2.7	54,000
- in biomass	6.2	124,000
Option, bequest and existence values		**129,600**
Potential use of recreational services		18,000
Potential use of other environmental services		111,600
Negative externalities		**-38,683**
Damages caused by forest fires (ha)	4,600	-2,683
Damages caused by touristic use	...	-36,000
TEV		955,011

Direct use values

Several direct use values of Croatian forests, such as timber, firewood, forest fruits are estimated on market price basis. Fodder and forage for grazing are valued by means of surrogate market pricing, while the value of hunting and recreation are based on the Contingent Valuation (CVM) and Travel Cost (TCM) results and benefit transfer.

Timber and firewood. Timber from Croatian Mediterranean forests has little importance for wood industry, primarily because of the inadequate tree species for exploitation. Significant value is attributed to firewood, most of which comes from continental forests. Quantitative valuation of timber and firewood considers the annual cut with and without permits. Timber removals are about 2.3 million m^3, of which around 5.4% come from the Mediterranean forests. Firewood production is about 2.4 million m^3, to which Mediterranean forests contribute with 80%. Based on the roadside prices, the monetary value of timber and firewood results 188,2 million euro and 331.6 million euro

respectively. The value of wood forest products (WFPs) in the Mediterranean Croatia is only 9.7 million euro.

Net growth of standing timber stock. Quantitative valuation is the difference between the annual increment and total annual cut (4.8 million m^3). Estimated at half of the stumpage price, it gives a total value of 97 million euro.

Forest fruits. In Croatia there is a variety of forest fruits, firstly thanks to the close-to–nature sylviculture, secondly, due to the spread of berries – particularly blackberries – among other shrub vegetation on places where degradation progressed (as a result of forest fires, clearcutting, overcutting, grazing, overexploitation for fodder and forage) (Šatalić and Štambuk, 1997). Monetary valuation was undertaken for chestnuts, walnuts, berries and other (miscellaneous).

On average, the harvest of chestnut reaches 11.400 t/year, which valued at a market price of around 0.6 euro/kg, gives a total value of 7.13 million euro. About 1.5 t of walnut are picked from forests yearly, which leads to a total monetary value of 3,000 euro, considering an average price of 2 euro/kg. It is supposed that 80% of the total quantity of chestnut and about 30% of the amount of walnut are sold on the market, the rest being self-consumed.

The most common forest fruits in Croatia are a wide variety of berries as well as apples, pears, cherries, and less often, meddlers, which are mostly collected for self-consumption. However, it is estimated that only insignificant quantities of these products (100 t) are sold on the local market, with a total annual value of 150,000 euro. Other forest fruits collected from the forests for marketing and self-consumption are estimated at about 500 t, having a total market value of 300,000 euro. Adding up these figures, total monetary value of forest fruits attains 7.6 million euro, of which slightly less than half can be attributed to the Mediterranean forests part.

Mushrooms and truffles. Mushrooms are generally harvested by individuals for subsistence and/or recreational purposes. Nevertheless, significant quantities – most of them growing in the forest, except for champignons - are seasonally sold on the green market throughout the country. There is no official data on the quantities of mushrooms harvested from the forests. However, it can be assumed there are around 1,000 t, out of which one third is sold on the market and the rest self-consumed. The total value estimated for both uses at market prices attains about 2 million euro, half of which is collected from the Mediterranean part of country. In Istrian peninsula, about 20 t of truffles are annually produced, of which around 90% is exported, mainly to Italy, and the reminder is consumed domestically. At a price of about 80 euro/kg, it results a total value of around 1.6 million euro.

Medicinal plants. Forest and forest soil in Croatia are inexhaustible sources of medicinal plants, which for centuries have been collected for local use, and in later times, for industrial purposes. Among the most demanded medicine plants on the market, it should be reminded the foxglove (*Digitalis purpurea*), the belladona (*Atropa belladona*), the monkshood (*Aconitum napellus)*, the autumn crochus (*Colchicum autumnale)*, the common horsetail (*Equisetum arvense)*, *Potentilla formentilla*, the alchemilla

(*Alchemilla vulgaris)* and the chamomile (*Matricaria chamomilla*). Additionally, there are more than 80 species of herbs and plants collected for medicinal use, from the arid and semi-arid littoral and mountainous part behind the Adriatic coast (typical Mediterranean), up to the humid, rainy northern and north-eastern part of the country (continental). Before the IInd World War, the Dalmatian insect powder made from the flower of pyrethrum (*Chrysanthemum cinerariafolium*), was demanded as a high quality and efficient insecticide. Later developments of chemistry pushed it out of the market, while recently, new ecological movements seem to bring it back. Consequently, on the whole, the quantity of medicinal herbs in Croatia could considerably increase in the future.

It is assumed that about 2,000 t of various medicinal herbs are collected annually from the forests. At a market price of approximately 0.5 euro/kg, it results a total annual value of 1 million euro, of which 90% belongs to the Mediterranean part.

Fibrous materials. A Mediterranean bush of Spanish broom, or gorse (*Spartium junceum L.*) was in earlier times demanded as raw material for production of cottonlike fibrous material. It is hoped that gorse would be again an interesting product for industrial use, provided that the abandoned technology the Italians (Callonia) developed at the end of the IInd World War would be modernised. In the littoral and karstic part of Croatia, cultivation of gorse could be economically profitable. Reedmace (*Typha latifolia* and *Typha angustifolia*) is used locally as weaving material for baskets and mats. Common reed (*Phragmites communis*), rich of cellulose, is abundant in marshy terrain sand serves only locally for thatched roofs or similar. Sedge (Carex caespitosa) is found throughout the world as a component of marshy habitat. A limited number of about 1,000 species are used locally as food or bedding for animals, while few are cultivated as ornamental plants. Basket willow (*Salix viminalis*), almond-leaf willow (*Salix amygdalina*) and purple willow (*Salix purpurea)* are used in large quantities as a weaving material for baskets, an important Croatian exports item. It is assumed that about 2.500 t of textile fibrous plants are annually collected from forests. At an average price of 0.4 euro/kg, it results a total value of 1 million euro, all of which produced in the Mediterranean part.

Honey. The value of honey produced in about 100,000 beehives in Croatia might be by 50% considered as generated from forest and forest land. Taking 10 kg/year as the capacity of an average beehive and the price of 4 euro/kg, the value of honey yearly produced from forest and forest land is approximately 2 million euro, of which 40% is produced in the Mediterranean part.

Tourism and recreation. Access to forests is generally for free, except for national parks, some natural parks and special nature reserves where entrance fees are required. Results of TCM surveys show an average consumer surplus of 2.85 euro/ha for various forest sites with recreational value (Benc, 1997; Vuletić, 2002). Applying this benefit to the area of forest reserves and special reserves of 346,200 ha, it results a value of about 1 million euro. National parks extending on 61,700 ha have the highest recreational value in the country, of approximately 450 euro/ha (Benc, 1997; Vuletić, 2002), or 27.8 million euro in overall. Based on these results, the total recreational value amounts to 28.8 million euro. In times of peace, each of the national parks of Plitvice Lakes,

Paklenica and Krka waterfalls were visited annually by more than 500,000 people. Results of CVM applications show similar results. The recreational value of the Mediterranean forests is assumed equal to 40% of the total, calculated on the basis of the ratio of protected areas and the number of visitors.

Hunting. Income from hunting is a very important part of the national revenue. There is plenty of game almost in every part of Croatia, thanks to its relatively small population, to the extended forest cover and reserves areas and of course to the long term care of the right number of game per specific area. This includes high ethical hunting standards followed by domestic and foreign hunters.

Valuation of hunting is undertaken by several methods, among which the CVM seems the most reliable. Another valuation attempt is based on the prices of hunting permits sold to hunters by public authorities. Accordingly, the value of hunting, including various costs - wages of game keepers and other personnel, armament expenditures, ammunition, transport, insurance - comes much lower, of about 4.2 million euro. This is a highly underestimation, also because it is believed that there are also people hunting without permits.

Results of a CVM survey in Italy leads to an average consumer benefit of 250 euro/hunter (De Battisti *et al.*, 2000). This value is probably too high for Croatia, despite the large number of foreign hunters willing to pay for shooting trophies, in addition to other taxes and associated costs (accommodation). The benefit of 215 euro/hunter seems closer to the Croatian reality.

The number of national and foreign hunters has decreased during the recent war and will probably remain low due to the numerous mines scattered almost everywhere over the area formerly held by Serb rebels. Considering that annually there are about 5,000 foreign hunters and around 42,000 national hunters, the value of hunting could be assessed within the probability limits of ±20% at approximately 10.1 million euro. Based on the 25% ratio of game found in the Mediterranean part, the value of hunting in this area is 2.5 million euro. It should be noted that in numerous scientific papers, game hunting is often overvalued. An objective estimate of this value is needed.

Fodder and forage. The use of forest and other wooded land for fodder and forage to feed domestic livestock was once a very important activity in Croatia, particularly in semi-arid areas of the littoral hinterland and in the southern and south-eastern mountainous regions. Grazing in the forests is forbidden by law, rule very often disregarded. Recently, the trend of growing goats has been felt again, on the grounds that they prevent forest fires by clearing the lower layers of inflammable vegetation. Anyway, grazing in woodlands is generally tending to decline, as a result of more intensive animal husbandry. Besides, after the recent war, the marginal, poor areas of Croatia have practically been emptied: their population, previously relying on half-nomadic animal husbandry, have migrated to more fertile areas of the country. Thus the number and size of sheep flocks decreased as well.

It is estimated that there are 40,000 cattle, 1,500 horses, 50,000 sheep and 20,000 goats annually grazing in the forests. Grazing by cattle, horses, and sheep takes place 250

days/year, and by goats, 270 days/year. The daily consumption of forage (grass, leaves) is supposed to be as follows: 15 kg for cattle and horses, 5 kg for sheep, 8 kg for goats. The average market price of fodder is about 50 euro/t. Based on these data, the value of grazing is 7.8 million euro for cattle and horses, 3.1 million euro for sheep and 2.2 million euro for goats. Adding up these figures, it results a total value of 13 million euro, of which around 90% accrue to the Mediterranean part.

4.1.2. Indirect use values

Erosion control and watershed protection. About 55% of the total forest area, or 1.15 million ha, are located on soils which would be exposed to heavy erosion if no forest cover was available. The absence of the rest of forest cover would provoke only a moderate erosion level. Annual average precipitation in the country amounts to 1.13 billion m^3 water, one third of which is retained by forest. This diminishes the water impact by about one tenth which is sufficient to control floods most of the year (Common, 1988). The monetary value of such retention power is calculated by the use of cost-benefit method in 'with-without' situation, that is, what damage would cause a water impact of additional 11 million m^3 of rainwater throughout a year? Since there are no reliable studies to prove or reject the above assumptions, they should be accepted with utmost care.

Furthermore, the existing forest cover protects the soil against erosion, sometimes up to 100% and this should enter the same cost-benefit analysis, under the same assumptions as above. The forest has an enormous influence on water balance. Croatia has no great problems with the drinking water supply, even close to the relatively great urbane agglomerations. In the European industrially developed countries, like Germany, water protection cost amounts to DM 72/ha/year (Brill, 1994). In Croatia such a cost may be regarded more moderately, probably at no more than about 1 euro/ha/year (Prpić, 1992). Thus, the water protection and erosion control function of forests may be estimated at 2,078 million euro. Of this value, 60% is assumed to accrue to the Mediterranean part, based on the proportion of area with high risk of erosion occurring in this zone.

Carbon sequestration. Valuation of carbon sequestration is based on the quantity of carbon annually stored in forest biomass and soils of 8.9 million tC (Box 2) and a shadow price of 20 euro/tC (Fankhauser, 1995), leading to a total value of 178 million euro. It is considered that around 14% of this value can be attributed to Mediterranean forests.

Box 1. Value of carbon sequestration in forests biomass and soils

The total amount of carbon (C) sequestered in Croatian forest biomass and soils is calculated as follows:
Total C content = C content in wood + C content in the above ground vegetation + C content in dead trees and roots + C content in forest soil
- **C content in wood** = growing stock * expansion factor to include branches, thicket, leaves and roots (1.45) * coefficient of transformation from wood into dry biomass * conversion factor of biomass into C (0.5)
The growing stock of Croatian forests is 324.3 million m^3 and refers to the above stump wood with a diameter larger than 7 cm. Adding up the volume of trees outside forests, that is, 6.2 million m^3, one comes to the total growing stock of 330.5 million m^3. Of it, the growing stock is 284.2 million m^3 for broad-leaved and 46.3 million m^3 for conifers in and outside the forests. The coefficients of transformation from wood into dry biomass is 0.37 for broad-leaved and 0.55 for conifers. Based on these figures:
C content in wood = $(46.3 \times 1.45 \times 0.37 \times 0.5) + (284.2 \times 1.45 \times 0.55 \times 0.5)$= 125.74 million tC (1)
- **C contents in the above ground vegetation, dead trees and roots, forest soil** were estimated on the basis of the productive forest cover (2,078,300ha) and the following average indicators:
C content in above ground vegetation = 1 tC/ha
C content in dead trees and roots = 5 tC/ha
C content in the forest soil = 150 tC/ha
C content in above ground vegetation + in dead wood and roots = 2.0783 million ha × 6 tC/ha = 12.5 million tC (2)
C content in the forest soil = 2.0783 million ha x 150 tC/ha C = 311.7 million tC (3)
Adding up (1), (2) and (3), total C content in wood biomass and forest soil results 449.94 million tC. Applying a discount rate of 2%, the annual quantity of carbon sequestered is 8.9 million tC.

Source: Vuletić, 2003.

4.1.3. Option, bequest and existence values

Valuation of different option/bequest/existence values of forests was undertaken within a CVM survey of Korčula forest site. It aimed at making integral valuation of all non-tangible forest services, considered the principal components of forest amenity within the TEV framework (Sabadi, 1992). It shows an option value for recreational opportunities of about 9 euro/ha and for other environmental values (such as landscape) of about 29 euro/ha. Extrapolated at national level, it results a total option value of recreation of about 18 million euro (6.6 euro for the Mediterranean) and a total option value for other environmental values of around 111.6 euro (21.5 million euro for the Mediterranean).

4.1.4. Negative externalities linked to forests

Forest fires are the main negative influences on forests in the Mediterranean region of Croatia, affecting 70-90% of the country's burnt area. Valuation is based on the average burnt area (4,600 ha) and the restoration costs, which total amounts to 2.6 million euro. Of that, 2.2 million euro are attributed to the Mediterranean part.

Other negative externalities originate from the touristic pressure on forests and reflected by increased burden of pollutants from movable and immovable polluters (such as traffic and water heating). A local level survey on the island of Korčula estimated the damage created by emissions of pollutants of about 21euro/ha (Vuletić, 2002). Applying this estimate to the forest area subject to pollution, it gives a total value of 36 million euro, of which 13 million euro corresponds to the Mediterranean part.

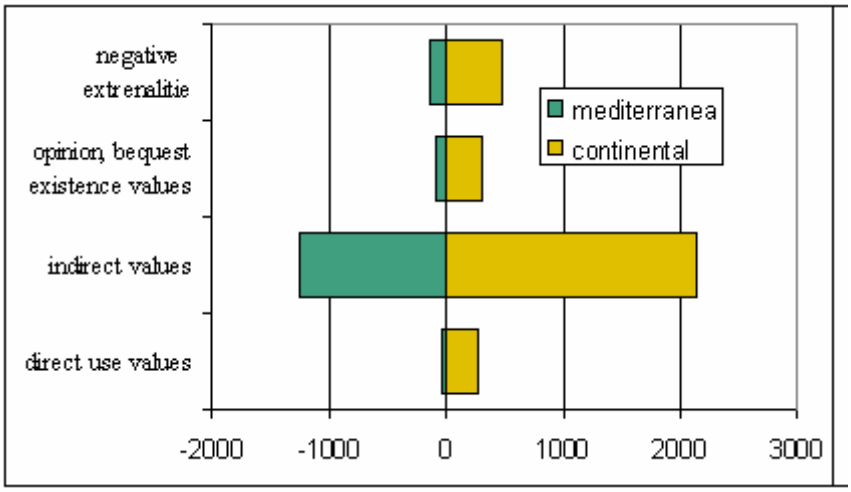

Figure 5. Towards total values of Croatian forests (million euro)

Table 14. Number of tourists for year 2004.

	September 2004	
	Arrivals	Nights
Total	1,019,104	5,104,375
Domestic	132,036	387,727
Foreign	887,068	4,716,648
	January - September 2004	
	Arrivals	Nights
Total	8,735,126	45,845,888
Domestic	1,234,722	4,710,908
Foreign	7,500,404	41,134,980

The values of negative externalities were calculated for forest fires (reaching 130 million euro, of which 125 million euro belongs to Mediterranean part) and for pollution provoked by tourism (amounting 43.6 million euro, of which 15.6 million euro for Mediterranean part). At present, about 60% of the estimated annual indirect and 15% of direct use values are produced by the Mediterranean region, with an expected strong raise particularly in non-market values. Contribution of Mediterranean forests to estimated annual option, bequest and existence values is about 30%.

4.2. Case studies of successful marketing strategies

Summary

The paper analyses the supply and demand of non-wood forest resources in the area of Split Forest Administration and at the Faculty of Forestry, University of Zagreb. Some general data on Split Forest Administration are given, the concept of supply and demand defined, and the notion of non-wood forest services discussed. The working method applied to obtain information to be analysed involved the use of primary and secondary information sources. Research was aimed at investigating the supply of non-wood forest services in the area of Split Forest Administration and finding out to what degree the supply meets the demand.

Key words: supply, demand, non-wood services, forest resources

Introduction

The company "Hrvatske šume" Zagreb manages forests and forestland in the Republic of Croatia. It comprises 16 administrations, of which Split Forest Administration is a component part. The total area of Split Forest Administration, extending over four counties, is 555,032 ha. It should be pointed out that within the company "Hrvatske šume", Split Forest Administration is the largest in terms of area and covers almost one third of the territory managed by "Hrvatske šume". Its basic activity involves forest silviculture and protection.

The area that it covers includes the beautiful and highly indented Adriatic coast with a total of 986 islands and islets, a small part of which belongs to three insular forest administrations (Brač, Hvar and Korčula). It also comprises overall natural and national wealth consisting of 4 national parks (Paklenica, Krka, Kornati and Mljet) and 3 nature parks (Telašćica, Vransko jezero and Biokovo).

The basic organisational form of Split Forest Administration is made up of 17 forest offices, while the Administration's specialist services include 9 departments. Split Forest Administration has 280 employees of different profiles and educational backgrounds. Split Forest Administration also caters for 7 nurseries distributed over 6 forest offices, whose production focuses exclusively on conifers and deciduous container seedlings raised for afforestation purposes. The future of this Administration relies on forest ecology and on the preservation and protection of the existing forest fund, as well as on maximal involvement of its entire personnel in forest management issues.

Problem matter

The concept of non-wood forest services embraces a multitude of diverse benefits that people obtain from forests. These benefits result from spontaneous effects of forests on the living environment and from activities of man and nature in the field of production and services. These services belong to all members of the society and nobody can purchase them for their sole use.

A turning point in the affirmation of non-wood services is considered to be the Multiple Use Sustained Yield Act, adopted by the US Congress in 1960. The Act advocates a multifunctional principle of managing state forests. Forests should simultaneously be used for timber production, watershed management, outdoor recreation, wildlife and fish, and cattle grazing in a combination which will best meet social needs, ensure the most prudent use of land for some or for all purposes, and at the same time relinquish the obligation of achieving the highest monetary income or the highest production per unit by the combination of uses. Sustainable yield of several products and services means the achievement and permanent maintenance of production at a high level without aggravating soil productivity. The fundamental point of multipurpose forestry lies in the idea of equal importance of all forest services. The principle of production maximisation should be replaced by the principle of harmony and co-ordination in forest exploitation.

In the Republic of Croatia, non-wood forest services are regulated by the Forest Act. Based on the above, research is aimed at determining the supply and demand of non-

wood services in the area of Split Forest Administration. Other research aims involve finding out which categories of non-wood forest services are the most common when they are evaluated.

Working method

The working method adopted in this research involved the analysis of primary and secondary information sources relevant for this work. Primary data are those that are collected directly from research units. A research unit may be an individual, a household, an economic or a non-economic subject, an institution and similar. In practice, research is reduced to communicating with individuals who can represent themselves, their households, or some other economic or non-economic subjects or research units.

Research used to collect primary data is commonly called field research. Primary data are collected directly from respondents and may relate to:

- facts, states and situations, or to
- opinions, attitudes, feelings and similar psychological variables

Secondary data are data which were collected and recorded earlier in the course of some other research and for some other purposes. From the point of a researcher currently conducting research and using secondary data, these data are historical and do not require contact with respondents or research subjects. Still, secondary data are the result of previous collection of primary data. Collecting may have taken place several weeks, months or even years ago.

This work was based on the primary information source method, which involved questionnaires completed through personal surveys. The questionnaire consisted of six groups of questions:

- questions referring to general data on respondents;
- questions referring to the respondents' behaviour;
- questions relating to the current supply and demand and comments on past business activities of the company "Hrvatske šume" involving natural resource management;
- questions relating to the awareness of environmental actions;
- questions relating to future supply that would satisfy the respondents' demand;
- questions relating to regulating environmental pollution by economic subjects.

A total of 18 questions were asked. The survey included 181 respondents.

The balance sheet in Split Forest Administration shows that income from non-wood forest services was entered under the item 'income from the sale of products and services on the home market', but also that a part was transferred to the items 'income from the use of products and services for own needs', and 'income from the sale of goods on the home market'. However, the nature of the income was not stated and neither were the percentages or amounts represented in the final balance sheet.

The survey conducted among the students of the Faculty of Forestry in Zagreb and the employees of Split Forestry Administration yielded some concrete results showing the degree of their satisfaction with the supply, the kind of non-wood forest resources

included in their demand, and the most frequently evaluated categories of non-wood forest services.

The conclusion drawn from data analysis shows that both the employees and the students were interested in certain categories of non-wood forest services, and that these can be evaluated. According to the survey, students spend an average of 2 hours a day in the nature, whereas employees spend 4 hours. 90% of the respondents answered affirmatively to the question of whether they would pay admission of between 22.6 and 30.6 euro to a national park.

A total of 16% of those questioned would be prepared to travel to a desired destination a distance of 20 km, 30% would cover a distance of 200 km, and 54% of the respondents would travel regardless of the distance. They would be prepared to use all means of transport.

It was felt that resorts should offer a wider range of activities, such as riding, jogging, climbing, cycling, animal watching, photography, etc. 68% of the respondents expressed only partial satisfaction with the current offer, 8% reported complete satisfaction, while 24% expressed dissatisfaction. Among those questioned, 49% respondents graded the current quality of use (availability) of natural resources as good, while 25% considered the offer sufficient.

The question whether the company "Hrvatske šume" needed competition in managing natural resources divided the students: 41% gave an affirmative answer and 40% a negative answer. They explained that competition was good, but also that "Hrvatske šume" managed natural resources well. 29% of the respondents among the employees opted for the YES answer and 57% for the NO answer. They gave the same explanations for their answers as the students. 19% of the students and 14% of the employees chose the option I DON'T KNOW, emphasising that they were not sufficiently informed about the problem.

All those questioned were well informed about environmental actions, mostly via television, newspapers and radio, while other media were poorly represented. They would like to be informed in the same way in the future, but the students also mentioned the Internet and SMS messages, that is, the media which are currently present but will become an even more important method of communication in time to come.

The destinations suitable for a visit included mountains, forests, islands and lakes in the first place, while forests with water and broad-leaved forests constituted their preferred holiday choices. As much as 66% of the respondents expressed individual readiness to donate a certain amount of money for the preservation of forests for future generations. The amount the students were prepared to give ranged from 73.3 to 106.6 euro, with this sum increasing in accordance with improvement in their situation, while the employees were prepared to give about 20 euro annually. 11% of those questioned were prepared to invest only their knowledge, 7% their free time, and 16% were not prepared to give anything.

42% of the respondents would solve the problem of environmental pollution with fines, 22% would raise pollution standards for those that pollute the environment, 18% would

impose taxes and 18% would close down the pollutants' plants. Based on the obtained concrete results, it can be concluded that there is a possibility of monetary valorisation, but the offer should be defined in a better way in order to be valorised in monetary terms.

The offer should also be expanded so that considerable income from non-wood forest services can be achieved in view of the global trend of 'returning to nature'. Despite the fact that the company "Hrvatske šume" would benefit from competition in this respect, a large number of the respondents were of the opinion that the company itself should be capable of achieving the above, provided that this business segment was better organised. The replies of the second- and fourth-year students and the employees of Split Forest Administration do not differ significantly.

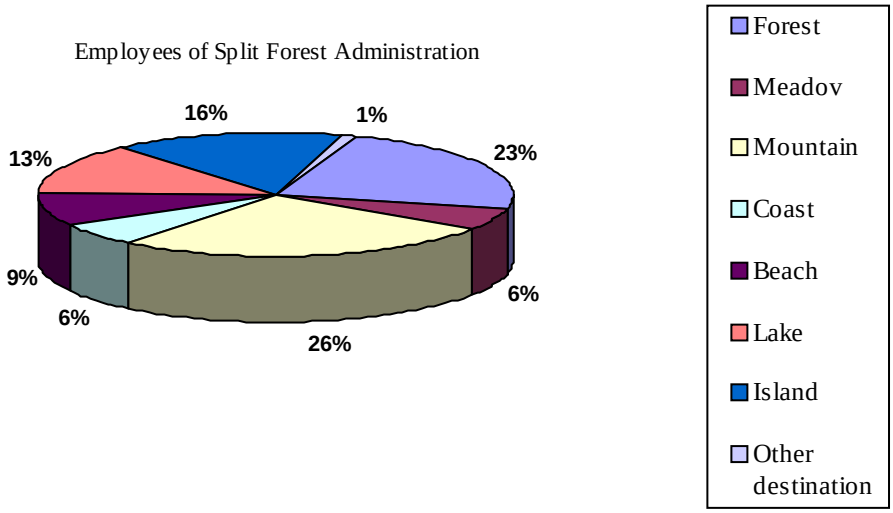

Figure 6. Review of most preferences destination in nature in opinion of the employees of Split Forest Administration, in percents

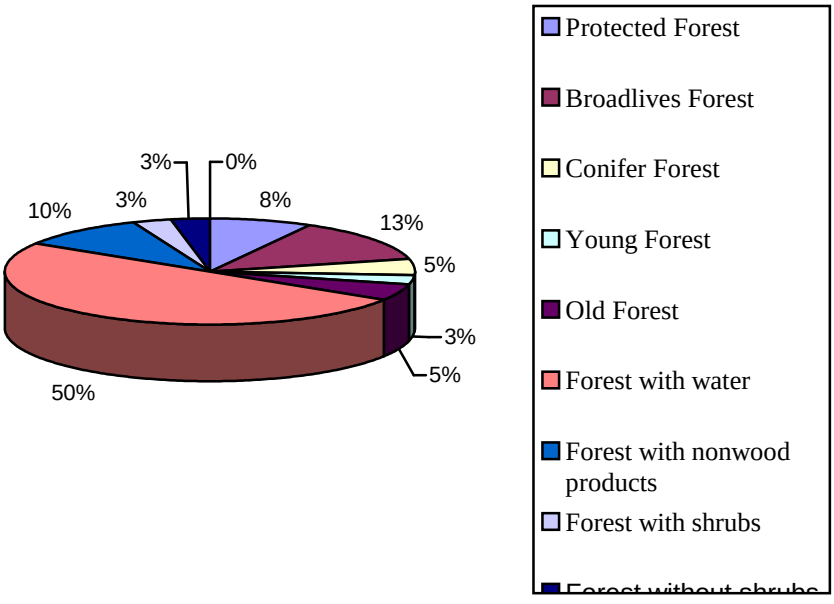

Figure 7: Review kind of forests which employees of Split Forest Administration prefers for vacation in nature, in percents.

5. Forests and ownership

Forests in Croatia have economic, environmental and social functions and have a major impact on the quality of life. Croatia is endowed with a great diversity of habitats (The Adriatic Sea, sub-mountainous regions and Panonian plain) and over 60 various forest communities are recognised. Our forests are acclaimed internationally for their natural composition on 95% of the forest areas and also for their great diversity of plant and animal life, resulting from more than 150 years of forestry tradition. The distribution of forests and forest land is as follows:

- areas covered by forests: 2,078,289 ha;
- forest land not covered by forests: 345,952 ha;
- infertile forest land: 61,370 ha;
- total: 2,485,611 ha.

Croatia is divided into 12 administrative regions and 16 forest regional units, totalling 171 forest offices. Total forest area managed by these forest offices covers 2 million ha, of which 0.9 million ha is karst forest area and 1.1 million ha are continental productive forests. The area administered by each forest office is divided into several management units. These are formed by numerous forest departments and sub-departments and represent the basic management and planning areas. This division is done according to the forest type, condition, stage of development, soil configuration, natural borders such as waters, hill peaks, roads.

For each management unit, there is a general management plan that applies for 20 years, must be revised at middle term and provides general directions for the next 20 years. For the first 10 years, the management plan is very detailed; however, operative management plans are made on annual basis. The revision of management plan has to be approved by the Ministry of Agriculture and Forestry.

5.1. State of the art and historical development

Forests in the Republic of Croatia occupy 2.5 million hectares or approximately 43.5% of total mainland area. Of the total area, the state owns 2,024,474 ha (81%) of forests and forest land, while 461,137 ha (19%) is privately owned. “Hrvatske šume”, limited company, Zagreb is responsible for management of state forests (1,991,537 ha), while some smaller areas (32,937 ha) are managed by other legal entities.

In the year 2000, the contribution of forest industry sector in GDP was 1.4%, with the furniture industry accounting for 0.5%, pulp and paper 0.4% and wood and wood products 0.5%. It has been estimated that the contribution of forests in GDP is additional 1% (source of data: Statistical yearbook of the Republic of Croatia 2002).

Forestry sector is a significant source of employment, especially in rural areas. In total, there are approximately 49,000 employed, out of which number 9,500 people work in company for forest management, 6,000 employees work as entrepreneurs for forestry works, 4,000 people are seasonal forestry workers, 11,500 people work in primary wood processing industry, 11,600 work in furniture industry and 6,250 work in pulpwood and paper industry.

"Hrvatske šume" ltd. Zagreb was founded on January 1st, 1991 as a public company for management of forests and forestland of the Republic of Croatia on the basis of provisions of the Law on Forests. When the Amendments of the Law on Forests were passed the company was restructured from a public into a limited trading company, the founder of which is the Republic of Croatia. Issuing a Statement of Foundation the Company was registered in the Register of Companies on April 8th, 2002.

The Company is structured in three levels: the Company as a whole with its management and main office in Zagreb, 16 regional forest administrative branches, 169 forestry stations and several work units for additional activities. The Company has five subsidiaries for complementary activities: wood processing, quarry, tourism and consulting.

The "Hrvatske šume" ltd. was founded for managing state owned forests of nearly 2 million hectares, which makes 35% of the territory of the Republic of Croatia and 80% of all Croatian forests. Annual cut for the period between 1996 and 2005 shows that 49.3 million m^3 of wood can be cut in ten years. In the area managed by the Company there are considerable hunting and tourist resources.

The basic capital of the Company is 146.5 thousand euro, the assets are 238.6 million euro, gross revenue is 253.3 million euro and the profit 5.25 thousand euro. The Company makes a profit by selling different wood assortments (58.1%), by works in the biological reproduction of forests (27.2%) and otherwise (14.7%).

The Law on Forests, Law on Companies and the Statement of Foundation regulate tasks, style of operation, organisation and other characteristics of the "Hrvatske šume", which in the existing form slows down the normal business dynamics. The main task of the Company is managing forests and forestland of the Republic of Croatia. It also ensures simple and a part of broader reproduction of state owned forests, i.e. in forests included in the forestial economic territory (Article 19 of the Law on Forests). The "Hrvatske šume" is a company and an economic subject and the main goal of the Company's business is, therefore: successful managing of state owned forests and forestland, as well as economically sound business. The economic goals of the Company were defined in 2002 as follows:

- business operation with a satisfying profit and providing funds for the activities of the biological reproduction of forests, protection from risks, maintaining the achieved level of average salaries and gross accumulation, which ensures the maintenance of the Company's property;
- financial stability, reducing short-term debts and a positive money flow from business activities in the amount that ensures prompt payment of long-term loans and financial means for planned long-term investments;
- balanced and selective investments aimed at further construction of forest roads and maintaining of property functions.

The "Hrvatske šume" ltd. was founded with a strictly defined goal and tasks regulated by the Law on Forests and other regulations and its business activities are regarded from two aspects:

- firstly, from the forestial economic aspect, when regarding managing state owned forests and forestland according to the planned cutting down of trees and production of wood products, and working on biological reproduction of forests belonging to the forestland territory;
- secondly, from the economic and financial aspect, i.e. through business results stated in financial reports.

5.2. Forest resources

Croatian forests cover 2.5 million ha (including productive and unproductive, covered and bare, fertile and unfertile areas), or 43% of the country's area, according to the national forest management plan. This places the country among those relatively richly endowed with forests in Europe, with more than 0.5 ha of forest per inhabitant.

The country's plant biodiversity is rich and heterogeneous, containing about 4,500 species and subspecies of vascular plants, almost 50% of which belong to the forest ecosystems. There are 260 autochthonous woody plants, among which more than 50 are economically significant. Besides, the vegetation comprises numerous species of bush, shrub, herbaceous plants, mosses and mushrooms, as well as a multitude of micro-organisms within the soil. The forest communities, zoo-cenoses and habitats include more or less natural and stable ecosystems.

From the phytogeographical viewpoint, Croatian forest vegetation can be divided in two regions: the Mediterranean one - with two belts and five zones - and the Euro-Siberian-North-American one - with six belts and 15 zones. There are 68 forest associations and sub-associations, from thermophytic and mesophytic to the cryophilic ones.

Forest soils are classified into automorphous and hydromorphous, and their formation was influenced by extremely different factors. The most productive soils are the automorphous luvisols, dystric cambisols, calceocambisols, brunipodsols and rankers, while less significant are podsolic colluvial, regosols and lithosols. Hydromorphous forest soils are dominated by eugley, semigley, pseudogley and fluvisol. The increasing water and air pollution caused by anthropogenic and technological factors has negative consequences on soil stability, with increasing negative influences on forest associations.

Croatian karst, or the Mediterranean-littoral region, including Adriatic islands, is among the richest regions of endemic European flora. For example, Velebit mountain littoral side contains 93 local endemic plants, Biokovo littoral slopes – about 31, Konavli archipelago – around 22.

Around 85% of the total growing stock and about 87% of the total annual increment is given by broad-leaved stands and the remaining by conifers. In total growing stock, the largest share is given by beech (36.3%) and various oaks (27.4%) among the broad-leaved; by fir (9.4%) and spruce (1.9%) among the conifers.

Total annual increment is 9.6 million m^3 and average allowable cut is 5.3 million m^3. Annual increment in state forests is 8.1 million m^3 and average allowable cut is 4.9 million m^3. Production has been steadily rising since the end of the war, from 2.6

million m^3 in 1995 to a planned 4.1 million in 2003, which is still less than pre-war level of production and allowable cut. Out of the planned quantity, 1.8 million m^3 is sawmill roundwood and the rest is pulpwood, fuelwood and wastewood.

The actual annual cut in public forests for 2003 is planned to be 3.6 million m^3 (it was 3.3 million m^3 during 1986-1990; 3.3 million m^3 during 1991-1995; and 3.5 million m^3 during 1996-2000.) The official data on annual cut in private forests is highly unreliable, since the owners of small forest holdings do not always possess cutting permits, to avoid tax payment. However, it is estimated that about 1.2 million m^3 is cut annually in private forests, out of which only one fourth is covered by permits. Therefore, total annual cut is about 4.8 million m^3, that is 50% of annual increment.

Croatian forests typologies can be divided into continental and Mediterranean forests. Of the **continental forests**, the even-aged stands represent the most valuable part from the economic viewpoint. They occupy 730,600 ha and have a growing stock of 177 million m^3 (Hrvatske šume, 1998). Due to forest diseases, their growing stock has diminished below the normal value, causing further drops in the annual growth and allowable cut. The uneven-aged continental forests extend mainly in the western mountainous part of Croatia and are mostly exploitable forests. They cover 294,400 ha and have a growing stock of about 76 million m^3 (Hrvatske šume, 1998). In addition, there are treeless areas, mostly including former pastures, covered by weeds or bush and envisaged for reforestation, as well as small areas of meadows within forests, envisaged for game and wild animals grazing.

The "Hrvatske šume" manage 1,991,537 ha of forests and forestland, which makes a third of the continental territory of the Republic of Croatia and 80% of the territory of all Croatian forests and forestland. 1,592,870 ha are covered in forests, while the rest are not overgrown. The most valuable spermatophytes cover 1,018,055 ha and make 64% of all overgrown territory, coppice 16% and different other simpler forms 20%. Economic forests cover 94% of the territory of uneven-aged and common forests. The rest are forests on karst, special-purpose forests and protected forests. Artificially grown plantations and cultures cover 1% of the overgrown territory.

Table 15. Wood reserves and exchange annual growth in volume

	Wood reserves		**Exchange annual growth in volume**	
Sort of trees	**1000 m^3**	**%**	**1000 m^3**	**%**
Common oak	43,307	15.6	1,004	2.31
Sessile oak	26,980	9.7	833	3.08
Beech	101,992	36.7	2,826	2.77
Ash-tree	10,089	3.6	316	3.14
OHL	41,205	14.8	1,526	3.70
OSL	11,076	4.0	503	4.54
Fir	28,133	10.1	539	1.92
Spruce	5,414	19	130	2.40
Other Čonif.	10,128	3.6	447	4.41
Total	278,342	100.0	8,123	2.92

Total annual cut is classified into the territory annual cut of common forests, further divided into main and previous growth and territory annual cut of uneven-aged forests. Annual cut is planned for forty years on the basis of forestial economy and is divided into two categories, according to the period. In the first half of the period, i.e. I/1 economic half of the period 1996 – 2005 the annual cut of the main growth of one-period forests is 20.8 billion m^3, the previous growth of common woods (thinning) 15.1 billion m^3, and the annual cut of the uneven-aged forests 13.4 billion m^3. In the first half of the period there were 49.3 billion m^3 available for cutting.

In the last five years the structure of the produced wood assortments has changed according to the sort of the trees and the quality structure of the produced net wood mass. These changes influence changes in the value of the produced net wood mass. The change of permanent price of certain sorts defined the value of the production of net wood mass in the last five years.

Table 16. Value of the production of net wood mass in the last five years in thousand euro

Sorts of wood	**1998**	**1999**	**2000**	**2001**	**2002**
Common oak	35,084	40,478	38,030	36,708	38,273
Sessile oak	7,870	8,069	8,348	10,061	11,482
Beech	41,620	44,121	49,690	47,313	46,611
Ash tree	9,204	7,419	11,396	13,324	12,849
Fir/spruce	17,075	16,659	17,226	18,218	19,000
Other sorts	15,074	16,920	20,406	19,850	20,913
Total	125,927	133,666	145,096	145,474	149,128
Round wood	102,449	110,239	115,812	117,875	119,056
Stacked wood	23,478	23,427	29,284	27,599	30,072
Total	125,927	133,666	145,096	145,474	149,128

Value of the production of wood assortment grew by natural growth until 2000 since when, with minor oscillations, it has maintained the same level. According to the realisation of the approved annual cut so far, it can be noticed that less demanded wood is behind and gives, so to say, less valuable sorts, while more valuable sorts, especially common oak, have a greater share than approved. The negative consequences will be felt in the following years, when the income from the sale of wood sorts will be smaller, which will be connected with lower business efficiency. A trend of growth of the physical extent of cutting and production of wood assortment is clearly seen in the five-year period, while positive changes in the quantitative elements (exploitation, assortment structure) is somewhat more modest. The above-mentioned movements and results in the realisation of the forestial economic tasks have a corresponding influence on the business and the position of the Company.

A trend of income and expenditure growth has been present in the last four years as a result of a growing business activity, as well as gradual change of the income structure and a growing share of own products and services in the income. The Company makes its income, which makes 95% of total income, by selling products and services in Croatia and abroad, mostly selling wood assortment and working on the biological reproduction of forests.

5.3. Forest ownership

About 81% of Croatian forest area is public property, while the rest of 19% is private. Most public forests are managed by **Hrvatske šume Ltd**. (Croatian forests), a large State company and the remaining public land is managed by other governmental institutions or authorities (Table 17).

Table 17. Forest area ownership (1000 ha)

Ownership type	Forest land Stocked	Forest land, unstocked			Total	%
		Productive	Non productive	Non fertile		
Hrvatske šume Ltd.	1,592.9	323.1	14.5	61.0	1,991.5	80%
Other public institutions	31.3	1.2	0.1	0.3	32.9	1%
Private ownership	454.1	7.0	0.0	0.1	461.1	19%
Total	2,078.3	331.3	14.6	61.4	2,485.6	100%

Source: Hrvatske šume, 1998

Private forests are dispersed in numerous small holdings which size hardly exceeds 2 ha/holding. Except for the stands in Gorski Kotar region, private forests in a degraded state, some of which, devastated. There are three reasons for such a situation: fragmentation of holdings, totalling 599,056 with an average size of plots equal to 0.76 ha; overextended woodcut with the aim of widening agricultural areas and providing investment means for mechanization in agricultural holdings; uncertainty of private ownership dominating for the 50 years of communist rule, pushed owners to wood overcutting activities, regardless of consequences for the biological state of their forests.

Table 18. Croatian forests according to ownership and structure

Forest ownership	Structure of forests	Area	Growing stock	Annual growth
		1000 ha		million m^3
Public Corporation Hrvatske šume Ltd.	Even-aged forests	890.6	190.3	6.0
	Uneven-aged forests	394.9	88.1	2.1
	Without management plan	330.0	...	...
	Subtotal 1	**1,615.5**	**278.3**	**8.1**
Other public institutions	Even-aged forests	10.1	1.4	34.8
	Uneven-aged forests	18.3	6.5	133.0
	Subtotal 2	**28.4**	**7.9**	**167.8**
Private ownership	Even-aged forests	393.9	34.8	1.3
	Uneven-aged forests	40.5	3.6	0.1
	Subtotal 3	**434.4**	**38.4**	**1.4**
Total	Even-aged forests	1,294.6	226.5	7.3
	Uneven-aged forests	453.7	98.2	2.3
	Without management plan	330.0	...	...
	Total	2,408.3	324.6	9.7

Note: Totals might not add up exactly due to rounding.
Source: Hrvatske šume, 1998

Forest classification according to ownership and structure is given in Table 1. Total growing stock is 324.6 million m^3, of which 88% belongs to public forests. Total annual increment is 9.7 million m^3, that is, 2.9% of the growing stock. Even-aged forests account for 74% of total forest area, 70% of the growing stock and 76% of the total annual increment. According to the **Rules of forest management**, during the next ten years, part of uneven-aged forests will be converted into even-aged stands.

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

Although the health status of forests continues to improve (with the exception of fir and peduncled oak), the Republic of Croatia cannot afford to be complacent. There is no national inventory of forest habitats. Further work and research will be required if valuable forest habitats are to be maintained, enhanced and protected.

The Karst region represents a special case for forest management. The principal aims of management for the Karst areas are soil protection and water. Given the low volume of wood and value of timber, the region is not economically viable in the absence of state intervention. Approximately 12% of the forests and forest lands are still inaccessible due to the contamination of land mines. This means that basic management tasks cannot be undertaken. Unless mine clearance is carried out, this portion of forests will lose its function.

State forests managed by Hrvatske šume represent an exceptionally valuable national resource and have the potential to make positive contributions not only to rural development but also to the social well-being of all citizens of the Republic of Croatia. The restructuring study highlights the need for Hrvatske šume, limited company Zagreb, to reorganise its activities and to adapt to free market conditions and become more efficient. Ignoring main recommendations of the study could result in Hrvatske šume, limited company, Zagreb, becoming economically unviable with consequent impact on the quality of forest management and development and growth of the forest industry sector.

Annex D: Organisations studying forestry and main publications and information sources

The Faculty of Forestry at the University of Zagreb, provides forestry education and training for graduate and post graduate studies. There are two main departments, one for forestry and the other for wood technology. Annually some 120 new students are admitted, although in recent years there has been a marked decline in line with the downturn in the forest sector.

Vocational secondary education in forestry is provided in a relatively large number of schools – there were nine in 2002, as well as five schools for carpenters and timber designer. These schools are under the authority of the Ministry of Education and are organised on a county level. Hrvatske šume, limited company, Zagreb, is registered to provide education and capacity building for its workers and provides a number of in-house courses.

Capacity building for emergency interventions is carried out in College for Fire-Fighting and Civil Protection an in other authorised institutions. The Ministry of Education and Sports, Institute for Education and other interested institutions are engaged in intensive preparations for the unification and modernisation of three-year schools.

The majority of forestry research is undertaken by the College of Forestry in Zagreb, Forest Research Institute in Jastrebarsko, Institute for Adriatic Culture in Split (Department of Land Reclamation on Karst) and the Centre for Scientific Work of the Croatian Academy of Science and Arts. In 2000, there were 105 forest scientists and researchers (51 PhDs and 54 masters of Science and postgraduates).
Current research activities include silviculture, forest planning, ecosystems, forest husbandry, nursery and plantations, protection of forest ecosystems, biomass and water monitoring and many others. Research results and findings are published in scientific and specialist journals e.g. Journal of Forests and reports of the Forest Research Institute, Jastrebarsko.

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Summary

In general, this report bears on the total forest area in Denmark, irrespective of ownership category and holding size. The reason is that from most points of perspective, almost all Danish forest holdings have the characteristics of small-scale forestry. Furthermore, the entire population is considered to be urban as only a small percentage is dependent on rural-type income.

By far the most important limiting factor on forest entrepreneurship in Denmark is the ownership structure in combination with the wealth of the country. There area a large and increasing number of forest holdings in the smaller size classes, where forestry as a business and livelihood is not a primary aim. Recent decreases in the prices of traditional products and hence decreases in economic performance of the primary forestry sector represent an additional limiting factor. This development has made private forestry – but also public forestry to some extent – look for opportunities for increasing income generation from non-wood products and services. A few forest owners have demonstrated great inventiveness and creativity – proving that many services can become income generating.

Society has developed some tools to remedy the potential welfare implications and support and improve the technological innovation and management processes of the sector in general. The key question and issue that research must study and private initiative deal with is how to build and develop markets for ever-increasing 'softer' goods and services from the forests at large.

1 Consumption

1.1 State of the art and historical development

Annual statistics on total fellings (removals) are published, based on mandatory reports from all forest holdings >50 hectares and from samples of holdings below that limit. Detailed information on foreign trade in wood and wood products is published annually. On this basis wood consumption in roundwood equivalents can be calculated more accurately than from FAO's Yearbook of forest products.

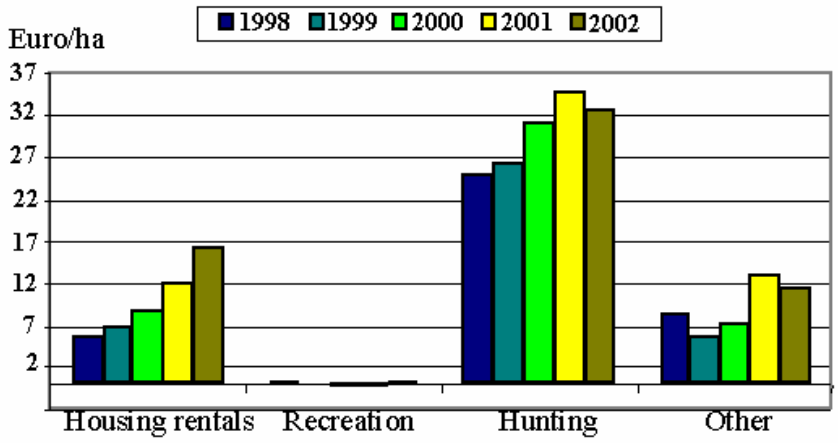
More detailed information on annual removals is available from State forestry and the more important private forest holdings, and also on other forest products and services.

Data are available on total annual exports (imports are negligible) of Christmas trees and greenery, whereas total production is not recorded.

1.2 Forest products and services consumption

Detailed calculation of Denmark's total roundwood balance has been made for 1938, 1958, 1963, 1968 (Dalgas 1970), 1971 (Moltesen 1971) and average 1970-1980 (Helles et al. 1984), and a more rough estimate for 1997 (Linddal 1997). There was an increasing trend for the entire period, from 3.0 to 7.5 million m^3 or 0.8 to 1.5 m^3 per capita. The share of domestic removals increased from 23 to 40%.

The annual domestic consumption of Christmas trees is estimated at about 2 million trees whereas no information is available on the consumption of greenery. However, a likely estimate is 2-3,000 tonnes. The exports of Christmas trees 1990-1999 fluctuated between 5.5 and 8.8 million trees, the exports of greenery was more stable, between 20,000 and 29,000 tonnes. (Larsen and Johannsen 2002).



Source: (Data from Danish Forest Association 2004)

Figure 1. Development of working surplus from non-wood products and services in private forestry 1998-2002, in nominal terms.

Figure 1 shows the development 1998-2002 of working surplus from non-wood products and services, i.e. those marketed, from private forestry holdings that are members of the Danish Forest Association – representing about 28% of the total forest area in private ownership. There were large variations among regions and holding sizes, but the average contribution margins per hectare amounted to:

- wood production 240 euro,
- Christmas trees and greenery 138 euro – both with decreasing trend, and
- other products and services in total 73 euro, with increasing trend (Dansk Skovforening 2003).

The total market value of hunting rentals in Danish forests is presumed to exceed 16 million euro per year (Thorsen and Strange 2003) and may be as high as 27 million euro per year.

The use of forests for recreation has been intensively investigated since the 1970s (Koch 1978, 1980, 1984; Koch and Jensen 1988; Jensen and Koch 1997; Jensen 2003). The free access to forests for recreation is legalised and is a little more extensive in public than in private forests, however, many privately owned forests <5 hectares are relatively inaccessible due to lack of proper roads and trails. The opportunities for forest visits vary rather much. If measured as the distance of 20 minutes by car, North Zealand and Mid Jutland have relatively very good supply of opportunity, and not surprisingly two thirds of all forest visits take place at the forest nearest to home. About one third of total visits are made to ten forests accounting for one tenth of the total forest area. Forest visits amount to a total of 75 million per year, 90% of Danish adults making a forest visit at least once a year, with an average duration of about one hour. The main motives for visiting the forest are to go for a walk and enjoy nature, only 1-2% doing horseback riding, hunting or fishing.

In Figure 1, ‘Recreation’ is close to zero but behind this total lie minor net incomes in the Islands and net expenditures in Jutland. The major items in ‘Other’ are letting of land (e.g. for grazing, to the armed forces), contract work, sale of seed, fishing licence, horseback-riding permits, nature kindergarten, dog training.

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

See Section 1.2, where this subject has been treated in total. As mentioned, by far the dominant part of the Danish population can be considered urban.

1.4 Main problems and research questions in consumption for enterprise development

The increasing importance of non-wood products and services (exclusive of Christmas trees and greenery) to Society and forest owners, see Section 4, makes it imperative that better statistics on the marketed products and services become available. To make forest owners bear the costs and risk associated with the development of new forest products in terms of, e.g. specialised recreation services or special biodiversity protection initiatives, it is imperative that owners have access to good information on market demands (a topic for marketing research) and can benefit from information on existing successful or failed attempts to develop similar products (an information and transparency issue must presumably be tackled by the sector itself).

Future general statistics will include data reflecting the emphasis on environmental goods and services in a broad sense, systematically collected through sample measurements in forests, e.g. standing volume, diameter distribution, tree species mixture, variation in stand structure, and indicators of biodiversity (cf. Section 5).

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

Organisations:

The Forest and Nature Agency, Ministry of Environment (www.sns.dk)
Danish Centre for Forest, Landscape and Planning, KVL (www.sl.kvl.dk)
Danish Forest Association (www.skovforeningen.dk)
Statistics Denmark (www.danmarksstatistik.dk)

Publications and information sources:

Danmarks Statistik: [Agricultural Statistics] (annual, in Danish)

Danmarks Statistik: [Danish Exports and Imports] (annual, in Danish)

Dansk Skovforening: [Survey of accounts for private forest holdings] (annual, in Danish, English summary)

Larsen, P.H. and Johannsen, V. Kvist (eds) 2002: [Forests and Plantations 2000]. Danmarks Statistik, Skov & Landskab, Skov- og Naturstyrelsen, Copenhagen, 171 p. (in Danish)

2 Small-scale forestry practices

It is emphasised that in the present context all forestry in Denmark is considered small-scale forestry, irrespective of ownership category and holding size. Forestry practices are described through the development of forest policy and Forest Acts.

2.1 State of the art and historical development

The Forest Act 1805 introduced the concept of **forest reserve**, which applied to the major part of the forestland – and still does. Forest reserve could, in principle, not be converted into other land uses and management should comply with good forestry practices, primarily aimed at wood production. The Forest Act 1935 made 'good forestry' the official guideline for forestry practice, to be interpreted according to developments in forest science but its focus remaining on wood production. The legislative process revealed that environmental values might be considered but not at the expense of market outputs to any significant extent (Helles 1969). However, in State and other publicly owned forests, some non-market outputs were taken into consideration in keeping with the demand, e.g. recreation opportunities.

In general, wood production potentials should be fully utilised, a practice that was benefiting from great achievements in silviculture mainly since the mid 1800s. What was physically possible should be done – there was little general emphasis on profitability, even though forest economics was much discussed (Helles et al. 1997). Many plantations should never have been established, wetlands in forests were drained and afforested, and so was any glade. Since 1904, Government grants are available to small woodland owners associations for engaging a forest graduate, so that even properties < 50 hectares could be managed in a sound way – most often for the production of wood for sale and own consumption and for providing labour opportunities in slack periods in agriculture.

A need for revision of the forest policy emerged in the late 1960s. With the increasing affluence in the Danish society, outdoor life had become popular, resulting in an increasing number of visits to forests. The issue gave rise to heated political debates, and in 1969 an Amendment to the Nature Conservation Act was passed, granting public access rights to private forests, however slightly more restrictive than those granted in 1917 to publicly owned forests. This is the first instance of the multiple-use concept being deliberately applied to Danish forestry.

The 1980s were a decade of transition with regard to forest management and to the perception of the role of forests in Society. A National Forest Inventory 1976 seemed to indicate that the area of beech was declining, not only in private but also in State forestry. Beech being Denmark's 'national tree', the risk of having in a few years to change one verse of the national anthem made the fate of beech a front page issue in newspapers and politicians became concerned. Stands of mainly Norway spruce in heathland plantations showed red needles, a fact that ENGOs immediately related to 'bad forestry practice'. This perception remained even after the phenomenon was termed 'forest die-back' and its complexity acknowledged.

A new Forest Act was passed in 1989. It maintained production objectives similar to those of its predecessor, but nonetheless the overall objective was extended to include multiple-use forestry. The management principle 'good forestry' was changed into 'good and multiple-use forestry'. In the comments on the Bill it was claimed that Danish forests were already characterised by multiple use, a principle that was now strengthened through making it the fundamental management principle. One might have expected that politicians would ask for a thorough updating of forest management. This was what ENGOs had fought for only a few years earlier, and the forestry sector had been completely on the defensive. A possible explanation is that in 1987, two governmental offices often contending had been merged to form the Forest and Nature Agency, covering the entire multiple-use spectrum. Almost all interested parties welcomed the Act drafted by this Agency because even if immaterial outputs were emphasised, a new grant scheme for the establishment of broadleaved stands was also introduced and other support to forestry increased. In line with a general trend, the new Forest Act was very much based on the 'carrot method' contrary to the 'stick method' that had dominated the previous Acts.

In Denmark, the 1990s might be called a 'decade of forest policy'. The Government was very active in the follow-up to international policies or strategies. In a statement 1994 the major forest policy issues were listed:

- Forests must be preserved, and within one rotation (80-100 years) the country's forest area should be doubled through State afforestation and financial support to private afforestation.
- The area of deciduous forest should be increased through financial incentives.
- A public forestry and a profitable private forestry shall be maintained.
- All forests must be managed according to 'good and multiple-use forestry', implying that economic outputs as well as non-market values are considered.
- Public forestry has a particular obligation to consider values of landscape amenity, nature, cultural heritage and recreation.
- Support to forest improvement in private forestry will be provided with regard to economic outputs and to furthering 'near-natural' management.
- For biodiversity reasons a certain area of State and private forest will be turned into 'non-intervention forest'.
- The property structure should not deteriorate by splitting-up of forests into small, non-sustainable management units.

These issues are included in the Forest Act 1996 which retains the objectives of its predecessor but changes the fundamental principle of 'good and multiple-use forestry' from an intention into an obligation for all forest reserves. All essential Government grant schemes in forestry were incorporated in the Act:

- Establishment of broadleaved stands, management planning, specific management practices, and recreation facilities.
- Conversion of stands into 'non-intervention forest'.
- Private afforestation of farmland.
- Development of more profitable or environmental friendly production processes.
- Professional assistance to small woodland owners associations.

Private forestry made substantial use of the grant for establishing broadleaved stands, not only when converting coniferous stands but also in cases where the grant did not obviously lead to a net increase of the area of broadleaves. Conversion of stands into 'non-intervention forest' or old management regimes has predominantly taken place in State forest. Afforestation of farmland has not yet reached the stipulated average of 5,000 ha per year, but when grants were made more advantageous in 1996 they became more in demand. Private afforestation without grants has been relatively more widespread, presumably because a precondition for the grant is that the area becomes a forest reserve and, furthermore, should preferably be in pre-assigned zones where afforestation is particularly welcomed. State afforestation tended to be concentrated at urban centres without previous easy access to nearby forest for recreational activities.

2.2 Small-scale forest holding

Tables 4 and 5 in Section 5.3 show the forest area's distribution to ownership categories and holding size classes. The characteristics of ownership categories are outlined below:

Personal private holdings account for 46% of the total forest area and in all size groups the majority of holdings are owned jointly with agriculture. Until fairly recently, if the forest was larger than about 250 hectares it played an important role in equalising the total holding annual income and formerly also as a job opportunity in slack seasons in agriculture.

Since 1904, the Government has through financial support encouraged small woodland owners to form associations aiming at improving the economic output, mainly from wood production. A network of forest extension firms organised under the Danish Forest Extension services has emerged, each owned by the associated forest owners on a co-operative basis and run by a board of owners. For many years, support was given only to holdings $\leq$50 hectares but the limit was later increased to 250 hectares. This support led to great improvements of silviculture, and sales incomes were raised through correct timing and assortment of fellings as well as coordination of sales from several holdings. Such associations still exist, each having a professional staff. Owners have never been heavily dependent on income from the forest. In this category, the pleasure from ownership as such has always been a very important factor, together with hunting possibilities – let out or not.

Until about 1970, holdings larger than 250 hectares usually had their own professional staff – either a graduate forester and/or one or more forest rangers – and permanent forest workers. However, costs – in particular wages and salaries – then started to rise at a pace that could not be counterbalanced through mechanisation. For example, in the period 1965-1980 the average annual surplus per hectare in the old forest regions fell by 70% when deflated by the wage rate (Helles et al. 1984: 77). Most forest owners reacted by dismissing staff and workers and relying on part-time professional assistance and contractors. At the moment only one private holding has its own permanent forest graduate – by far the largest holding.

Juridical private holdings (societies, private companies and partnerships) account for 19% of the forest area. All size classes are represented. The most important category is plantations established between 1870 and 1930 by groups of individuals, usually locals,

wanting to contribute to a 'national issue' of the time: the afforestation of heathland (Helles 1984). Many such plantations are members of a small woodland owners association or rely ad hoc on similar professional assistance from the Land Reclamation Service (formerly The Danish Heath Society). Mainly since about 1970, some personal private forest holdings have been turned into juridical ownership, e.g. for taxation reasons.

Foundations, private or public, account for 6% of the forest area and are dominated by the size group 500->1000 hectares. Some were founded a few hundred years ago and as the demand for surplus is often small compared to personal holdings of similar size, they have been more able to maintain own professional staff. Some foundations of recent origin aim at improving amenity values and perhaps realising the resulting property value increase through sale and then investing in other forest holding.

State forests under the National Forest and Nature Agency cover 23% of the forest area. They are administratively allocated to forest districts, most of which are large for Danish conditions – the average size being 4300 hectares. There are forests previously belonging to the Crown for hundreds of years, there are plantations established mainly in the late 1700s and the 1800s on sand dunes and heathlands, some forests have for various reasons become in state ownership, and recently afforestation of farmland has taken place. Forests on former sand dunes have predominantly soil protection objectives and recent afforestations are mainly made for ground water protection and recreation opportunities at urban centres. Apart from that, State forests have until recently been managed for business, albeit with – increasing – emphasis on protection of landscape amenity, nature values and cultural heritage, and promotion of recreation. Attention has been paid to not competing with private forestry business, e.g. in production of Christmas trees etc. and letting out of hunting. State forestry has professional staff and workers, machinery, nurseries, etc.

Forests belonging to municipalities and counties comprise 4% of the forest area. Some holdings are small, but others fall in the largest size class. In general, the primary objective is to supply recreation opportunities.

2.3 Small-scale forestry practices

Changes in general conditions have over the last few years led to changes in forestry practices towards less intensive management and this trend will presumably continue in the foreseeable future. Less intensive management has become legal through changes of the Forest Act.

General provisions of the Forest Act 2004

a. Objectives: As discussed in Section 2.1, the previous general management principle 'good and multiple-use forestry' has been modernised into 'sustainable forestry', however without the concept being properly defined and with predominant emphasis on biological and social aspects.

b. The concept of 'forest': There has never been an explicit definition of what is meant by a 'forest', but a practice has developed (Wulff 1998):

- Generally, the area must be minimum 0.5 hectare and 20 m wide,
- the stand must be of forest tree species,
- the species must be able to develop into closed high forest,
- a stand may be established for non-forestry purposes without this preventing it from being regarded as forest, e.g. willow for energy or conifers for Christmas trees,
- it does not matter whether or not a stand is managed according to rational forestry principles, e.g. near-urban recreation forests fall under the Act.

c. Forest Reserve: The forest reservation clause (see below) implies a permanent binding of areas for forestry, i.e. they must 'in perpetuity' be used for such purpose. In the comments on the Forest Act 1996 the binding was justified by the increasing pressure for converting forest reserve areas into other uses, e.g. building land. However, the Act holds provisions for removing the clause, so it is just a restriction of disposal rights similar to the general non-compensated regulation of ownership found, e.g. in agriculture. But a conflict over a particular area should in principle be solved for the benefit of forestry. (Wulff 1998).

d. Regulation of holding structure: Here the Forest Act 2004 introduces a major change. Previously, coherent forest reserves could not be split up into smaller holdings, the administrative practice being that forests with a distance between them of up to 0.8-1.2 km were considered coherent. The reason for this strict policy was that business economic potentials would suffer from holdings becoming smaller. This restriction now applies to physically coherent forests only. The rationale is that business economic aspects are no longer that important, whereas an owner should have the option to sell part of his holding to improve his finances. The reason for not permitting that physically coherent forests be split up is that this would be to the disadvantage of recreation. Apparently it is no more a policy objective to unite woodlands into fewer holdings – and there has never been efficient ways to do this.

e. The use of forest reserve land: Forest reserve land must be kept under such tree cover that forms – or will within reasonable time form – a closed high forest. This has been a central provision of the forest reservation clause since the Forest Act 1805. Areas under tree cover must be managed according to forestry principles, but some previous standards of 'good forestry' no longer apply. For example,

- an owner may choose not to manage the forest at all, or part of it,
- exemption is no longer needed for managing the forest for creating or preserving biological diversity, and
- management may aim at furthering landscape amenity, nature values and cultural heritage, environmental protection and recreation – even at the expense of wood production.

Apart from thinning, felling must not be made until the stand or the individual tree has reached maturity (age or dimension). This provision was previously motivated by economic reasons only, but now amenity considerations have been added. It is also new that the owner is free to fell before maturity if the aim is to create open areas for nature

amenity. A new guideline is that clear-cutting should for environmental reasons be omitted if possible.

No later than ten years after felling a mature stand, the area must be sufficiently regenerated to form closed high forest (cf. above), irrespective of how the new stand is established. Previous practice was a time limit of 3-4 years. It is emphasised that due to weeds, undue delay of regeneration may become too costly. If the regeneration does not meet usual forestry demands, the area must be planted or seeded – however, a new possibility is to include the area in that kept open for amenity reasons (see below).

Irrespective of the above, the forest owner is free to turn 10% of the area into coppice or rangeland. Previously, exemption for such uses might be granted, and the change is primarily meant to further the 'variation' of forest management. Production of Christmas trees and greenery in short rotation is still permitted on maximum 10% of each topographic forest unit, i.e. the limit does not relate to the holding area.

Another new exemption from the general rule of forest cover is that maximum 10% of the area may be kept open to the furtherance of nature and landscape amenity values, cultural heritage or biological diversity, e.g. forest meadows, protected nature types, natural re-growth, areas not reforested within the 10 years time-limit. Exemption from the area limit may be granted. Together with the permission for Christmas tree and greenery, a total of 20% of the forest area may now be more or less permanently maintained without typical forest cover.

Buildings, constructions and modifications of terrain are only permitted on forestland if necessary for management. It is now permitted to build workmen's sheds and cottages for scouts or nature kindergartens. A suggestion that weekend cottages and hunting lodges also be permitted was immediately suppressed by all actors in the legislative process – somewhat surprisingly as this might have improved private owners' incomes.

Subsidies

Possibilities for obtaining Government grants have changed somewhat, but are still primarily open to private owners (individuals as well as juridical persons).

a. Furthering of sustainable management in existing forests: The substitution of 'sustainable' for 'good and multiple-use' management implies some changes. Elements of sustainable management that are not immediately economically advantageous to the forest owner are eligible for support, in particular activities considering biological diversity. Emphasis will also be put on support to the conversion into more sustainable management, of forests rather than individual stands. Support may still be granted for conversion into non-intervention forest. There are more activities eligible for support, all of them aiming at environmental improvements and nature protection. The corresponding grants in the previous Act were more specific, e.g. regeneration with beech, oak and other 'valuable' broadleaves; on poor soils regeneration with stable conifers; establishment of forest edges of broadleaves.

b. Afforestation of farmland, tending of plantings, and income compensation: More emphasis will be put on afforestation in regions designated for such undertaking, and also projects for the protection of ground water resources will be prioritised.

c. Products development: Subsidies may be granted for the development of products from forestry and the wood processing industry. In forestry, eligible projects must aim at the development of products and production processes, new and more environmental friendly or profitable production methods, and new products that are suitable for forestry. The scheme is a continuation of the Forest Act 1996.

d. Support to small woodland owners associations: Until further notice, the grant scheme is continued (cf. Section 2.2).

A major shift has taken place in the **State forestry paradigm**. Non-production goods and services have for almost one century been taken particularly into account but nonetheless forestry has basically been considered a business. Now the central objective has become to provide public access to nature, and traditional forestry is scaled down accordingly (Skov- og Naturstyrelsen 2002, 2003a), implying a general conversion into near-natural forestry, with a time-horizon of 100-300 years (Skov- og Naturstyrelsen 2003b). This conversion has no doubt been fuelled by heavy budget reductions since 2002, low investments in reforestation and tending being justified by conversion into a management practice that is often held obviously economically advantageous – which is certainly not always the case, neither from a business nor from a Society point of view (Thorsen and Strange 2003).

Management practice is also changing in **private forestry**. Some important trends are:

- There may be room for further relying on administration through entrepreneurs, but at least for some categories of holdings and owners this development has perhaps gone too far – some income opportunities may not be utilised.
- Owners may be tempted to minimise reforestation and tending costs, as such short-term consideration has become legal. The aim should of course be to develop a good multi-purpose production potential – at low costs. The more and more widespread justification of low investments by conversion into near-natural forestry is not always well founded – it tends to be neglected that, e.g. the transition phase may prove very costly. Furthermore, lower levels of investment may correlate with fewer future production options, which would have proven beneficial in face of a future where only change and variation are certain features (Abildtrup 1999; Jacobsen 2004).
- Many owners are already succeeding in developing marketable environmental goods in a broad sense (see Section 4.1). However, this is not very easy as it must be goods that are not already supplied without charge.

From a Society point of view the changes towards more emphasis on non-wood products is immediately advantageous. However, the possibility to supply high quality wood products may prove forgone if – or when – sales prices rise again to profitable levels.

2.4 Policy framework and production conditions

In 2002, the Forest and Nature Agency published a national programme on forests with six major goals, four of which were:

- **Nature and environment**: Conversion of present even-aged mono-species forestry into near-natural forestry and preservation of nature amenities in forests.
- **Economy**: Maintenance of forestry as a trade through the provision of sustainable framework conditions.
- **Social considerations**: Securing and developing forests as suppliers of welfare through providing possibilities for recreation and nature experiences.
- **More forest and nature**: In the effort to double the forest area, emphasis is put on promoting nature amenities and furthering public participation in decision-making.

At the same time, a revision of the 1996 Forest Act was initiated, leading to a new Act in 2004. There are several reasons why a revision was held necessary after so few years:

- Profitability of forestry had decreased so much that many private owners had difficulties in covering the costs demanded by 'good forestry'. Therefore, private forestry wanted more freedom in the choice of management practice.
- ENGOs held that Society needed more environmental services than could be supplied within the framework of 'good and multiple-use forestry'.
- The Government felt a strong need to comply with the demands of the EU Directive on habitat protection (i.e. Natura 2000).

It is seen that the above is in keeping with three of the major goals cited from the National Programme on Forests, whereas it is a moot point whether the goal on economy is considered.

One of the objectives of the Forest Act 2004 corresponds to previous forest policy, viz. to preserve and protect the forests and increase the forest area. But the management principle 'good and multiple-use forestry' has been replaced by 'sustainability', aiming at:

- Furthering the establishment of stable forests.
- Securing the wood production.
- Preserving and furthering the biological diversity in forests.
- Securing that landscape amenity, natural history, cultural heritage, environmental protection and recreation are properly considered.

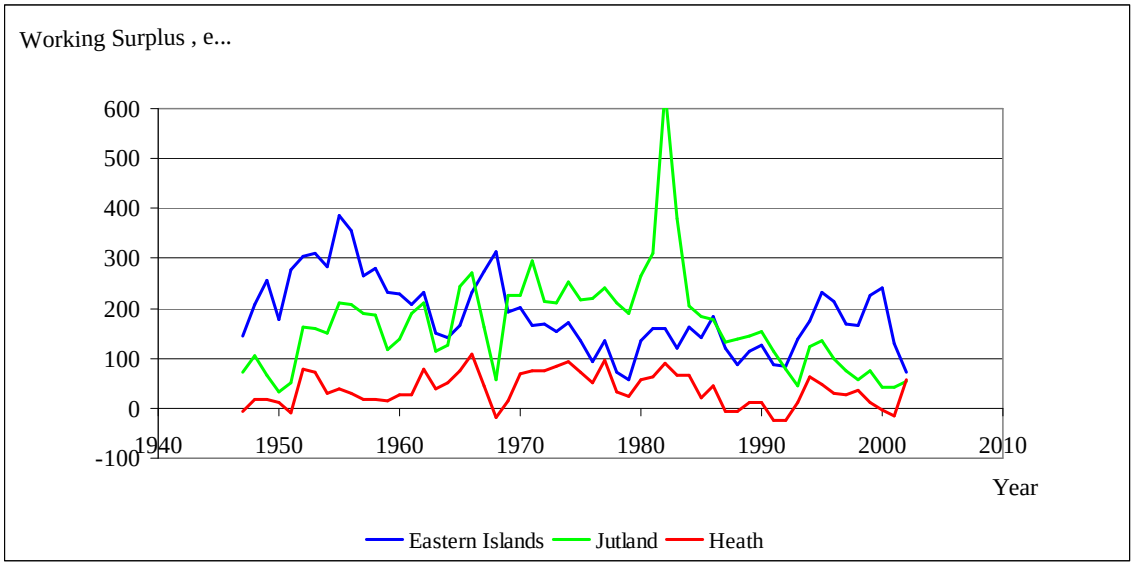
'Stable forests' refers to resistance against windthrow and climate change, and the aim is supposed to be met through conversion into near-natural forestry. It is not evident that wood production will be secured, whereas emphasis is put on biological diversity. The last aim is a continuation of the two previous Forest Acts.

The **profitability of forestry** has deteriorated since the mid 1970s, leading to changes in management practices in both private and State forestry. The production conditions are outlined below whereas the management changes were dealt with in Section 2.3.

Figure 2 shows the development of working surplus in private forestry 1947-2001 (Thorsen 2003a, b). It is seen that by 2000 the surplus was at a historically very low level, in particular for holdings in the old forest regions of Jutland (Jylland) but also in the Heathland (Heden) region. During the period 1995-2001, exceptionally high prices on beech logs for Asian markets supported the surplus of the Islands region (Øerne). In the surplus shown are included marketed 'minor' products, e.g. hunting rentals, but the development reflects to a considerable degree the downward trend in sales prices of the more important products: roundwood of beech and Norway spruce, and Christmas trees of nordmann fir.

Roundwood prices vary considerably over time, and trends – upward as well as downward – may be sticky. Therefore prices are likely to start rising again and maintain the upward trend but nobody can tell when. Except for Norway spruce, prices have sometimes been just as low or even lower, so the real problem is that rising production costs – in particular wages and salaries – have not been made up for by rise in productivity. Prices of Christmas trees will no doubt also start to rise, but presumably only as a response to decreasing supply – many owners currently stop such production due to financial loss.

Concurrently with the decreasing working surplus and roundwood prices it has apparently become more popular to be a forest owner. This has impacted on the development of forest property (taxation) values, and they do more or less reflect property market values. The average real property value has more than trebled in the period 1947-2001.



Sources: Dansk Skovforening 2003 and earlier account surveys.

Figure 2. The development of working surplus in private forestry 1947-2001 in real 2000 prices

The implication is of course that the return on property value decreases, in the last 5-10 years between 0 and 3.5% compared to 2.4-4% for the entire period, see Table 1. However, when the capital gain from increasing property values is included, the real return is for the period 6.3-8.1% – a reasonable level in comparison to many other long-

term investments, and even more so because the return seems to be positively correlated with inflation and negatively with the return on a number of more sensitive assets. The level was lower in the last 5-10 years of the period but with an upward tendency.

Table 1. The annual return rates in Danish Forestry over different periods. Based on data from Dansk Skovforening (2003) and earlier account surveys.

	Capital gain			Return excl. capital gain			Return incl. capital gain		
Period	**Øerne**	**Jylland**	**Heden**	**Øerne**	**Jylland**	**Heden**	**Øerne**	**Jylland**	**Heden**
1997-2001	2.8%	1.4%	3.5%	2.9%	1.1%	0.3%	5.8%	2.5%	3.7%
1992-2001	0.9%	0.0%	1.0%	2.8%	1.4%	0.4%	3.7%	1.4%	1.4%
1947-2001	2.4%	2.8%	4.0%	5.7%	5.7%	2.3%	8.1%	8.6%	6.3%

Even if the business economy of forestry is currently strenuous, there is nothing seriously wrong with forestry's aggregate long-term profitability – as an investment asset. One reason is that the increasing property values seem to reflect buyers' appreciation of functions, products and services that are not included in the accounts. However, this does not lift the economic pressure felt by the majority of owners and managers of private forests for whom the forest is an important source of income and who want to keep the property. An investigation has shown that 60% of all owners hope to be able to descend the property to family, whereas only 10% expect to sell it (Boon 2003).

Boon (2003) also shows that there are many more owners finding landscape and nature amenities etc. very important to their ownership, as compared to owners who put emphasis on the forest as an investment asset. It seems as if many owners are motivated by the pleasure and other values derived from ownership as such. Owners apparently balance worries about income against other outputs also obtained – many of them being immaterial. This has every appearance of being rational and is supported by the upward trend in property value. It does, however, imply that forest ownership relies more on the perception of forests and forest ownership as a private consumption good, and less on the perception of forests as classical production capital.

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

By far the most important limiting factor on forest entrepreneurship in Denmark is the ownership structure in combination with the wealth of the country. There are a large and increasing number of forest holdings in the smaller size classes, where forestry as a business and livelihood is not a primary aim. Each of these holdings are much too small and have too small cash flows and balances for investing any significant effort in R&D activities, including the development and marketing of new technologies, products and services within the sector as well as to the outside world.

Recent decreases in many product prices and hence decreases in economic performance of the primary forestry sector represents an additional limiting factor, which nevertheless may be of a more temporary nature.

This is not a new feature of Danish forestry, in fact similar structural problems were earlier also true for the agricultural sector. In recognition of this Society has developed

tools to remedy the potential welfare implications and support and improve the technological innovation and management processes of the sector in general.

These include in particular, as described in section 2.2, financial support to encourage small woodland owners to form associations aiming at improving the economic output, mainly from wood production, but in recent years also from Christmas trees and greenery as well as other products and services. A network of forest extension firms organised under the Danish Forest Extension service exists and each unit is on a co-operative basis owned by the associated forest owners. There is no doubt that this supporting infrastructure has increased the ability to undertake small-scale technology development and in particular furthered the spread of innovations in the forest sector.

Another and more recent feature is the establishment of a public R&D fund aimed at the forest sector and the (primary) wood-processing industries. Some activities spurred by this initiative are further described below (Section 5.4).

Finally, State forestry has historically taken on the responsibility of testing and introducing new (often Swedish/Finnish) technologies to the Danish forest sector. Owning and running around 30% of the Danish forest area, State forestry has a size that makes it worthwhile to engage in R&D activities, even if profit concerns have in general also been given substantial weight in State forestry practice.

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

We refer to Annex A with the addition of another organisation:
Danish Forest Extension (www.skovdyrkerforeningen.dk)

3. Wood-processing industries

No information available, apart from some comments in Section 5.4.

4 Non-wood forest products and services

4.1 State of the art and historical development

As explained in Sections 1.2 and 2.4, non-wood products and services have become more and more important in Danish forestry. The main reason is the development into an increasingly affluent Society with a corresponding rise in leisure time and environmental concern and awareness, but the development has in recent years been fuelled by the dramatic decline in roundwood sales prices, forcing private forestry into searching for alternative income-generating activities and State forestry into giving wood production an inferior status.

An attempt has been made to estimate the recreational benefits from the entire forest area (Dubgaard 1998). A CV survey of WTP for an annual pass to Danish forests yielded an estimated (lower-bound) social net benefit from recreation of about 62 million euro or about 135 euro per hectare annually – as compared to a gross factor income in the forestry sector of about 148 million euro. There is reason to believe that the ratio of social benefits to marketed benefits has increased since the mid 1990s.

The problem for private forestry – and public to a less extent – is how to capitalise on the huge interest in recreation benefits. It goes without saying that goods and services that are now free cannot suddenly be charged. New products must be made and some private forest owners demonstrate creativity, for example:

- Facilities for nature kindergartens. Here the Forest Act 2004 has provided the opportunity to build simple houses.
- The same applies to scouting and other youth activities, but it may prove more difficult to demand payment.
- It was suggested that the new Forest Act should permit the building of hunting lodges but this failed because of protests from NGOs (Rasmussen and Skyum 2004). It is difficult to say how much such opportunity might have increased hunting rentals, but nonetheless the hard opposition demonstrated how little understanding NGOs have of private owners' economic difficulties.
- A suggestion that weekend cottages and a house for absentee owners be permitted in forests was immediately suppressed, and this might have proven a better income-generating activity than the one above. The argument was adduced that in State forestry many houses formerly used for residence (workers and staff) are now let out, did not convince the opposition (Rasmussen and Skyum 2004), but this is more intelligible as such activity is also found on private holdings, see Figure 1.
- It has for some years been discussed whether forest owners should charge organised recreation activities, e.g. orienteering, company outings. Some owners prefer not to charge and keep the possibility to refuse applications, whereas others do make an income from such activities. A recent income source that will no doubt gain importance is guided nature walks. Here is room for much creativity in many forests, e.g. general and specialised tours at different times of the day and year, and with extra service in the form of leaflets and refreshments. It may also be feasible to charge for permitting, e.g. motoring and mountain biking. Administration costs must of course be considered and it will hardly be feasible to charge for facilities to further the ordinary forest recreation, e.g. parking places and toilets.

- Horseback riding becomes more and more popular, and in both State and private forests permits are usually required and charged.
- The same applies to fishing licences.
- In private forestry, hunting rentals is an important source of income (cf. Figure 1). In State forestry, hunting rights lie with the Crown, however, in some regions they are let out at market price. Unlike in many other countries, hunting rights belong to the landowner and are often transferred to a leaseholder through rental contracts covering a well-defined period and a well-defined area. However, little is known about the dynamics and characteristics of the market for hunting rentals in Denmark. An improved understanding of this market and the welfare economic value of hunting are becoming increasingly important, as forest management practice is about to shift towards a stronger reliance on natural regeneration and less extensive investment phases, cf. Section 2.3. These management measures may be sensitive to the presence of large game populations that may inflict significant damages on regeneration (Thorsen and Strange 2003). On the other hand, large game populations presumably influence the value of hunting rights positively. Thus, Society and forest owners face a welfare economic dilemma with a potential scale of billions of DKK. Research has been initiated (Helles et al. 2002) to develop theoretical and empirical models for the valuation of hunting leases, including a proper assessment of the cost side of game management for hunting, in particular costs inflicted on forest management. This is needed to provide a well-informed basis for arbitration between the management of forests and the management of game and hunting.

These new activities may bring about new and profitable business for private forestry, quite different from traditional roundwood production. This has in fact happened before in the Danish forest sector, the prime example being the rise of prosperous activities in Christmas tree and greenery production. This production developed only slowly through the 1960s and early 1970s, but gained an incredible momentum during the 1980s, and in parts of Jutland it became the dominant income-generating activity in forestry. The fall of the Iron Curtain made available large amounts of seeds and plants from quality provenances in the Caucasus. This in combination with annual return rates well above 10% led to massive investments and increases in the Christmas tree production area, in turn causing increased supply and decreased prices during the last 6-7 years. Nevertheless, we will choose this particular field as the prime example of successful entrepreneurship and innovation and discuss the marketing efforts making Denmark the dominant exporter of Christmas trees in Europe. However, two case studies are added to demonstrate the ongoing efforts in private forestry to develop income sources alternative to wood and Christmas trees.

4.2 Case studies of successful marketing strategies

Christmas trees and greenery

The Danish producers of Christmas trees and greenery are as diverse in size and other characteristics as are the forest owners. While considerable technological innovation and entrepreneurship has taken place in the business, the need for massive marketing abroad quite early spurred co-ordinated initiatives across producers and wholesalers.

In 1990 the first effort was made to establish the ‘Domus Silva’ trademark, but the initiative soon lost the support from central players – possibly due to free-rider

incentives – and was aborted. During the period 1994-1999, the growers association arranged a number of marketing campaigns aiming at, in particular, the French and German markets and increasingly focusing on nordmann fir Christmas trees.

To support the continuous innovation and improvement in the Christmas tree business, a R&D fund was established in 1997, which depends in part (50%) on a per hectare tax on private Christmas and greenery production areas and on a matching (50%) Government contribution. This has supported the development of the current 'Original Nordmann' trademark, which has been marketed with a fair amount of success since 1999. While the growers association runs the current initiative, regular communication takes place with the exporters and wholesalers. Through market surveys the impact of this trade campaign is regularly evaluated.

The fact that the campaign depends partly on the general support from growers and partly on Government funding – always at stake in annual budget negotiations – points to potential problems and threats to the initiative. With decreasing profitability in recent years, the area of Christmas trees – and hence the R&D fund – has begun to shrink simultaneously.

A forest district with good growing conditions[1]

The forest district comprises 430 hectares under tree cover and 250 hectares of bare land (meadows, fields, grassland, moor). Moreover, there are 450 hectares of farmland. The management objective is to maintain the present family ownership and preserve the rich natural amenities and cultural values.

Two houses are let on a yearly basis for use as kindergartens. One of them is for 30 children, and inclusive of some extra access to the forest and other areas the rental is € 21,000 – equivalent to a little less than 1 euro per child and day. However, the kindergartens imply some reduction of hunting rights rental, an income source that is so important that in management decisions wildlife is often given precedence over timber production. Another problem is how to combine a rich wildlife with low-cost natural regeneration.

It is difficult to charge for guided tours in the forest because the county and State Forestry offer similar tours without charge. However, the estate's website lists many different nature experiences offered and in total the annual income from such experience – inclusive of the above – amounts to 175 euro per hectare (cf. Figures 1 and 2).

A forest district with poor growing conditions[2]

The forest district comprises 470 hectares of woodland, lakes and beach that is the setting for comprehensive and non-traditional activities at a course centre – a rather small rustic building inside the forest. Courses are offered on team building and on executive and personal training, and nature excursions and instruction are arranged – or just a funny and 'meaningful' staff or birthday outing. Focus is on 'action, suspense, healthiness, and mental well-being'.

[1] Based on Simonsen and Bak (2003).
[2] Based on Emmedsbo Skov (2004).

The wildlife is very rich and hunting is rented out on a selective and individual basis, e.g. shooting fallow buck, red deer and wild boar. For shooting a wild boar (fenced in), under professional guidance, of up to 40 kg the price is 335 euro plus VAT but inclusive of the meat, for a red deer with premium antlers must be paid 2,700-4,000 euro – plus VAT and for the trophy only. Venison is for sale, e.g. 1 kg of red deer at 15 euro plus 500 euro for the slaughtering.

A team-building day may comprise, e.g. the following activities: archery or axe throwing, Segway Human Transporter-driving, safari on ATV-motor-cross bike, teamwork training, climbing, canoeing and firewalking – the last activity, though, not included in the 270 euro per person plus VAT but including the use of a 65-persons tipi.

Guided nature and forest walks are arranged for groups of minimum 12 persons, two hours for 25 euro per participant. Special walks are arranged for school classes, youth clubs etc., with many activities, e.g. felling a tree – same duration, minimum group size and price (however, no charge for the leader).

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

Many of the conclusions in Section 2.5 are also valid for non-wood forest products and services. Society's demand for such products and services is increasing, contrary to the demand for timber and the traditional non-wood products Christmas trees and greenery.

Decreasing prices of traditional products has made private forestry – but also public forestry to some extent – look for opportunities for increasing income generation from non-wood products and services. To some extent the Forest Act 2004 facilitates such development because it puts less emphasis on traditional production forestry, but its emphasis on 'nature' also implies barriers to the development of new services.

However, the major barrier is that most forest owners are not prepared for developing new activities or charging for activities that have so far been supplied for free. A few forest owners have demonstrated great inventiveness and creativity – proving that many services can become income generating. There are potentials for intensifying well-known services, e.g. hunting lease, and developing new services, some of which are considered odd or even 'unworthy' of forestry, e.g. organised paint-ball fighting or 'survival' tours. An example of services that Society may be willing to pay for is protection of ground water resources under private forests. The imaginative forest owners will of course benefit from the pressure of demand for new non-wood forest products and services. There must be an upper limit to the demand, but it is far from reached – and moreover, the demand is dynamic.

5 Forests and ownership

5.1 State of the art and historical development

Since 1881, general forest statistics have been published every 10-15 years, based on information that forest owners are liable to supply through filling in a questionnaire. However, data on removals are collected every year and for forest properties <50 hectares only for a sample. Since 1990, the Forest Act has made general statistics mandatory every ten years, the most recent and comprehensive relating to year 2000 (Larsen and Johannsen 2002).

Definitions and classifications have changed over the period, but the two latest general statistics – 1990 (Miljøministeriet et al. 1993) and 2000 – are safely compared.

5.2 Forest resources

The total forest area 2000 is 486,000 hectares (11.3% of the country's area), of which 35.8% is under broadleaves, 60.5% under conifers, and 1% is temporarily and 2.7% permanently without tree cover.

Table 2. Development of forest area 1990-2000, 1,000 ha

	Denmark		**Islands**		**Jutland**	
	1990	**2000**	**1990**	**2000**	**1990**	**2000**
Total forest area	445	486	141	149	305	337
Perm. uncovered	28	13	8	4	21	9
Total under tree cover	417	473	133	145	284	328
Broadleaves	143	174	81	90	63	85
Beech	72	80	43	44	29	36
Oak	30	43	15	19	15	24
Other	41	52	23	27	18	25
Conifers	268	294	51	54	218	240
Norway spruce	135	132	30	27	105	105
Sitka spruce	35	34	4	4	31	30
Silver fir	7	12	2	3	5	9
Nordmann fir	12	28	4	10	7	18
Other	79	87	10	11	69	77
Temp. uncovered	6	5	2	1	4	4

In the period 1881-2000, the total registered forest area more than doubled due to afforestation, primarily with conifers. In the same period the share of broadleaves was reduced from three fourths to one third. The forest area increased by 41,000 ha 1990-2000, however, some was due to improved statistics and the real increment is estimated at 28,000 ha – partly a result of the Government policy of doubling the forest area (cf. Section 2.1). The area of nordmann fir more than doubled (40% as afforestation of farmland) and also the area of Silver fir (Abies procera) increased substantially.

Table 3. Size distribution of forest holdings, %.

	1990		2000	
	number	**area**	**number**	**area**
Total	20,563	100.0	26,548	100.0
0.5-1.9	35.0	1.6	32.2	1.9
2.0-4.9	30.0	4.1	31.5	5.2
5.0-9.9	15.9	5.0	17.6	6.6
10.0-19.9	9.5	5.9	9.6	7.3
20.0-49.9	5.2	7.2	5.4	9.1
50.0-99.9	1.8	5.8	1.5	5.7
100.0-249.9	1.4	10.2	1.2	10.6
250.0-499.9	0.6	10.1	0.5	9.2
500.0-999.9	0.4	11.5	0.3	10.8
>1,000.0	0.3	38.6	0.2	33.6

As shown in Table 3, Denmark has many small and few large forest holdings (in fact units – holdings may include two or more units). For example, 17,000 holdings <5 hectares account for only 35,000 hectares, whereas 200 holdings of 500 - >1,000 hectares cover in total 216,000 hectares. Apart from the smallest category, the relative number and area of holdings <50 hectares has increased 1990-2000, whereas the opposite trend is dominating for holdings >50 hectares.

In general, the largest holdings have higher yield classes than the smallest, a combined effect of forest climate, forest structure and proper administration. The total average annual increment in broadleaves 1990-1999 was 1,135,000 m^3 and is forecasted at 1,334,000 m^3 for 2000-2009; the corresponding figures for conifers are 3,417,000 and 3,843,000 m^3.

The average annual felling (removals) 1991-1999 was 1,830,000 m^3, beech accounting for 26% and conifers for 63%. The average share of timber was 59% (54% in broadleaves and 77% in conifers). In absolute terms the amount of timber was decreasing, fuelwood was stable and woodchips increasing.

In the period 1990-1999, 72% of total felling took place on holdings ≥250 hectares while holdings <50 hectares accounted for 12%. In the first category, average annual felling per hectare was 5 m^3, in the second <2 m^3, and 49 and 16% respectively was fuelwood.

It is forecasted that 1-2 million m^3 will accumulate annually in the period 2000-2009.

For the period 1990-1999, the annual net sequestration in forests is estimated at 3,064 Gg C or 3,901 Gg CO_2. For comparison, the actual total emission in Denmark 2001 was 54,100 Gg CO_2. An extensive analysis of sequestration potential and marginal sequestration costs in Danish forestry is published in Anthon et al. (2003)

5.3 Forest ownership

As described in Section 2.3, the ownership structure in Danish forestry is distributed across several categories. Private (individual) forest owners are the largest owner group in terms of number (93.7%) as well as area (46.1%). Juridical private owners (foundations etc.) account for another 25.6% of the forest area, leaving State and other public ownership with 28.3 % of the forest area. However, as seen in Table 4, more than half of the forest area in individual ownership is related to holdings <50 ha and in fact more than 40% is related to holdings <20 ha.

For almost all other ownership categories, private or public, the picture is very much the opposite as more than 50% of the area owned by any of these categories is related to holdings >250 ha.

Table 4. Forest area distribution to ownership categories.

Size category	Total	0.5-19	20-49	50-99	100-249	250-499	> 500-
All, ha	486,234	101,832	44,061	27,911	51,403	44,970	216,058
Private	46.1	42.8	14.9	7.3	10.2	7.6	17.2
Foundations etc.[1]	6.3	4.3	3.2	2.3	7.1	11.8	73.3
Societies etc.[2]	19.3	12.9	8.2	8.5	21.2	19.2	38.2
F&N[3]	23.2	-	-	-	-	-	100.0
Other state[4]	1.1	9.3	19.8	17.1	15.7	27.7	10.4
Counties etc.[5]	4.0	3.1	4.9	10.5	26.5	24.9	30.0

Notes: 1. Private institutions 2. Private companies, partnerships, other associations
3. Forest and Nature Agency 4. Incl. livings 5. Municipalities

Table 5. Number of holdings and forest area in various ownership categories.

	1990		2000	
	no.	ha	no.	ha
All	20,563	445,391	26,548	486,235
Private	19,375	202,102	24,874	223,986
Foundations etc.	107	28,786	131	30,524
Societies etc.	737	74,647	1212	93,954
F & N	28	114,099	26	112,928
Other state	106	4614	118	5357
Counties etc.	210	20,543	187	19,486

Notes: Categories as in Table 4.

The number of forest holdings is increasing along with the forest area. However, while the forest area has increased with slightly less than 10%, the number of forest owners has increased with almost 30%. This indicates the increasing dispersal of forest ownerships, probably caused by the new afforestation efforts as well as the breaking up and selling of larger private holdings as well as some privatisation of publicly owned forest- land. In fact, the only two categories where the number of holdings as well as the area has decreased are public: The Forest and Nature Agency has reduced its number of districts and forestland and so have the counties, municipalities etc. The forest owner category showing the largest growth is 'Societies etc.', which includes private companies, partnerships, and other associations. This group has increased with more than 60% in number and more than 25% in area during the 1990s.

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

As pointed out in Section 2.5, the most important factor restraining forest entrepreneurship in Denmark is the ownership structure. There is a large and increasing number of forest holdings in the smaller size classes, and each of these holdings is by far too small as to area, cash flows and balances to allow any significant effort in R&D activities, including the development and marketing of new technologies, products and services within the sector as well as to the outside world.

This is not a new feature of Danish forestry, in fact similar structural problems were earlier also true for the agricultural sector. In recognition of this, Society has developed tools to remedy the potential welfare implications through supporting and improving technological innovation and management processes of the sector in general. As described in Sections 2.2 and 2.5, this includes in particular financial support to encourage small woodland owners to form associations aiming at improving the economic output. A network of forest extension firms organised under the Danish Forest Extension service exists due to this long-standing support.

Another and more recent feature is the establishment of a public R&D fund aimed at the forest sector and the (primary) wood-processing industries. Furthermore, to support the continuous innovation and improvement in the Christmas tree business, an R&D fund has been established, which depends in part (50%) on a per hectare tax on private Christmas and greenery production areas and on a matching (50%) Government contribution. Some of the results of this latter R&D fund in terms of innovation, marketing and entrepreneurship have been described in Section 4.2.

The public R&D fund aimed at the forest sector and the (primary) wood-processing industries has spurred a number of R&D partnership projects, involving public research organisations and private firms and organisations. These include:

- The Plant Fibre Laboratory – a research entity established within The Royal Veterinary and Agricultural University, Copenhagen, doing research on the use of wood fibres for a number of purposes.
- The Danish Wood Centre (www.traecentret.dk), a research and industry network, involving a number of organisations and firms and handling a growing portfolio of research projects within the field of improved and innovative use of wood.
- A number of R&D projects, focusing on improving the forest operation systems at firm, regional and national levels – in particular at the first level involving private holdings as well as research organisations.
- Significant support has recently been given to a joint initiative on improved and cost-efficient reforestation and afforestation techniques. The initiatives involve State forestry, research organisations and a number of private forest holdings and forest entrepreneur firms.

Thus, while R&D and innovative entrepreneurship do take place in the Danish forest sector, the efforts are certainly hampered by structural features. A number of tools have been developed to remedy the potential problems caused by the forest ownership structure. While these tools have been extensively used and with some impact and success, it is obvious that the innovative forces have so far not been sufficient to

counterbalance the effect of the overall developments on the (global) roundwood markets.

By any standard, Denmark is a country rather poor in forest land, e.g. there is less than 0.1 ha of forest per capita. However, turning that fact upside down, Denmark is a country with more than 10 people per ha of forestland. People who may ask the forest and hence the forest owners for an increasing amount of services in terms of experiences with and in a natural environment offering a number of health improving and environmental benefits. Thus, while a growing and increasingly more urbanised population, creating increasing wealth from other productive sources, leading to decreasing significance of the traditional forest sector's contribution to the GNI, the same dynamics seem to point towards obvious new ways of expanding the values of the Danish forests to Society.

The key question and issue that research must study and private initiative deal with is how to build and develop markets for ever-increasing 'softer' goods and services from the forests at large.

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Finland

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Executive summary

Expanded domestic wood product consumption

The recent increases in apparent consumption of wood products in Finland have occurred in plywood and sawn wood, where the domestic consumption has doubled over the last decade. This is partly due to macroeconomic recovery but the parallel promotion programs on wood use in house construction and repair have also contributed to the development.

Diversified non-industrial forest land tenure and commercial timber production

Private ownership is diversified into small ownership units in Finland. The size distribution of private forest holdings is polarised: fragmentation and parcellisation is going on along with consolidation. The major ownership transfers are through bequests and in recent years only about 10% of the holdings have been sold on the free market. The latter restricts effectively the formation of large-scale ownership and the accompanied possibilities on scale economics in commercial forestry as well as the possibilities of effective timber management investments. Joint efforts have been frequently been applied in silvicultural activities, such as road construction and ditching, to achieve positive scale economics. There are some joint owned forests by non-industrial private forest owners (NIPFs) and these forests are managed commercially by experts.

NIPFs, which are the main roundwood source for Finland's forest industries, accounted for close to 47 million m³ (or 85%) of total fellings of commercial roundwood in 2003. The most common commercial timber species are: Scots pine, Norway spruce and Silver birch. In addition, the commercial use of aspen has increased in the recent years. The profitability of timber growing in NIPFs, depending on stumpage prices, cost-effectiveness of production and public subsidies, has remained stable during the last decade. The public investment subsidies on NIPFs have been directed to wood production for the most but investments towards ecological sustainability have increased their share in subsidies since the Forest Act 1996.

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Domestic stumpage prices have become more and more sensitive on the international roundwood markets, mainly those around the Baltic Sea. This development tend to promote diminishing trend in domestic roundwood prices in the long-run and increase pressures to improve the cost-effectiveness of forest investments and management in general.

There is little room for efficiency improvement in thinnings because almost all timber harvests through clear cuttings have already been mechanised. The ever-increasing shortage of labour force together with high unit costs address the need for mechanisation of silvicultural activities. The use of family labour force in forest work, both in logging and silviculture, can compensate cost-effectiveness improvement needs. However, self-activity will most likely diminish in the future along with the increased urbanisation and absenteeism as well as aging of forest owners. Cost efficient timber procurement is a supportive activity towards improved profitability within the wood processing value chain. New roundwood market information services have improved the informational balance between NIPFs and few large buyer companies are in favour of the former.

Current forest policy planning has concentrated on the application of ecological and social sustainability in Finland. The latter has been among the major tasks in the implementation of National Forest Program (NFP) 2010. Contrary to many European industrialised countries public subsidies provided to timber production investments were reaffirmed in Finland's NFP process. Forest policy makers consider short rotation roundwood production for bioenergy a valid potential alternative to long rotation timber production. Subsidies provide incentives to intensify commercial timber production in NIPFs. Multifunctional forest owners, tending to support biodiversity and carbon sink services, shall be subsidised by the state in the future.

Forest owners who are interested in forestry have access to numerous information services arranged by local forest owners associations as well as courses, training, journals and literature. For instance, information on stumpage prices by regions is easily available on Metla's internet pages (www.metinfo.fi) and those of The Central Union of Agricultural Producers and Forest Owners (www.mtk.fi).

Few large international corporations and numerous SMEs occupy wood product industries

No SMEs exist in pulp and paper industries in Finland and the same is true with wood plate industries. These business activities are mainly excluded here and this survey concentrates on wood product industries. Three types of wood product industry firms can currently been identified in Finland: a) sawmills and panel mills of global forest industry corporations having wood product industry activities parallel with their core business interests in pulp, paper and board production, b) large export oriented sawmills and log house producers and c) SMEs in sawing, planing and woodworking industries producing mainly to domestic or local markets. A large majority of sawn timber (70%) is produced in plants with over 50 employees and their number (48) among the sawmill units (1070) is less than one %.

Gross revenue in Finnish wood product industries has more than doubled during the last twenty years but the profitability of business has not achieved a satisfying minimum level in major sub-sectors a) and b) of these industries. Poor long-term profitability and shortage of equity capital are typical especially among the SMEs of the industry. The international competitiveness of Finnish wood product industries has remained modest because of the high unit prices of input factors. High investment costs, price of raw material and dependency on few customers only, however, may be highly risky for new entrepreneurs. The threshold to entrepreneurship is high in wood product industries irrespective the current supportive resources to new entrepreneurship, innovations and heavy public investments into various R&D programmes.

The majority of wood product industry sub-sectors apply low tech production technologies implying large capital input when investing into new plants. Low added value products dominate the export of major sub sectors of wood product industries. There are only few examples of horizontal integration and networking among wood product industry SMEs and the same is valid with vertically integrated partnerships among firms. The latter activities, providing ways to benefit from positive economies of scale in production, have not become common. The lack of qualified potential subcontractors has delayed wood product industry firms to focus on their core competencies and the options to expand added value chains inside the country.

Lack of marketing intelligence and poor familiarity of export markets are often mentioned among the major barriers to new entrepreneurship as well as to the expansion investments among the existing wood product SMEs. Owners of small companies have received vocational training that is most frequently focused on wood engineering. At least 43% of the entrepreneurs have a college-level education and they are active staffing promoting and organising training for their staff. A good education system provides access to high level formal knowledge also among SMEs. The Finnish unemployment benefit system, however, is considered a barrier to new small-scale entrepreneurship. Current small-scale entrepreneurship often "runs in the family" and the smallest companies do not necessary have particular need to grow.

Special roundwood market segments characterised by specific tree species, log dimensions and qualities are frequently essential to SME sawmills applying focusing strategies in their production. Submarkets for these specific roundwood assortments of their interest have never existed in Finland. The latter provides an effective barrier to entry for SMEs in the business. The few buyers for pulpwood and sawmilling residues are at the same time the price leaders in the roundwood market.

Specialized production implies high costs of product variation making cost leadership and product differentiation mutually exclusive among firms in wood product industries. Therefore the design or the value chain and its components can be assumed dependent on the strategy adopted. Factor conditions with respect to labour endowment and labour cost have an impact on the strategies that firms provide to achieve competitive advantages.

Growing entrepreneurship in producing non-wood forest goods and services

The economic role of non-wood forest goods and services (NWFP&S) is still of relatively minor importance compared to the other forms of use of forest resources in Finland. However, there are geographical regions where they already have a significant role that is increasing rapidly. The entrepreneurship related to NWFP&S can be divided to producing commercial goods and non-commercial utilities, mainly services.

The most of non-commercial environmental services (mainly biodiversity related or restoration of recreational areas) are produced and consequently paid by governmental authorities (different kind of subsidies/assistance work for e.g. Metsähallitus (Forest and Park Service)). The entrepreneur occupying private land area is in these cases often the landowner or a forest professional. In public land the work is usually done by an employee or a subcontractor for Metsähallitus and by a municipality employee when municipality land areas are concerned. However, there is an ongoing process in Finland to outsource these services more and more to private commercial companies. The demand for environmental services also in private forests can be estimated to grow in the future along with the structural changes of private forest owners.

Everyman's rights guarantee wide access to all commercial forests in Finland. Therefore people are not very used to pay for common land recreational services. There are numerous recreational dimensions in the use of forests in Finland. Over a half of Finnish people pick berries and approximately 40% pick mushrooms. Approx. 8% of the total population also hunt.

Regardless, nature tourism sector is growing rapidly in Finland. Most companies operating are relatively new (less than 10 years old). It has been estimated that the employing effect of nature tourism was 32,000 person-years in 2000 and by the year 2010 it could be even 64,000 person-years. In northern Lapland the reindeer herding is more and more becoming the secondary economic activity with respect to tourism. The most important commercial NWFP botanical products are forest berries and mushrooms.

The companies operating in the field of NWFP&S are usually quite diversified and often operate without clear business strategies. This, in turn, causes in many cases poor identification of relevant customer groups and their demands. Typically companies are small with limited resources, even though there are some larger ones e.g. in the fields of forest berry or nature tourism. Especially smaller companies would benefit significantly from suitable partners and networks including marketing and supplying channels. The lack of a clear business plan and proper segmentation of the market are among the major weaknesses of this business.

There is a clear need for new innovative off-season activities among the enterprises in NWFP&S sector due to the seasonality of single activities concerned and sector-specific information services due to the low technology level and labour intensive production. The sustainable supply of domestic raw material is also one of the main challenges for the producers of NWFP botanical products.

1 Consumption

1.1 Forest products' consumption and urban population

The population of Finland comprised 5.2 million in 2003, with an increase of 128,000 inhabitants during the last decade. The population is at a constant level as its' growth is annually under 1%. The number of households in Finland was 2.3 million in 2001. The share of urban population has increased over the period 1993–2002 and currently is estimated to be nearly 65% of total population.

The value of annual house construction was in 2003 15.6 billion euro, including new construction (9 billion euro) and repair/renovation construction (6.6 billion euro). The annual residential house construction is about 42,000 apartments/houses (app. 13,000 houses with concrete frame, 22,000 wood frame single houses/row house apartments and 7,000 cottages). The popularity of wood as house frame material has increased during the last decade according to the statistics. The annual use of wood in house frames has increased in Finland. The latter is partly due to the rapid increase in the number of secondary cottages (24% increase in ten years, 368,000 in 1990 compared to 457,000 in 2001).

Expanded construction of single family houses has been an important determinant of the domestic use of wood industry products in Finland. Increased available private incomes among households explain the increased single house construction that in turn explains the consumption of forest products, especially that of wood based panels (plywood particle board and fibreboard). Sawnwood and wood based panels have frequently substituted other materials in other house construction as well as in repair and remodelling investments.

1.2 State of the art on demand for forest products and consumption

Finland is a major exporter of forest industry products in the world. Only 10–30% of the forest industry production is consumed domestically. The share of domestic consumption from total production is 40% for sawnwood, 15% for plywood, 61% for particleboard and 93% for fibreboard. OSB (oriented strand board) and MDF (medium density fibreboard) wood based panels are less used partly because of the lack of domestic production. The domestic use by households and industrial production of value added products are not known. This shows well, for example in the case of sawnwood, where the end use calculations and estimates for the share of value added production do not cover the whole domestic consumption (see e.g., Hänninen and Toppinen 2002). The historical development in per capita apparent consumption during the last decade (1993–2003) is given below for four major groups of forest industry products, i.e., soft sawnwood, plywood, paper and paperboard. Because economic growth (based on increased available private incomes) is the major determinant of consumption for forest industry products, figures also show the change of Gross National Product in Finland during the same time.

Figures 1 to 4 show that the apparent consumption of soft sawnwood, plywood and paperboard reached their record levels in 2003. The consumption of sawnwood has grown to about 1 m^3 per inhabitant in 2003. That is five times higher than the major country averages in the European Union and also higher than in the countries like

Canada (0.4 m^3/a) or the United Sates (0.3 m^3/a) characterised by high preferences on wood use in construction. The consumption of plywood, the major wood based panel product in Finland, has reached a level of 0.03 m^3 per inhabitant in 2003. The consumption of paper had its' highest level in year 2000 (consumption per capita 246 kilograms). Apparent consumption of paperboard was 119 kilograms in 2003 (majority used in packaging).

The apparent consumption in plywood and sawnwood has doubled during the last decade partly due to the macroeconomic recovery and partly due to the effective promotion programs towards increased wood use in house construction and repair construction. The growth of consumption has been, however, faster than the growth of house construction. The explanation can be that the percentage share of single houses and cottages has increased in residential construction during the last decade. Almost all cottages and more than 90% of single houses constructed recently have had a wood frame. This also means that in the future the increase in the domestic use of sawnwood must be achieved in other segments of wood construction that in wood frames.

The domestic consumption of paper and paperboard was 8% of production in 2003. It has increased about one quarter over the last decade. The exact volume of domestic use is, however, an estimation that is based upon annual net trade and production figures, and they do not take into account the possible changes in inventories.

There is a long-term interdependence with the aggregate consumption of forest products and aggregate value of domestic production (GNP Gross National Product). The relationship between the single annual observations (i.e. the annual change of forest products and GNP) does not always match. The inaccurate estimation of apparent consumption levels (due to missing information on industry and consumer inventory changes) can partly explain this. More important, however, are the changes in the GNP-independent use of forest industry products. The annual fluctuations in the production of the construction sector, the main end user of sawnwood and plywood in the country, are stronger than those in the aggregate GNP.

The consumption of non-wood forest products and services in Finland is mainly domestic (household consumption). The annual berry yield is estimated to be approx. 600–1,100 million kg. The yield variations between the years are significant. Annually app. 40 million kg are picked, of which app. 30 million kg end up for the domestic use (Finnish Statistical Yearbook 2003). The average consumption of wild berries is estimated to be approx. 8.3 kg/person/year (Markkula & Rantavaara 1996). Annual mushroom yield varies between 350–1000 million kg. Only less than 1% (approx. 2–10 million kg) is collected and 90% of collected mushrooms is used for domestic use (Finnish Statistical Yearbook 2003). The average consumption of forest mushrooms is 0.4–1.5 kg/person/year. The young people in Finland consume notably less wild mushrooms than the older ones (Feodoroff 1999). More detailed information on economical role of wild berries and mushrooms in Chapter 4.

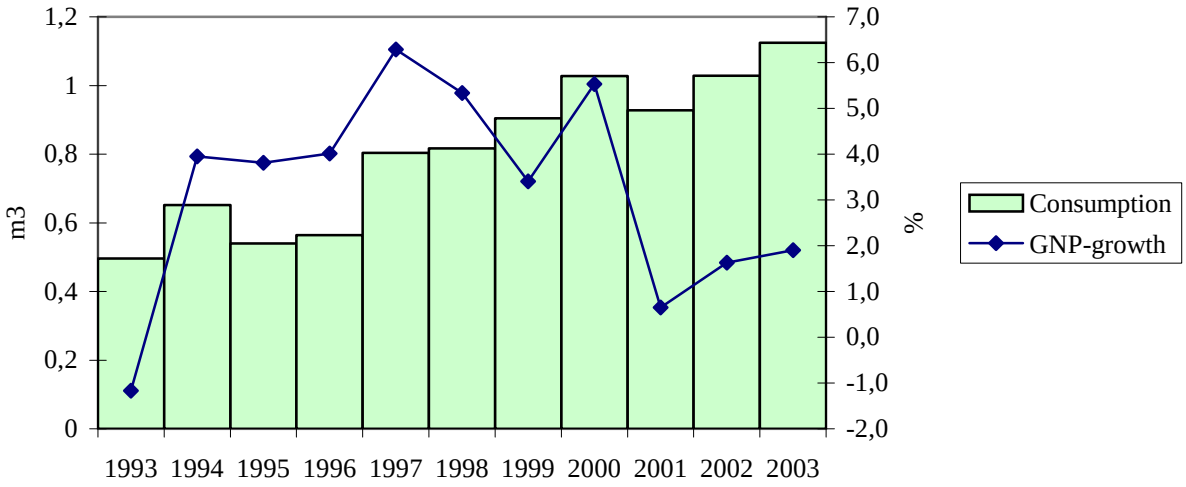

Figure 1. Apparent consumption of sawnwood per capita in Finland compared with GNP growth, 1993–2003.

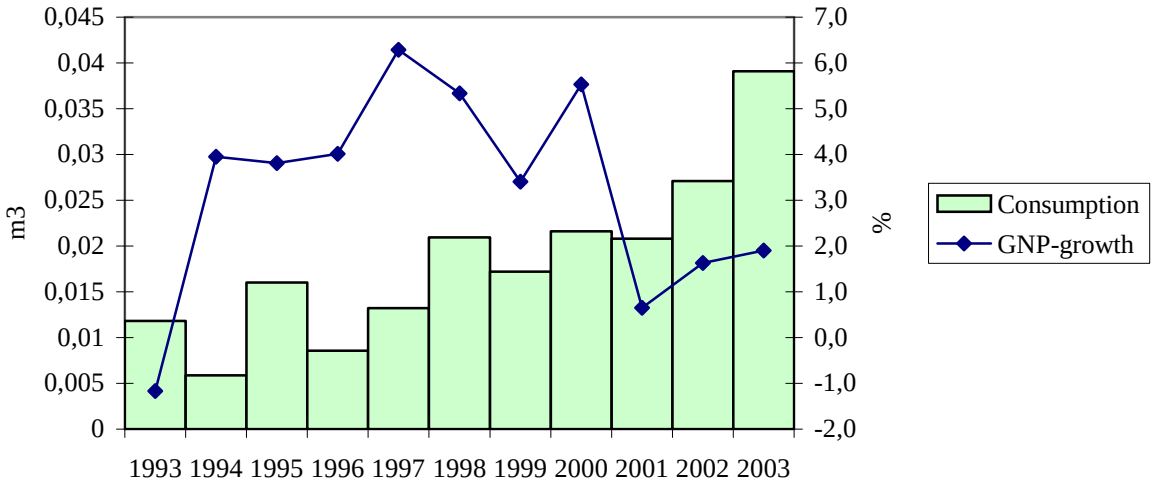

Figure 2. Apparent consumption of plywood per capita in Finland compared with GNP growth, 1993–2003.

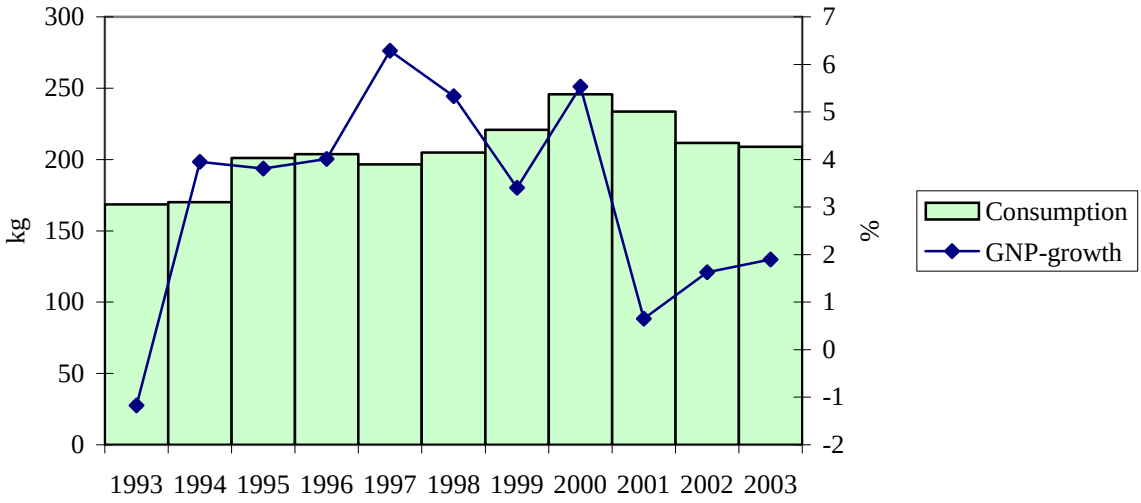

Figure 3. Apparent consumption of paper per capita in Finland compared with GNP growth, 1993-2003.

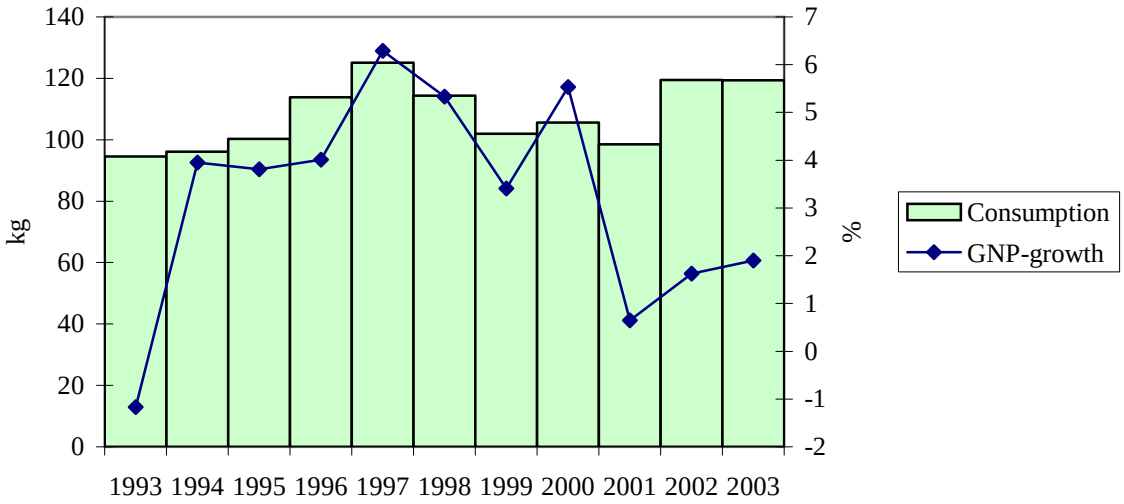

Figure 4. Apparent consumption of paperboard per capita in Finland compared with GNP growth, 1993-2003.

1. 3 Ongoing research and areas for incomplete information

Research on consumption of forest industry products is undertaken e.g., at the Finnish Forest Research Institute (Metla) and the Pellervo Economic Research Institute within their annual outlooks for the forest products markets. Their main focus is, however, on the export markets of these products. The dominant interest of export markets is due to the low share of domestic consumption of forest industry products. VTT Building and Transport[1] also undertakes estimation of wood usage in construction in Finland and participates in European Network of Construction Forecasts (EUROCONSTRUCT). Individual forest industry firms and private commercial research firms make internal and often confidential analyses and forecasts on forest product consumption. The research efforts on modelling domestic consumption are scanty because of the dominant position of exports for the Finnish forest products industry.

Statistics on forest related consumption by the urban population are not available in Finland and urban consumption of forest products is not reliably separable from the aggregate consumption. The only reference on urban consumption available is the share of urban population, about 65% of total population. Other areas with incomplete information involve the consumption of forest related services. However, the demand for wood, non-wood and forest related services in Finland may be approximated with market surveys (for outdoor recreation, see e.g. Sievänen 2001, see also Chapter 4).

1.4 Main problems and research questions in consumption

High values and volumes of forest industry production are mainly due to the export (export share: 90% in paper paperboard, 85% in plywood and 60% in sawn timber). Domestic consumption of sawnwood, going mainly to construction, has increased to 5.5 million m^3 in 2003. Wood based panels are domestic products except plywood. The more than proportionate growth of family houses in house construction is the major cause for the increased domestic use of sawnwood. Also joinery industry has expanded, which shows well in the increase of employees by about 5000 between years 1993–2004. The major problem in consumption research is the scare data available. Majority of statistics on the consumption of forest products are domestic aggregates. Disaggregated information on forest product consumption is gathered by the inquiries of the specific survey studies.

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Markkula, L & Ranta-Vaara, A. 1996. Consumption of mushrooms and other food products in Finland. Published in: Walderhaug, T and Gulaugsson Eo. (eds): Proceedings of the 11th meeting of Nordic society for radiation protection and the 7th Nordic radioecology seminar 26.-29.8.1996

[1] VTT provides research, development and testing services as well as product approval and certification in the field of construction, communities and physical infrastructures

Hänninen, R. & Toppinen, A. 2002. Miten hyvin asuinrakentamisella voi selittää sahatavaran kotimaan kulutusta? (How well does residential construction explain sawnwood consumption in Finland?) In: Hänninen, R. (toim.). Metsäsektorin suhdannekatsaus 2002–2003. Metsäntutkimuslaitos, pp. 53-55.

Sievänen, T. 2001. (ed.) Outdoor recreation 2000. Metsäntutkimuslaitoksen tiedonantoja 802. 204 p. (in Finnish with English summary)

Annex A: Organisations studying forest products' consumption

Federation of Finnish Forest Industries. http://www.forestindustries.fi/

Finnish Forest Research Institute (Metla) http://www.metla.fi/hanke/3338/index.htm

Pellervo Economic Research Institute http://www.ptt.fi/en/index.html

University of Helsinki, Department of Forest Economics.

http://honeybee.helsinki.fi/MMEKN/eng/research/pmark/pmarkres01.htm

VTT Building and Transport http://www.vtt.fi/rte/indexe.html

2 Small-scale forestry practises

Non industrial private forest ownership (NIPFO) is diversified into small tenure units in Finland. These NIPFs are the main domestic roundwood source for Finland's forest industries. The public investment subsidies on NIPFs have been directed to wood production for the most but investments towards ecological sustainability have increased their share in subsidies since the Forest Act 1996. Domestic stumpage prices have become more and more sensitive on international roundwood markets, mainly those in the Baltic Sea area challenging the profitability of timber production and promote efforts towards the cost-effectiveness in forest investments and management in general.

2.1 State of the art knowledge, and historical development at country and regional level on small-scale forestry and its related policy framework.

The organised governing activities of public authorities on private management of forests goes back to the early 1300s under the king of Sweden when the first statements concerning the privatisation rights on common property village forests were announced. The duties on the supervision of private land forest management were delivered to public hunting officers in the mid 1600s. The public arrangements to govern forest management are related slash-and-burn based agriculture in the 1600s. The statements allowing tar burning and slash-and-burn based agriculture in the late 1700s promoted the formation of farming tenures in the remote lands of the kingdom of Sweden.

Private forest ownership in Finland was formally established by the Great Partition legislation in 1757 and 1775. The pressure to create a new land division procedure was caused by practical inconveniences arising from the so-called open field system and the need to revise land taxation. For the first time forest land owned by the villages was divided between the farms in order to stop the devastation of forests. The division was continued and improved by the New Partition in 1917. Forest Law 1886 made devastation cuttings illegal and Forest Degree 1917 regulated cuttings towards adequate regeneration.

Other landmarks in the development of private forestry, which have affected the size distribution of the holdings and other structural characteristics, were the redemption of leasehold properties in 1918 after the Civil War, and the settlement laws of 1922 and 1936. Finland was obliged to cede large territories to Soviet Union after the World War II, which caused the need for massive settlement activities to provide land for refugees, war veterans and war widows (Karppinen 1988).

Comprehensive reform in public administration of private forest management was carried out through a legislative reform in 1928 (Forest Law to govern sustainable forest management in private lands, Forest Improvement Law towards public support of timber production investments and Law on Forest Boards allowing the arrangement of advising and supervising to non industrial private forestry). The governance of private forest management was based on semi-public Forestry Boards and the public supervision arranged through State Forest Board.

The redistribution of agricultural as well as forest land is observable in the development of the size distribution of forest holdings (Table 1). In Finland, forest properties are

mainly inherited from parents or bought from parents or relatives. Only 13% of the holdings are acquired from the free market (Karppinen *et al.* 2002). The inheritance system has been the main reason for structural changes in private forestry since the late 1960s.

Table 1. The development of the size distribution of NIP (Non-Industrial Private) forest holdings 1929–1994 (Ripatti 1996).

	Year				
Size category, ha	**1929-30**	**1959**	**1969**	**1980**	**1994**
	% of the holdings				
1.0-4.9	16	20	16	32	35
5-19.9	32	35	36	29	28
20-49.9	27	28	29	25	23
50-99.9	14	12	13	10	10
Over 100	11	5	6	4	4
In total	100	100	100	100	100
Mean size of holding, ha	45	33	32	27	26

2.2 General information on small-scale forest holdings in the country

The role of private forestry

The aggregate forest land in Finland is about 20 million hectares (see Appendix.). The proportion of NIP forest holdings of this forest land area is 61% (Finnish Statistical... 2003). NIPF is distributed into about 446,000 non-industrial private forest holdings (> 2 ha). The aggregate number of forest owners has been assessed to be at least twice as much as the number of holdings mainly due to the family ownership structures and some types of joint ownerships (Karppinen *et al.* 2002).

NIPFOs provide the major proportion of the roundwood delivered into the roundwood market and finally to forest industry use. The share of NIP forests of the roundwood used by the forest industry has been around three thirds when calculated from the aggregate where roundwood import is included. The gross stumpage earnings from private forestry were 1540 million euro in 2002, i.e. 88% of the total gross stumpage earnings. Around half of the sum was distributed in eastern and central Finland (the so-called Forest-Finland, see Figure 5). Incomes from forestry are important in the economies of rural societies because the major share of the roundwood sales incomes are consumed in the municipality of the forest holding. The latter has remained valid irrespective the structural changes in forest land tenure where the urbanisation among NIPFOs is the most important singe factor concerned (Karppinen *et al*. 2002).

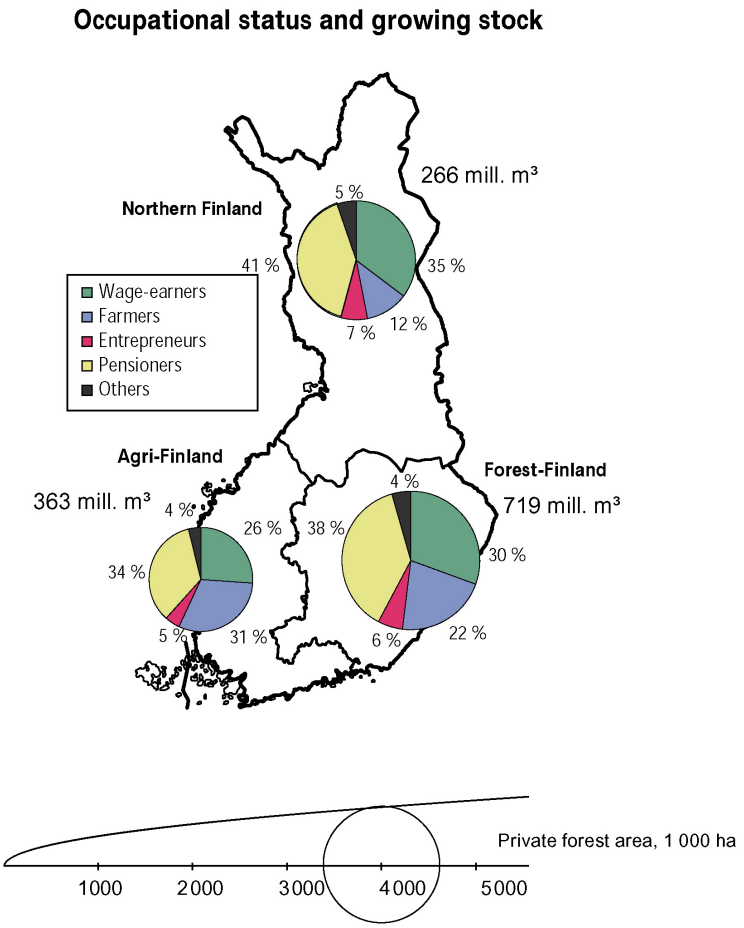

Figure 5. Occupational status of forest owners, growing stock and forest area in private forests by regions in Finland (Karppinen *et al.* 2002).

The structure of private forest ownership and landowner objectives

The main trends in the socio-economic change in Finland have been the occupational and regional differentiation, migration and a general urbanisation of the population during the past thirty years. These trends have been associated with a rising standard of living and wealth. This development has taken place rather late compared with other industrialised countries, but it has been particularly rapid. The general changes have had a powerful impact on private forestry.

The most significant characteristic of the structural change among NIP forest owners in the 1990s has been the ownership transfer from farmers to non-farmers through bequests. Farmers have been the most active owner group that concerns both timber sales and silvicultural activities. The number of full-time forest entrepreneurs has remained modest, only a few thousands in the whole country.

The major structural features of NIPF occupancy along with the major changes are listed shortly below. Forest owners are on average rather old (57 years) and this proportion is still increasing. Also absentee ownership has been growing. However, more than 60% of forest owners live in rural areas and two thirds of the owners live either on the holding or close to it in the same municipality. The basis of forest

ownership is still strongly rural. Forest size distribution has been polarizing which means that especially the number of small holdings but also the number of large holdings is increasing. The mean size of the holdings (exceeding 5 ha) is 37 ha.

Finnish forest owners can be classified into four groups based on their ownership objectives (Karppinen 2000, Karppinen *et al.* 2002). *Multiobjective owners* value both the monetary and amenity benefits of their forests. *Recreationists* emphasize non-timber and amenity aspects of their forest ownership. On the other hand, *self-employed* owners value labour income as well as employment provided by their forests. Finally, *investors* regard their forest property as an asset and a source of economic security, and as a source of regular timber sales income.

Half of the owners were classified as multiobjective owners, one fifth both as recreationists and self-employed owners and over one tenth as investors (Table 2). Self-employed and multiobjective owners were more often farmers than other groups. For instance, one third of the self-employed forest owners were farmers, but almost half of the forest area owned by self-employed owners belonged to farmers (Table 3).

Finland can be divided into three regions based on the forest resources and the means of livelihood. The Eastern and central part of the country can be labelled as "Forest-Finland", the Western part as "Agri-Finland" and the Northern part simply as "Northern Finland". "Forest-Finland" has a dominant position in private forestry, which is indicated by the largest volume of growing stock (Figure 5). The occupational structure of forest owners is similar as the national average. In Northern Finland, the proportion of farmer-entrepreneurs is clearly smaller than in other parts of the country and in "Agri-Finland" their share is largest.

Wood and non-wood production

Commercial roundwood removals from private forests were 46 million m^3 in 2002, corresponding to app. 85% of the total of commercial roundwood removals (Finnish Statistical... 2003). The role of private forests is, despite the rapidly increasing roundwood imports, of crucial importance for the export-oriented forest industries.

Estimations of the value and the volume of non-wood forest products from private forests are not available. Table 4 shows the values for some non-wood and wood forest products in non-industrial private, state-owned and forest industries' forests. Industrial roundwood is by far the most valuable product. Game, mainly moose and other artiodactyls, as well as fuelwood have also a remarkable economic value.

In Finland Everyman’s right guarantees certain rights for the public also in private forests, such as free picking of berries and mushrooms, hiking and camping possibilities. Hunting is, however, licensed by the state, but the fees paid for the access to the forests collected by landowners are rather modest. (For more information on NWFP (Non-wood Forest Products) see Chapters 4 and 5).

Table 2. The size of NIP forest holdings exceeding 5 ha by owner categories and their proportions in 1999 (Karppinen et al 2002).

	Size of forest holding, ha					
	5-19.9	20-49.9	50-99.9	Over 100	In total	Mean size of forest holding, ha
	% of holdings/owners (% of private forest area)					
Occupational status						
Wage-earners	50 (17)	33 (33)	12 (26)	5 (24)	30 (25)	31
Farmers	23 (5)	39 (22)	25 (31)	14 (41)	22 (33)	56
Entrepreneurs	46 (14)	31(26)	17 (31)	6 (29)	6 (6)	36
Pensioners	47(16)	36(34)	13 (28)	4 (22)	37 (32)	32
Others	49(17)	33(34)	13 (28)	5 (21)	5 (4)	31
Place of residence						
Rural area	38 (11)	37(28)	18 (30)	8 (31)	63 (69)	41
Population center/ small town	50 (16)	34 (31)	11 (24)	5 (29)	18 (16)	33
Town (over 20 000 inh.)	53 (19)	31 (32)	12 (28)	4 (21)	19 (15)	29
Control of holding						
Family ownership	42 (12)	35 (29)	15 (28)	7 (31)	75 (76)	38
Private partnership	39 (11)	35 (29)	18 (31)	8 (29)	11(12)	39
Undistributed estate	46 (16)	35 (33)	15 (31)	4 (19)	14 (12)	32
Owner's age						
Below 40 yrs	35 (9)	36 (25)	19 (30)	11(36)	11 (13)	45
40-59 yrs	42 (12)	35 (28)	17 (29)	7 (31)	45 (47)	39
Over 60 yrs	45 (15)	36 (33)	14 (28)	5 (25)	44 (40)	34
Gender						
Male	40 (11)	36 (28)	17 (30)	8 (31)	76 (81)	40
Female	52 (19)	33 (35)	11 (26)	4 (21)	24 (19)	29
Objectives of forest ownership						
Multiobjective owners	34 (9)	37 (27)	20 (31)	9 (33)	48 (59)	45
Recreationists	64 (28)	27 (35)	6 (16)	3 (21)	21 (14)	24
Self-employed owners	42 (13)	34 (29)	17 (31)	7 (27)	18 (18)	38
Investors	54 (22)	32 (36)	11 (29)	3 (13)	13 (9)	28
Region						
Forest-Finland	41(13)	38 (33)	15 (28)	6 (26)		36
Agri-Finland	55 (21)	32 (34)	11 (28)	3 (17)		28
Northern Finland	31 (7)	31 (19)	23 (31)	15 (43)		53
In total	42 (13)	35 (29)	16 (29)	7 (29)		37

Table 3. Forest owners' occupational status by owner categories and their proportions in 1999 (forest holdings exceeding 5 ha) (Karppinen et al 2002).

	Occupational status					
	Wage-earners	Farmers	Entre-preneurs	Pensioners	Others	In total
	% of forest owners (% of private forest area)					
Place of residence						
Rural area	22 (17)	33 (46)	5 (4)	36 (29)	4 (3)	100
Population center/small town	42 (39)	3 (6)	7 (9)	41 (39)	6 (7)	100
Town (over 20 000 inh.)	48 (48)	2 (2)	7 (9)	37 (36)	6 (5)	100
Control of holding						
Family ownership	26 (20)	26 (39)	6 (6)	39 (32)	4 (3)	100
Private partnership	41 (35)	16 (22)	9 (8)	29 (29)	6 (6)	100
Undistributed estate	44 (46)	7 (8)	3 (3)	38 (35)	7 (8)	100
Owner's age						
Below 40 yrs	43 (37)	41(52)	5 (4)	0 (0)	11 (8)	100
40-59 yrs	50 (38)	29 (44)	9 (9)	6 (4)	6 (5)	100
Over 60 yrs	7 (7)	10 (14)	3 (3)	79 (76)	1 (1)	100
Gender						
Male	30 (24)	26 (38)	7 (6)	34 (29)	4 (3)	100
Female	33 (31)	9 (12)	3 (3)	48 (45)	8 (8)	100
Objectives of forest ownership						
Multiobjective owners	23 (20)	26 (36)	5 (5)	43 (36)	3 (3)	100
Recreationists	42 (40)	10 (16)	8 (9)	34 (29)	6 (6)	100
Self-employed owners	32 (26)	34 (46)	5 (5)	24 (19)	5 (4)	100
Investors	35 (33)	12 (17)	7 (5)	42 (40)	4 (5)	100
In total	30 (25)	22 (33)	6 (6)	37 (32)	5 (4)	100

Table 4. Values of non-wood and wood forest products in Finland in 2002 (Finnish Statistical... 2003).

		Mill. euros
Industrial roundwood	(stumpage value)	1689
Fuelwood	(stumpage value)	65
Forest chips	(value at use site)	24
Christmas trees	(christmas tree trade)	7
Game	(estimated value)	73
Wildberries	(market supply value)	6
Mushrooms	(market supply value)	1
Lichen	(value of exports)	2
Reindeer husbandry	(value of culled reindeers)	14

2.3 Small-scale forestry practices

Forestry techniques and practices

There are about twenty indigenous tree species growing in Finland, the most common ones are pine (*Pinus silvestris*), spruce (*Picea abies*) and birch (*Betula pendula* and *B. pubescens*). Usually two or three tree species dominate a forest stand. About half of the forest land area consists of mixed stands (Finnish Statistical... 2003). The forests are managed a compartment at a time. The average size of a compartment is usually less than two hectares. Rotation of forests varies between 60 and 120 years depending on the tree species and the composition of the site. The major mode of rotation applied is clear cutting and the establishment of the new tree generation either by natural regeneration or by planting or seedling. Nowadays, about one third of Finnish forests are regenerated naturally and two thirds by planting or seedling (Finnish Statistical... 2003). Before regeneration, the ground on the site has to be prepared. When the new stand has been established, the initial development of the seedlings has to be secured. This includes e.g. removing rivalling grass vegetation, and supplementary seeding or planting whenever needed.

Private forest holdings are usually quite small, on average 20−30 ha (Finnish Statistical... 2003). Still, for many forest owners forest earnings play an important part: an average forest holding under sustainable management may return an annual timber-sales income of about 2500−3300 euro. NIPFOs frequently acquire additional net income over stumpage by carrying out the harvesting themselves. Many forest owners also save in their outlays by carrying out forest management work on their holdings, such as planting and young stand management.

Much of the harvesting is accomplished mechanically (96% of harvesting by forest industry and the Finnish Forest and Park Service), and only some thinning and felling for special purposes is done manually (Finnish Statistical... 2003). Loggings, where larger volumes are harvested at one go, are usually carried out every 3 to 4 years. Forest industry companies generally buy their timber as standing sales, i.e. the company takes care of the logging and hauling using subcontractors. The forest owners can also choose delivery sale, carrying out the felling themselves or using a subcontractor and delivering the timber to a road-side landing. In the delivery sales the share of manual fellings 68% and mechanical fellings 32%. The forest industry companies do not have their own logging machines, which means that they use small contractors for felling and thinning. The trees are felled, trimmed and cut into lengths with a harvester. The timber is then loaded onto a forest tractor and transported to a timber landing.

In Finland, logging is based on the so-called assortment system. This means that a tree trunk is cut immediately after felling into saw-timber and pulpwood, based on its quality and diameter. The butt end of a large tree gives about 2 or 3 logs which can be used for sawn timber, whereas the top is used for making pulp and paper. The thinnest part of the tree top is often used for producing energy.

Management and organisational arrangements

The share of forest owners' own work has decreased in the last decades mainly due to the structural changes in tenure as described earlier. The share of the delivery sale is about 20% of total roundwood removals. However, the share of forest owners' own work (family work) in silvicultural treatments is still remarkable (in monetary terms over 90 million euro annually, see Koho et al. 2004).

Forest management planning document has been produced to holdings covering about 70% of private forest areas (Finnish Statistical... 2003) and about every second forest holding has a valid forest management plan. Regional Forestry Centers (RFC) are carrying out most of the forest planning and in some cases also the Local Forest Management Associations (LFMA). Regional Forestry Centres get state subsidies for forest planning. At the moment, there is debate on the forest policy arena whether to open the forest planning for free competition. There are already now some private entrepreneurs who provide forest planning in the context of forestry services.

Finnish forest owners have easy access to expert advice relating to the management of their forests. There are about 158 LFMAs that provide the forest owners with advisory services relating to forest management and felling as well as other types of related services. The LFMA's task, stipulated by law, is to promote private forestry while securing its economic, ecological and social sustainability. The LFMAs' share of fellings in delivery sales is 37% (Finnish Statistical... 2003). LFMAs are working in a close co-operation with the forest owners in all matters related to forests: as forest management services, training and planning services and timber sales services. As a result, around 80% of the planning and execution of silvicultural measures in private forests and 75% of preliminary planning of timber sales are carried out by LFMAs.

There are about 100,000 timber sales deals made every year between forest owners and forest industry companies. The average sales volume is about 500 m^3. Forest industry companies generally buy their timber as standing sales, i.e. the company takes care of the logging.

Role of forestry on farms

The current tenure proportion (share of units) of full-time farmer entrepreneurs is one fifth, whereas their share of the NIPF land area (share of hectares) is one third (Tables 2 and 3). The mean size of forest holding is 56 ha in farm forests. The number of active farms has decreased from 105,000 farms in 1994 to 73,000 farms in 2002 (The Central Union of Agricultural Producers and Forest Owners 2004). At the same time the mean size of the farms has increased. This means that the economic importance of forestry on farms has in average decreased. But it also can be noticed that some farms have been focusing more on forestry.

Costs, benefits and investments

The gross stumpage earnings in NIP forestry were 1.5 billion euro (115.2 euro/ha) in 2002 (Table 5). The importance of timber sales income especially in Eastern Finland is worth noting (see also Figure 5) The value of investments in private forestry is around 190 million euro annually, as shown in Table 6. Forest regeneration, including planting

and seeding as well as natural reforestation, is the most important silvicultural activity as regards the financing.

Table 5. Incomes and expenditures in non-industrial private forestry, 2002 (Finnish Statistical… 2003).

	1 000 €, Whole country	**€/ha, Whole country**	**€/ha, Western Finland**	**€/ha, Eastern Finland**	**€/ha, Northern Finland**
Gross stumpage earnings	1 542 734	115.2	144.4	160.2	42.5
Total costs	277 184	20.7	23.7	25.6	13
Silviculture and forest	*184 314*				
Forestry administration costs	*92 869*				
Forestry fees	*28 235*				
Services of experts	*6 830*				
Insurance fees	*8 106*				
Travel and course costs	*30 071*				
Other administration costs	*19 627*				
+ State subsidies	*61 222*	*4.6*	*4.2*	*4.5*	*5.1*
Net earnings	**1 326 772**	**99.1**	**124.9**	**139.1**	**34.5**

Table 6. Financing of silvicultural and forest-improvement works in 2001 in NIP forests (Finnish Statistical... 2003) (1000 euro).

	Self financing and own labour input	State loans	State grants	Total
Total	**130 221**	**545**	**57 729**	**188 495**
Forest regeneration	72 828	-	11 254	84 082
Tending of seeding stands, improvement of young stands, energywood harvesting and chipping	23 624	10	29 410	53 044
Pruning	743	-	744	1 487
Remedial fertilization	1 877	-	727	2 604
Ditch cleaning and supplementary ditching	4 271	84	10 885	15 240
Construction and basic improvement of forest roads	25 968	451	4 708	31 127
Other costs	911	-	-	911

Timber markets

The Finnish timber markets are characterised by a small number of large buyers. In 2002, the three largest companies, Stora Enso, UPM and Metsäliitto, purchased 78% of private roundwood. The share of small buyers, buying annually less than 10,000 m^3, was only 1% from total volume (Finnish Statistical... 2003). The share of delivery sales has decreased during last decades being now under 20% of total sales.

Household consumption

Roundwood consumption in Finland was 76.5 million m^3 in 2002, from which forest industry used 71.3 million m^3 (incl. also roundwood consumption of small sawmills) (Finnish Statistical... 2003). The fuelwood used in small-size dwellings was 5.2 million m^3.

Co-operation

As mentioned before, the Local Forest Management Associations are working in close co-operation with the forest owners. This co-operation is based on strong history and traditions. Forest industry firms provide forest service contracts to NIPFOs. These contracts cover forestry activities depending the interests of the NIPFO concerned. The three largest corporations (Stora Enso, UPM and Metsäliitto Group) offer these contracts. One means of co-operation are the so-called joint management forests where forest estate is run businesslike on behalf of the many individual owners. This kind of co-operation may increase in the future due to recent changes in legislation.

Entrepreneurship and innovations

The rate of formation of new enterprise initiatives in small-scale forest farms is rather low in Finland. Although the number of forest owners is high (app. 440,000), only few forest holdings run other types of businesses than farming or forestry. There were, however, 212 heating plants under the management of heating entrepreneurs in 2003. Their number is expected to rise rapidly (Nikkola 2004). Also small-scale sawmills, fully or partly operating, on the basis of owners' forest property is quite common. There are three types of these entrepreneurs: entrepreneurs using light transportable circular saws providing local service, small commercial sawmills and small plants for domestic consumption only. The annual production of these groups is around 1 million m^3 sawn timber, which accounts for 8% of the annual sawn timber production and 30% of the domestic sawn timber trade.

One characteristic of the innovation environment in small-scale forestry is the dominance of the effective large-scale industry. Therefore innovation activities are often focusing on maintenance innovations, mainly on improving the effectiveness of existing processes. However, there are some good examples of new start up enterprises utilizing forest resources in a new innovative way.

2.4 Policy framework and production conditions

Institutions

The forestry administration in Finland is based on organisations occupying three levels in the public-private dimension. (i) Public organisations refer to Ministry of Agriculture and Forestry, Ministry of Environment and Ministry of Finance (only taxation) and their regional organisations. (ii) Semi-public organisations, the Forestry Development Centre Tapio (FDC) and the Regional Forestry Centres (RFC), promote non-industrial private forestry but at the same time occupy also public control duties. Public and extension tasks of the RFC's and FDC are financed from the State Budget. (iii) Private organisations are a) under special laws like the Local Forest Management Associations (LFMAs) or b) private free market forest service enterprises. The LFMAs are controlled by non-industrial private forest owners, but their duties are supervised by the Forestry Centres. The funding of LFMAs is party based on an obligatory fee collected from forest owners. The LFMAs have formed Unions, which are regarded as a part of the organisation of "MTK", the Central Union of Agricultural Producers and Forest Owners. (Leppänen *et al* 2004). The forest service enterprises have started to establish nation-wide co-operation in the form of associations or other kinds of networks.

Legislation

The most important laws concerning private forestry are the Forest Act 1093/1996, the Act on the nature protection 1096/1996, the Act on Financing of Sustainable Forestry 1094/1996 and the Act on Forest Management Associations 534/1998. The control over the forest laws is carried out by regional Forestry Centres and the Nature Protection Law by the Regional Environment Centres. Private forest management is guided by the forest management recommendations of the Forestry Development Centre Tapio. Those recommendations are also applied in NIP forest management plans (Leppänen *et al.* 2004).

The Forest law prohibits devastation of forest, which means that regeneration of forest has to be carried out or ensured after final cuttings. Supplementary decisions restrict in a detailed way also thinning and final harvesting and define e.g. the accepted levels of seedling stands. The Forest Act also concerns forest habitats important for biodiversity, which have to be maintained and the Nature Conservation Act includes a section of nature habitats to be conserved. (Kiviniemi 2004, Leppänen *et al* 2004).

State cost-sharing, forestry planning and extension

The most important law as regards to financing private forest management is the Act on Financing of Sustainable Forestry 1094/1996. The law is aimed to ensure the sustainability of timber production, the maintenance of the biological diversity of the forests and to support forest ecosystem management undertakings. The subsidised measures include forest regeneration under specific circumstances, prescribed burning, tending of a young forest (incl. cleaning, thinning and pruning), harvesting of energy wood, forest remedial fertilisation, renovation ditching and forest road construction and improvement. Many of the measures above are also co-financed by European Union (EU Council regulation 2080/92). Field afforestation is not publicly funded at the moment. Forestry planning is executed by Forestry Centers and estate-level plans are sold to private forest owners at less than full-cost prices. In 1999, more than 60% of the private forest area was covered by holding-level forestry plans (Karppinen *et al* 2002).

The organisations FDC, RFC and LFMA are competent in providing extension services in basic forestry issues. However, even they have not been able to promote new enterprise initiatives in small-scale forestry so far.

The Employment and Economic Development Centre helps to sustain Business Activities in Finland. The Ministry of Trade and Industry, the Ministry of Agriculture and Forestry, and the Ministry of Labour have jointly combined their regional forces in the Employment and Economic Development Centers (T&E Centre). Fifteen centers countrywide provide a comprehensive range of advisory and development services for businesses, entrepreneurs, and private individuals. Each of the Employment and Economic Development Centers countrywide provides a centralised, flexible range of advisory and development services to fulfill the needs in matters concerning employment and economic development. The comprehensive technological expertise of the National Technology Agency of Finland (Tekes) is also under the same roof.

Research and education

The most important research organisation from the point of view of private forestry is the Finnish Forest Research Institute (Metla). Metla is subordinate to the Ministry of Agriculture and Forestry and mostly state budget funded. Metla's social task is to promote – through research – economically, ecologically and socially sustainable management and utilisation of the forests. Metla started its activities in 1917 and since then it has grown considerably. The current network of research centers, research stations and research forests covers the whole country. The total number of permanent staff is around 750, of which 330 are researchers. One research area of Metla is the field of forest economics were about 10 researchers are involved in studying the field of private forestry. Those study topics vary from forest owners' forest management behaviour and the effectiveness of forest policy means on this behaviour to the profitability in private forestry.

The TTS Institute (Work Efficiency Institute) with its staff of about 160 people is a research, development and training institute for agriculture, forestry, home economics and other related fields. The institute operates in four localities. Approximately 80% of the financing comes from projects, publications and membership fees, while the remaining 20% comes from the state budget. The Department of Forestry in the TTS Institute employs a total of 20 people in research and specialist tasks. Research topics concern the behavior of private forest owners, forest work, enterprise economics and the harvesting and utilisation of biofuels. The department has specialised in developing technology for use both in private forestry and by small-scale entrepreneurs in the forest and wood products trade.

The Pellervo Economic Research Institute (PTT) is a non-profit organisation governed by the institutions promoting NIPFO interests. The institute was established in 1979. At the moment there is a staff of 20 people working at the institute. Owner contributions covers 40% of the budget, project financing 35% and 25% comes from donations and the Finnish state. Current studies deal with general economic topics, agriculture and food sectors and forest economic issues. From the point of private forestry, the most interesting studies concern the functioning of roundwood markets in Finland and in the Baltic Sea region, the behaviour of private forest owners and the supply of and markets for wood energy in Finland and the EU.

The Finnish education system comprises two parallel sectors: universities and polytechnics. There are two universities in Finland responsible for University level academic education in the field, the University of Helsinki and the University of Joensuu.

The polytechnics are arranged on regional basis in Finland. Majority of the polytechnics provide forestry related degrees oriented towards working life and base their operations on the high vocational skill requirements.

Vocational colleges, on the other hand, offer professional training in forestry. These institutions arrange adult education and advanced professional courses of study. Additionally, vocational colleges run courses directed at forest owners.

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

Diversified NIP forest tenure dominates in Finland and the number of forest owners is at least twice as much as the number of holdings. High timber production intensity is frequent in NIPF partly due to the easy access to expert advice. Local Forest Management Associations provide advisory services covering to forest management and felling as well as other types of related services. More than half of NIPFOs have access to the forest management plan of their forest holding that provide adequate management planning base. Expectedly, private forests provide the major proportion of the domestic roundwood delivered to forest industries but large percentage of NIPFOs do not manage their forests with commercially dominated targets. Three multinational corporations have vast majority of annual timber trade volumes (about a quarter during recent years). There are variety of long term contract types between NIPFOs and these large forest industry firms that cover forest management activities. These contracts are frequent, however majority of timber trade is based on separate trade contracts. The structural features of roundwood market impede the identification of quality roundwood supply among SME woodworking industry firms.

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Annex B: Organisations studying small-scale forestry and their specialty. Main publications and information sources on small-scale forestry in the country.

Main publications

Finnish Forest Research Institute (Metla)

Silva Fennica is a peer-reviewed international journal of forest science. It covers all aspects of forest research, ranging from basic to applied subjects. The journal carries original research articles, review articles, research notes, discussion papers, book reviews, and information on forthcoming events. Silva Fennica is published in English and is open to all authors. The journal is published by the Finnish Society of Forest Science and the Finnish Forest Research Institute (Metla).

Metsätieteen aikakauskirja publishes in Finnish or Swedish original research articles, reviews, research notes and other writings covering all aspects of forestry. It is also a peer-reviewed journal.

Metsäntutkimuslaitoksen tiedonantoja is a series published either in Finnish, Swedish or English. It covers all the aspects of forestry and includes, e.g., scientific monographs, doctoral dissertations, proceedings etc.

Working Papers of the Finnish Forest Research Institute publishes preliminary research results and conference proceedings. The papers published in the series are not peer-reviewed. Working Papers are published on the Internet.

TTS Institute/Work Efficiency Institute

TTS Institute's publication series. This series includes scientific research reports and an English summary.

TTS Institute's pamphlet series. A series including short research reports, preliminary studies, theses and guidebooks, as well as the Annual Report of TTS Institute.

TTS Institute's bulletin series. Agriculture, Forestry and Home Economics bulletins contain studies, surveys and reports in a concise and comprehensible form. Each bulletin comes out 10 to 15 times a year. Usually, each bulletin contains an English summary.

Pellervo Economic Research Institute/PTT

Pellervon taloudellisen tutkimuslaitoksen julkaisuja -sarja /Publikationer / Publications. The series includes dissertations and especially large research reports.

Pellervon taloudellisen tutkimuslaitoksen raportteja -sarja / Forskningsrapporter / Reports. The series includes other large research reports.
Pellervon taloudellisen tutkimuslaitoksen työpapereita -sarja / Diskussionsuderlag / Working Papers. The series includes short and preliminary research reports.

Information on the Internet

Laws

Everyman's right (www.ymparisto.fi/default.asp?contentid=49256&lan=EN)
Forest act 1093/1996 (www.mmm.fi/english/forestry/)
Act on the nature protection 1096/1996
(www.ymparisto.fi/default.asp?contentid=30853&lan=en)
Act on Financing of Sustainable Forestry 1094/1996

Administrative and extension organisations

Forestry Centres (www.metsakeskus.fi/)
Forestry Development Centre Tapio (www.tapio.net/tapionet_eng.html)
Regional Environment Centres
(www.ymparisto.fi/default.asp?node=4661&lan=en).
Ministry of Agriculture and Forestry (www.mmm.fi/english/)
Ministry of Environment (www.environment.fi/)
Local Forest Management Associations (LFMAs) (www.mtk.fi)
Union of Agricultural Producers and Forest Owners
(www.mtk.fi/sivu.asp?path=2918;2935)
The Employment and Economic Development Centre (http://www.te-keskus.fi/).

Research organisations

Finnish Forest Research Institute/Metla (www.metla.fi/)
TTS Institute/Work Efficiency Institute (www.tts.fi/)
Pellervo Economic Research Institute/PTT (www.ptt.fi/)

3 Wood-processing industries

Pulp and paper industries in Finland are carried out by large international corporations (Stora Enso, UPM, M-real) and the same is true with the wood plate industries. These business activities are mainly excluded from this survey due to the SME approach. This survey concentrates on wood product industries. Gross revenue in Finnish wood product industries has more than doubled in the past twenty years but the profitability of business has not achieved a satisfying minimum level among SMEs in the business. The international competitiveness of Finnish wood product industries has remained moderate because of the high unit prices of input factors. Low added value products dominate the export of major sub sectors of wood product industries. There are only few examples of horizontal integration and networking among wood product industry SMEs and the same is valid with vertically integrated partnerships among firms. The latter activities, providing ways to benefit from positive economies of scale in production, have not become common. High investment costs, price of raw material and dependency on few customers are typical in Finland increasing risks among new potential entrepreneurs.

3.1 State of the art and historical development

Roundwood and labour markets

The use of roundwood by the forest industry has increased in Finland from the average level of 37 million m^3 in the 1970's up to 49 million m^3 in the 1990's. The share of roundwood used in the wood product industries, i.e. mainly in the primary processing into sawn wood and wooden panels, has increased from the average level of 18 million m^3 to 24 million m^3, meaning that the share has remained constant. The increase in industrial roundwood consumption has been based on roundwood imports, especially from the 1990's onwards. The share of imported roundwood in the wood processing industry in 1990 was 1% of the total volume of 20.3 million m^3, but increased to 14% of total consumption of 32.8 million m^3 in 2002. (Metinfo dataservice 2004).

Total roundwood consumption in the forest industry (wood product industries (WPI) and pulp and paper industries (PPI) taken together) has increased from 50 million m^3 in 1990 to 71 million m^3 in 2002 (a rise of 43%). The use of roundwood in WPI has been slightly smaller than that of the P&PI. Wood raw material input was the largest single production cost in WPI (38%) whereas the wood cost share in P&PI was 14% in 2000 (Finnish Forest Sector Economic Outlook 2000).

Pricing of roundwood has been based on more competitive markets from 1999 onwards after the market information produced by independent institutes has become available for both SMEs and individual NIPF(non-industrial private forests)-owners in the roundwood trade contracting (e.g. METINFO http://www.metla.fi/metinfo/index-en.htm). Competitive roundwood markets have improved the opportunities for SMEs to trade timber assortments most relevant to their products.

The Wood and Allied Workers' Union covers the wage contraction and other labour union activities in mechanical woodworking (sawmills and wood based panels), carpentry, boat building, forestry, drivers of wood processing machines and forest nurseries. This Union has currently some 50,000 affiliated members and their representatives negotiate 13 parallel collective agreements, all of them at the national

level. The average membership level in the trades represented by the Union is some 80%. (Source: http://www.puuliitto.fi)

Ownership & Entrepreneurship

There is a clear distinction between forest industry firms in Finland, which are divided into a) large international public corporations listed in domestic and international Stock Exchanges, b) big family based corporations with either more than 250 employees or turnover of over 40 million euro or a balance sheet of over 27 million euro (http://www.ktm.fi/chapter_files/EUohjelmat.pdf) and c) small and medium size enterprises (SMEs) with properties below the limits of group b).

Big multinational corporations have multi-product distribution and most of them have also international production activities. Their core business interests are in the pulp and paper industries; wood processing industries are mainly of secondary interest in their business and production portfolio. Despite this, the majority of wood processing related to wood based panels in Finland are in the business portfolios of these large corporations. They also produce about 50% of the annual sawn timber production.

Owner leadership and majority ownership of family members is typical for the companies operating in the wood processing industry. The owners lead 93% of companies with less than 100 employees engaged in manufacturing of wooden structures and wooden houses (Petäjistö et al. 2001).

Roundwood consumption of SMEs in the wood processing industry

Industrial sawn wood production in Finland amounted to 13.3 million m^3 in 2002. The share of the 10 biggest producers was about 70% (Toimialaraportit 2004). In 2002, about 12 million m^3 of roundwood or 40% of the total industrial roundwood consumption was used and transformed by small and medium sized mills with processing capacity between 10,000-100,000 m^3 per year into wooden products for final use or further processing. (Metsäteollisuus ry 2004, Toimialaraportit 2004)

The following sources provide an exhaustive statistical overview of forestry and the forest industries in Finland:

- Finnish Forest Industries Federation. Key to the Finnish Forest Industry http://www.forestindustries.fi/files/julkaisut/pdf/key to_the_finnish_forest_industry.pdf
- Finnish Forest Industries. Facts and Figures 2003. http://www.forestindustries.fi/files/julkaisut/pdf/metsateoll_vsk_2003_gb.pdf
- The Statistical Yearbook of Forestry. Finnish Forest Research Institute http://www.metla.fi/julkaisut/metsatilastollinenvsk/index-en.htm
- Reunala A, Tikkanen I. and Åsvik E. (ed.) The Green Kingdom. 1999. Finland's Forest Cluster. Otava Publishing Ltd – Metsämiesten Säätiö Foundation. Keuruu. Finland.

Structure, behavioural characteristics and dynamics of SMEs in the Finnish economy

The Finnish economy is dominated by a relatively small number of large companies. Family enterprises, characterised by owner leadership or majority ownership of family members, account for 86% of all Finnish SMEs. Family members and owners participate in business management and operations in 30% of SMEs. (Heinonen 2002)

Finland was considered a low entrepreneurship activity country in Global Entrepreneurship Monitor Research (Pk-yritysraportti 1999). New enterprises, however, exceeded the number of closed-downs in Finland during the 1990s. The rate of growth in new firms, 2.5% p.a. during 1995–1997, was accompanied with strong regional variation.

Over half of Finnish SMEs are growth-oriented and 6% are proactively growth-oriented (Holm & Kauppi 2003, Pk-yritysten 2003). SMEs with less than 10 employees are considered to have the most promising potential to provide new employment opportunities (Holm 2001). Rural SMEs do not share these potentials (Kupiainen et al. 2000).

Factors affecting the future development of SMEs

The issue of succession is currently seen as a challenge for the continuance of the business operations of family enterprises because a large share of SMEs (18%) will face a change in ownership in the next five years covering 40,000 enterprises and over 100,000 (Pk-yritysbarometri, spring 2003). The lack of strategic plans (positioning) restricts succession and business management in many small companies (Heinonen 2002).

The international competitiveness of Finnish SMEs is poor due to weak home markets in terms of domestic purchasing power. The development of business is hampered by leadership deficiencies due to lack of time and inadequate administrative capabilities of business managers both in business planning and finance acquisition. They share these challenges with SMEs in other OECD (Organisation for Economic Co-operation and Development) countries. Intensified co-operation of SMEs, experts, educational institutions and public administration is therefore needed (Kailaranta 1998, Larimo & Arola 1998, Larimo 2000). The Finnish Unemployment Benefit system is considered a barrier to new entrepreneurship in Finland (Holm & Onnela 2004).

Structure, behavioural characteristics and dynamics among the SMEs of wood product industries

Small enterprises of the Finnish forest and wood sector with less than 100 employees had a 40% share of total turnover and employed 45% of the labour used by the sector in 1991 (Mäkinen 1995). The workforce of SMEs in sawn wood and wood products was 12,000 during 2000–2002 covering about 41% of the total employment provided by the industry. The employment opportunities a single firm offers are small: the average firm employed only five people. (Tilastokeskus/2001-2002).

Only 22% of the small companies engaged in the manufacturing of wooden products have export activities. One fifth of these companies do not practice any marketing for

their products. One third rely on their steady customer base (Pk-yritysbarometri 2003). Marketing is considered as a question of major concern for small companies of the forest-wood chain. Typically small firms start up with the implementation of some invention or product idea, but later they fail to keep up with changing markets and customer needs. Resources are primarily allocated into machinery and equipment. Marketing is not seen as a strategic asset. Small firms do not dispose of marketing competencies to implement differentiation or focusing strategies. Generally there are insufficient competencies in marketing leadership and business accounting. (Enroth 1995)

Employment in logging and wood contracting has diminished rapidly during the four decades. There were approximately 70,000 workplaces in the branch in the 1960s, and only 10% of them in 2000 (Finnish Statistical Yearbook of Forestry 2004). There is regional distribution in the forest related value networks in Finland. Forest-rich Eastern regions in Finland create the fewest jobs of forest industry (Selby & Petäjistö 2002).

House construction is among industries using majority of domestic wood product consumption. The current popularity of wood frame residential construction in Finland may provide wide promotion of wood product consumption also in panel and board industry. Wood panel production is expected to belong the growing sectors in Finnish forest cluster. The annual 4.6% growth in employment in producing building material in 1999 was accompanied by the 7.8% growth in the construction industry (Hernesniemi et al. 2001). The increase by 17 million euro in the consumer demand for domestic wooden furniture is expected to increase employment by 60% more than the same growth of demand in paper and paperboard products. (Lammi 2000)

3.2 Wood-processing industries in Finland

Information used is mainly based on Statistics Finland StatFin-database (StatFin 2004). The systematic of statistics used in chapter 3.2 is presented in Annex C.

Value-added of production and trade

In 2002 the total value-added of Finnish production and services was 93 billion euro, of which the value of TOL 02, TOL 20, and TOL 21[2] comprised 8 billion euro (9.9%). Information of the value-added of TOL 36[3] was not available. The share of forestry and forestry related services (TOL 02) of the total value of Finnish value-added has diminished in the past decades while the proportion of wooden products fabricating (TOL 20) has remained the same and the pulp, paper, and paper products (TOL 21) has increased. In 2002 forestry has been 2.6%, wood-processing 1.35%, and paper and pulp industry 5.95% of the total value-added in Finland. (StatFin 2004).

In 2002, the aggregate value of Finnish exports was 47 billion euro, of which forestry products comprised 12.5 billion euro, or nearly 27%. Over 99% of forestry exports was composed of manufactured goods while less than 1%, was formed by the trade of industrial roundwood and wood residues. (Finnish Statistical Yearbook of Forestry

[2] TOL 02 (forestry and forestry related services), TOL 20 (wooden products fabricating), TOL 21 (pulp, paper and paper products)
[3] TOL 36 (furniture manufacturing)

2002). While in 1970 the share of forest products of the total value of exports (9 billion euro) was over 50% (5 billion euro), by 2002 it had diminished down to 26%. The monetary values are deflated with wholesale price index (1949 = 100) to the values of year 2002.

Structure of wood-processing industry in Finland

There were 9500 Finnish wood-processing business units in the branches of forestry and forestry related services (TOL 02), furniture fabricating (TOL 36), wooden products manufacturing (TOL 20), and pulp, paper and paper products producing (TOL 21) in 2002. By the average amount of employees (max. 250 employees in the company), the role of SMEs was important in forestry and furniture fabricating branches (SMEs 75–85% of business units), while in the wooden products producers there were both SMEs (55% of business units) and large-scale companies. Pulp, paper, and paper products producing is dominated by large-scale international companies (90% of business units). The total employment distributed as follows: forestry and forestry related services 9%, furniture fabricating 14%, wooden products manufacturing 30%, and pulp, paper and paper products producing 47%. (StatFin 2004)

Sawmills in wood product industries

There are 2500 sawmills in Finland using 29 million m^3 roundwood annually (Petäjistö et al. 2000, Metinfo 2004). Over half of them are SMEs. The total turnover of the 1100 sawmill units included into industry statistics was over 3.1 billion euro in 2002 (StatFin 2004). Of this, the sawmills owned by large integrated forestry companies with an annual production capacity of at least 100,000 m^3 estimated to have had a share of 51%, large family enterprises in the same capacity class a proportion of 24%, and sawmills with annual capacity less than 100,000 m^3 the share of 25%. However, this group of sawmills with smaller capacity employed in 2002 as much as 43% of all the workers in the branch with an average amount of 4 employees per business unit. In large sawmills (annual production of at least 100,000 m^3) the corresponding figure was 100 workers.

Regional information on industry

The wood processing industry is highly concentrated in Western and Southern Finland where the majority of consumers also are. 66% of production plants work in western (40%) and southern (26%) parts of the country and the proportion of Western and Southern Finland was over 73% in terms of total employment and turnover. The proportion was rather evenly distributed between the two areas. (StatFin 2004). Majority of forest land and timber resources are in the Eastern part of the country (see chapter 2 above)

3.3 Wood product industry practices

SMEs in wood product industries

The sawmilling, planing of wood and secondary wood processing business are the major domains of small and medium sized companies in Finland (Table 7). There is little research done on business practices in small companies manufacturing wooden buildings, carpentry and joinery (Petäjistö et al. 2001).

Technical characteristics of sawmilling

Large diversity in production technology and the scale of production are typical for the sawmill industry in Finland. Small sawing units producing less than 10,000 m^3 of sawn wood per year on a discontinuous basis in small batch sizes typically use circular or band saws. Sawmills with an annual output of at least 100,000 m^3 (large-scale sawmills) mainly use chipper canter lines, profiling units, circular sawing machines and band sawing machines. The production process includes log sorting and peeling, lumber sorting by quality, dimension, strength and length classes, and packaging. Drying capacity is no bottleneck. Currently there is no major technological innovation to be expected. Automation of processing lines and exploitation of IT-technologies will continue requiring high capital input. Efficient technologies require expensive investments and large production volumes. Therefore small companies are not able to keep pace with technological progress. (Toimialaraportit 2004)

Technical characteristics of secondary wood processing and wood contracting

The business activities classified as secondary wood processing (TOL 203) comprise (i) the manufacture of prefabricated wooden buildings (TOL 20301) as industrially manufactured products, including chalets, huts etc., and (ii) the manufacture of builder's carpentry and joinery, (TOL 20309) i.e. windows, doors, casing, stairs, handrails, roof trusses, parquetry etc.

Industrial capacity structure in these subsectors is concentrated. Majority of annual production is provided by few firms both in pre fabricated wooden buildings and other builder's carpentry.

Table 7a. Wood product industry in Finland: business units, employment, gross and added value of business and export in 2002.

Industry	**Business units**	**Employers**	**Turnover, million €**	**Gross value, million €**	**Value added, million €**
Wood and wood products	2939	27977	5534	5386	1231
Sawmilling and planing 201	1220	8969	3001	2923	428
Veneer sheets, plywood, etc.	69	6668	902	869	301
Builder's carpentry etc. 203	1017	10470	1444	1415	426
Prefabricated wooden buildings 20301	*256*	*3150*	*495*	*494*	*120*
Other builder's carpentry 20309	*761*	*7320*	*950*	*920*	*305*
Wooden containers 204	206	1077	127	121	49
Other products of wood 205	427	793	59	58	27

Table 7b. The shares of the subsectors are measured by relative shares in gross and added value from TOL 20 and added value as a share of gross value in each sub industry (Tilastokeskus/2003).

Industry	**Value added, million €**	**Exports, million €**	**Gross value, % of TOL 20**	**Value added, % of TOL 20 turnover**
Wood and wood products	1231	2693	100	100
Sawmilling and planing 201	428	1629	54	35
Veneer sheets, plywood, etc.	301	604	16	24
Builder's carpentry etc. 203	426	446	26	35
Prefabricated wooden buildings 20301	*120*	*149*	*9*	*10*
Other builder's carpentry 20309	*305*	*297*	*17*	*25*
Wooden containers 204	49	7	2	4
Other products of wood 205	27	6	1	2

Material flows constitute a large share in the purchased inputs (60% of turn-over) in wooden house manufacturing making the management knowledge of major importance. The degree of process integration varies widely. There are companies, whose activities cover sawing, planing and fabrication of components, other companies focus on assembling of components and purchase the product components from subcontractors. Producers make increasingly use of integrated product development and manufacturing information systems and automated processing stations. There has been a trend among firms to outsource their secondary business activities to be able to focus on their core competencies. The latter development has been delayed due to the lack of qualified subcontractors. (Toimialaraportit 2004)

In the furniture industry small companies are frequently engaged in the manufacturing of components but the large ones include also assembling of consumer products into their production.. Business-to-customer business is the domain of large companies as Ikea, Lundia, Martela etc.

Wood contracting has been a major domain of SMEs in wood product value chains. Wood contracting includes the logging chain (felling, bucking, pruning and hauling of wood). The degree of mechanisation of the logging chain used in the procurement of industrial roundwood is about 95%. The typical two-machine logging chain consists of a harvester and forwarder. Only about 3% of the industrial roundwood from final cuttings and 11% from thinnings is harvested using motor-manual techniques.

Delivery sales are the domain of harvesting techniques based on the chain saw as the main tool. About 20% of the harvest of industrial roundwood is sold to industrial users at the roadside. About half of the timber sold in this manner is harvested by NIPF-forest owners themselves using small-scale logging techniques and 36% is transported using agricultural hauling equipment. 37% is organised using harvesting services offered by NIPF-owners' forest management co-operations (NIPF-owners' joint sales) and 13% by NIPF-owners themselves.

Educational background among the owners and the staff, working conditions and business leadership

The educational level of entrepreneurs has increased during the past 20 years (27% of entrepreneurs had college-level education in 1983 and 43% in 2003). However, only 10% of Finland's entrepreneurs have an academic degree and one quarter of entrepreneurs are without any formal vocational education.

On-the-job training of employed staff is seen as a challenge to small and medium-sized companies (Holm et al. 2002). Owners of small companies have received vocational training, most frequently on a professional or college-level in wood engineering in the fields of carpentry or joinery. SMEs assessing themselves successful in inquiries are active in training their manpower (Petäjistö et al. 2001).

Part-time or periodic contracts have become common in SME's lately and one fourth of SMEs does use hired labour (Petäjistö et al. 2001).

Networking and joint ventures among/between industries

Networking and joint venture activities are not common among wood product SMEs in Finland. Only few small wood processing companies with less than 100 employees are members in corporates (joint enterprises) or marketing networks. About one half of these companies are operating as subcontractors or use subcontractors themselves (Petäjistö et al. 2001). At the same time networking is a common business mode among Finnish SMEs. One third (37%) of all SMEs in Finland operate as a subcontractor and about half (51%) use subcontractors themselves and 80% of them co-operate with other companies or partners. Written contracts are the basis for intra- and inter-sectoral business transactions in 58% of co-operating activities between companies. (PK-yritysten… 2003).

For sawmills looking for downstream co-operation with wood processing partners it is a major problem to find qualified candidates. There are only a few opportunities for small firms to co-operate with spearhead companies. There is a shortfall in knowledge and competencies how to build and operate business networks (Vanhanen 1995).

With respect to specialisation and co-operation, the wood processing industry is classified as weakly developed what concerns networking (Value Added Wood Chain, Tekes 2004).

The dominating operating model consists of one business unit organised as a single company and localised in a single production site (Saarikivi & Riihonen 2003). New markets are emerging especially for wooden small houses and low storey-houses in urban residential areas. Rebuilding the forest-wood chain is seen as the prerequisite for the implementation of business model innovations necessary to exploit the business opportunities offered for small and medium sized enterprises by niche markets.

Sales

SMEs in the wood processing industry (incl. mainly sawmilling and secondary wood processing industry; excl. furniture industry) s generated an aggregated turn-over of 1.8 billion euro in average per year over the period 2000–2002 (Tilastokeskus 2004)

Profitability and scale of investments

Operational performance (average turn-over per employee) of SMEs was 155,000 euro during the period 2000–2003 and 211,000 euro in large companies. The average turn-over per company was less than one million euro (Table 8).. The SMEs have increased the return on their invested capital during the latest years. Poor long-term profitability and shortage of equity capital is, however, valid among the small firms in the industry with less than 100 employees (Petäjistö et al.2001). The equity ratio has improved substantially during the last years from its average level of less than 15% in the second half of the 1990s (Toimiala-analyysi 2003).

Table 8. Profitability, equity rate and scale of investments in big companies and SME's in the manufacturing of sawn wood and other wooden products. Average 2000–2002. (Tilastokeskus/2002).

Wood processing industry [1)] 2000-2002	Turnover million € / company	Gross margin	ROI	Total debt net of receivables	Net investment	Equity ratio (gearing ratio)
			% of turn-over			
Large companies	54.1	6.4	5.1	42.4	4.8	46.6
SME's	0.7	8.8	11.5	37.4	5.1	31.8

[1)] TOL 20: sawmilling, wooden panels and secondary wood processing, excluding furnitures.

Competitiveness

Cost efficiency has been the main parameter of competitiveness among the wood processing industry SMEsinstead of the breakthroughs in technologies or products. The quality of wood products as a source of competitive power has been modest(Saarikivi & Riihonen 2003, Toimiala-analyysi 2003). Growth-orientation is more frequent among young than old companies (PK-yritysten… 2003)

Characteristics of innovation behaviour in wood processing industries

Wood processing industry can be characterised as a low-tech industry measured by R&D expenditures. Knowledge embodied in new technologies and spilled over into the industry by investment in machinery and equipment is an important source of innovation while localisation of activities into industrial districts through culture and trust, specialisation and network relationships have provided comparative advantages also in Finland. (Hazley 2000)

3.4 Policy framework and production conditions

Public policy incentive activities fare divided into a) general policy actions provided to business activities without sector specific orientation and b) forest industry specific policy activities below.

Policy activities & financial support for entrepreneurs and business firms

Public support to business firms in general and entrepreneurship in particular comprise an extensive system of subsidies aimed to:

a) new entrepreneurship (start-up) including also start-up aid for the unemployed who start new enterprises;

b) increased employment (regional equalisation) including support for hiring unemployed persons;
c) constituting new international activities (export) and partnership in carrying the business risks of foreign operations;
d) develop new innovations and/or technologies (R&D).

These subsidies favour SME's but all business firms are in principle eligible applicants to these subsidies.

The majority of these subsidies are implemented through a regional network of regional centres. The Ministry of Trade and Industry, the Ministry of Agriculture and Forestry, and the Ministry of Labour have jointly combined their regional forces in the Employment and Economic Development Centres (TE Centre). Fifteen centres countrywide provide comprehensive range of advisory and development services for businesses, entrepreneurs, and private individuals. Their subsidies are aimed to:

- implement regional labour policies;
- plan and organise adult training within the official labour policy framework;
- promote and develop farming and rural enterprise activities;
- influence and participate in regional development in general;
- provide grants for projects promoting energy conservation, improved energy efficiency and the use of renewable energy sources;
- provide subsidies paid for transportation of products manufactured by SMEs located in Lapland, Northern Ostrobothnia, Kainuu, North Karelia and South Savo;
- provide support and advise to SME's at the various stages of their life cycles a) to economic development in general, business policy objectives and employment by means of corporate financing b) to assist the acquisition of fixed assets.

Public subsidies to promote technological development

TEKES (the Finnish National Technology Agency) allocates national funds into research in technologies of strategic importance. TEKES provides financial support to the companies participating in projects, that bear high technological and business risks. Research activities in key technologies are organised in research programmes. TEKES activities are implemented within the framework of operation of the regional TE Centres (Employment and Economic Development Centre).

Public support for international activities

The TE Centres are a significant specialist and contributor of EU funding. Each TE Centre also develops and channels EU co-operation and funding in its own area. Finnvera is a national public institution providing loans and guarantees for business development and growth as well as export credit guarantees for covering against credit risks of exports. NOPEF (Nordic Project Fund) grants favourable loans to Nordic companies for their feasibility expenses of the export or internationalisation projects. The projects must be located outside the EU and EFTA countries.

The forest sector innovation system

Forest sector innovation and R&D activities have been in the public policy agenda in the form of specialised projects from the 1990s onwards. These activities, started through independent projects, have gradually developed into the activities with

accompanied permanent networks of R&D and educational institutions. The major stages and projects to support WPI are presented in the Figure 6 accompanied with the organisations managing the administration.

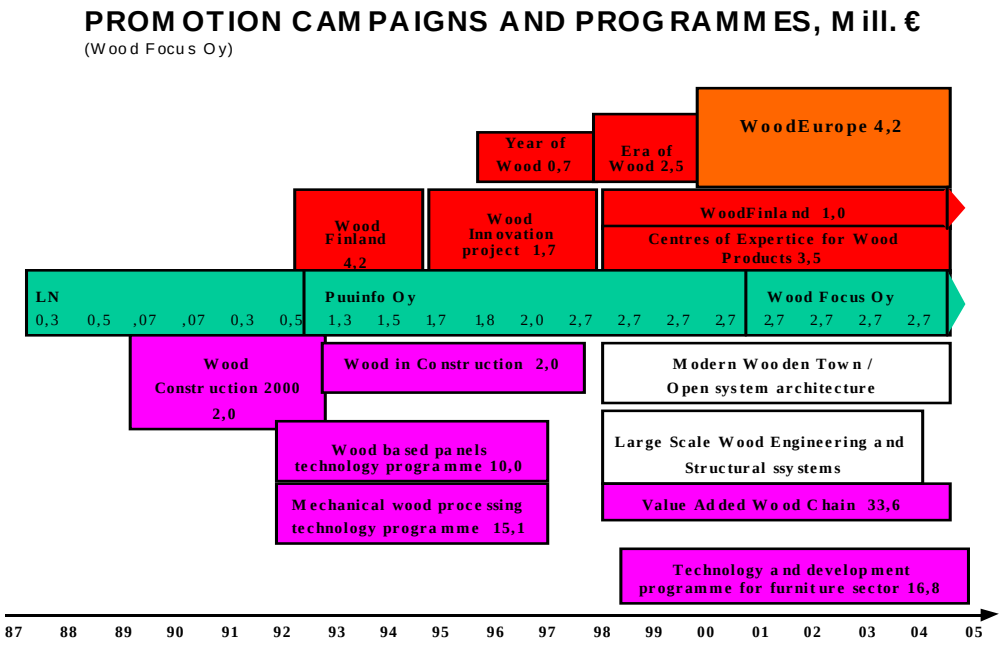

Figure 6. Promotion campaigns of wood production in Finland.

The Finnish government focused particular attention to support and develop the wood construction in Finland. During the first stage, 1990–1995, the first programmes, Puu Finland, Wood Construction 2000, and other separated projects concentrated on separate commercial activities. One of the aims was to formulate a separate sector of "wood construction" among the diversified wood sector SMEs. Major interests were aimed to develop businesses around end products. (Details of the programs see Annex C)

The economic integration in Europe and growth of international competition in general during the second stage of programmes in 1995–2000 caused policy reactions related to the SMEs of wood industry. New programmes, Wood Innovation, Era of Wood, Wood in Construction and the first phase of WOOD WISDOM (1998-2001) were directed more on R&D issues. (Details of the programmes in Annex C)

The National Technology Agency of Finland launched a five-year technology programme in 2003 named Value Networks in Construction (SARA) with an estimated total budget of 33 million euro. Using information technology and managing customer needs, the programme aims to achieve substantial productivity and quality improvements in the Finnish real estate and construction cluster, so that it can become more competitive in the world market. The programme supports efforts to develop product concepts and knowledge intensive services for the building construction industry.

The Establishment of Centres of Expertise for Wood Products/Wood Finland action programme networks in 1999 provided an arena for R&D institutions and companies to develop new R&D projects with extension activities (For details see Annex C).Under development between governmental parties (Ministries) and wood product industries there is a new economic development programme for wood product industries starting in 2005 that will co-ordinate the future organisation of R&D programmes.

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

Wood processing industry has constituted slightly smaller proportion in the industrial use of roundwood than that of pulp and paper industry in Finland. Large multinational corporations, having their core business interests in the pulp and paper industries, produce almost all wood based panels and about half of the total annual sawn timber production in the country. In addition to these, there are also a) large export oriented family companies, producing about a quarter of the annual total sawn timber production and b) family owned SMEs with properties below the limits of group a) in sawn timber production. Over half of aggregated industrial sawmill production is exported and mainly sold to European countries. Almost half of firms in the group b) operate in the domestic markets. There are SMEs in planing and secondary wood processing industries. The business activities in secondary wood processing comprise (i) the manufacture of prefabricated wooden houses, and (ii) joinery, including windows, doors, casing, stairs, handrails, roof trusses, flooring etc. One third of the total production in wood houses, doors and parquet is exported. Less than 9 large firms in the group i) and in the subgroups of doors and parquet in ii) cover 80% of the total production in these sub industries concerned. These large firms have their major interests in international markets. Business activities of SMEs focus on the demand segments providing only satisfying level of yield and the interests on the entrepreneurship cover self-employing and social interests in majority of the cases.

The gross value of Finnish wood product industries has more than doubled in twenty years but the profitability has still been equable or in deficient level in many sub-sectors of wood processing industries. Outsourcing and focusing on core competencies has delayed by the lack of qualified potential subcontractors. There are only few examples of horizontal integration and networking among SMEs. There are a few successful examples of partnership sub-contracting between component producers and e.g. large furniture chains. These SME producers can be assessed to aim at economies of scale in production, leaving product design and marketing efforts to the client. There is high threshold to entrepreneurship and expanding business, irrespective the extensive subsidies to new entrepreneurship, innovations and heavy public investments into various R&D programmes. Owners of small companies have received vocational training that is most frequently addressed to wood engineering.

Pricing of roundwood has been based more on competitive markets from 1999 after market information produced by independent institutes has increased competitive features of the roundwood market. Competitive roundwood markets can impede the price /quality ratio for the SMEs dependent on the high-grade wood raw material. Expansion of effective markets due to the enlargement of EU may cause threats especially for Finnish sawmill SMEs but on the other hand, it may also mean

opportunities for innovative high quality special products with competitive price/quality ratios.

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Annex C

1 Statistical Information

The exact number of companies in the branch of wood-processing industries is difficult to assess both because of the characteristics of industries and statistics. The data is not always consistent and detailed enough for profound analysis. Taking these facts into account, the aim of the chapter is to give as good general view as possible of the Finnish wood-processing industries with a special effort on emphasising on the small and medium size enterprises (SMEs). The focus is on following industry branches: sawmilling; pulp, paper and printing; plywood; board producing; carpenter industry; furniture fabrication; and wood contracting.

The data used is classified according to TOL-2002 and received from StatFin dataservice. It follows the European statistical classification NACE (StatFin 2004). The information gathered is mainly based on the following classes: TOL 02013 (Timber harvesting, woodchip producing in forest, and timber transport in forest), TOL 201 (Processing timber by sawing, planing and impregnation), TOL 202 (Fabrication of wood based panels, e.g. veneer, chipboard, fibreboard), TOL 20301 (Wooden buildings made either on industrial or craftsmanlike basis), TOL 20309 (Carpenter products, e.g. doors, windows, and stairs), TOL 21 (Producing pulp, paper, and making refined paper products, e.g. wallpaper), and TOL 361 (Furniture made of wood and other material). The information presented is based on the number of business units, not the number of companies.

In case detailed information of the TOL-classes was not available, the data was gathered at broader, 2-digit level (TOL 02, TOL 20, TOL 21, TOL 36). The regional and country level information from StatFin dataservice are annual averages from years 2001–2002, country aggregates are annual. When applicable, the information received from StatFin dataservice is complemented with other sources.

2 R&D activities in Wood Processing Industries

The Value Added Wood Chain -technology programme 1998–2003 was launched by the National Technology Agency (Tekes). The programme's purpose was to increase the use and value added characteristics of Finnish wood products and promote international co-operation in wood processing and related industries. A total of 206 new projects were started with value of 51.4 million euro (24.5 million euro public finance support). The "Vision 2010" was launched so that by the year 2010, wood would be the leading material for building system solutions and high-quality home and office furnishings in Europe. (Tekes 2004).

The Wood Wisdom Forest-Cluster -research programme stage I was carried out 1998–2006, as a part of the Finnish government’s additional R&D funding scheme with the aim to strengthen the country’s industrial clusters to 1) promote the competitiveness of the Finnish forest cluster, 2) to train specialists in market-driven production and processing wood raw material. The first phase joined the resources of the entire production chain to fulfil the customer's requirements for the end product. It covered both pulp and paper production and mechanical wood processing from end product to raw materials. The first phase of the programme was co-funded by the Academy of Finland, the Ministry of Agriculture and Forestry and the Ministry of Trade and

Industry. Stage II launched in 2003 consists of sub-programmes: a) Wood Material Science to transfer new knowledge and technology from its producers to the users b) International Wood Material Science Programme to establish a sound knowledge base in order to enable the development of innovative forest-based products and to add value in the wood products industry. The programme includes a Finnish-Swedish joint programme to fund organisations to expand the co-operation to the European level and even beyond that to North America and Japan. (WoodWisdom 2005).

3 Organisations & institutions related to R&D activities

The Finnish Timber Council and Finnish Wood Research Ltd. merged into Wood Focus Finland at the end of year 2000.

Wood Focus Finland is a promotion and research organisation of wood industry and trade. It's shareholders are forest industry companies and co-operational companies. http:// www.woodfocus.fi

The Centre of Expertise for Wood Products is an umbrella organisation that takes a market-oriented view of the forestry and wood products business chain. It provides precisely customised, high-quality expertise for R&D projects in various fields. Nominated for the period of 1999–2006 and coordinated by Wood Focus Finland, the Centre of Expertise for Wood Products is part of the national Centre of Expertise Programme. It works in a close co-operation with the Wood Wisdom Research Programme and WoodFinland action programme.

Fields of Expertise with the coordinating organisations:

- Modern Wooden Town and Structural Systems (University of Oulu / Department of Architecture / Wood Studio),
- Large-Scale Wood Engineering and Structural Systems (Tampere University of Technology),
- Living With Wood and Design (University of Art and Design / Department of Design), Diversification of Wood Utilisation (Finnish Forest Research Institute / Joensuu Research Centre),
- Business Based Development of Technology (Lappeenranta University of Technology), New Business Concepts (University of Vaasa / Levón Institute), and
- Developer Forum (Helsinki University of Technology / Department of Forest Products Technology).
- About 60 Finnish research and development units (universities, polytechnics and other organisations) are networked in co-operation. *http://www.puuoske.com/*

The Wood Finland action programme is a nationwide umbrella for regional programmes aiming to develop SMEs specialising in wood products. The network consists of 18 regional representatives in charge of implementing local strategies by activating companies to conduct spearheading development projects. The desired trend is towards more effective development work and a stronger focus on international projects. http://www.puuoske.com

Education and training institutions:

- University of Helsinki, Faculty of Agriculture and Forestry: Programme of Forest Ecology and Forest Resources Management, University of Joensuu, Faculty of Forestry: Programme of Forest Economics and Marketing
- Degree Programmes in Polytechnics: Häme Polytechnic, Kymenlaakso Polytechnic, Mikkeli Polytechnic, North Karelia Polytechnic, Rovaniemi Polytechnic, Tampere Polytechnic, Seinäjoki Polytechnic, Yrkeshögsskolan Sydväst. Upper Secondary Level Education

Extension services:

- Vocational Adult Education (non degree) Many secondary and tertiary level institutions arranging separate courses
- Supplementary education programmes arranged by some universities and polytechnics
- Other institutions arranging adult education (extension) for forestry professionals and forest owners
- The Forestry Development Centre TAPIO, Forestry Centres, Local Forest Management Associations, Pellervo-Institute, Work Efficiency Institute (TTS).

Consulting and guidance

R&D by technology departments of Economic Development Centres, industrial secretaries (teollisuussihteerit), National Technology Agency of Finland, VTT Technical Research Centre of Finland, Design Forum Finland, the National Board of Patents and Registration of Finland, Foundation of Finnish Inventions, Foundation and innovation agents, Finpro, Euro Info Centre, Chambers of commerce, Programme consulting units of Ministry of Trade and Industry, Finnish Standards Association SFS, Invest in Finland Bureau. (PK-yrityksen kehittämis- ja rahoituspalvelut 2000)

4 Case study: In search of customer orientation by new business concepts - *Lessons from four cases in mechanical wood processing industry*

Customer orientation is among the most important means to increase the value-added of SMEs in mechanical wood industry in Finland. It is a source of competitive advantage of firms and a necessary requirement for export activities. Typical wood processing industry SME in Finland is less proactive, has quite traditional practices and is product-oriented. Four examples below characterise the types of customer orientation in Finland.

The focal small firm – a supplier- firm, following business concept called **cost efficiency, is managed by its owner who has systematically developed the concept** for years. The furniture industry firm has concentrated mainly on a single product (a kitchen table) and the main customer is a large international furniture store chain. The supplier has concentrated on producing one product cost efficiently, and thus, the price of the product is competitive in the global market. The case proves that even a small firm can work cost-efficiently provided that it has only one or a few customers.

The firm applying business concept **building a brand** strives to create something that is unique, desirable and valued by the customers by product differentiation. Building a brand is also a demanding business concept because it is built on customer relations in the long run. The focal mid-sized company has focused to become an international brand in massive wood house industry. Its core competences are in processing mass

wood and in international marketing. It has outsourced most of its component production to small firms and the outsourcing is increasing also in the design activities. The logistic chain is well developed from component building to house and yard building. All the suppliers and subcontractors are encouraged to become top performers in their field and they should be initiative and seek better solutions to the problems of the core firm in building the international brand.

Network of firms applying total delivery concept as a group has established a joint marketing company that is responsible for marketing, logistics and production control of the processes of partners. The joint company can co-ordinate some production activities of the firms increasing market power over that of individual companies. The sales company thus has the role of a larger supplier of total furnishing systems. Part of the founders´ production was marketed by the sales company, part was sold through their own distribution channels. However, some problems are imminent in building this kind of concept. The new company requires extra investments and therefore the partners´ business should rest on a solid economic foundation. Total delivery concept produces more value-added to customers because of total systems deliveries, lower transaction costs (fewer relationships), the founders´ access to markets became easier and finally, the joint sales company helped the partners to concentrate on their core production and design competences.

A group of small firms in mechanical wood processing industry applying **reciprocal concept** have produced value-added to their customers through a large, nation-wide distributor. Small firms have joined to the network of the core firm as producing partners. The distributing core firm search markets for the small firms´ products and combine small producers´ tailor made products to meet its own customers´ special needs. The relationship between small firms and the large distributor is reciprocal; all partners gain benefits, they can concentrate on their core competences and the total system produces value-added, tailor-made solutions to customers.

Reference:

Humala, I. and Peltoniemi, J. (2001). Development of customer-oriented business concepts for SMEs in mechanical wood industry (written in Finnish). Reports 1/2001, Ministry of Trade and Industry, Finland.

4 Non-wood forest products and services

Commercial production of non-wood forest goods and services (NWFP&S) is inferior activity compared with the other forms of forest resource use. However, there are regional variations concerning significance. The entrepreneurship related to NWFP&S can be divided to producing commercial goods and non-commercial utilities mainly services. The most of non-commercial environmental services (mainly biodiversity related or restoration of recreational areas) are produced and consequently paid by governmental authorities. Entrepreneur occupying private land area is in these cases often the landowner or forest professional.

4.1 General information on forest related non-wood products and services in Finland

4.1.1 Definition

In the Finnish context non-wood forest products and services (NWFP&S) include utilisation of various non-wood forest products, nature-based tourism, utilisation of reindeer and game populations, conservation of forest environment and recreational use of forest nature (Kangas & Naskali 2001). Furthermore, non-wood products can be divided into forest berries, mushrooms, wild herbs and other products. Good examples of these other products are tarn, tree sap and different kinds of decoration substances (e.g. lichen, salix species, moss). Economically the most important berries are lingonberry (*Vaccinium vitis-idaea),* bilberry *(Vaccinium myrtillus)* and cloudberry *(Rubus chamaemorus*). The most important mushroom species are chanterelle (*Chantarellus cibarius*), ceps (especially *Boletus edulis and B. Pinophilus*) and northern milk cap (*Lactarius trivialis and L. utilis*) (Luonnontuotealan teemaryhmä 2000).

In the field of nature tourism there are a lot of different terms of which some are not yet quite established. Mostly used terms are nature tourism, ecotourism, environmental friendly tourism, sustainable tourism and forest tourism. Nature tourism is tourism, where essential aspects are related to nature (Saarinen 2001). Forest tourism as a term refers to tourism, which aims to introduce different ways of using forests for forestry (Turunen 1995).

Reindeer herding is still an important source of livelihood in northern Finland, especially in northern Lapland. However, the cultural and social aspects of reindeer herding are becoming more important (Kangas & Naskali 2001).

The use of forests for environmental protection purposes aims to preserve biodiversity by controlling the human impact and maintaining esthetical values of forests (Kangas & Naskali 2001). Recreational use of forests is significant in Finland and it includes all kinds of non commercial outdoor activities in forests, e.g. hiking, skiing, bird watching and hunting (Pouta & Sievänen 2001, Liikanen et al. 1993).

4.1.2 Economical role of the NWFP&S in Finland

In Finland the economical role of the NWFP&S is still of relatively minor importance compared to the other forms of use of forest resources. However, there are regions where it is already significant and increasing rapidly. In general there are only scattered statistics concerning the NWFP&S and most of the existing figures are based on estimations.

Economic valuation of berry and mushroom harvest

Economically the most important NWFP botanical products in Finland are forest berries and mushrooms (Table 9). However, only 3–10% of the annual yield of berries and less than 1% of eatable mushrooms are collected during a season (Luonnontuotealan teemaryhmä 2000). The annual changes in the yields of wild berries and mushrooms can be significant.

Table 9. Examples of values of commercially used NWFP in Finland (Malin, A 2002 and 2003, Luonnontuotealan teemaryhmä 2000, Kemppainen et al. 2003.).

	Value of commercial utilisation, million €	**Year**
Wild berries	6.48	average 2002–2003
Wild mushrooms	2.52	average 2002–2003
Wild herbs	0.1-0.2	1999, estimate
Reindeer	13.2	season 2001–2002

Annually ¾ of berries and mushrooms picked for commercial use are coming from Eastern and Northern Finland, where the traditions of picking are strong. Most of incomes (80–90%) coming from berry and mushroom picking remain in the rural regions, which means a contribution of approximately 5–11 million euro to these areas (Malin 2001). Although berry picking gives additional incomes to 8–31% of the households in the area, this income is only 3–10% of their total annual income (Kangas 2001).

Approximately 35,000–50,000 persons participate in commercial berry picking annually. This equals 1500–2000 man-years. The food industry employs approximately 850 persons for their upgrading processes round-the-year (Table 10). Also the employing influence on other services supporting the activities of the NWFP sector (Ministry of Agriculture and Forestry 2002) have to be taken into consideration.

Table 10. Number of companies in the wild berry and mushroom sector in Finland (Ministry of Agriculture and Forestry, (MMM) 2002. Marja- ja sienialan erityistoimet - työryhmän muistio.).

Type of company	**Turnover, million €**	**Number**	**Employees**
Wholesales	< 0.17	250	250
Collecting companies	0.17-5	8	80
Small processors	< 0.17	300	400
Bigger processors	> 0.17	12	120
Total		570	850

Approximately one half of the berries and mushrooms picked for commercial use will end up being exported. The annual value of exports is approximately 8–17 million euro. It is difficult to estimate the total value, because e.g. the most important berry in export, lingonberry, does not have a CN-code. In addition, the influence of small exporters is not registered in the statistics (Ministry of Agriculture and Forestry 2002).

Innovative research has taken place during the last few years concerning different kinds of valuable substances found from e.g. bearberry *(Actostaphylos uva-ursi*), sundew (*Drosera* species) or from the seeds of cloudberry. These substances are used e.g. for medical or cosmetic products and therefore they provide a significant value added compared to the traditional use of the raw materials concerned.

Among other products originating from nature, e.g. lichen has some economical importance for the rural region. It is picked up for decoration purposes and mainly exported to Germany and Central Europe (Kangas & Naskali 2001). It has a special economical value as a secondary occupation in the western coast of Finland in Hailuoto and in the costal area between Oulu and Kalajoki. The value of the annual lichen yield (approx. 500,000 kg) was 1.5 million euro in 2002 (Finnish Statistical Yearbook of Forestry 2003).

Annually approximately 1.2 million Christmas trees are harvested in Finland, being mainly Norway spruce (*Picea abies*); about 500,000 of these end up for commercial trade. Only approx. 100,000 of sold Christmas trees are cultivated. It has been estimated that the economical value of Christmas tree trade is 7 million euro per year.

Economics of nature tourism

The regional economical role of nature tourism has become significantly more important over last few years. It is difficult to measure the economical and employing importance of nature tourism, however. In the national statistics nature tourism is a part of tourism in total. In some regions, where the subject has been studied more deeply, the share of nature tourism of total tourism has been remarkable (e.g. Rinne 1999).

The annual employing effect of nature tourism, including jobs in the nature tourism industry and jobs of the state and municipalities related to nature tourism, was 32,000 man-years in 2000 (estimation made by the Ministry of the Environment). Approximately 500 enterprises concentrate especially on nature tourism in Finland. 150 of them are small, operating on a seasonal basis. In addition to them there are approximately 2000 country holiday enterprises, which operate partly in the field of nature tourism (Ministry of the Environment 2002).

The incomes originating from nature tourism remain typically quite well in the rural regions. E.g. according to the visitor survey of Oulanka National Park, 70% of the money used in the region by domestic tourists remained in the area whereas in the case of foreign tourists the proportion was 50% (Honkala 2001). As a labour-intensive industry the employing influence of nature tourism is also significant. There is a need for local knowledge in the business environment and nature-based activities and for skills in recreation services, which encourages the tourism industry to employ local people. For example the tourist companies in the municipality of Kuusamo employed a total of 465 persons during the year 1997, of which 428 were registered as residents in the region (see Saarinen 2003).

The indirect economical impacts are more significant than direct incomes to tourism enterprises. 2/3 of the incomes benefit other businesses than the actual nature tourism entrepreneurs (Ministry of the Environment 2002). The increasing tourism also supports

the development of infrastructure and services in the regions, which is beneficial also to local people.

Economics of hunting

The total value of game bag in 2002 has been estimated to be 73 million euro, the most important species being the moose (*Alces alces*) (Finnish Statistical Yearbook of Forestry 2003). Recreational hunting is very popular in Finland and 300,000 Finnish people have a hunting permit (Finnish Statistical Yearbook of Forestry 2001). Most of the meat is used by private households. Only a very small fraction ends up to commercial use. The economical role of hunting becomes evident through recreational hunting and to some extent through hunting tourism. Hunters use annually approximately 118–130 million euro (Finnish Statistical Yearbook of Forestry 2001) to their hobby and this has influence on the rural regions. At the moment there are only few companies specialising in hunting tourism.

Reindeer husbandry

Reindeer herding has economical importance in northern Lapland. More than 70% of production (see Table 9) goes to further processing, which is a very high percentage compared to game or other products from nature (Kemppainen et al 2003). Reindeers are also used more and more in tourism and the image of reindeer and reindeer herding is very significant in marketing of tourism. There are approximately 1520 reindeer owners in Finland, among whom 690 are full-time reindeer herders (Finnish Statistical Yearbook of Forestry 2003).

Economics of in situ aesthetic values and nature recreation

The economical role of nature conservation areas in the rural regions can vary a lot. If the use of the area is strictly limited, the positive influence can be realised through the imago of the region. On the other hand, national parks, outdoor recreation areas and areas with rich biodiversity attract visitors to the area and their economical role can become quite important. It has been discovered that these areas are highly important for nature tourism (Kangas & Naskali 2001).

Traditionally the recreational role of forests has been significant in Finland. 97% of population go in for some kind of outdoor activity, of which the most are forest related (Sievänen 2001). Over a half of Finnish people pick up berries and approx. 40% pick up mushrooms as leisure activities (Matilainen and Aro 2002, Sievänen 2001). Also 25% of population go hiking and 40% cross country skiing. Approximatly half of Finnish people have a summer cottage of their own or owned by their family. The time spent in summer cottage is in average 31 days/year (Sievänen 2001).

4.1.3. Recent trends in the NWFP&S sector

Currently the value added of the NWFP sector is rather low and most of the turnover comes from wholesales of raw materials and semi-processed products. There are a few bigger companies in the wholesale, whereas more advanced processing takes place in smaller companies (see Table 10). The wholesale is more international, whereas the processing companies focus mainly on the domestic market. (Kangas 2001, Ministry of agriculture and forestry 2002).

The market environment of raw materials has changed significantly since Finland joined the EU in 1995. The economical competitiveness of Finnish raw materials has become weaker due to negative changes in the custom duties, which has increased import mainly from Eastern Europe and Asia. This has decreased the prices paid to natural product pickers and it has been suggested to decrease domestic supply in the future. Another parallel trend has been the ongoing mass migration from rural areas to big cities, which has decreased the number of potential pickers. As a result of this development, the improvement of value added is even more important. This has created a new challenge for the processing industry.

The number of bigger processors is rather low in Finland but the number of smaller companies has increased during the recent years, partly due to public development projects and funding available e.g. from the EU (Ministry of Agriculture and Forestry 2002). Especially the use of more special substances from nature has increased during the last few years and it has created new business opportunities to the NWFP sector.

It is becoming evident that the sustainable development of the Finnish NWFP will require more processed and more innovative products. The rising interest in the healthy, environment-friendly and ethical production among consumers has improved the potential of the NWFP sector and a part of consumers are willing to pay for these values. However, there is a great need for more deep information concerning consumer needs and behaviour when developing new successful products.

Finland has traditionally offered opportunities for nature-based recreational activities to tourists. During the snow-free season the activities have included backpacking, hiking, fishing and hunting and in the wintertime mainly skiing (see Kauppi 1996; Saastamoinen 1982). In addition, canoeing and boating have gained more importance than previously. During the last decade, the use of natural areas for tourism has experienced both quantitative and qualitative changes. Snowmobile trekking has become one of the most central and visible forms of the new nature-based tourism activities in central and northern Finland. Traditional Nordic cross-country skiing is, however, still economically the most important form of nature-based tourism activities in northern Finland. It has been estimated that in Lapland Nordic skiing alone brought approximately a total of 40 million euros of direct tourist income in 1998 (Lapin Matkailumarkkinointi, 1999).

The above nature-based tourism activities entail many characteristics that connect them to the rise of ‘new tourism’ in Finland. Recreation service enterprises offer especially snowmobile trekking, dog sledge safaris, mountain biking and canoeing/kayaking. They benefit from the use of wilderness and the related images and often tailor-make their products to meet the demands and needs of different customer groups. The tours utilise mainly official trails made in close co-operation with land owners and environmental authorities. With careful advance planning it is possible to reduce potential problems from intensive use of trails. The forms of so-called incentive tourism occupy also a large part of the demand of the recreation service enterprises.

Nature tourism has been typically a secondary occupation, partly because of its seasonal nature. At the moment there are some larger companies operating in the field especially

in Lapland. Bigger companies are usually situated especially near the biggest cities but also close to the significant nature attractions. During the latest years there has been a great interest to create and offer comprehensive service packages to tourists. This has increased networking and co-operation between entrepreneurs to a significant extent. Internationalisation is also an important challenge to the nature tourism sector (Elomaa et al 2003).

4.1.4 Laws and regulations related to the NWFP&S

Utilisation of the NWFP&S products is based mainly on the so called Everyman´s rights, which include the entirety of possibilities and limitations related to the use of nature. Everyman´s rights are based on the principle of public right of access to nature and on some laws and regulations related to the use of nature. It is a commonly agreed way of using nature. It is not an actual subjective right, because it has not been especially granted to anyone and there are no legal regulations to implement it. It can be called “right of public use”(Laaksonen 1999).

According to Everyman´s rights hiking, biking or skiing in the nature and picking up natural flowers, berries and mushrooms are allowed regardless of who is the owner of the area concerned. It is also allowed to ice fish, angle, boat and swim freely. Enjoying Everyman´s rights is free, including foreign people and no permit from the landowner is needed. However, Everyman’s rights do not allow causing any damage or disturbance in the nature. It is not allowed e.g. to kill or disturb animals, damage growing trees or collect moss, herbs or wood without the landowner’s permission. It is also forbidden to make an open fire or to drive with motorised vehicle without a permission or to disturb privacy by being too close to settlements. (e.g. Mäntymaa 1997, Laaksonen 1999, Finland's environmental administration 2004).

Fishing (excluding ice fishing and angling) and hunting require special permits. The legislation related to hunting includes regulations e.g. concerning the game species and hunting seasons. In addition, it specifies e.g. hunting methods and the principles of using game meat for commercial use (Suomen laki (Finnish Law): metsästyslaki 1993/615 metsästysasetus 1993/666). Hunters have to pass an approved hunting exam and for some species also a shooting test (Metsästäjäin keskusjärjestö (Central Organisation of Hunters), www.riista.fi 2004).

In some areas like national parks, recreation areas and nature preservation areas, there are limitations to the Everyman´s rights. The use of these areas is regulated by the environmental legislation. The Finnish environmental legislation covers various sectors of environmental protection. This legislation originates mainly from the 1980’s and 1990’s and it has been harmonised with the relevant EC-legislation (www.environment.fi 2004).

Everyman´s rights allow the collection of economically most important berry and mushroom species. However, collecting of many herb species and special products from the nature (e.g. moss and lichen) is not allowed without the landowner’s permission. Additionally, also a special disquisition can be required regarding the impacts of collecting the species (Luonnontuotealan teemaryhmä 2004, www.mmm.fi/luonnontuote). The regulations of eatable mushrooms list the mushroom

species, which can be picked for commercial use (Suomen laki (Finnish Law): ruokasieniasetus1981/871). To be able to pick up wild mushrooms or herbs for commercial use, the pickers are recommended to have a special certificate that proves that they are familiar with the legislation related to picking and have shown adequate knowledge in identification of mushroom or herb species. Byers usually require this certificate from their raw material suppliers.

The income from gathering wild cones, berries, mushrooms and other products used for human nourishment or for medical use is regarded as tax free in the income taxation of the pickers (Luonnontuotealan teemaryhmä 2000). However, the raw-material gathered e.g. for decoration use is not included in this definition. Therefore the income from products gathered from nature can be interpreted differentially in taxation depending on the final use of the raw materials concerned. This has caused some misunderstandings among the pickers. The pickers have to pay the reduced value added tax (VAT) on the income for all products picked up from nature, if the total annual income from sales exceeds 8500 euro. If the annual income exceeds 20,000 euro, the pickers have to pay the full amount of the VAT. The VAT percentage in Finland is 22%. There are few exceptions to this regulation (Luonnontuotealan teemaryhmä 2000).

Despite the Everyman´s rights, the landowner's permission is always required for commercial nature tourism whether the area is owned by a private owner, municipality, or state. Commercial use does no longer fit into the category of private and random use mentioned in the Everyman's rights (Laaksonen 1999). With regard to exploring the nature there are also other forms of legislation that enact and limit the use of nature for tourism, e.g. environmental legislation, legislation of cross-country transportation and legislation of outdoor activities. In addition to the actual legislation and regulations, there are lot of recommendations and codes of good practices related to the NWFP&S products. The most relevant of these focus usually on quality improvement.

4.1.5 Conclusions: Supporting and impeding factors for enterprise development in non-wood forest products and services production and barriers to entrepreneurship

Companies operating in the field of NWFP&S are usually quite diversified. In many cases it is vital to clarify the business strategies to develop and to stand out from the other companies: what is the core of the company´s business strategy, what do they offer and to whom? These questions lead to the need to better understand the different customer groups and their demands. The companies are usually small and therefore they should find suitable partners, including marketing and supplying channels, to fit in their own resources. Also networking with other companies is essential (e.g. Ryymin 2003, Ministry of Agriculture and Forestry 2002, Rutanen & Luostarinen 2000). In a small company it is not possible to divide the limited time and financial resources between too many sectors. Therefore a clear business plan and proper segmentation are even more important.

Potential customers groups of products of NWFP&S sector are mainly from urban areas. Because of this, the distance between companies and customers can be relatively long and most of the products are used outside of the production areas. Small companies alone do not have necessary resources for comprehensive marketing to bring their

products to the common awareness. In the tourism business there are already a lot of marketing organisations. To connect these to even better co-operation would provide more possibilities to obtain wider visibility and accessibility of the products (Ryymin 2003). In the NWFP sector building of a common imago has also been stated to be an important operation in the near future (e.g. Ministry of Agriculture and Forestry 2002, Matilainen & Aro 2002).

Forest berries and mushrooms are currently the major commercial NWFP botanical products in Finland. The sustainable supply of domestic raw material is the main challenge to the producers of NWFP botanical products. The profitability of picking e.g. berries has reduced rapidly and the yield variations can be remarkable. There is also a clear need for further research to find new effective operation models for the companies and to determine new innovative and valuable substances from natural products (Ministry of Agriculture and Forestry 2002). Development of the value added from the sales of raw material to upgrading is essential. Also the need for off-season activities should be resolved both in the NWFP sector and in the service (nature tourism) sector.

4.2 Case studies of successful marketing strategies

4.2.1 Bird watching, Finnature Oy Ltd (www.finnature.com)

Nature is the most significant tourist attraction in Finland (Ministry of Environment 2002). Nature tourism is increasing rapidly. At the moment companies operating in the field of nature tourism are usually small and have limited resources e.g. time and money, which can make it difficult to develop their products to meet the demands of urban, selective consumers. Domestic tourists are still quite capable of roaming through independently in the nature. Also Everyman´s rights and wide network of different kinds of recreation areas and national parks make it possible for them. The domestic customers are not yet accustomed of setting financial value to or pay for the merchandise utilised in nature tourism, like hiking in the forests or watching the wild life. The services bought from nature tourism enterprices are usually very basic ones (accomodation and catering services). However, by offering just the basic services the content of the nature tourism products becomes quite scarce, and wide range of opportunities offered by Finnish nature are not fully utilised.

The highly specialised programme services have been more succesful in the long run than the basic ones. **Bird watching** is a good example of these. However, for specialised products the domestic markets are not very widespread and therefore it can be difficult to find customer group big enough for economically sustainable entrepreneurship. Nevertheless, there are good examples of how these challenges can be overcome. One succesfull story is a company called Finnature Oy Ltd.

Box 1. Finnature Oy Ltd activities

Finnature Oy Ltd is a Finnish company specialised in nature-based tourism. The company was established in 1993 and employs at the moment around ten nature guides with expertise in birds, mammals, and plants. Tours are organised to Finland, northern Norway and Estonia, the focus being mostly on foreign clients arriving from outside Finland. According to the company, its success is based on top quality tour leaders and respect for wildlife.

The idea for this innovative company came to the entrepreneurs from their strong interest on bird watching as a leisure activity. At the beginning operating as an entrepreneur simply gave more possibilities to organise different kind of bird watching tours and made it possible to meet the increasing demand by customers for the guided tours. Already before establishing the company, the entrepreneurs had a strong knowledge on wild life, especially birds, which is an absolute necessity to operate properly in this business sector. During the first years the company form of Finnature developed from the company to limited partnership and further to limited company (Ltd), which gave the opportunity to the entrepreneurs to learn business skills along company development. The development of Finnature has mainly been financed by income financing. This has kept the company on sound foundation during different kind of development phases.

Since its establishment the company has had a very focused strategy based on clear segmentation of clients, good selection of marketing channels and advanced networking culture. From the very beginning Finnature has put a lot of effort to marketing research and has selected their potential customer group very carefully. The company made at very early state of their history the consious decision to target their products directly to foreign tourists. The products are targeted to well-off, strictly defined customer group, which has created a good opportunity to develop first class products for very demanding markets. The average customer of the company is a 65 year old, solvent person interested in the nature and coming from the UK or some other country of the European Union. This has been important for the company's learning process; by using this strategy, the company has been able to avoid the 'trap' of less developed domestic markets. Close co-operation with international travel agencies has been vital and provided valuable information about different consumer segments and their needs, including pricing. The tour development in co-operation with travel agencies has build up trust and commitment and as a result the company has outsourced most of all its marketing and selling activities to experienced travel agencies.

Being a very demanding and selective business partner, Finnature has created a well working business network where activities other than guidance are produced by its partners, including transportation, accommodation and food services. The outsourcing strategy was motivated by the avoidance of high risks of investments, but it has proven to be a successful way to proceed also from other points of view. Finnature has had the needed resources to concentrate on their special area of expertise: guidance and bird watching. Since there has not been a need to disperse their limited resources too widely, they have had a change to develop the high quality of their first class products with low investment level. They have managed to penetrate to the "first class tourism markets", which is usually very difficult for small companies. Finnature's tours utilise mostly state owned forests and national parks. Finnature has grown steadily and it aims to keep the size in which it is able to control the quality of services also in the future.

4.2.2 Birch sap, Oy Aurinkolehto Ltd (www.aurinkolehto.fi)

The utilisation of special products gathered from nature (e.g. tarn, tree sap, lichen, salix species, moss) is a very small- scale production in Finland. However, these products can offer a lot of new innovative business possibilities for rural areas, not yet fully utilised. They also can have a significant role in local economics in regional level (e.g. lichen). Typical problems for small companies operating in the sector are the lack of objective research information and low level of technology. Due to the lack of correct information the risk of failure increases and entrepreneurs are not willing to invest significantly in the companies. This along with low technology level leads to small production amounts, which is one of the main problems for e.g. in marketing and logistical solutions. Also finding the suitable marketing channels is typically one of the biggest barriers for

economical utilisation of specialised products from nature. In addition, sometimes there are problems with the raw-material supply and storage due to the collecting seasons.

Box 2. Oy Aurinkolehto Ltd activities

Oy Aurinkolehto Ltd has solved these problems by long term investments on research and development activities. Aurinkolehto is specialized in industrial production of birch (*Betula pendula*) sap. Bottled sap is used e.g. as refreshment, dietary and sports beverage as well as to accompany meals. Birch sap is a very special product and the economical role in national level is marginal. It is easily perishable raw-material and the collecting season is short during the spring time. Therefore it is seldom found in shops. However, by utilizing this special raw material combined with high production technology and specified marketing channels, Aurinkolehto has managed to establish a profitable company in a remote rural area. The company is a good example of innovative businesses in rural areas.

The company was established in 1996. The business idea was fixed after very analytic research on different kind of possibilities for successful entrepreneurship in rural areas. The main motivation was to find a source of livelihood, which would make it possible for the owners to move from urban area to the countryside. The owners did not have previous experience on birch sap, but they invested a lot of time to collect and analyse information widely, before making the decision to specialize in it.

The entrepreneurs have developed an innovative collection and production system for industrial-scale production of sap. This system also enables serial production, which makes it possible to produce sap in large scale necessary e.g. for export activities. The production capacity of Aurinkolehto's current equipment is approximately 150,000 liters per year. The raw material is gathered from company's own forests.

With this high technology innovation the company has solved the main obstacles to commercial use of birch sap. The unique technology also guarantees a long preservation time for birch sap bottles unopened in room temperature. Aurinkolehto's Koivu™ birch sap is 100% natural, without any additives or preservatives. Koivu™ birch sap has also a certificate of organic production of Finland and the EU. Most of Aurinkolehto's production capacity is exported e.g. to Japan, Korea and Central Europe.
The company continues to develop its technology and automation even further. In development work Aurinkolehto has utilized financing and developing services offered to SMEs by the Employment and Economic Development Centre, Finnvera and Tekes. In 2002 Aurinkolehto received the President's InnoFinland Prize as national recognition for their innovativeness.

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Annex D.

1. Organisations related to NWFP in Finland

NWFP&S products relate closely to many different industries. Therefore, there are also a lot of different kinds of actors in the field of NWFP&S. In addition, to the list below e.g. many polytechnic schools have development departments that may have development projects and other activities related to NWFP&S.

Over all in Finland the research related to products of nature as raw materials or the amounts of tourists in nature tourism destinations are quite widely studied. Also the environmental aspects have been in the centre of interest. Influences to rural economics and social and economical role to the regions are, on the other hand, not yet so well studied. Also there is no actual research material related e.g. on special products of nature.

Research:

Agriculture Research Centre, MTT
- research on e.g. natural ecosystems, environmental research, rural entrepreneurship etc.

European Forest Institute EFI
- conducts forest research, compiles forest information and organises meetings on a European scale

Finland's environmental administration (Ministry of the Environment, Regional Environment Centres, Finnish Environment Institute)
- works to promote ecological sustainability and the economic and social and cultural preconditions for achieving this sustainability.

Finnish Game and Fisheries Research Institute, RKTL
- produces high-quality scientific data about fisheries, game and reindeer.

Finnish Forest research Institute, METLA
- research on e.g. berry yields (annual estimates), multiple use forestry, estimating immaterial values of forests, recreational use of forests, tree breeding etc.)

Geological Survey of Finland, GTK
- research centre that provides geoscientific information and services essential for assessment of raw materials, environmental studies, construction and land use planning.

Kajaani University Consortium
- research, education, development e.g. on utilisation of products of nature, biotechnology of berries

Network University of Tourism
- research related to tourism, including sustainable development, ecotourism etc.

Tampere University of Technology
- natural fibres, research and experiments, wood information centre

The Archipelago Research Institute
- research is focused on Archipelago Sea- as well as Baltic Sea studies

The Plant Production Inspection Centre, KTTK
- supervises organic production of wild berries, mushrooms and other products from nature

Thule Institute
- an independent national institute for northern and arctic research

Technical Research Centre of Finland, VTT
- an expert organisation that carries out technical and technoeconomic research and development work

TTS Institute (Work Efficiency Institute)

- a research, development and training institute for agriculture, forestry, home economics and other related fields., products from nature, fiber plants

University of Helsinki

- especially: forest sciences, Foodcenter, faculty of food technology, faculty of pharmacy)

University of Helsinki, Institute for Rural Research and Training, UHEL SIRRT

- research and development projects e.g. on nature-based entrepreneurship, rural entrepreneurship

University of Joensuu

- research e.g. on multiple use forestry, forest scenery, products from nature

University of Jyväskylä

- research on e.g. peatland ecology, fishery, recreational use of nature

University of Kuopio

- research on e.g. ingredients of berries and herbs, biotechnology, rural economics)

University of Lapland

- research e.g. on nature tourism and rural development

University of Oulu

- research on regional development

University of Turku

- especially faculty of biochemistry, biochemistry in food sciences, Biocity

University of Turku, department of continuing education

- nature tourism, environmental aspects of nature tourism

Advisory and development organisations:

Forest Management Associations

- advisory organisation for private forest owners. Provides e.g. forest planning services. Offices around Finland.

Metsäkeskus (Forest Centre)

- provides information, consultation and education on forest related matters, mainly to private forest owners. Offices in every region around Finland

Rural Advisory Centre

- provides information, consultation to the entrepreneurs, tailor-made services in all aspects of rural business life. Offices in every region around Finland

The Women's Advisory Organisation for Development of Rural Areas

- nationwide organisation for advice directed at households and consumers, promotion of landscape management and small enterprises in rural areas

Non-Governmental Organisations:

Arctic Flavours

- association for Non-Wood Products in Finland. Promoting Finnish forest berries, mushrooms and herbs.

Christmas tree association

- promotes e.g. breeding and treatment experiments related to growing Christmas trees

Finnish Nature-based Entrepreneurship Association

- a national network, main tasks are to increase and improve co-operation between entrepreneurs and organisations, reinforce and increase a positive public image and to improve and increase quality and sustainability of nature-based entrepreneurship

Finnish Peatland Society

- a scientific society, aims to encourage the study and research of peat and peatlands in all aspects and to promote their sustainable and socio-economic use.

Metsästäjäin Keskusjärjestö (Finnish Hunters Central Orgnanisation)

- organise and coordinates hunting associations

MTK, The Central Union of Agricultural Producers and Forest Owners

- NGO, represents an industry that uses renewable natural resources in a sustainable and economical way. Takes care of various interests and living conditions of farmers, forest owners, rural entrepreuners and rural people.

Suomen Latu - The Central Association for Recreational Sports and Outdoor Activities

- produces, supplies and developes recreational sport and outdoor activities services, and related education, to municipalities, organisations, schools, societies and companies. Suomen latu also implements different kind of development and research projects related to nature tourism and recreational use of nature.

Wild Organic Product Industries' Association

- association promoting berry mushroom and herb industry

Others:

Berry- & Gardenknowhow-centre

- developing and training services for berry growing, horticulture and the food industry

Forest and Park Service, Metsähallitus

- administers the state's land and water areas e.g. nature parks and recreational areas. Also governs the protected areas in state´s land.

Foodwest Oy

- development and consulting organisation for food enterprises

Game management districts

- e.g. grant hunting permits, developers of game management

Jalasjärvi Vocational Adult Education Centre, JAKK

- development projects on upgrading of natural fibres (cotton crass, peat)

Pori Forest Institute, Porin metsäopisto

- compile statistics on mushroom and herb picking permits and inspectors of gathered products

Regional and multiregional tourist boards

- development projects related to nature tourism

The Finnish 4H federation

- in some areas acts as berry and mushroom supplying organisation

The Finnish Tourist Board, MEK

- works in close cooperation with and for the Finnish tourist and travel industry, implementing and financing marketing projects jointly with the industry. One of the joint goals is to develop more enticing, competitive products for tourists.

Wine Knowledge Centre, Viinitietokeskus

- development, research and training organisation, promotes upgrading berries and fruits

2 Information sources, statistical information

Statistical information related to NWFP&S is usually more or less hidden in general statistics. E.g. statistics concerning nature tourism are in official statistics a part of tourism in total. There are a lot of very small companies operating in the NWFP&S sector or NWFP&S sector maybe a secondary occupation for the entrepreneur. Therefore the business of these entrepreneurs is not usually compiled in official statistics.

Products from nature:

Suomen Gallup Elintarviketieto Oy

- statistics on traded berries and mushrooms (MARSI) annually.

Finnish Forest Research Institute, METLA

- research and statistical information about multiple-use of forests, yield forecasts for the wild berries etc.

Food Composition Database Fineli,

- database contains information for 290 nutrient factors and over 2500 foods of which half is mixed dishes

National Theme group of products from nature

- research and statistical (partly estimated) information related to products from nature

Pori Forest Institute

- statistics on authorised mushroom and herb pickers and inspectors

The Plant Production Inspection Centre, KTTK

- statistics on organic berries and mushrooms, amounts, picking areas etc.

Nature tourism:

Finnish Forest Research Institute, METLA

- research and statistical information about multiple-use of forests

Forest and Park Service, Metsähallitus

- statistics and research on users of national parks (amounts, some demographical information)

National Theme group of rural tourism

- e.g. statistics on utilisation rate of rural accommodation enterprises

The Finnish Tourist Board, MEK

- research and statistic information on tourism in Finland and towards Finland

Others:

Environmental administration (Ministry of the Environment, Regional Environment Centres, Finnish Environment Institute)

- statistics on nature protection areas, endangered species

Finnish Game and Fisheries Research Institute, RKTL

- official statistics on game and fish management. Statistics e.g. on game population, hunting amounts, the value estimations annually

Geological Survey of Finland, GTK

- estimations of peat resources, stone occurrences

Ministry of Agriculture and Forestry, MMM

- statistics on reindeer farming

Statistics Finland

- administratively under the Ministry of Finance, official statistics on entrepreneurship, employment, regional development etc.

5 Forests and ownership

5.1 State-of-the-art knowledge and historical development in the country on forest resources, forest ownership, forest production, wood procurement and employment in the forest sector

Forest resources and forest ownership

The information on Finland's forest resources is based on national forest inventories (NFIs), carried out by the Finnish Forest Research Institute (Metla) since the beginning of the 1920s. Finnish forests have been assessed nine times, and the field work of the 10th inventory was launched in the summer of 2004.

In recent decades, several forest programmes have aimed at increasing Finnish forest resources. The main focus in the 1960s was on increasing wood production, but in the 1980s and 1990s, non-wood values and uses of forests have emerged alongside with wood production as important guiding management principles. In the current National Forest Programme 2010, new issues (e.g. ecological, social and cultural sustainability) have received more attention than before (State of Forestry... 2001).

The total forested area (forest land and scrub land together) in Finland amounts to 23.1 million ha. In addition, there are 3.0 million ha of treeless and sparsely stocked waste land. Roads, depots, etc., occupy less than 0.2 million ha. In total, the forestry land area of 26.3 million ha covers 86% of the land area of Finland (Table 11).

Since the 1960s, Finland’s forest land area has increased by 1.6 million ha, primarily as a result of the drainage of peatlands and afforestation of agricultural lands, as well as of intensive forest improvement efforts. Consequently, the share of scrub land has been reduced. Mires, at present, account for 34% of forestry land, and their share is significantly higher in the northern part of the country. More than half of mires has been drained (4.9 million ha). No first-time ditching takes place any more. Instead, the focus is now on ditch-cleaning and supplementary ditching.

Since the late 1960s, the volume and increment of the growing stock have continuously risen (Figure 8). The total standing volume now amounts to 2049 million m³ over bark. In 1951–1953 (at the time of the third NFI), the corresponding figure was 1538 million m³. The volume increment of the growing stock is 83 million m³ per year. From the 1970s to the 1990s, the total drain amounted to about 60–80% of the increment. Ten years ago, the difference between increment and drain diminished, and now the annual volume increment exceeds drain by approximately 10 million m³ (Figure 9, Table 13).

In regard to the area of forestry land, 53% belongs to non-industrial private forest owners. The State owns one third of forestry land with most of the State-owned forests being located in northern Finland. The share of companies is 8% (Finnish Statistical... 2004).

Forest production and wood procurement

In recent years, roundwood fellings have remained at a very high level. In 2003, approximately 55 million m³ (over bark) of industrial roundwood was harvested from Finnish forests (cf. to the annual average of 43 million m³ during 1970–2002). In

addition to industrial use, some 5 million m³ of fuelwood is annually removed for domestic heating purposes.

Non-industrial private forests are the main roundwood source for Finland's forest industries. In 2003, they accounted for close to 47 million m³ (or 85%) of total fellings of commercial roundwood. Roundwood felling from the forest industries' own forests totalled 3.5 million m³, leaving the remaining amount of approx. 5 million m³ to be supplied from State forests. In the past few years, about half of the annual felling volume has consisted of logs and the other half of pulpwood (Figure 10) (Finnish Statistical... 2004).

Over 80% of the roundwood volume is harvested by forest-industry companies and by the Finnish Forest and Park Service (operating in State-owned forests), and the remaining one-fifth by non-industrial private forest owners, who engage in delivery sales. In standing sales, intense mechanisation has helped the forest industries to reduce their costs. The share of mechanised fellings is currently at the level of 96%. Multi-function harvesters, numbering about 1500, prevail in logging operations (Torvelainen 2003).

On the national scale, non-wood forest products and services are of marginal importance in comparison with income earned from roundwood sales. In 2003, gross stumpage earnings in roundwood sales were estimated at 1.8 billion euro. The overall value of the bag in hunting was estimated to be 76 million euro. The value of commercial wild berries and mushrooms collected from the forests totalled approx. 12 million euro (Finnish Statistical... 2004). However, much larger amounts are picked for direct household use.

Employment in the forest sector

The role of the forest sector as an employer has continuously diminished for several decades. At the beginning of the 1970s, the sector employed more than 200,000 persons, corresponding to close to 10% of the total labour force. In 2003, the figures were 89,000 and 4%, respectively. Of the sector's total of employed persons in 2003, three-quarters were employed by the forest industries, while about 22,000 were working in forestry (Figure 11).

The declining trend in forestry is mainly due to rapid mechanisation in timber harvesting. Less forest workers are needed to carry out manual work in felling and also in silvicultural works.

In the forest industries, due to increased automation, total employment has fallen from 120,000 (in 1980) to 68,000 in 2003, a decrease of 43%. This decline has occurred despite the fact that the production of sawnwood has doubled, and the production of paper has more than tripled since 1970 (Figs. 12 and 13) (Aarne 2004).

The employing effect of nature tourism and non-wood forest services has been estimated to grow rapidly. In 2000 the employing effect was around 32,000 man-years and it has been estimated that by the year 2010 it could be even 64,000 man-years. In commercially most important NWFP sector, forest berries, annually 35,000–50,000

people (1500–2000 man-years) take part in commercial picking. In addition, upgrading processes in berry business have been estimated to employ 850 persons round-the-year.

5.2 Forest resources

Area distributions, growing stock and increment

The land area of Finland totals 30.4 million ha, 86% of this is classified as forestry land. The area of *forestry land* (26.3 million ha) is sub-divided into *forest land* (20.3 million ha), *scrub land* (2.8 million ha) and *waste land, etc.* (3.2 million ha) according to the site productivity. The national definitions of the forestry land categories are as follows:

1) *Forest land*: Potential annual increment of the growing stock is at least 1.0 m³/ha.
2) *Scrub land*: Potential annual increment of the growing stock is less than 1.0 m³/ha, but at least 0.1 m³/ha.
3) *Waste land:* Unless naturally treeless, the annual increment is less than 0.1 m³/ha.

The total standing volume amounts to 2049 million m³ over bark. Almost half of the growing stock consists of *Scots pine*. The share of *Norway spruce* is 34%, leaving 19% for the broadleaved species, mostly birch. Two-thirds of the growing stock are located in Southern Finland. The tree species structure of the growing stock has remained relatively stable for a considerable period of time. The proportion of pine is, however, slowly increasing (Table 13) (Forest Finland... 2003).

The mean volume of the growing stock on forest land is 98 m³/ha. In Southern Finland, the mean volume (125 m³/ha) is almost double that in Northern Finland (66 m³/ha). The volume increment of the growing stock on forest land and scrub land amounts to 83 million m³. The mean increment on forest land is estimated to be 4.1% (Table 14) (Finnish Statistical... 2004).

Protected forests and forests under restricted forestry use

Maintaining forest biodiversity is one of the main goals of the Finnish Forest Act. Nature conservation areas form the basis for maintaining natural environments. There is a total of 4.7 million ha of land with restrictions on wood production. Strictly protected forests (forest land and scrub land) account for 1.7 million ha of this area. Most of these set-aside areas are situated in the northern part of the country (Finnish Statistical... 2003). In the last 25 years, the area of protected forests in Finland has increased considerably (Table 15).

Afforestation of agricultural land

Since the 1970s, approximately 240,000 ha of agricultural land have been afforested with State support. In 2003, only 2000 ha of arable land were afforested (Table 16) (Finnish Statistical... 2004).

5.3 Forest ownership

Of the total *forestry land*, non-industrial private owners possess 53%. The proportion owned by the State amounts to 34% and that by companies to 8%. The remaining 5% belong to municipalities, parishes, jointly-owned forests, etc. Contrary to other ownership categories, State-owned forests are mainly situated in Northern Finland, where the State owns 55% of the total forestry land. In Southern Finland, the

corresponding share is only 8%. It is also worth mentioning that the statutory nature conservation and wilderness areas are mainly located on State land in the northern part of the country (Finnish Statistical... 2003).

Of forest land, non-industrial private owners possess 61%, corresponding to 12.3 million ha. The shares of the other ownership categories are as follows: State 25%, companies 9%, and others 5%.

Regional differences in land ownership are clearly reflected in the distribution by ownership of the growing stock and, especially, of the annual increment. Although the State owns one-third of forestry land, its share of the total volume of the growing stock amounts to only 18%. The corresponding proportions of other categories are as follows: non-industrial private owners 68%, companies 9%, and others 5%. Of the annual increment, the share of non-industrial private owners is even more significant, being 70% (Figure 7).

Share and number of non-industrial private forest holdings

There are 445,000 non-industrial private forest holdings (>2 ha) in Finland corresponding to 10.5 million ha of forest land. Private forest holdings are relatively small: on the average, they cover 24 ha of forest land (holdings of over one hectare). Almost half of the number of holdings belong to the category having less than 10 ha of forest land. In recent years, middle-sized forest holdings (20–50 ha) have decreased in number, while the numbers of small and large holdings have increased (Finnish Statistical... 2003).

The right to collect and sell NWFP

Access to and recreational use of forests is free for all in Finland. Everyman's right bestows on all people a free right to use land owned by others to travel on foot, skis, bicycle or horseback, provided that they do not cause any damage. Other activities freely permitted on other people's land are e.g. picking wild berries and mushrooms (State of Forestry... 2001). In some areas e.g. natural parks and nature preservation areas Everyman’s rights are limited with other legislation. Hunting and fishing (excluded ice fishing and angling) are licensed by the state. In addition also landowners permit (usually chargeable) is required.

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17. The annual harvest of berries and mushrooms
18. Bogs of game and reindeer

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http://www.metla.fi/metinfo/tilasto/index.htm

http://www.metla.fi/metinfo/kestavyys/index.htm

Annex E

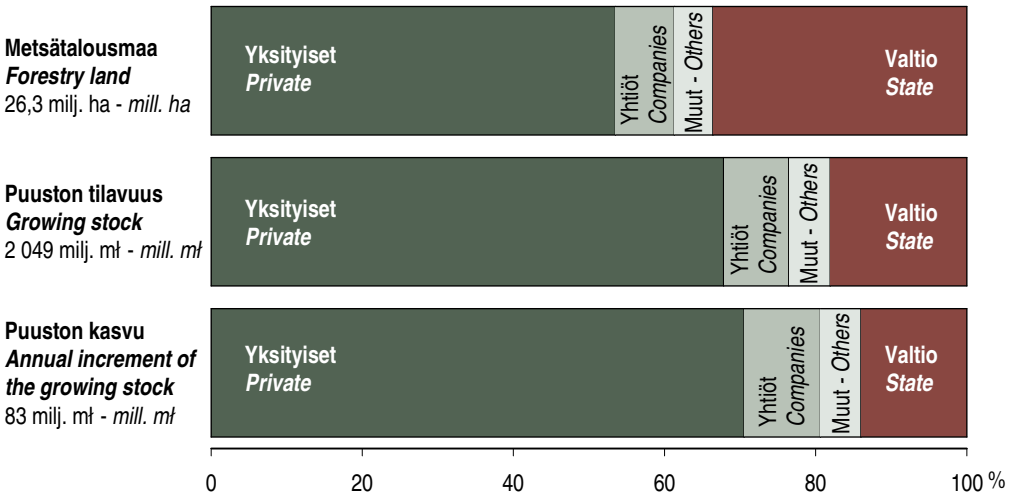

Figure 7. Forestry land, growing stock and annual increment of the growing stock by forest ownership category (Source: Metla, NFI).

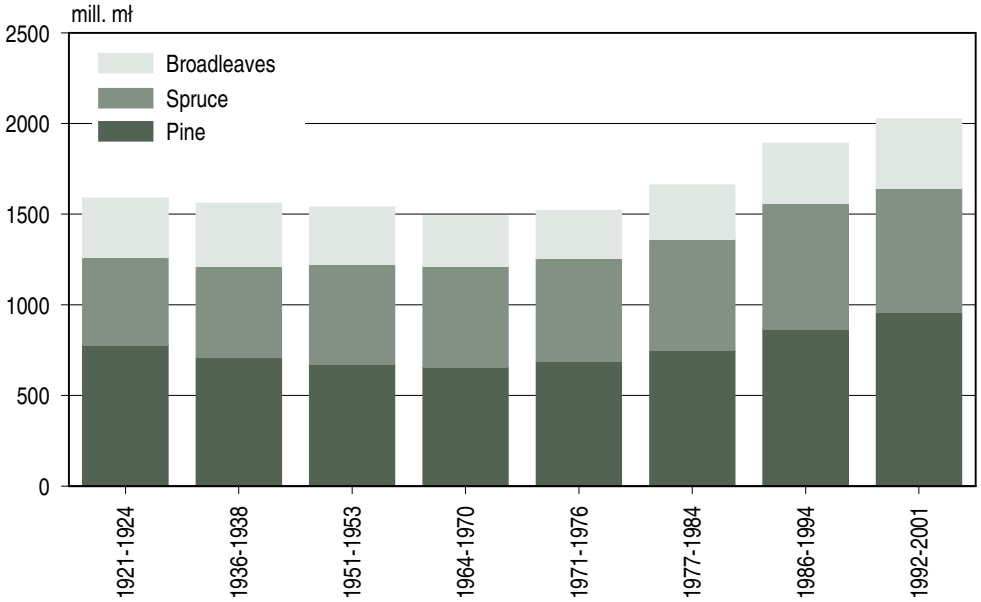

Figure 8. Growing stock volumes since the 1920s (Source: Metla, NFI).

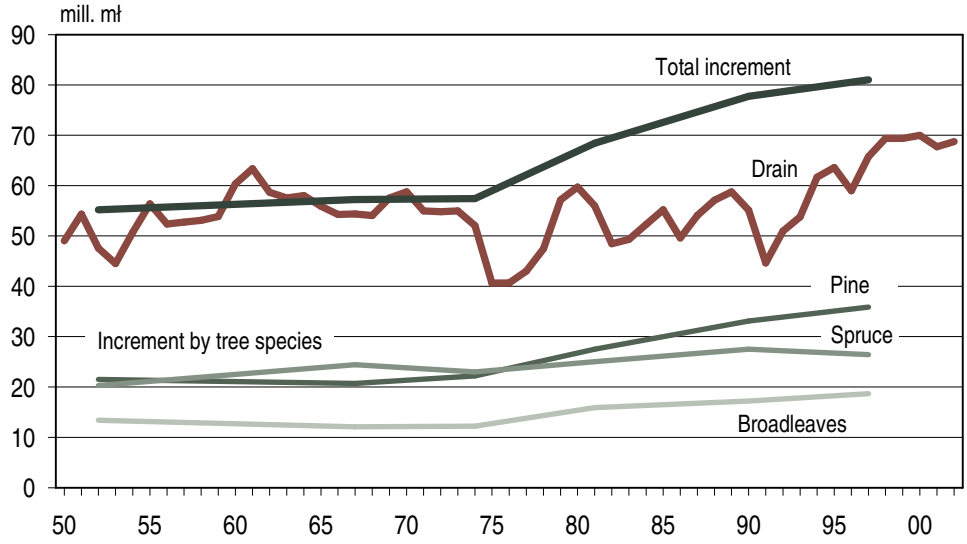

Figure 9. Annual increment of the growing stock and growing stock drain, 1950–2002 (Source: Metla, NFI and Forest Statistics).

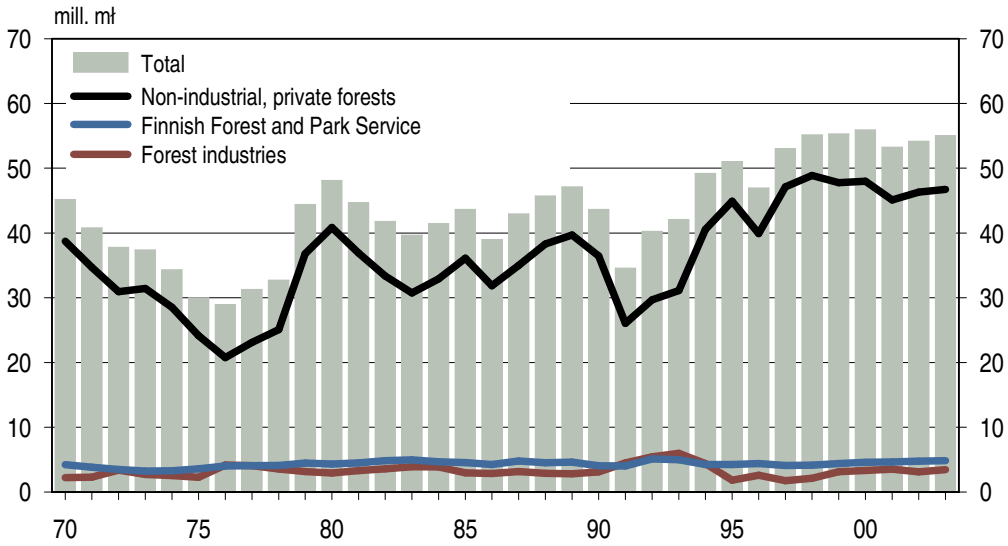

Figure 10. Commercial roundwood production 1970–2003, by forest ownership category (Source: Metla, Forest Statistics).

Figure 11. Persons employed in forestry, 1970–2003 (Source: Statistics Finland).

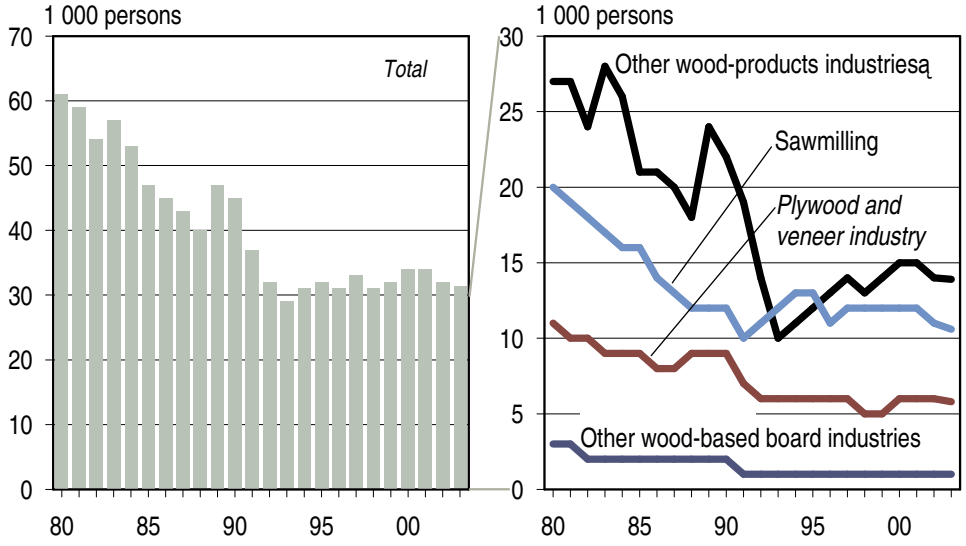

Figure 12. Persons employed in wood-products industries, 1970–2003 (Source: Statistics Finland and Metla).

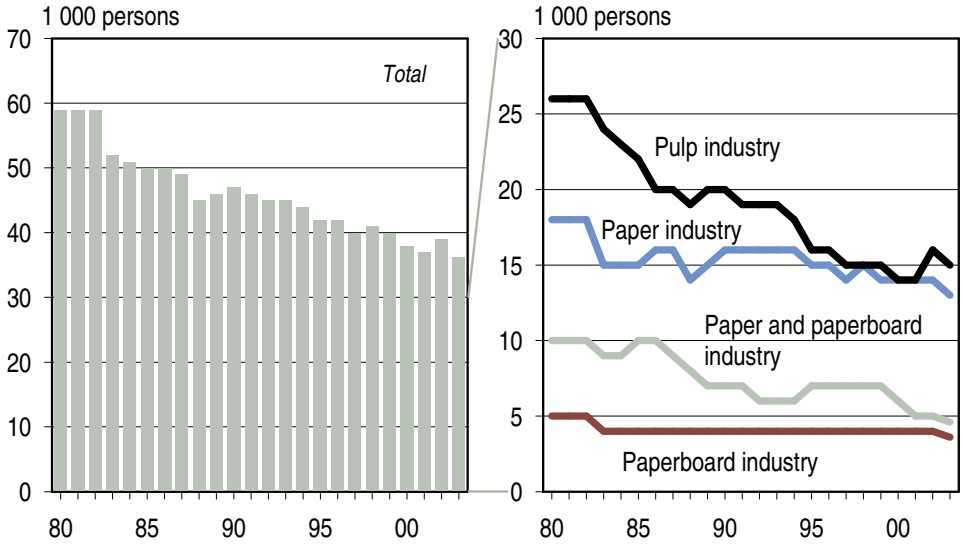

Figure 13. Persons employed in pulp and paper industries, 1970–2003 (Source: Statistics Finland).

Table 11. Finland's forest resources in brief (Source: Finnish Forest Research Institute, NFI)

	Unit	Forest ownership categories				
		Private	Companies	State	Other	Total
Total land area of Finland	1000 ha					**30447**
Forestry land	1000 ha	**14027**	**2041**	**8882**	**1327**	**26277**
Forest land	1000 ha	12334	1816	5089	1064	**20303**
Scrub land	1000 ha	960	115	1602	118	**2794**
Other	1000 ha	734	110	2192	145	**3180**
Growing stock	million m^3 o.b.	**1386**	**176**	**378**	**109**	**2049**
Pine	million m^3 o.b.	589	97	232	55	**973**
Spruce	million m^3 o.b.	519	50	85	33	**688**
Broadleaves	million m^3 o.b.	278	28	62	21	**388**
Annual increment of the growing stock	million m^3 o.b.	**58.2**	**8.3**	**12.0**	**4.4**	**82.9**
Pine	million m^3 o.b.	22.8	4.6	7.5	2.1	**37.0**
Spruce	million m^3 o.b.	20.9	2.2	2.4	1.3	**26.7**
Broadleaves	million m^3 o.b.	14.5	1.5	2.2	1.0	**19.2**
Growing stock drain	million m^3 o.b.					**69.9**
Pine	million m^3 o.b.					**28.3**
Spruce	million m^3 o.b.					**28.0**
Broadleaves	million m^3 o.b.					**13.6**

Table 12. Land use in Finland from the 1950s to the 2000s (Source: Finnish Forest Research Institute, NFI).

1000 ha

Land use	1951–53	1964–70	1992–2002
TOTAL AREA	33701	33704	33814
Total land area	**30540**	**30548**	**30447**
Forestry land	26315	26667	26277
Forest land	17352	18697	20303
Scrub land	4522	3674	2794
Waste land	4441	4226	3030
Roads, depots, etc.	..	70	150
Agricultural land	3965	3331	2822
Other	260	550	1354
Built-up areas	..	266	957
Transport routes, etc.	..	284	397
Inland watercourses	**3161**	**3156**	**3367**

Table 13. Growing stock volumes, 1992–2002 (Source: Finnish Forest Research Institute, NFI).

Part of the country/ Ownership category	Inventory	Pine	Spruce	Birch	Other broadleaves	Total volume	%
		million m³ o.b.					
WHOLE COUNTRY	**1992–2002**	**973**	**688**	**316**	**72**	**2049**	**100.0**
Private		589	519	222	56	1386	67.6
Companies		97	50	24	4	176	8.6
State		232	85	55	7	378	18.4
Others		55	33	16	5	109	5.3
Southern Finland	**1996–2000**	**583**	**558**	**206**	**60**	**1408**	**68.7**
Private		421	463	164	49	1097	53.5
Companies		76	44	18	4	142	6.9
State		50	22	12	3	87	4.2
Others		37	29	12	5	81	4.0
Northern Finland	**1992–2002**	**390**	**130**	**110**	**12**	**641**	**31.3**
Private		168	56	57	7	289	14.1
Companies		21	6	6	1	33	1.6
State		182	63	43	4	291	14.2
Others		18	5	4	1	28	1.4
Whole country, previous inventories (NFIs)							
NFI 1	1921–24	777	481	290	40	1588	
NFI 2	1936–38	707	502	295	56	1560	
NFI 3	1951–53	672	549	282	35	1538	
NFI 5	1964–70	655	555	244	37	1491	
NFI 6	1971–76	686	568	224	42	1520	
NFI 7	1977–84	745	613	249	53	1660	
NFI 8	1986–94	865	691	277	58	1890	

Table 14. Annual increment of the growing stock of forest and scrub land (Source: Finnish Forest Research Institute, NFI).

Part of the country/ Ownership category	Inventory	Pine	Spruce	Birch	Other broadleaves	Total	Mean annual increment
		million m³ o.b./year					m³ o.b./ha
WHOLE COUNTRY	1992–2002	**36.99**	**26.72**	**14.74**	**4.42**	**82.86**	**3.6**
Private		22.82	20.90	10.94	3.53	**58.16**	4.4
Companies		4.59	2.17	1.23	0.25	**8.26**	4.3
State		7.46	2.38	1.87	0.32	**12.04**	1.8
Others		2.12	1.26	0.71	0.32	**4.40**	3.7
Southern Finland	1996–2000	**23.30**	**22.90**	**10.14**	**3.83**	**60.16**	**5.2**
Private		16.24	18.98	8.09	3.14	**46.41**	5.4
Companies		3.58	1.92	0.93	0.22	**6.67**	4.8
State		2.06	0.89	0.58	0.18	**3.73**	4.2
Others		1.42	1.11	0.53	0.28	**3.35**	4.8
Northern Finland	1992–2002	**13.70**	**3.81**	**4.60**	**0.59**	**22.70**	**2.0**
Private		6.58	1.93	2.85	0.39	**11.75**	2.5
Companies		1.01	0.25	0.30	0.03	**1.60**	3.0
State		5.40	1.49	1.28	0.13	**8.30**	1.4
Others		0.70	0.14	0.17	0.04	**1.05**	2.2
Whole country, former inventories (NFIs 1–8)							
NFI 1	1921–24	24.8	15.4		14.3	**54.5**	
NFI 2	1936–38	22.7	17.6		14.0	**54.3**	
NFI 3	1951–53	21.5	20.3		13.4	**55.2**	
NFI 5	1964–70	20.7	24.4	10.3	1.8	**57.2**	
NFI 6	1971–76	22.2	23.0	10.0	2.2	**57.4**	
NFI 7	1977–84	27.5	25.0	12.8	3.1	**68.4**	
NFI 8	1986–94	33.1	27.5	13.1	4.1	**77.7**	

Table 15. Areas of protected forests and areas under restricted forestry use by land class, 2002 (Source: Finnish Ministry of Agriculture and Forestry, 2002)

Classification	Forest land	Scrub land	Total of forest and scrub land	Waste land	Other land classes	Total land area
				1000 ha *%*		
Category 1: Strictly protected forests	834 *4.1*	831	1 665 *7.2*	1 606	32	3 306 *10.8*
Category 2a: Protected forests where minor fellings are possible	79 *0.4*	19	98 *0.4*	16	2	116 *0.4*
Protected forests: Total of categories 1 and 2a	**912** ***4.5***	**850**	**1 762** ***7.6***	**1 622**	**34**	**3 422** ***11.2***
Category 2b: Areas under restricted forestry use	652 *3.2*	386	1 038 *4.5*	246	24	1 308 *4.3*
Total of all categories	**1 565** ***7.7***	**1 236**	**2 800** ***12.1***	**1 868**	**58**	**4 730** ***15.5***

Forest land: 20 153 142 ha, total of forest and scrub land: 23 023 206 ha, total land area of Finland: 30 459 382 ha.

Table 16. Arable land afforested, 1990–2003 (Source: Finnish Forest Research Institute, Forest Statistics Information Service).

Year	Hectares			
	Non-industrial, private etc.	Forest industries	State	Total
1990	8524	10	11	8545
1991	10439	14	4	10457
1992	17057	12	12	17081
1993	17683	1	4	17688
1994	8799	-	2	8801
1995	4131	-	6	4137
1996	9024	-	7	9049
1997	9293	-	10	9303
1998	7116	6	13	7135
1999	6153	-	10	6163
2000	5777	-	5	5782
2001	6008	-	1	6009
2002	2698	-	7	2705
2003	1952	-	4	1956

Table 17. The annual harvest of berries and mushrooms (Finnish Statistical Yearbook of Forestry 2003).

	Annual yield million kg	Amount picked up million kg	Amount picked for commercial use million kg
Wild berries	600–1100	40	10
Wild mushrooms	350–1000	2–10	0.2–1
Wild herbs	No estimations	No estimations	0.01

Table 18. Bogs of game and reindeer (Finnish Statistical Yearbook of Forestry 2003).

	1000 individuals	Meat 1000 kg	Calculatory value of the meat 1000 €	Year of measurement
Reindeer meat	106	2600	1100–1400	2002–2003
Wild game, moose and other artiodactylus	108	12120	59950	2002
Wild game, waterfowl	469	248	3797	2002
Wild game, grouse	315	189	2824	2002
Wild game, hares	258	501	2483	2002

Germany

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Executive Summary

Entrepreneurship in non-industrial commercial timber production

The number on forest owners in Germany varies between different authors from less then one million to one and a half million forest owners because the number of owners with less then one acre is enormous and can hardly be estimated. About one third of the forest area belongs to small forest owners, about a half of which is managed by agricultural businesses. Aside from forest-related income, most of the businesses receive income in varying amounts from other sources. Services have therein a growing share. By far, the income from the forest is realised through the sale of wood. For the most part, the owners of smaller areas have predominantly more or less urban life-styles and are not to be regarded as "entrepreneurs." The privatisation of forest areas in Eastern Germany and the increasing sale of forest in the western part of the country have caused the number of owners with idealistic interests and without their own managerial competence to increase.

Data on forest management and business success are almost exclusively submitted by farm foresters. They are in possession of relatively high stocks of coniferous wood, which have a high potential for use. A mobilisation of these quantities of wood has for a long time only limitedly succeeded in the larger businesses. The development of forest co-operatives also proceeds satisfactorily, above all with a high degree of participation of farmer forest owners, i.e. a high degree of government involvement.

[1] Chapter 1, 3, 4, 5
[2] Chapter 2
[3] Chapter 3
[4] Chapter 3

State extension and service offerings are being reduced at this time in most of the German states, and related involvement in the sale of private wood is being prohibited in certain cases for reasons associated with competition law. This is currently creating opportunities which can offer new possibilities to forest co-operatives as well as new enterprises. Until now, it has not been clear to what extent after the reduction of convenient government services agricultural businesses offer services and urban forest owners receive privately offered services.

The most important forest policy questions, which are also scientifically relevant, consequently touch on the possibilities for co-operation in the forestry associations as well as the development of demand and supply of forestry-related services and the marketing of wood.

Some recommendations for the German legislator can be made. The right of access shall be upheld in the interest of recreationists. But some legal amendments on specific uses of the forest would be helpful in order to stress disposal rights of private landowners and, thus, to facilitate implementation of RES-products

Entrepreneurship in industrial commercial timber production

Industries which can gain economics of scale by substitution labour by capital still grow (sawnwood, panel, paper), while those who are more dependent on labour (veneer and plywood) loose market shares. Another mayor factor is the possibility to develop products on high technical standards with value added services.

For decisions on political means as well as for entrepreneurial investments the question on potential reserves is of high value. No forecasting has been done in the project so far because in many areas the main problem was to quantify the volumes. Furthermore in many sectors no time series are available. To give some basic information on the resource situation the available data on inventories and on investment plans were used to give an expert estimate on potential uses and reserves. Furthermore inventories have been actualised in the “Bundeswaldinventur” for the year 2002.

It is quite obvious, that the main reserves on wooden biomass are located in forests. All other sources reserves are marginal in comparison to forest reserves. Thus, almost the complete reserve of 66.3 million m³ is located forests. However, this reserve is a technical reserve of wooden biomass. Under the current circumstances it will not be possible to activate this potential. Technical, ecological, social and economic limitations reduce the feasible reserve:

- Natural: Not all biomass can technically be harvested.
- Ecological: Biomass can only be removed as long as nutrition of forests isn’t harmed.
- Social: The owner structure and the targets of owners as well as their ability set limits to the mobilisation of the resource.
- Economically: At current prices it is not possible to remove most of the reserves.

However, even if only one third of the reserve is possible to mobilise in the next years, all current investment plans and more can be realised. The balance of wooden resources is therefore a helpful instrument for politicians and entrepreneurs to make their decisions on the use of wood resources.

Entrepreneurship on recreational and environmental products

Many good examples of new product development were done in recent years. The variety is very broad and in some forest enterprises the economic value is very high. However, most products are still niche markets. The barriers are mainly low skills and low interest of foresters on the one side and high transaction costs and risks on the other side.

Another barrier is science itself. The way neoclassical trained economists approach the problem (value calculations) do not help at all to bring more products in the market.

1 Consumption

1.1 Forest products' consumption and urban population

After a strong increase of consumption in most areas of the industry, since the middle of the 90's industry growth is more or less the stagnating. Especially the construction industry suffers from a sharp decline in residential and non-residential buildings, that has smoothened, but is still ongoing.

Table 1. General indicators of consumption in the year 2002

General indicators	**2002**
Population in 1.000	82.435
GNP in bil. € (current prices)	2.108
GNP in € / capita	25.572
employees	38.688
agriculture	955
wood industry	88
unemployed	4.060
housing units (completions)	289.601

Table 2. Consumption of mayor wood products in the year 2002

Wood consumption	**2002**
softwood lumber in 1.000 m³	16.080
hardwood lumber in 1.000 m³	1.230
particle boards in 1.000 m³	8.324
paper in 1.000 t	10.984
chemical pulp in 1.000 t	4.251
mechanical pulp in 1.000 t	1.427
used paper in n1.000 t	12.038

1.2 State of the art on demand for forest products and consumption

A good example for the overall consumption development can be given by the development of lumber industry. As production of softwood lumber was increasing in the last decades, production of hardwood lumber could not extend. The main reason is the lack of cost competition. While softwood lumber could realise economics of scale by substituting labour by capital and technological development, the hardwood lumber industry remain labour intensive and looses market shares while finished products (parquet) was more and more imported.

Table 3. Softwood lumber sawmills in Germany, in 1,000 m^3

Year	**1950**	**1960**	**1970**	**1980**	**1990**	**2000*)**
Production	7,890	6,213	7,458	8,359	10,394	14,456
Import	683	3,410	3,947	4,492	4,423	5,022
Export	172	129	183	444	926	2,816
appar. consumption	8,401	9,494	11,222	12,407	13,891	16,662

Source: Statistisches Bundesamt, Produktions- und Außenhandelsstatistik; ab 1991 Gebietsstand ab dem 3.10.1990. Comment: Sawmills with more than 1.000 m³ cuttings, from 1993 more than 5.000 m³ roundwood cutting. (estimation factor 1,076)

Table 4. Hardwood lumber sawmills in Germany, in 1,000 m^3

Year	**1.950**	**1.960**	**1.970**	**1.980**	**1.989**	**2000*)**
Production	1,023	1,525	1,925	1,989	1,599	1,677
Import	10	216	395	987	808	772
Export	45	70	156	368	380	563,035
appar. consumpt.	988	1,671	2,164	2,608	2,027	1,886

Source: Statistisches Bundesamt, Produktions- und Außenhandelsstatistik; ab 1991 Gebietsstand ab dem 3.10.1990. Comment: Sawmills with more than 1.000 m³ cuttings, from 1993 more than 5.000 m³ roundwood cutting. (estimation factor 1,457)

The following tables rank the German wood industry as producer, exporter and importer in Europe and in the world. The comparison between 1990 and 2000 show some changes in this decade. The sawmill industry in the Russian Federation came back on the market. Thus sawn wood production lost place one. But the exporting activities of the sawmill industry have increased rapidly.

Table 5. Ranking of the German wood industry in Europe and the world and its development in the last decade 1990 to 2000, **Production**

Production	**1990**		**2000**	
	Europe	World	Europe	World
Roundwood	1	9	4	13
Sawnwood	1	6	2	6
Panels	1	4	1	4
-Particle boards	1	2	1	3
-Plywood	3	10	6	14
-MDF	1	7	1	3
-Veneer	2	4	2	8
Paper	1	5	1	6

Table 6. Ranking of the German wood industry in Europe and the world and its development in the last decade 1990 to 2000, **Export**

Export	**1990**		**2000**	
	Europe	World	Europe	World
Roundwood	1	5	3	6
Sawnwood	6	9	5	7
Panels	2	6	1	4
-Particle boards	2	3	1	2
-Plywood	7	17	6	12
-MDF	5	10	1	1
-Veneer	2	5	1	4
Paper	3	5	3	5

Table 7. Ranking of the German wood industry in Europe and the world and ist development in the last decade 1990 to 2000, **Import**

Import	**1990**		**2000**	
	Europe	World	Europe	World
Roundwood	6	10	7	11
Sawnwood	5	9	3	4
Panels	2	4	1	4
-Particle boards	1	2	1	2
-Plywood	2	8	2	6
-MDF	2	4	1	3
-Veneer	1	3	2	6
Paper	1	2	1	3

1.3 Ongoing research and areas for incomplete information

In recent years some studies were made by the German Timber Council (Holzabsatzfonds) on consumption of sawn wood. Thus the information in this area is quite good. However, most of the material is not public and partly confidential.

An overall study on wood consumption was finished in 2005 by Mantau/Billitewski on demand of the Paper association. (VDP). The study covers the end uses of wood products. In areas where no empirical data were available, assumptions were made on the end use sectors. Most assumptions had to be made in the area of panels.

1.4 Main problems and research questions in consumption

The biggest problem in market research in Germany is that econometric modelling is not valued very much by the industry thus research potential cannot be developed by industry funds. This could be an area for EU-projects.

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2 Small-scale forestry practises

2.1 State of the art and historical development

Ownership structure, business size and management form of small private forests in Germany are closely tied together with the **modernisation of agriculture**. Almost the entire amount of smaller forest ownership stems from farm forest ownership. Besides the classical small farm forests in the more recently settled mountains, in many regions of Germany small-scale private forest holding came into existence only during the late 18th and especially at the beginning of the 19th century. This was often due to the super session of user rights and partitioning of municipal forests (Brandl 1993). During the 19th and 20th centuries, the small private forest area continued to increase above all through the **afforestation** of pastures that were no longer needed. In this way, the private forest area in Baden-Wuerttemberg increased by 16% over the past 40 years, but only by 7% resp. 1% in the state and communal forests. Within the private forest category, almost only the smaller businesses up to 50 ha attained of new forest and thereby expanded the area of small private forest (Schmid 1997).

In the meantime, the official statistics on private forests differentiate between agricultural businesses which own forestland and businesses that are strictly concerned with forestry. The number of agricultural businesses with forestland has greatly decreased over the past few decades in the course of the change in the agricultural structure. Therein, it catches the eye that, above all, the agricultural businesses with little forest give up agriculture. Statistically, this leads to the outcome that the number of business that are strictly concerned with forestry increases, as does the average forest area of the remaining agricultural businesses. Over the past few decades, the strictly forestry-oriented businesses have on average lost in area through this statistical effect. Since small forest areas without a relation to agricultural enterprises are not statistically covered, more forest owners and forest areas are increasingly being excluded from the official statistics. The raising of the limit of coverage to 2 hectares for agricultural businesses with forest and 10 hectares for forest businesses lead to the result that, with 1.8 million ha forest and presumably over one million forest owners in the meantime, considerable areas of forest and the majority of owners in Germany are no longer included in the statistics.

2.2 Small-scale forest holding

With 10.7 million hectares, forests cover about 30% of Germany’s area. 46% thereof are in **private ownership**. This percentage includes the forest in eastern Germany that is yet to be privatised. About 12% of the forest area belongs to people who own less than one hectare and a further 20% to those owning between one and 200 hectares. The share of private forest fluctuates greatly according to region. Much private forest is located in Bavaria, North-Rhine-Westphalia, Brandenburg, and Lower Saxony (Table 1).

The **economic significance** of the small private forest is presented in many greatly differing ways. Due to the small amount of commercial use and the high amount of individual use, the economic contributions of small private forests are considered by many authors to be marginal. Nonetheless, regional economic studies, which observe the entire cluster of forestry and wood, make it clear that with a changed viewpoint a high economic significance can also be attributed (Brandl 1999, Clusterstudie NRW 2003).

In these cases, noteworthy contributions to gross domestic product and the job market are even calculated for highly industrialised parts of Germany. These contributions are calculated, for example, as 7.2% of the GDP and 3% of all employment in North-Rhine-Westphalia, a German state with a large amount of private forest (Clusterstudie NRW 2003). There are no reliable numbers about the current harvest of wood in the small private forest area of Germany. Available numbers are often based on estimates that are then added. Empirical findings on the regional level vary greatly according to region and method of data collection. The Baden-Wuerttemberg "test business network" ("Testbetriebsnetz") currently documented 7.6 m^3 of harvested wood per hectare and year, while Bavarian surveys show between 3.8 and 5.4 m^3/ha/year (Brandl 1999, Perschl 2003, Schaffner 2001). Universally, it nonetheless becomes clear that wood use has increased considerably in recent years, above all, after the 1990 storm and related occurrences. Furthermore, it is undeniable that the sale of wood is by far the most important source of income for small forest owners.

Those small forest owners that generate **income** from their forest do so mostly in combination with other branches of production, commonly as a means of additional income. Income from agriculture, the service industry as well as tourism present further typical branches of revenue. The individual branches of revenue are combined in various ways and have varying degrees of relative significance. The combination of two or three branches of production is typical (Ziegenspeck 2002).

Aside from wood, Christmas trees and ornamental branches above all are marketed from the forest. They perform an increasing but nevertheless on the whole small contribution to the produced financial yields. Of the **non-timber forest products**, the income derived from hunting permits plays a role. This income varies in great deal nonetheless depending upon the presence of animals and the geographic location of the forest. The aimed for returns are likewise increasing slightly in comparison to past years. In regions with less suitable conditions for forestry production, the relative share of side uses to the entire return tends to be higher but stays, as a whole, of lesser significance for the entire return. On the other hand, financial aid from state has developed as an important component of income. Above all, this share of income is very meaningful following catastrophic events (Brandl et al. 1999, FVA 2003).

In the meantime, many people acquire forest properties, which predominantly pursue idealistic objectives. In the **forest property market** of Western Germany, this has for a long time been mostly restricted to individual parcels. Nonetheless, the change in ownership of extensive areas has taken place in Eastern Germany, where since the reunification of East and West Germany, the ownership structure has markedly changed. For one, the **restitution** of about 770,000 ha forest has made it possible for 370,000 people to again have access to their forest property. Furthermore, priory once socialised forests are being privatised with the objective to create a wide dispersal of ownership (Table 2). The share of private forest will thereby increase significantly in some German states. The goal that is tied together with **privatisation** – to establish economically stable private forestry businesses, depending upon ability, even establishing own personnel, has only partially been realised. The forest areas that are to be privatised were shaped through the land reform initiated during the Soviet

occupation and therefore are commonly characterised by a small size and a closely aggregated positioning with regard to other forest ownership types (Verch 2003).

Table 8. Current situation of privatisation, i.e. re-privatisation of once socialised forests (Wötzel 2003)

Categories according to privatisation law	**Flächen (ha)**
farm forest („Bauernwald“)	16,000
reposessed enterprises („Wiedereinrichter“)	13,000
newly acquired enterprises („Neueinrichter“)	140,000
earlier owners	130,000

From the altogether 600,000 ha of forest that is to be privatised, almost two thirds were sold by 2003. All forest units above a size of 30 ha should be sold by the end of 2004. In the following years, about a further 150,000 hectares of small areas will be sold (BVVG 2003).

In addition to the federal privatisation institution (BVVG), German states and communities in the meantime also offer forest areas for sale in a lesser amount. As long as the sold areas are not acquired by other forestry businesses, this provides a new source for the establishment of small forest ownership.

2.3 Small-scale forestry practices

Evidence for the great diversity and increasing heterogeneity of **objectives and attitudes** of small forest owners has been presented in many studies. Often the description of various "types" represents the diversity of owners (Judmann 1998, Becker und Borchers 2000, Spinner 2003). Therein, it becomes clear that, while many small forest owners increasingly pursue idealistic objectives, for some agricultural businesses the income from the forest is of existential importance. The typification emphasises, above all, free-time use, idealistic links (e.g family history, nature protection), ownership pride and classical economic interests. The most recent approach describes the life-style of the forest owner in a rural-urban continuum and makes the close association between life-style, mobility, free-time budget and forest management clear (Schraml & Härdter 2002, Ziegenspeck et al. 2004, Härdter 2003). The privatisation of forest in Eastern Germany under very favourable conditions was likewise used by numerous people whose economic interest is not their primarily interest (Spinner 2003).

The **age class distribution** and **thinning condition** of the private forest differ often clearly from the situation in the public forest. The afforestation activities at the end of the 19th century as well as in the 1950s and 60s resulted in the establishment of many spruce stands in the small private forest. The result is a tendency towards imbalanced age distribution ratios in the broad-leaved forest and slanted distributions in the coniferous forest. In North Rhine Westphalia, for example, 70% of all private spruce stands fall into the 2nd and 3rd age classes. Both age classes are massively over-stocked (Clusterstudie 2003). Inventories as well as time series from the Baden-Wuerttemberg "test business network" on small private forest likewise make it clear that the stocks of wood in the small private forests have increased on the whole over the past 20 years and have shifted in favour of spruce (Brandl et al. 1999).

Of the **management types**, the age class forest dominates on the inter-regional scale. Only regionally do other forms of management gain in relevancy. In this way, for example, the plenter forest has traditional significance in the farmer woodlands of the Black Forest. It is typical for the small private forest that the harvest regularly lies above the levels set by the calculated annual cut, but that the supply is thereby not reduced. Receiving both of these outcomes is commonly also the intention of the owners for tax and business reasons.

Studies show that small private forest owners interpret their forest, to a great extent independent of the actual tree species composition and management form, as close to nature. The possibility to influence species richness, structural diversity and stability is observed as relatively slight. Nevertheless, the preparedness for **forest conversion** has grown since the calamities of recent years and a more intensive extension and corresponding financial support (Bieling and Schraml 2004).

The high degree of **family employment** is characteristic of the small private farmer forests. This lies for these businesses constantly at 90% and, for the most part (ca. 70%), is concentrated on wood harvest (FVA 2003). On the whole, the work commitment that is performed by owners and their family in the small private forest category decreased amidst a background of urbanisation, while the share of outside services is unmistakably increasing. According to a Bavarian small scale forestry study, the number of businesses that employ outside work force members has doubled to 40% today as a result, compared to the situation 20 years ago (Schaffner 2001). The performed work time has decreased in recent years. This can be explained through greater productivity resulting from new procedures in wood harvest and utilisation (e.g. avoidance of manual bark removal), and also modern silvicultural methods. The share of **self-advertisment** has been insignificant for a very long time. But in Baden-Wuerttemberg, for example, it has continually increased and, most recently estimated at 4% is regionally double as high. While earlier almost only firewood was sold to self-advertisers, in the meantime, specialised entrepreneurs also harvest high-value sortiments (Brandl et al. 1999, FVA 2003).

The organisation of the **forestry associations** as well as the degree of organisation of the owners varies very strongly from region to region. At this time in Germany, 5,403 such co-operatives with 449.000 members and 3.3 million ha forest exist, with large differences in size and the professionalism of the business management (Bundesregierung 2004). The degree of organisation has greatly increased in parts of western Germany in recent decades. In Eastern Germany, it is still very low. Studies show that farmers and small forest owners with larger areas are for the most part members. Some co-operatives also try to include urban forest owners contractually through the services that they supply.

The work of some forestry associations has been considered as being particularly successful and therefore has acted as a model of sorts for many years. These are co-operatives with large supplies of wood and expansive activity in the service sector and businesses. With further observation, it is shown that these models lie above all in regions with comparatively favourable forest ownership structures. The individual businesses and their branches of operation related specifically to forestry are either

relatively large and the engagement of the owners high or the laws governing the individual ownerships are traditionally weakly formed, making the common management of an area easy to organise. In Eastern Germany, the decades-long public management of private forests also appears to be preventing new forms of common management.

Self consumption is evaluated as very constant in all studies, but it varies in its level, depending upon author, between one and two harvested m^3/ha (Brandl et al. 1999, Schaffner 2001). It is composed for the most part of firewood. In smaller businesses, almost the entire harvest of wood is processed into firewood and the proceeds from higher-value sortiments as for the most part forgone.

Through many surveys, it has become clear that most forest owners today are no longer **farmers**. The proportions of forest owners that have their main occupation in agriculture fluctuate according to region. Values from more recent studies in Western Germany lie between 14 and 48% (Härdter 2003, Becker und Borchers 2000, Bollin und Eklkofer 2000). Only in Eastern Germany are more individual forest owners active in agriculture and forestry (12%, Köpf 1997).

For the agricultural report of the German government about small private forests, up to 90% of the included businesses are fulltime farmers. But they manage only about 17% of the forest area. On average, about 2% of the proceeds of the entire business of these agricultural enterprises with forests come from forestry. The size class outline shows furthermore that positive net yields were, on average, first reached in the group with more than 50 ha of used forest area (Bundesregierung 2004).

Table 9. Characteristics of full time farmers with forest 2002/03 (Bundesregierung 2004)

Characteristic	**Unit of measurement**	**Forestry area**			**Sum**
		10 - 20	**20 - 50**	**50 plus**	
businesses	%	68.2	27.8	4.0	100
agricultural area	ha	58.8	69.8	117.2	64.2
forestry area	ha	13.9	28.3	86.1	20.8
wood harvest	m^3	44.4	92.6	0.0 ?	56.2
wood harvest	m^3/ha	3.2	3.3	0.0 ?	2.7
forestry support	€	49	224	955	134
gross income II forestry	€/ha	137	112	134	127
net income II forestry[1]	€	- 30	4	100	4

[1] calculated included forestry support

These data differ very clearly from those taken from individual regions that are rich in forest area as well as studies that include part time farmers. These studies show how important the sources of income that originate aside from the agricultural and forestry sources are today. In the southern Black Forest, for example, 36% of the entire income of the businesses stem from other sources. To this sum can be counted in order of decreasing significance: (1) dependent activity (2) tourism (3) services (4) direct marketing as well as further income. The diversification leads to typical work time patterns for family members. While the performances in tourism are almost exclusively carried out by women, men perform all other services (Mijacz 2000). The current discussion is affected by the engagement of some forest owners as producers of energy.

The energy sources biomass and wind power are increasingly supported by forest owners through the supply of raw materials, i.e. the leasing of areas.

The concentration of the most important **wood buyers** continues to increase. In Eastern Germany and neighbouring countries, extensive capacities for processing are still being created. Insofar, a sustained, high demand for various wood sortiments is to be reckoned with. Nonetheless, the demand requires minimum quantities and a continual supply. The share of wood that is marketed by the forest owners themselves to regional buyers continuously decreased in recent years. The only exception is firewood, which almost exclusively is sold directly by the forest owners. The marketing of logs and mass sortiments increasingly takes place depending upon the German state through forestry associations and regionally through the Forest Service.

2.4 Policy framework and production conditions

The most important laws, which also affect small private forests, follow the **federal structure** of Germany. Forest as well as nature protection law are based on the national legal framework and state regulations. Above all, in forest law a great regional diversity exists between those states that have adopted detailed rules on best management practices and other states with very liberal rules. In this way, in some states, for example, clear cut are regulated, while in others they are not. Important rulings that should support the sale of wood, such as the financing of common advertising of wood or tax reductions at the onset of calamities are, nonetheless, federally regulated.

Regional diversity exists with regard to **fixed costs** associated with mandatory insurance coverage, federal duties, and contributions to the so-called soil and water organisations, which are concerned with the drainage of agricultural areas. Above all, on poor sites the contributions to these institutions are constantly higher than the value of the potential amount of wood that can be used by individual owners.

In all German states, there has, for a long time, been a wide-spread and for the most part cost-free extension as well as a very cost-favourable supply of services for small forest owners. In addition, a voluntary education through courses, excursions, and schools has been offered. Traditionally these were organised differently according to region. Above all, the role of the state Forest Service with regard to individual consultation, schooling, advising of forestry co-operatives and the marketing of wood follows various models. In some states, close connections to small private ownership exist through the business leadership of forestry associations through state officials as well as unified methods of timber sale by both forest ownership types. At this time, this practice is being tested through national as well European institutions on the grounds of anti-trust law. Many actors await thereby a change to this practice.

Independent of the organisational form that has proceeded, the current reforms of the state forest services are leading to far-reaching changes. In one case, extension service is even expanded with the personal resources that have been freed up through the reform. As a rule, nonetheless, the dismantling of such services and an increase in the costs of other services are resulting. The forestry associations and private suppliers should fill in the resulting holes. The responsibility of the owner should be encouraged.

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

At this time in Germany, very high stocks of wood are presumed to exist in small private forests. The attention being given to small private forests by professionals is therefore enormous. It is awaited that the evaluation that is currently being undertaken of the second national forest inventory will show that, above all, there is a large supply of those sortiments from middle-aged coniferous forests for which presently a particularly large demand exists. Since these woods were most recently very intensively used in other forest ownership types, a significant potential of this forest ownership type exists in this case. Above all, such increased use will stem from the farm forests.

At the same time, serious doubts as to the possibility to actually mobilise this wood in large amounts exist for many small private forest owners because of social and business conditions. The life-styles of many urban forest owners and their income situations complicate the personal forest management for reasons associated with time and lacking competence and also make it financially unnecessary. Idealistic interests or disinterest in the forest predominate for wide parts of the smallest forest ownership class. In individual cases, this leads to a high level of participation in activities related to nature protection or in the conversion of coniferous into mixed forests, but many times this may lead to passiveness. This passive behaviour that many owners have taken on in recent years will increasingly be complicated. On the one hand, constant financial inputs into the land for insurance purposes and other contributions lead to a strain on the owner that does not yield any revenue. On the other hand, the reoccurring calamities that have taken place over short intervals in recent years have demanded more time and financial input from many forest owners than they were prepared to contribute. This leads to the result that many owners are regularly reminded of their forest property and are receptive to changes.

Above all, the large group of forest owning, part-time farmers has pursued various strategies of diversifying its supply in recent years. Oftentimes the amount of available work time of the family members is a limiting factor. The resulting, enormous work strain on the business manager restricts the pursuance of innovative ideas and is often no longer tolerated by the succeeding generation. At the same time, the political framework conditions are changing. The state forest services will increasingly be forced to give up their cost-favourable service-offerings. Many model projects that have performed wood mobilisation that spans ownership types in recent years were over-seen with large federal support. Through the retreat of financial input and personnel of the state government from state forest extension services, this will always become less possible. It is unclear to what extent private suppliers will fill up this gap. It is to be presumed that in the active farmer forest the significance of forestry associations will continue to increase and enterprises will establish themselves. Models of the private consultation of the smallest areas, which are in the ownership of urban forest owners are still to be developed.

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

Organisations studying small-scale forestry

Institute of Forest- and Environmental Policy, University Freiburg
Tennenbacher Str. 4, D-79106 Freiburg

Forstliche Versuchs- und Forschungsanstalt Baden-Württemberg,
Wonnhaldestrasse 4, D-79100 Freiburg

Lehrstuhl für Forstpolitik und Forstgeschichte, TU München
Am Hochanger 13, D - 85354 Freising

Bayerische Landesanstalt für Wald und Forstwirtschaft
Am Hochanger 11, D-85354 Freising

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3 Wood processing industry

3.1 State of the art and historical development

Ownership structure, business size and management form of small private forests in Germany are closely

Table 10. Wood industry in Germany

	Enterprises (number)	Employees (number)	Turnover (in million €)
Timber industry	2.655	51.636	8.538
Wood processing	1.114	71.543	8.587
Furniture industry	1.450	163.789	21.567
Carpenters	14.379	65.112	4.231
Furniture craftsmen	7.638	35.572	2.251
Wood related construction	28.839	175.736	11.950
Wood gross traders	4.431	55.038	18.962
Pup & paper	253	46.461	12.119
Total	60.759	664.887	88.206

3.2 Wood processing Industry

Introduction / Purpose of work

Since 1999 in the Section Economics of Forest Products at the University of Hamburg several studies have been launched on the "Sites of the German Wood Industry". A major task of the studies has been the identification of the sites of the main branches of the wood industry (panel board industry, chemical and mechanical pulp industry and biomass power and heating plants). Furthermore the consumption of different forest resources should be quantified. In addition to the main wood demanding industries two suppliers of important assortments of recovered wood (saw mill industry and waste management industry) were surveyed.

Segments of supply and demand of wooden biomass

The analyses of supply and demand of wooden biomass should be done in specific segments, because each of the following segments has its own specific market and industrial structure and therefore its own way of analysing biomass quantities. The following segments have proven as relevant and specific.

Supply

1. Cutting of logs and pulpwood
2. Other cuttings
3. Potential of forest biomass
4. International trade of row wood
5. Wood processing residues – sawn by products
6. Wood processing residues - industrial rest wood
7. Bark
8. Post-consumer wood
9. Landscape care wood
10. Energy plantations

Demand

1. Chemical and mechanical pulp industry
2. Panel board industry
3. Saw mill industry
4. Other material uses
5. Biomass Power and Heating Plants (> 1MW)
6. Biomass Power and Heating Plants (>1 MW)
7. Energy wood in private households

Distribution of wooden biomass

Every single wooden recourse is subdivided into demand areas. At first the domestic availability is determined. The domestic supply is extended by imports and reduced by exports. Inventory modifications also affect the domestic availability. Unfortunately, only few data are available only about stock levels. The amount of the domestically available wood raw materials is finally assigned to the demand sectors. The information about it is lifted up in the interviews. For this purpose the distribution structure and/or the procurement structure is asked in the questionnaire. The following figure shows the results for sawmill by products.

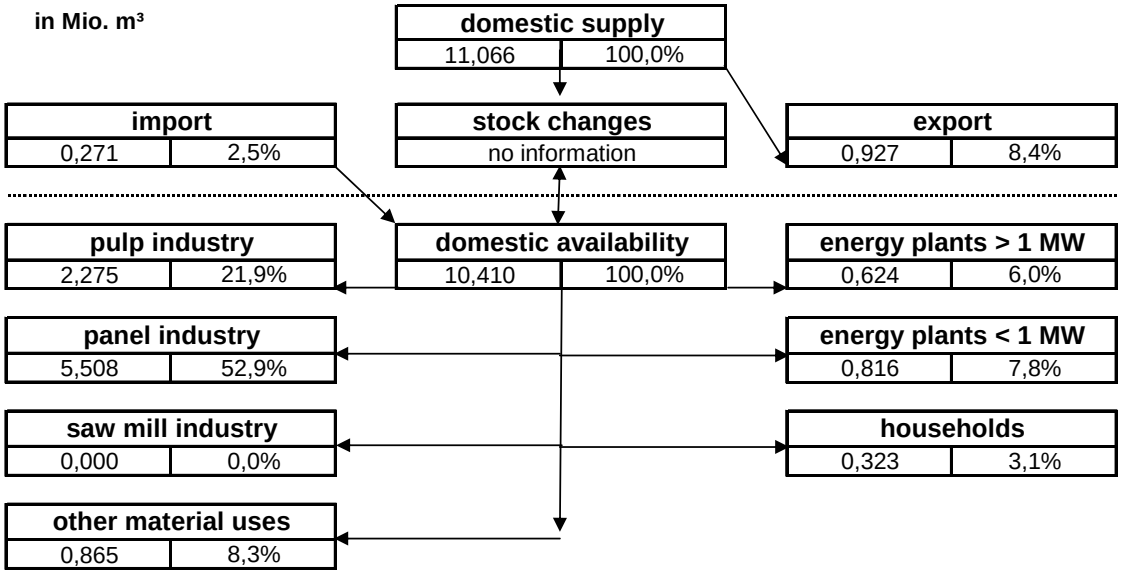


Figure 1. Flow chart of sawmill by products in million m³ (2002)

Similar to the sawmill by product sector all other sectors are analysed and quantified. Finally all sectors can be summarised in a matrix of resource flows.

Balancing the wooden biomass

To receive correct answers it is important to question the people asked in the measurement units correspondingly to those they act in their daily business life. Post-Consumer wood is measured in t(lutro) (air dry) while logs are measured in m ³. A corresponding conversion matrix has to be built to change different measurement dimensions into one comparable measurement unit for the drawing up a balance sheet. In case of the wood resource balance this was tons (absolute dry) and m ³.

Table 11. Sources and uses of wooden resources in different measurements (2002)

Uses		domest.	material				energy		
Wooden	unit	availa-	pulp	panels	saw m.	other	>1M	<1M	household
Sources	in	bility							
logs	Fm	30.3	0.0	0.0	29.9	0.4	0.0	0.0	0.0
Industrial	Fm	17.2	4.1	7.2	0.0	0.3	0.2	0.0	5.4
forest rest	Fm	7.6	0.0	0.0	0.0	0.0	0.4	1.9	5.4
sawmill by	Fm	10.4	2.3	5.5	0.0	0.9	0.6	0.8	0.3
bark	SRm	6.7	0.0	0.0	0.0	3.6	3.1	0.0	0.0
other industrial	m³	3.4	0.0	1.8	0.0	0.0	1.4	0.2	0.0
post-consumer	t lutro	6.4	0.0	1.5	0.0	0.2	3.8	0.2	0.8
landscape care	t atro	0.3	0.0	0.0	0.0	0.0	0.2	0.1	0.0

Fm (Festmeter) = used in forestry – equivalent to m³; pulp = pulp industry; panel = panel industry; saw m. = saw mills; other = other material uses; > 1 MW = power plants bigger 1 MW; < 1 MW = power plants smaller 1 MW; household. = energy wood uses in households

The following Table includes the conversion factors for absolute dry tons (t_{atro}) and m³. These are the most common measuring units for comparisons of volumes and masses.

Table 12. Conversion factors into t(atro) – absolute dry tons and m³

Uses		conversion	conversion
Wooden resources	unit	factor	factor
Sources	in Mio.	in t(atro)	in m³
logs	Fm	0,48	1,00
Industrial wood	Fm	0,48	1,00
forest rest wood	Fm	0,48	1,00
sawmill by products	Fm	0,48	1,00
bark	SRm	0,20	0,33
other industrial restwood	m³	0,48	1,00
post-consumer wood	t lutro	0,75	1,55
landscape care wood	t atro	1,00	2,07

The following resource matrix is converted in cubic meters. After conversions sums can be calculated. The sums of lines and columns are taken to build a summarised balance.

Table 13. Sources and uses of wooden resources in million m³ (2002)

Uses		domest.	material uses				energy uses		
Wooden resources	unit	availa-	pulp	panels	saw m.	other	>1MW	<1MW	household.
Sources	in Mio.	bility							
logs	m³	**30.3**	0.0	0.0	29.9	0.4	0.0	0.0	0.0
Industrial wood	m³	**17.2**	4.1	7.2	0.0	0.3	0.2	0.0	5.4
forest rest wood	m³	**7.6**	0.0	0.0	0.0	0.0	0.4	1.9	5.4
sawmill by products	m³	**10.4**	2.3	5.5	0.0	0.9	0.6	0.8	0.3
bark	m³	**2.2**	0.0	0.0	0.0	1.2	1.0	0.0	0.0
other industrial restwood	m³	**3.4**	0.0	1.8	0.0	0.0	1.4	0.2	0.0
post-consumer wood	m³	**10.0**	0.0	2.3	0.0	0.2	5.9	0.3	1.3
landscape care wood	m³	**0.6**	0.0	0.0	0.0	0.0	0.3	0.3	0.0
total		**81.7**	**6.4**	**16.8**	**29.9**	**3.0**	**9.8**	**3.4**	**12.3**

The wooden resource balance summarises the most important results of different studies an thereby gives a good overview on the actual sources and uses.

Table 14. Sources and uses of wooden resources in million m³ (2002)

Wooden resource balance in Mio. m³					
sources	Mio. m³	in %	**uses**	Mio. m³	in %
logs	30.3	37.1	pulp industry	6.4	7.8
Industrial wood	17.2	21.0	panel industry	16.8	20.6
forest rest wood	7.6	9.3	saw mills	29.9	36.6
sawmill by products	10.4	12.7	other material uses	3.0	3.7
bark	2.2	2.7	energy plants > 1 MW	9.8	12.0
other industrial restwood	3.4	4.2	energy plants < 1 MW	3.4	4.2
post-consumer wood	10.0	12.2	energy use in housholds	12.3	15.1
landscape care wood	0.6	0.7			0.0
total	**81.7**	**100.0**	**total**	**81.7**	**100.0**

For decisions on political means as well as for entrepreneurial investments the question on potential reserves is of high value. No forecasting has been done in the project so far because in many areas the main problem was to quantify the volumes. Furthermore in many sectors no time series are available. To give some basic information on the resource situation the available data on inventories and on investment plans were used to give an expert estimate on potential reserves. However, the table includes a broad basis of empirical data. Inventories have been actualised in the "Bundeswaldinventur" for the year 2002. In many questionnaires the interviewees have been asked on their future investments plans. In other areas, like post-consumer wood and industrial rest wood the possible development scenarios are limited. Thus, the table gives a good estimate on the wooden resource situation in Germany.

Table 15. Sources, uses and potential of wooden resources in million m³ (2002)

Wooden resource balance and potential reserve in Mio. m³							
sources	**actual**	**poten-tial *)**	**reser-ve**	**uses**	**actual**	**poten-tial *)**	**future needs**
logs	30.3	70.3	22.8	pulp industry	6.4	8.9	2.5
Industrial wood	17.2			panel industry	16.8	17.0	0.2
forest rest wood	7.6	44.0	36.4	saw mills	29.9	33.1	3.2
sawmill by products	10.4	11.6	1.2	other material uses	3.0	4.7	1.7
bark	2.2	2.4	0.2	energy plants > 1 MW	9.8	13.7	3.9
other industrial restwooc	3.4	4.8	1.4	energy plants < 1 MW	3.4	3.9	0.5
post-consumer wood	10.0	13.5	3.5	energy use in housholds	12.3	13.5	1.2
landscape care wood	0.6	1.4	0.8	***potential reserve**)***		***53.2***	
total	**81.7**	**148.0**	**66.3**	**total**	**81.7**	**148.0**	**13.1**

*) as far as information is available.

**) potential reserve = potenzial (148.0) - actual use (81.7) - future needs (13.1)

It is quite obvious, that the main reserves on wooden biomass are located in forests. All other sources reserves are marginal in comparison to forest reserves. Thus, almost the complete reserve of 66.3 million m³ is located forests. However, this reserve is a technical reserve of wooden biomass. Under the current circumstances it will not be possible to activate this potential. Technical, ecological, social and economic limitations reduce the feasible reserve:

- Natural: Not all biomass can technically be harvested.
- Ecological: Biomass can only be removed as long as nutrition of forests isn't harmed.
- Social: The owner structure and the targets of owners as well as their ability set limits to the mobilisation of the resource.
- Economically: At current prices it is not possible to remove most of the reserves.

However, even if only one third of the reserve is possible to mobilise in the next years, all current investment plans and more can be realised. The balance of wooden resources is therefore a helpful instrument for politicians and entrepreneurs to make their decisions on the use of wood resources.

Chemical and Mechanical Pulp Industry

At present the branch of the mechanical and chemical pulp industry in Germany consists of 22 enterprises. All but one enterprises took part in the interview carried out in the year 2003 (Mantau and Sörgel, 2003a). For this the data of the previous interview were consulted. Two enterprises were closed down in the meantime. In addition a cellulose plant is under construction at present.

Mechanical wood pulp is produced in 17 of the locations, 4 locations produce cellulose by to the sulphite method, at present one location is producing kraft pulp. A new cellulose plant which is to start operating in 2004 also will produce kraft pulp. The following table refers to the locations which are processing at present.

Table 16. Demand on raw material in the chemical and mechanical pulp industry in 2003 (Mantau and Sörgel, 2003a)

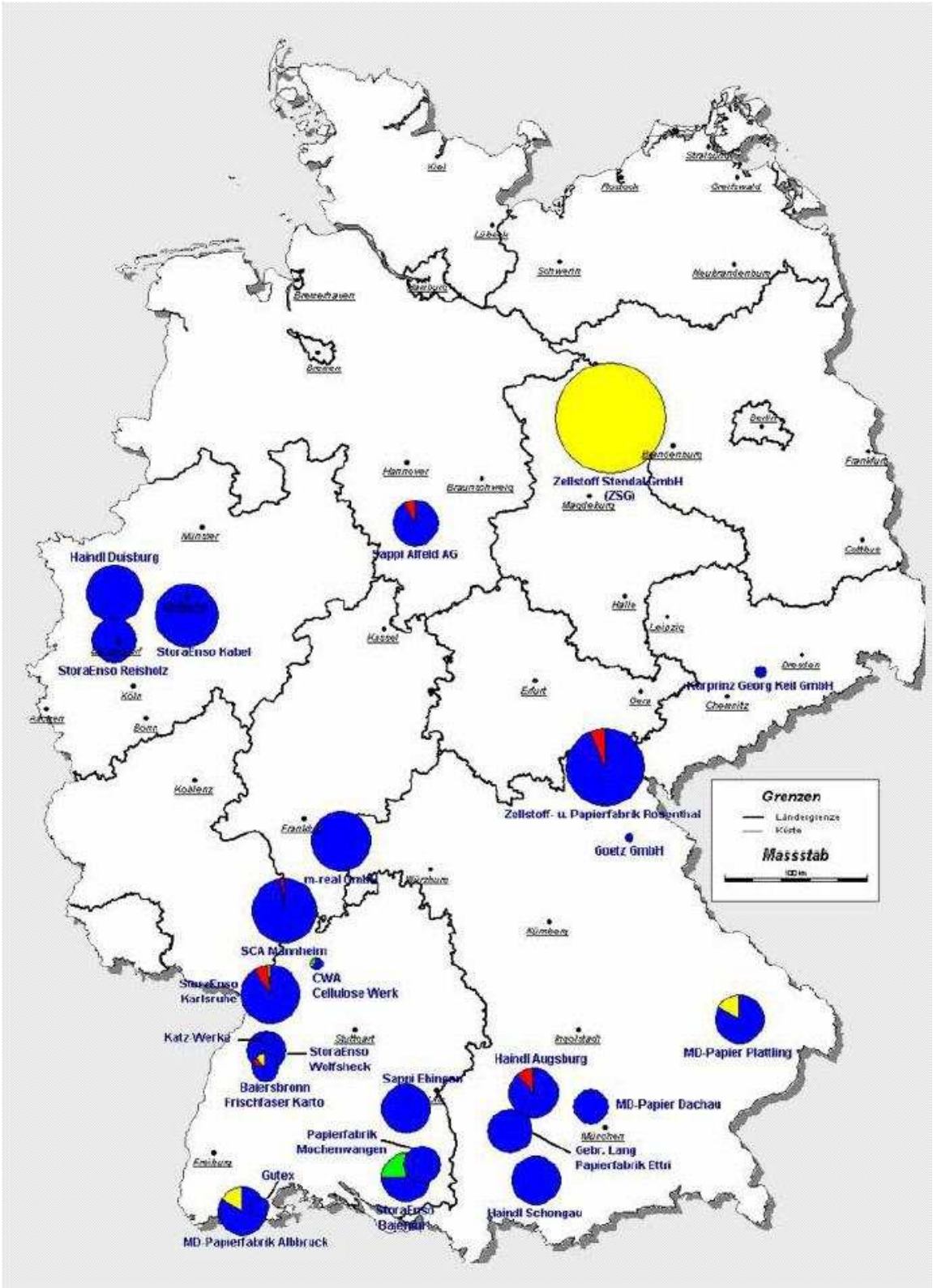
		Demand on Raw Material [1.000 Tons,					
Branch	Sites N	Tota	[%]	Ind. Wood		SawMill by-Pr.	
Mechanical	17	1,31	40.9	1,01	31.4	307	9.5
Sulphite	4	1,25	39.0	773	24.0	484	15.0
Kraft	1	645	20.0	194	6.0	452	14.0
Sum	22	3,22	100.	1,97	61.4	1,24	38.6

The table reflects the situation of the raw material demand in the year 2003. The plant utilisation of the cellulose industry (chemical pulp industry) lay at 99%, in the mechanical pulp industry at 79%. Saw mill by-products with a share of almost 40% strongly contribute to the total volume. Due to the new cellulose plant the total demand on raw material of this industry branch will increase by 1.3 m. t (absolutely dry), this being about 30% the latest by 2005. The need for saw mill by-products will then increase to approximately 1.6 m. t (absolutely dry), provided that the volume of output of the other locations remains on the standard of 2003.

Besides the demand on raw materials the sources of supply of the plants were examined as well. For the mechanical pulp and chemical pulp industry the most important direct sources of supply are forestry and sawmills regarding the assortments industrial wood (43.5%) and saw mill by-products (34%). By ways of the timber trade a total of about 22.3% of the raw materials are obtained, 17.7% of which are industry rest wood and 4.6% saw mill by-products. Direct raw material imports and other sources of supply with a total share of 0.2% are of secondary meaning.

In contrary to the examination of 2001 there is a significant trend to buying the raw materials directly from the producer. The share of the raw material trade in the total raw material supply was reduced by five percentage points within two years.

Map 1. Capacity of pulp industry



Panel Board Industry

In the context of the examination of the panel board industry the included locations were the production of particle boards, MDF and OSB. A total of 44 production lines could be identified on 37 locations. On seven locations there are two production lines. 66% of the addressed companies answered the questionnaires. Data about the production capacity of enterprises which did not answer has been taken from the media or from the previous examination.

Based on the answering enterprises, indicators were calculated. With these it was possible to display the plant utilisation, the demand of raw material and the sources of supply of the raw materials used for the complete industrial branch as well as for individual production branches.

For the year 2003 the industrial capacity of the panel board industry can be estimated to 13.4 million m³. The raw-material demand for this line of industry lies at 8.4 million tons (absolutely dry).

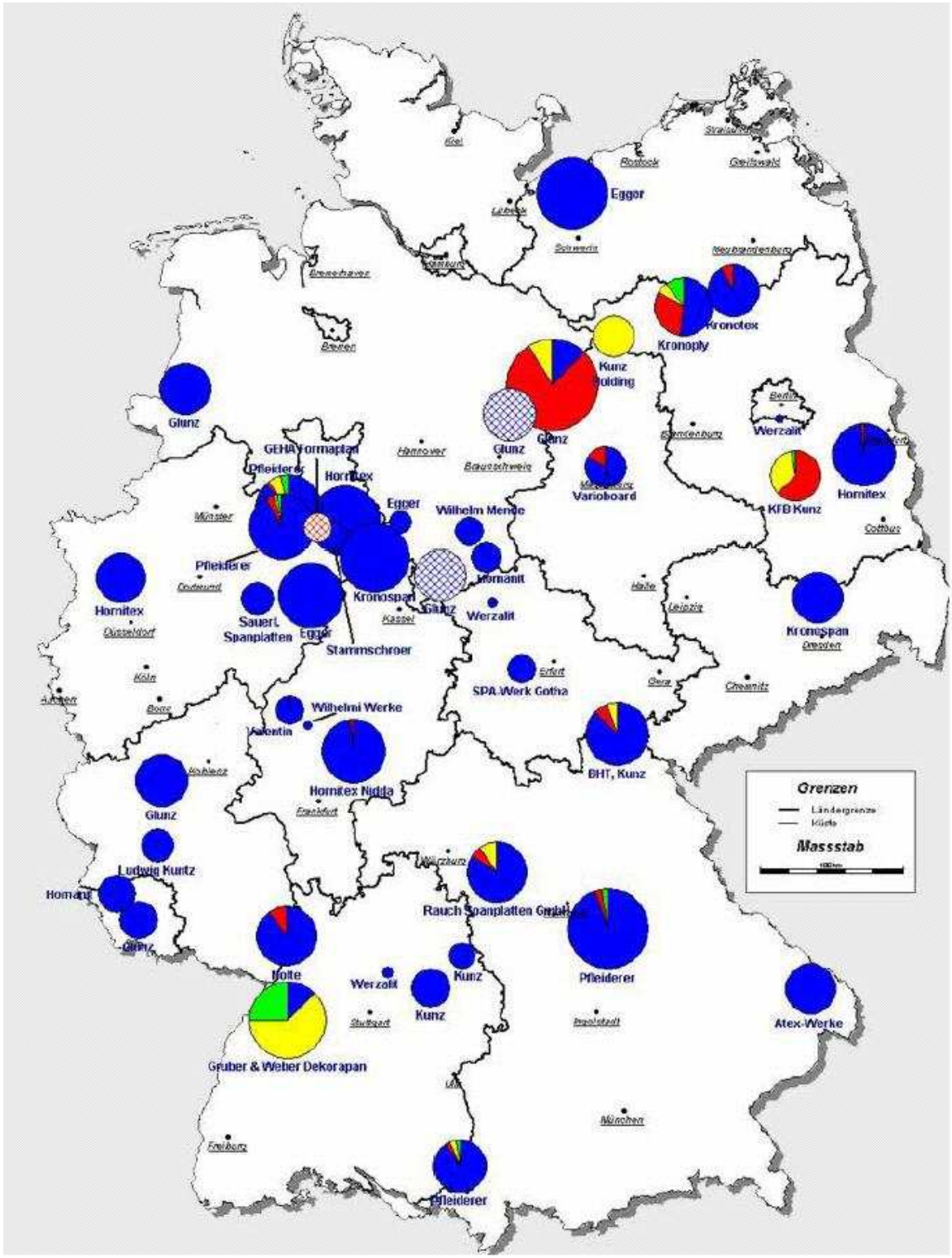
Table 17. Demand on raw material in the panel board industry in 2003 (Mantau and Sörgel, 2003b)

		Demand on Raw Material [1.000 Tons, absolutely dry]									
	Sites										
Branche	N	Total	[%]	Ind. Wood	[%]	SawM.by-Pr.	[%]	PostCons.W.	[%]	Other	[%]
Part.Board	27	5,142	61.3	1,253	14.9	2,697	32.2	1,088	13.0	104	1.2
MDF	14	2,730	32.6	1,703	20.3	1,009	12.0	19	0.2	0	-
OSB	3	515	6.1	515	6.1	0	-	0	-	0	-
Sum	44	8,387	100.0	3,470	41.4	3,706	44.2	1,107	13.2	104	1.2

Industrial wood, sawmill by-products, post-consumer wood and other fibrous materials are used as assortments. Great differences can be found within this branch. Industrial wood is used exclusively for the OSB production. The MDF production mainly needs industrial wood and saw mill by-products. 50% saw mill by-products are used for the particle board production. Industrial wood and post-consumer wood are used for the particle board production to approximately equal shares.

The investigation has shown that the demand of industrial wood is almost exclusively covered by forest enterprises (72.5%) or the trade (25.6%). Saw mill by-products are purchased to approximately two thirds (63.1%) directly from sawmills and approximately to one third (34.2%) from the trade. 80% of the post-consumer wood is delivered by disposal enterprises. Timber trade (10.6%) or imports from foreign countries (3.1%) only play a minor role. The source of supply of the other fibre raw materials could not be determined more explicitly.

Map 2. Capacity of penal industry



Saw mill industry

Many saw mills cut softwood as well as hardwood. Thus a 10%-definition was used. Mills that cut 90% and more of softwood are softwood mills, respective hardwood mills. All others are mixed mills. Of 3.038 documented mills by site 2.293 are softwood mills, 297 are hardwood mills and 448 are mixed soft- and hardwood mills. Almost 75% of all sawmills are hardwood mills, approx. 15% are mixed mills and 10% are softwood mills.

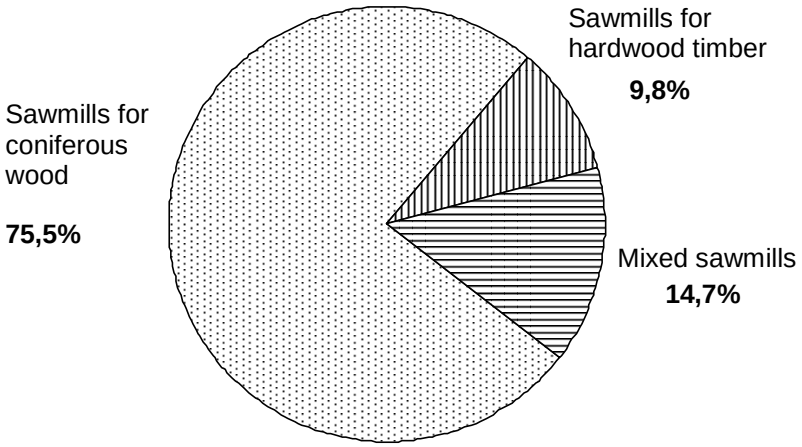


Figure 2. General business registration (Mantau and Sörgel, 2003c)

32.7 million m³ of wood are cut by 3,038 sawmills. 89% is softwood and 11% is hardwood. The softwood sawmills cut with 28.3 million m³ the greatest volume of wood. About one 1 million m³ of the softwood are processed by the 448 mixed operations. This corresponds to about 4% of the softwood cut. With the amount of 645,000 m³ the proportion of the cut in mixed operations is relatively high (18%). The softwood lumber enterprises saw about 80% of the leaves wood with 2.8 million m³.

Table shows the size class distribution of all sawmills related to the cut of the enterprises. About 50% of the enterprises have an annual cut of less than 2,500 m³. Of the total cutting volume these enterprises have only a share of 4%. Unlike this than 50% of the complete cutting is processed by plants bigger than 100,000 m³ capacity. These 63 companies have a share of 2% in the number of sawmills.

Even though the number of plants will decline further, unlike to other wood industries the structure of sawmill industry will remain diverse. Small companies in regional niche markets will remain as well as huge companies operating in world markets.

Structural differences in the production method become clear in this table. The yield on sawn wood is considerably higher in smaller saw mills than in the larger ones. The main quantities of the total of approx. 11.2 million m³ saw mill by-products are produced in the large sawmills. This strong concentration of the branch is an important aspect also for the marketing structure for saw mill by-products.

Table 18. Saw mill by-products in the saw mill industry (Mantau and Sörgel, 2003c)

Size Class by	Cut		Share	Saw Mill Residues	
Annual Cut [m³]	[1,000 m³]	[%]	[%]	[1,000 m³]	[%]
< 1,000	389	1.3	26.5	103	0.9
1,000-2,499	1,141	3.8	29.4	335	3.0
2,500-4,999	821	2.7	29.8	245	2.2
5,000-9,999	2,234	7.5	29.9	668	5.9
10,000-19,999	1,844	6.2	31.9	588	5.2
20,000-49,999	2,533	8.5	34.5	874	7.8
50,000-99,999	3,155	10.5	37.0	1,168	10.4
100,000-499,999	9,918	33.1	43.0	4,266	37.9
>= 500,000	7,893	26.4	38.1	3,005	26.7
Sum	29,928	100.0	37.6	11,253	100.0

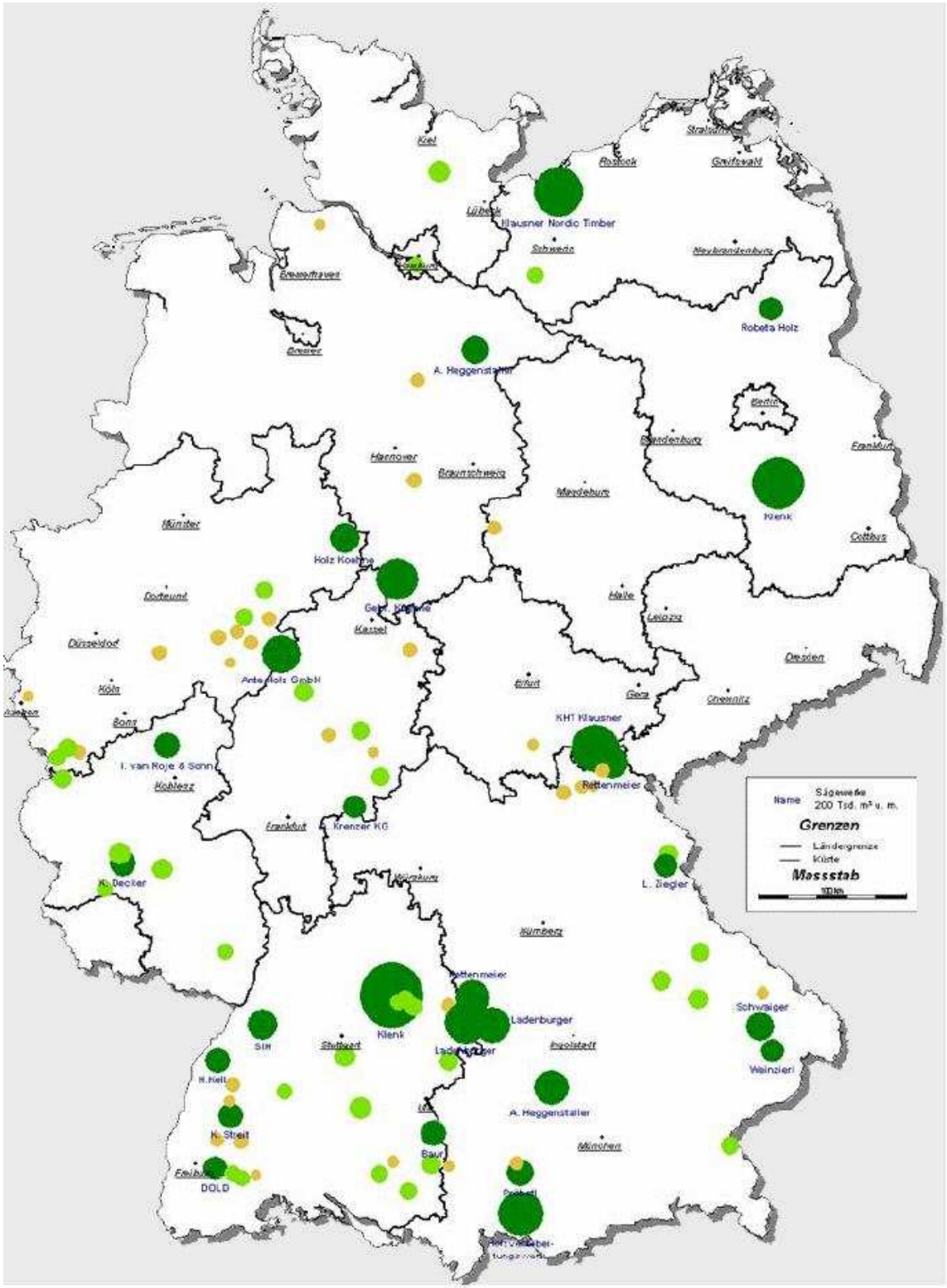
The examination of the sales and utilisation structure showed that the main customer of saw mill by-products is the trade (32%). Significant quantities also flow into the panel board industry (27.1%) and the mechanical and chemical pulp industry (18%). Remarkably high was the sale to other buyers (17.9%). With 2.7% the energy enterprises only take a quite small amount of the saw mill by-products directly. Adding the amount of the pellet production (1.5%) to this, about 5% flow into the generation of energy. However, it can be assumed that the final distribution to energy plants is much higher, since trade as the largest buyer may be in a better position to fulfil the needs of the energy industry.

The firms of the industry - Contractors

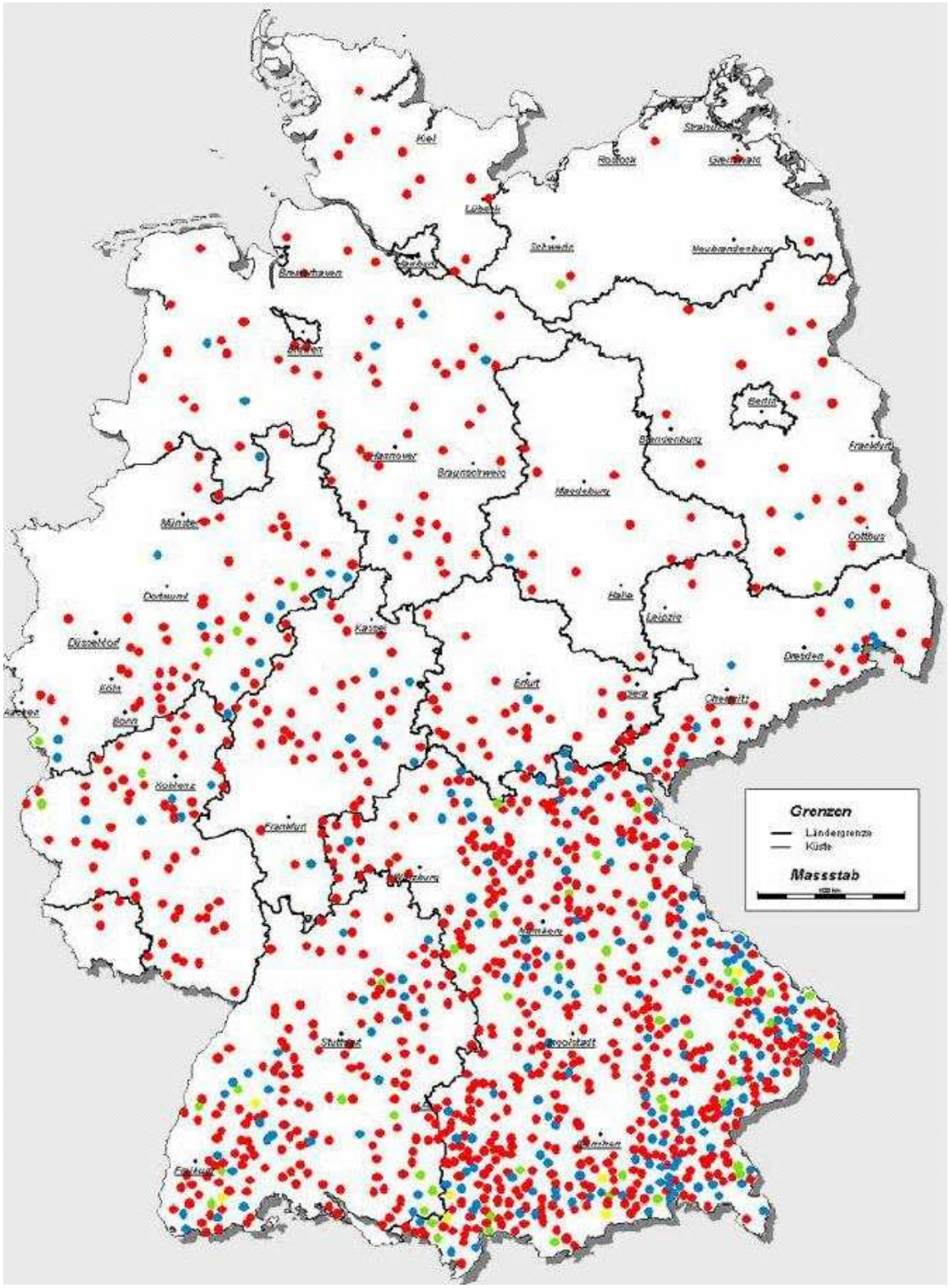
Number of contractors: Forestry contractors became more and more important over the last decades. However, only few empirical results exist on the number of forestry contracting enterprises, their effect on job creation or their structure. Most of the existing numbers are rough estimations without a standardised method. Their reliability consequently is to scrutinise. Nevertheless, these figures show two things. First, they give an idea on how many forest entrepreneurs exist in Germany. Second, there was a need to get actual data on the number of forest entrepreneurs in all federal states in Germany based on a transparent method.

Latest research results delivered rather reliable information about forestry contractors in Germany (Westermayer and Brogt 2004). A survey was carried out in order to receive reliable data on the number of forestry contracting enterprises located in Germany, the number of employees in contracting enterprises and their structure. To get representative data, all state forest district offices in all federal states were addressed with a short questionnaire (with exception to Bavaria and Saarland where no addresses were available at this time due to administrative reforms). In total 561 offices were contacted. The rate of return was 36%. However, only in 55% of the utilisable data contributed structural characteristics of the entrepreneurs to the study result. The final results will be presented in brief.

Map 3. Sawmills with more than 50.000 m³ cutting (coniferous logs)



Map 4. Sawmills with less than 5.000 m³ cutting (coniferous logs)



The survey on forest entrepreneurs resulted in an estimation of a total of 7,290 enterprises in Germany. About 90% of them are working in forestry operations full-time, the remaining 10% part-time. Therefore, the previous investigations underestimated the total number of enterprises drastically. First estimations spring from the year 2002 from H.-J. Narjes, chair of the forest contractor association in Lower Saxony. He estimated the total number of entrepreneurs, based on a survey in Lower Saxony in January 2002, at about 1,800 (Gabriel, 2002). However, Morat from the KWF estimated the total number to be about 2,800 (Kastenholz, 2002).

Compared with the numbers from 2002 the number of enterprises is about three times higher than estimated earlier. As a consequence thereof earlier estimated numbers of workers need to be reconsidered as well. Morat stated about 8,000 to 11,000 persons in this field (Kastenholz, 2002), with an average size of three to four persons per forest enterprise. A survey about forest machines from Nick and Forbrig (2002) resulted in an estimation of a total number of employees of 7.000 for Germany.

Westermayer (2004) reported 17,500 to 22,500 employees as a result of the analysis of various data sources and extrapolations, which would be about one fourth of the whole forestry workforce in Germany. In the survey, the district offices were asked to indicate the number of employees the forest enterprises. The questionnaire alleged five categories ranging from “only owner” to “> 15 incl. owner”. The results show that more than half of the forest enterprises are in a category “1 to 5 employees incl. the owner”. In several federal states the category “only owner” made 70 – 90%. The size of the forest enterprises proves that it is a small-scaled entrepreneurial landscape in Germany (Brogt and Westermayer, 2005).

Another possibility to make a statement on forest entrepreneurs is the ration forest entrepreneurs per 100,000 ha of forest area. Große (2001) stated 24 entrepreneurs per 100,000 ha in Lower Saxony (1999), for all western federal states a mean of 15 entrepreneurs per 100,000 ha in 1991. Directly after the German Reunion, this figure was about 30-40 entrepreneurs per 100,000 ha in the eastern federal states. But today, the number dropped down to 15-20 entrepreneurs / 100,000 ha.

Besides information on the total number of enterprises, the average size and the number of employees, data on the main activities of the forest entrepreneurs were collected. The aim was to identify major working areas as well as machine equipment. Again, various categories were given but also new working areas could be added to the questionnaire. The result was distinct: 61% of the entrepreneurs work in skidding and 33% work in motor manual logging operations. The percentage of the entrepreneurs that are active in the field of highly mechanised logging operations with 18% is quite low. Looking closer into the data it became clear that certain combinations of activities are common. Therefore an attempt to build categories reflecting the main fields of activity was made. The most common combination is motor manual logging in combination with skidding operation. Entrepreneurs offering this type of service combination were neither working as consultants nor in transport nor in highly mechanised logging operation. Highly mechanised entrepreneurs are involved only in logging activities. Entrepreneurs only working as consultants are classified as forest service engineers. Road transport builds

its own class. Boundaries of the presented classification are floating and any combination of activities is possible in individual cases.

It became clear that most of the enterprises are linked to the traditional field of logging, skidding or forwarding operations whether motor manual or highly mechanised. These enterprises can be integrated in the general group of forest enterprises. It is worth mentioning that in the eastern parts of Germany the level of mechanisation is higher than in the western parts. The differences in the history of forestry entrepreneurship in eastern and western part of Germany contribute to an explanation to this observation. Besides the forest enterprises other fields of activities were observed and illustrated in the figure.

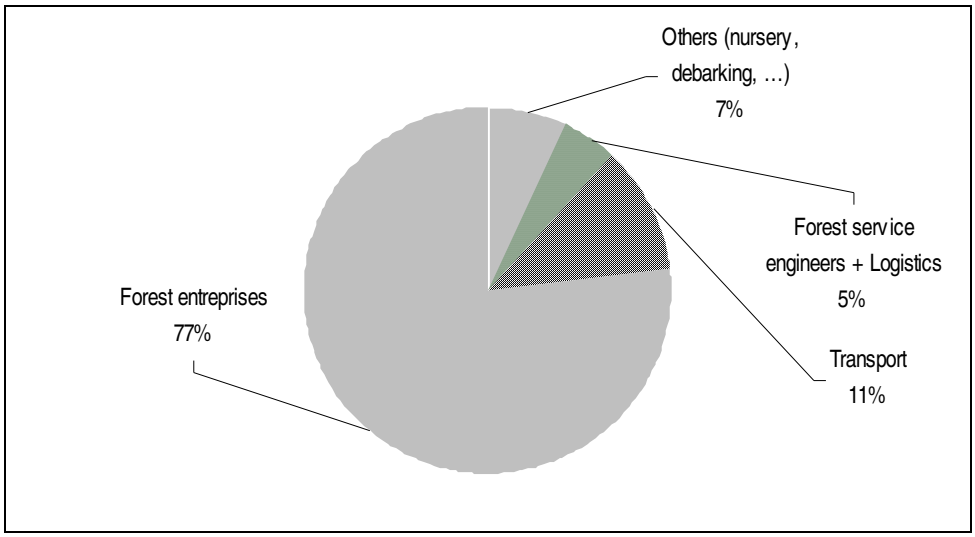


Figure 3. Percentage of different types of enterprises (source: Westermayer and Brogt, 2005)

Products / Services: To get a better understanding of the work and services offered by forest entrepreneurs it is necessary to have a closer look on the service they offer. Two big groups can be distinguished as indicated in the paragraph before. The first group is technical forest services. The second group is engineering forest services (Sachse, 2003).

Technical forest services means that the work directly linked with forestry work, i.e. silviculture, forest regeneration, thinning or harvesting and skidding operations. The establishment of new roads is closely connected to logging operations but also to recreational purposes. Therefore his work is considered as a separate activity. The results from the survey on forest entrepreneurs (Westermayer and Brogt, 2004) show that logging and skidding are the main activities and consequently close connected with the category of forestry contractor offering technical forest services.

Engineering forest services describe services offered by forest consultants. This group of entrepreneurs got important over the last years. At the beginning their work was not considered to be a service, however today the demand for external consultancy is increasing. Especially the support in the management of private or communal forest holdings provides good possibilities for these entrepreneurs.

The border between the two groups of services is merging since the integration of wood trade activities by entrepreneurs offering technical forest services. Mainly bigger forest enterprises try to provide complete service packages for forest holdings including e.g. the preparation of the stands for harvesting, logging operation, transport and wood sales. The idea is to get the whole wood chain from the standing tree to the gates of the wood industry in one hand.

Organisational and managerial structures: To structure a field that is as inhomogeneous as the one of forestry contracting is a huge challenge. In Germany attempts were made by Westermayer in 2002 and again in 2004 (Westermayer, 2002; Westermayer, 2004). The proposals differ which reflects the difficulties classifying forest enterprises in Germany. To start with a simple differentiation the differences between forest entrepreneurs and service agencies will be highlighted first. Service agencies, as affiliated companies of forest owners or wood processing industries, are aiming at the organisation of the wood chain from forest to factory. Logging operations are part of the wood chain and consequently service agencies get into the act as a new participant in the forest market. Often they have no own machine equipment and their core business lies in wood trade and the supply with service packs along the wood chain. To ensure the logging capacity a certain number of subcontractors are bound to a service agency.

The forest entrepreneurs differ in various ways and similarities that allow a clear classification are missing. Most of the enterprises are relatively small and have not more than 50 employees, with very rare exceptions. According to the directive of the EU Commission all enterprises are smallest (less than 10 employees) or small (less than 50 employees). The approach to describe forest contracting enterprises according to Westermayer (2004) is presented in the following paragraph. Within the field of forest entrepreneurs two extreme types can be set as a kind of pole: On the one side we have an enterprises consisting of the owner without employees. In most of this cases the entrepreneur does not have an own machinery but works with a high probability as a subcontractor. On the other side there are enterprises with, in some cases, up to fifty employees. These enterprises are equipped with forest machines like harvesters and forwarders and are operational organised. In most cases the enterprises are more the first ore more the second type, but sometimes a clear positioning is not possible. Because of that it is useful to say there is a continuum between both extreme types.

Owner without employees Family enterprise - no employees, only owner - maximal one machine - works mostly as subcontractor - intense integration in family structures	small and medium-sized businesses - up to 50 employees - several machines - several business sectors - organised structure	service agencies, logistic enterprises - managing functions - use of subcontractors - concentration on logistics

Figure 4. Typing forest entrepreneurs (source: Westermayer, 2004)

Education and business skills: Rural regions are characterised through migration of qualified personnel due to economic centralisation effects. In forestry operations a shift from state labour towards the assignment of forest entrepreneurs can be observed during the last years. But still there is no special education for job profile forest entrepreneur. Most of German forest entrepreneurs did a 3-year apprenticeship vocational training after main school, which alternates between school and practice. A special education or job profile for forest entrepreneurs working with harvesters and other machinery does not exist. Therefore qualification becomes an important aspect in forest entrepreneurial work (Sachse, 2003). While qualification actions for state employed forest workers was organised under the responsibility of the forestry offices there is no constraint for forest entrepreneurs for uniform occupational qualification to this day. In some federal states a demand for a certification of forest entrepreneurs, working in state forests exists. The details for qualification requirement are stated in the provisions of the contract for the certain federal state. In general, forest entrepreneurs need a vocational training in forestry, need to provide objective evidence of forest abilities or must be certified by the DIN, ISO, RAL or the German forest service certificate (DFSZ). However, there is no uniform rule for all federal states but it is stated from several states that they will require of forest entrepreneurs in future to be certified (Narjes, 2003; Thieme, 2004). This is largely because 63% of German state forest is certified by PEFC and for this the forest owner, in this case the state, needs to guarantee that the entrepreneur working in his forest keeps the logging principles.

Sachse (2003) found that despite the lack of the demand for a uniform qualification standard many forest entrepreneurs realised the need for education and further education. For the entrepreneurs investigated in his work, he found that in 1997 about 14% of the total work volume was done by unskilled employees. In 2002 only 3% were unskilled workers. The percentage of skilled workers increased during the time from 1997 to 2002 from 41% to 44%, the workers with specialised education from 41% to 47%. Especially in silvicultural activities the number of unskilled workers is high. Explanations are the general lack of qualified workers or the labourers only active as temporary staff. For this kind of activities the necessity of qualified workers is often undervalued. In other work areas, particularly in highly mechanised logging operations the demand for specialists is recognised to be essential. Also managerial skills are very important and the percentage of workers active in one of these two working area having special education is over 50%. This example shows that forest entrepreneurs recognised the need of qualification in order to provide good work and gain good operating profit.

Forestry Contractors Associations: Forestry Contractors in Germany are represented by associations. There is one umbrella organisation for Germany called DFUV, its members are the individual and independent associations in the federal states. All in all is the degree of organisation among Forestry Contractors is still rather low. The reason for this is mainly that many individual contractors do not clearly see the benefit of membership. But there is a development for the future which suggests that this negative attitude is going to change. The percentages of the entrepreneurs which take part in an association vary between the federal states. There is a high percentage of membership in some federal states while in others the percentage of contractors being member of an association is very low. The reason of this different behaviour is mostly based on the amount of lobby which is done in the regions. The chairman of the DFUV is for

example also chairman of the association of Lower Saxony. He is very active in advertising for joining together and in this case he shows the forestry contractors of his region much more advantages of this organisation than other chairmen are doing.

Socio-economic characteristics: Since the 1990s with the strengthened use of forest entrepreneurs several problems emerged and became gravely influencing factors. In the following the most important problems are listed forest entrepreneurs are faced with (Westermayer, 2004):

Economic problems force the entrepreneurs to run their machines full-time. Consequently the acquisition of new work orders is one of the major tasks for entrepreneurs. A partnership with bigger enterprises or the wood industry is one possibility to guarantee a sufficient work load. In general, the attitude towards subcontracting work is often negative.

Very long working hours (up to 14 hours per day) as well as work on Saturdays are common for the entrepreneur (and his employees, if existing). Variations occur due to work orders or weather and season.

Boundaries between work and life are merging and can't be defined clearly for the entrepreneur and at least for his family. Calculations are based on experience and probably on machine efficiency. There is often no calculation on a well-founded economic basis. The work area increased over the last years. In order to get new work orders machines are brought to locations up to several hundreds of kilometres away. One of the major problems is the tendering conditions for work in state forests. Low cost rates that did not represent the real costs for the entrepreneur and the European wide tender of huge forests overstrain entrepreneurs and especially small entrepreneurs are faced with enormous problems.

In Germany only few forest entrepreneurs are big enough and have adequate qualification to survive on this market or to defend niches occupied before. Even though nearly all small forest entrepreneurs are confronted with the strategic decision between a real independence of entrepreneurs or a close liaison with big service agencies or the wood industry this is one of the least discussed problems.

Due to these identified problems, the Institute of Forest Utilisation and Work Science focuses on the socio-economic factors in the research on forest contractors while most of the other studies on focuses on logistic models and wood procurement. Consequently, the factor "human" and the objective "social sustainability" needs to be highlighted in further research.

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4 Non-wood forest products and services

4.1 State of the art and historical development

There are some traditional non-wood forest products in Germany, like Christmas trees and hunting. Even these can be developed by value added strategies, as some case studies have shown.

There are no statistics on non-wood forest in Germany. The market is still in development. However, the general interest is increasing in the last years, as employment possibilities in forestry decreased rapidly. The most comprehensive study on non-wood forest in Germany is still the RES-project. Together with the Ministry of Agriculture a practical guide for forest land owners shall be produced in the near future.

The main objective of the RES research project was to develop market solutions and strategies for various forest outputs, which are considered to be not or hardly marketable. The phenomenon of „public goods“ (recreational and environmental goods and services of forest) was considered under dynamic conditions, in which marketability rather is a matter of product and framework development than of objective circumstances. The analytical framework was divided into five tasks:
Management of multifunctional forests
Strategies for product design and strategies for market transformation
Marketing strategies and training courses
Contracts, institutions and legal aspects (property rights)
Policy analysis and implication

Many practical solutions have been developed within the RES-Project. The following example shows checklists for legal aspects.

Identification of relevant legal provisions in Germany

As this research focuses on the frame conditions for RES-projects in general, it is not always simple to identify the legal problems in a specific case. Therefore, some checklists and tables shall be presented in order to give some orientation to the reader. It has to be noted that establishing of RES-projects in the forest can affect a lot of legal provisions. Their application does not only depend on the type of project, but on the place of realisation as well. Thus, provisions of state law are only applicable in the respective state, provisions on protected areas only apply if a designated site is concerned. According to individual circumstances, several provisions can be relevant and even several permits can be required. The following table gives a rough overview on the legal provisions that have to be checked and that can be applicable cumulatively for specific types of projects.

Table 19. Checklist to identify relevant legal provisions for RES-projects

Type of project	Relevant legal provisions
Mere access to the forest (e.g. events, camping, riding, ...)	Right of access Specific provisions on the respective activity
Recreational facilities	Conversion of forest areas Building-permit Specific provisions of state law Construction of fences Animal enclosures
Environmental projects	Afforestation
All projects (additionally)	Intrusion in nature and landscape Protected areas

In the next step, the relevant legal provisions have to be considered in detail in order to evaluate admissibility of RES-projects. However, in some cases it might turn out to be a problem to identify the relevant laws that contain the respective legal provisions. Unfortunately, the provisions are split up in a number of different laws and, moreover, the legal situation is not uniform throughout Germany as the most important laws in this context - nature conservation and forest law - are mainly subject to the legislative competence of the federal states. Besides, the legislator sometimes entitles the appropriate administrative bodies to enact specific provisions. Therefore, an overview on the different laws and their scope of application shall be given (see).

Table 20. Relevant German laws for RES-projects in the forests

Relevant law	Important provisions
Federal Forest Act (federal law)	Right of access to forests Conversion of forest areas Afforestation Protection of specific forest areas
Federal Nature Conservation Act (federal law)	Right of access to nature except forests Protection of specific areas Protection of species Animal enclosures Intrusions in nature and landscape
Forest and/or nature conservation law (state law)	Construction of fences Restrictions on riding, cycling, driving, camping and other activities in the forest Construction of recreational facilities Details on application of federal law
Traffic law (federal law)	Traffic regulations (order, security, events, fences)
Street law (state law)	Access to public roads Access to private roads (only Bre)
Building law (state law: order, security) (federal law: planning)	Construction of recreational facilities
Regulations of police law (state or local law)	Camping Organised events
Local decrees (empowerment by state law)	Gathering of mushrooms (Nds) Riding (NW, LSA)

Going further into detail, the provisions of the states on specific types of forest uses turn out to establish a very broad and complex field. Nevertheless, it seems necessary to review some of the details, because of their primary importance. Therefore, the main important provisions of forest and nature conservation law of the federal states are shown in the next table. Regarding this table, it has to be borne in mind that the table is not complete. Further provisions on specific uses do exist and other provisions might be additionally applicable, in particular regulations of police law or provisions of planning law. Besides, this table contains some simplifications; further details are described in the respective chapter of this research. Apart from this, it has to be noted that missing of specific provisions does not imply that the respective activity is generally admissible. Other provisions still may impose restrictions in individual cases and, furthermore, the appropriate authorities may prohibit specific uses when disturbances, damages or dangers are caused.

Finally, it has to be pointed out that admissibility of a specific RES-project can only be ascertained in individual cases according to the legal and the factual situation of the case. This research can only present a rather rough overview on the most important legal provisions and their general interpretation.

Final reflections and recommendations for German legislation

In respect of the legal situation in Austria, Italy and the Netherlands, some recommendations for the German legislator should be made.

The comparative study on the legal situation in different countries shows that the **right of access** has not turned out to be a general impediment for the implementation of RES-products. Therefore, it shall be maintained in the interest of recreationists. Even a regulation based on financial incentives for toleration of access, similar to Dutch law, would imply significant deterioration of recreational rights. Besides, this would necessitate very far-reaching legal changes and considerable burdening of the public bodies in financial respect which probably will not be accepted by German policy. But in order to facilitate realisation of specific RES-products, some legal amendments on specific uses of the forest would be helpful.

First of all, the legislator should specify the right of access with regard to the construction of fences and other types of **barriers in context with recreational uses**. Insofar, mainly the state legislators are asked to fill the legal frame provided by the Federal Forest Act. Thus, the state legislators could specify that fences and even charge of entrance fees may be admissible in the forest when the respective recreational facility or event is offered to the overriding public interest. However, this would still imply that significant impairments of free access and of the ecosystem must not be caused, so that only particular RES-products would benefit. But an even further change of the legal situation in favour of fences would not comply anymore with the right of access provided by the Federal Forest Act.

Table 21. Provisions on specific forest uses by German state laws

Type of use	BW	Bay	Bln	Bbg	Bre	Hmb	Hess	MV	Nds	NW	RP	SL	SN	LSA	SH	Thür
Riding admitted on lanes in general	F	N				F	F			L	F	F		F/N		F
„ only on marked lanes			F	F				F	F/N	N			F	L	F	
Riding prohibited on footpaths	F					F					F	F		F/N		
" on sport and nature paths	F					F	F	F		N						F
" on marked hiking lanes	F					F		F		N	F	F				
Cycling prohibited on footpaths	F												F	F/N		
" on sport and nature paths	F												F			F
" on bank promenades			F													
Riding prohibited away from lanes	F	N	F	F		F		F				N	F			
Cycling prohibited away from lanes	F					F		F				N	F			
Duty to mark riding horses	F	N		F			F		F/N	N		F	F		(F)	
Riding levy	F									N		F	F		(F)	
Driving by car				F, a				F, p								
Motorsport				F, p				F, p						F/N, p		F, p
Camping				F, a				F, a							F, p	
Caravaning				F, a				F, a							F, p	
Organized sport events	F, a			F, a				F, a						F/N, a		F, a
Organised meetings	F, a													F/N, a		
Organised gathering of mushrooms	F, a						N, a		L		F, a			F/N, a	N, a	
Construction of sale stalls								F, a								
Construction of advertising installat-ions								F, a								
Construction of lanes		N, n		F, a				F, a		F, n						F, a
Construction of recreational facilities	F, a													F, a	N, a	F, a
Construction of fire places	F, a	F, a	F, a	F, a		F, a		F, a		F, a	F, a		F, a			F, a

Abbreviations: a: approval, n: announcement, p: prohibited; F: provided by forest law, F/N: provided by common forest and nature conservation law, N: provided by nature conservation law, L: empowerment by forest or nature conservation law for provisions to be enacted by the local authorities, (F): provided by forest law, but not enacted.

Nevertheless, an amendment of federal law could be taken into consideration in order to determine the conditions of fences for recreational facilities in a general way throughout the country, similar to Austrian law. However, the German state legislators still would have to transform the federal law by adaptation of their state laws, because the federal legislator of Germany usually is not allowed to pass provisions of direct effect within the area of forest law which is subject to framework legislation.

Besides, enlargement of the right of access by the state legislators should be done prudently in respect of the interests of landowners. In particular, it could be stated that **gathering of mushrooms and berries** in small amounts is only admitted for free as far

as the landowner does not introduce picking-permits. Thus, a forest owner would still be entitled to implement RES-products in this field.

Another problem of RES-products is the **riding levy** which impedes contracting with riders or riding organisations if riders have to pay two duties at the same time: the public levy and, additionally, a private fee. However, only few federal states are actually concerned (NW, SL; SH only if the levy would be enacted). In this respect, adoption of legal provisions is necessary in order to introduce an exemption clause for the riding levy as far as private contracts on riding are effected on forest areas with the landowner.

Apart from that, it has to be hinted at the fact that riding is not included in the Austrian right of access at all which generally facilitates implementation of RES-projects in this context. However, exclusion of riding from the German right of access will probably not be possible for political reasons, besides it is not really necessary if the above mentioned amendments on the riding levy are adopted. The other restrictions on riding imposed by the state legislators do not have similar impeding effects on RES-products.

Finally, it has to be conceded that the German state legislators have enacted a number of **restrictions on specific recreational activities**. Moreover, most of these provisions have been passed in recent years due to the increasing demand for recreation of the general public and the various conflicts caused thereby. Even though these provisions are also aimed at the protection of private property, they can impose restrictions on those landowners who want to implement RES-projects. Therefore, it is necessary that the legislator pays due regard to the rights of the landowners when new provisions on recreation are enacted. Until today, RES-products that are implemented by forest landowners are probably not considered by policy leaders, so that some publicity in this market field is necessary.

In general, it can be recommended that a permit of the landowner for rather small recreational projects in the forest, such as events with rather small groups, should be sufficient. An additional authorisation of the forest authorities should only be required when the respective activity generally is dangerous, e.g. for big events with disturbing effects. Besides, a strict ban will only be necessary in very exceptional cases, e.g. for motor sport in the forest. It has to be borne in mind that further restrictions can still be imposed on protected areas in order to comply with the requirements of nature conservation. On the contrary, it should explicitly be stated by law that the appropriate authorities may prohibit recreational uses in individual cases when disturbances, damages or dangers are caused in order to protect nature, as well as providing safety to other recreationists. By this means, public interests can be sufficiently safeguarded while RES-projects are impeded as little as necessary.
Some recommendations for the German legislator can be made. The right of access shall be upheld in the interest of recreationists. But some legal amendments on specific uses of the forest would be helpful in order to stress disposal rights of private landowners and, thus, to facilitate implementation of RES-products.

4.2 Case studies of successful marketing strategies

Within the RES-Project 98 case studies have been documented. The following 28 of them in Germany. Two of them will be described more in detail.

Case Studies Germany

DE01 Christmas fair Forest and fishpond management "Waldhütten"
DE02 Holiday-flats Forest and fishpond management "Waldhütten"
DE03 Environmental information centre Forest authorities of Boeselager
DE04 Organised hunting events [indication of the name not authorized]
DE05 Nature preservation contracts Borough of Gieboldehausen
DE06 Direct marketing of game [indication of the name not authorized]
DE07 Riding permits [indication of the name not authorized]
DE08 Water protection sponsoring in the forest "Klimaschutz durch Wald e.V."
DE09 Specialised guided tours [indication of the name not authorized]
DE10 Seminars for executives Forest-land farmer Joseph Spann
DE11 Survival and Wilderness Center Freiherr v. Poschinger Forst- u. Gutsbetriebe
DE12 Holidays at the forester's Forest administrations Dahn and Schönau
DE13 Christmas fair Forest-district Alterfrade, Forest administration of Hamburg
DE14 Water protection forest Municipal undertakings of Hannover
DE15 Organised tours through the forest [indication of the name not authorized]
DE16 Christmas fair Freiherr von Gravenreuth / Affing
DE17 Events in the forest County forest [indication of the name not authorized]
DE18 Outdoor-events for enterprises Forest administration Lahnstein
DE19 Ski-tracks at the Taufstein Forest administration Schotten
DE20 Sponsoring of recreational facilities Forest administration Kassel
DE21 A track for motorsport City of Schlüchtern
DE22 Sponsoring of an afforestation FBG at the forest administration Fulda
DE23 Contract concerning cycling paths Forest administration Nürnberg
DE24 Utilisation of paths by a riding-school Forest administration Dinkelsbühl
DE25 Permission of downhill skiing Forest administration Schliersee
DE26 Letting of ski-tracks Forest administration Sankt Martin
DE27 Youth hostel in the forest Forest administration Sellhorn
DE28 Riding and hunting trips [indication of the name not authorised]
DE08 Water protection sponsoring in the forest "Klimaschutz durch Wald e.V."

Product: The "Verein Klimaschutz durch Wald e.V." is a non-profit association founded by two foresters. The main aim is the increase in ground water by turning pine forests into pine-beech mixed forests. Plantations are organised and paid by sponsors. The organisation acquires sponsors and organises the public relations necessary. Forest owners make their forests available to the project and by this get the plantations free of charge.

Place: The product is distributed in co-operation with forest enterprises. For tax reasons, there are no written sponsoring contracts.

Price / Bookkeeping: Non-profit organisations must not pursue financial targets. Therefore, the forest owners receive the afforestation free of charge. The project was

developed by a team. Working-hours total up to around 140 hours per sponsoring project. Bookkeeping and cost calculation are of low importance.

Promotion: The non-exclusive service of the raising of water is advanced to the level of „environmental responsibility“, and this value is marketed via sponsorships. To reach this aim, the environmental facilities of the forest are supplemented by additional product components such as information material or the invitation of the press. For tax reasons, the product is financed by donations. It was developed in 1995. The necessary knowledge partly was supplied by the forest authorities. The main target groups are enterprises and public institutions. The organisation had to submit an expertise on the influence of the forest conversion on the ground water level. Communication is done via newspaper articles, radio and television broadcasts, as well as the participation in ecology fairs. The name and the logo of the organisation can be considered as the brand name for the environmental contribution of the forest owner.

Public acceptance: Although the product was welcomed by the forest and nature preservation authorities, there were not any incentives from the side of these administrations for the development of the product. Experiences with private organisations were varied. One of the organisations sought to put an end to the projects as there allegedly is only a limited sponsoring volume at disposal. The public and the sponsors welcomed the project.

DE13 Christmas fair Forest-district Alterfrade, Forest administration of Hamburg

Product: The forest-district Alterfrade (540 ha of woodlands) belongs to the forest administration of Hamburg. Hardwood plantations which also contain a large percentage of fir species were established on areas formerly used agriculturally. Part of it is harvested for reasons of cultivation and marketed with the label "Forest product - free of chemicals". Besides, at Christmas the enterprise offers events for companies and associations which want to give their customers or members credit slip for cutting their own Christmas tree. The marketing of Christmas trees and decoration material contributes with 90% to the income of the forest-district.

Place: The forest enterprise markets the product direct to the customers. Furthermore, there are informal contacts to eco-farmers. There are no written contracts. Especially tax regulations have to be observed.

Price: As the area is run by a forest administration, the overall production target of the forest enterprise is of eminent importance for the offer. The financial targets of making profits were more than fulfilled. Besides, the motivation of the staff is an important target. Emphasis is laid on bookkeeping. Experience shows that the marketing-mix could be ameliorated, as well as cost calculation and organisation.

Promotion: Though the product is widely known, the concept of the production being distinctly based on the ecological aspect and the offer of additional events is new. The forester of the district was responsible for this development. The profit factors mentioned are the uniqueness of the product, good promotion and the support by nature preservation associations. Information on the market potential were derived from

discussions with potential customers, from own experiences, market research and tests. The target group of the product "event package" mainly are enterprises. When co-operating with companies, special demands are taken into consideration. In many cases, the companies combine the Christmas event with a visit at the neighbouring deer park. A new brand name (see above) has been developed and registered at the German Patent Office.

Public acceptance: The production of the Christmas trees without using chemicals especially was welcomed by the nature preserve groups. The product was immediately accepted by initial customers and the positive effect of the image of a product made without chemicals was an important point in promoting it.

DE19 Ski-tracks at the Taufstein Forest administration Schotten

Product: The forest administration Schotten (a public forest of 4,500 ha) in co-operation with the national park "Hoher Vogelsberg" offers a high-quality ski-track network consisting of a track for training and competitions and parallel to it a track for “spectators”. For financing the tracks, a sticker for the ski equipment is sold to the users of the tracks under the brand name "Loipl". Together with the “Loipl”, a track map is sold. It is not obligatory for the users to buy the sticker, but the proceeds of the sticker are meant to contribute to the fixed charges of maintenance.

Place: The track is offered in co-operation between the forest administration and the National Park. Though, there are no existing contracts on the co-operation. There is a legal problem as concerns the issue that the national park according to its statutes is not allowed to make profits. Theoretically, the proceeds derived from the sale of the sticker, therefore, would have to be deduced from the subsidies for the National Park. As this would not ameliorate the financial situation, there is an agreement presently, to deduce the proceeds of the sale of the sticker from the costs.

Price: The forest administration in charge supplies the following additional services: increased care to ensure traffic safety, longer hauling distances with regard to the tracks, seasonal limitation of hauling. The project has been carefully planned, and 3,000 stickers have been printed. The aim is to gain a positive profit contribution.

Promotion: Throughout the country, the region is important for the training of cross-country skiing. There are distances of different levels of difficulty and a floodlight track for professional and hobby skiers. In the development of the offer, the aspect of direction of visitors was an important issue. The product is the further development of an already existing ski-track (contract of agreement without remuneration). The forest administration has ameliorated the track by the removal of trees at the forest margin extremely exposed to weather conditions and conifers. Staff members of the national park ameliorated the signposting. The idea of the fee was supplied by the consumers themselves. For testing purposes, the sticker was sold in hotels, restaurants and boarding houses. Further promotional measures planned are articles in the regional press or television broadcasts. In the planning stage, as well, is a wooden gate at the starting point. At this gate, a track map will be supplied. On timber plates, the sponsors could be indicated.

Public acceptance: The reception of the product in the public has been positive in this context. Features of the product are the direction of visitors and the willingness of the users to pay for access to the track offered. The project conforms with the wishes of the regional politicians. As concerns the wooden gate, a conversation has been held with the Nature Preserve Authorities, and a corresponding licence has been applied for.

Reference

Complete literature on the state of the art up till 2000 can be found in:

MANTAU, U.; SEKOT, W.; MERLO, M.; WELCKER, B.: Recreational and environmental markets for forest enterprises: a new approach towards marketability of public goods. Wallingford: CABI Publishing, 2001, 541 S.

Further RES-publications:

MANTAU, U., MERTENS, B., WELCKER, B., MALZBURG, B.: Beiträge zur Vermarktung der Umwelt- und Erholungsleistungen des Waldes, Sonderveröffentlichung der AFZ, Hrsg. MANTAU, U., AFZ Der Wald 2001, 106 S.

WELCKER, B.: Marketing für Umwelt- und Erholungsprodukte der Forstwirtschaft. in: Sozialwissenschaftliche Schriften zur Forst- und Holzwirtschaft, Hrsg. MANTAU, U., Frankfurt (Peter Lang GmbH, Europäischer Verlag der Wissenschaften) 2001, 431 S.

MERTENS, B.: Absatzwege und Vertragskonzepte für forstliche Umwelt- und Erholungsprodukte. In: Sozialwissenschaftliche Schriften zur Forst- und Holzwirtschaft. Hrsg. U. Mantau. Bern: Peter Lang, 2000, 364 S., Band 1

The above mentioned books are the most important publications on this topic. More details under www.rrz.uni-hamburg.de\holz

5 Forests and ownership

5.1 State of the art and historical development

Forest resources and forest ownership

The following presentation of the development of forest area, forest ownership and growing stock is mainly based on the results of two Federal Forest Inventories. The first Federal Forest Inventory in Germany was carried out from 1986 to 1989, results were published in 1992. For the first time, all-embracing data was obtained concerning forest resources in the Federal Republic of Germany. The former German Democratic Republic was not included in this project, as inventories were already finished up to the time of reunion of both states. The second Federal Forest Inventory was carried out from 2001 to 2002. The results of this inventory were published in 2004.

The results of both Federal Forest Inventories allowed detailed information about development of growing stock for the first time. It became obvious that the actual increment of growing stock exceeded expectations. The 2nd Federal Forest Inventory became an important planning fundament for the German Forest products industry. So far, publication of the results of the 2nd Federal Forest Inventory can be seen as starting signal for the realisation of several greater projects in the German sawmill industry.

The total forested area in Germany amounts to 10.5 million ha. In addition, there are some 570,000 ha of not accessible or not forested area. In total, the forest area of 11.1 million ha covers about 31% of the land area of Germany. While the share of forest land in the western part of Germany is 32%, the forest land area in the eastern part of Germany covers about 29% of these federal countries` total area.

Since 1987, forest land area has increased by 1.0%, corresponding to 350,000 ha. As can be seen in Table 22, Western Germany shows a higher absolute increment of forest land, while the relative increment of forest land area was higher in the federal states of the former German Democratic Republic.

Table 22. Categories of forest land area by definition of 2nd Federal Forest Inventory

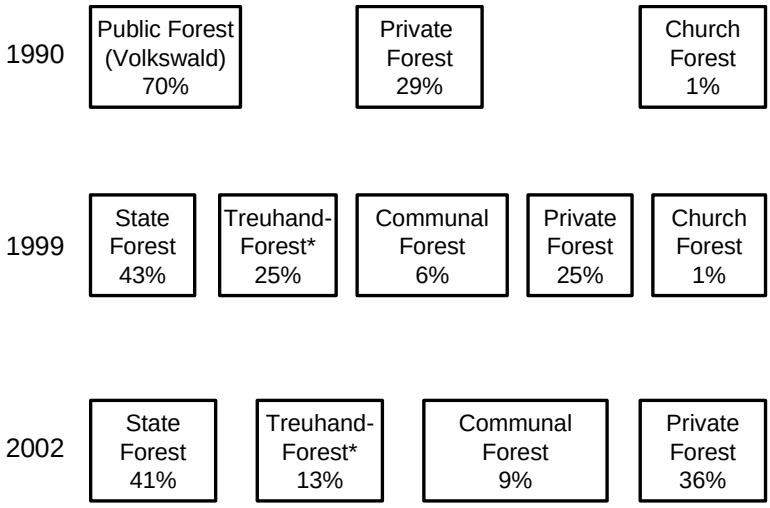
		in ha	in %	in % of
1	**total forest**	**11,075,79**	**100.0%**	**100.0%**
	thereof			
2	not	185,70	1.7%	1.7%
3	accessible forest	10,890,09	98.3%	98.3%
	thereof			
4	non-wood-	322,43	3.0%	2.9%
5	wood-	10,567,66	97.0%	95.4%
	thereof			
6		66,38	0.6%	0.6%
7	**forested**	**10,501,27**	**99.4%**	**94.8%**

Source: Federal Forest Inventory II (BWI²), 2004

With a share of 47% of the total forest area, private forest owners form the most important forest owner category in Germany. State forests reach a share of 33% of the total forest area, about 20% of the forest land are in communal possession. While the

distribution of the different ownership categories has stayed constant during a longer period in the western federal states of Germany, the eastern part of Germany has seen some changes as far as forest ownership is concerned. Especially the area of former public forests ("Volkswald") had to be assigned to private ownership structures. By the year 2002, a minor part of former public forests (about 400,000 ha) still was in possession of the "Treuhand association", i.e. had to be assigned to private proprietors (see Figure 4 for details).

Figure 4. Development of forest ownership, area of the former GDR



* Forest that used to be in possession of the former GDR government, yet to be sold to private owners

Source: Polley, 1994 ; Federal Forest Inventory II (BWI²), 2004

Table 23. Development of forest land area in Germany

	First Forest Inventory Results for 1987			Second Forest Inventory Results for 2002			Forest land increment (1987 - 2002)	
	Total land area	Forest land area	Share of Forest land	Total land area	Forest land area	Share of Forest land		
	in Mio. ha	in Mio. ha	in %	in Mio. ha	in Mio. ha	in %	in Mio. ha	in %
Federal Republic of Germany	35.69	10.73	30.1%	35.70	11.08	31.0%	0.35	+ 1.0%
Western Germany	24.86	7.75	31.2%	24.85	7.95	32.0%	0.20	+ 0.8%
Eastern Germany*	10.82	2.98	27.5%	10.86	3.13	28.8%	0.15	+ 1.4%

* Source: Datenspeicher Waldfonds

Source: Federal Forest Inventory II (BWI²), 2004

Growing stock in Germany amounts up to 3.4 billion m³, corresponding to 317 m³/ha. With a growing stock of 1.2 billion m³ spruce is the predominant tree species, followed by pine with a growing stock volume of 705 million m³ and beech with a volume of 583 million m³ (Table 24). With 348 m³/ha growing stock in coniferous forests is remarkably higher than in broad-leaved forests with a growing stock volume of 273 m³/ha. Table 25 shows growing stock by ownership categories. With 337 m³/ha private forests show the highest growing stock per hectare. At present, private forests hold 47% of the total growing stock volume. The comparatively high share of private forests` growing stock is the result of less utilisation particularly by smaller private forest

proprietors. As can be seen in Table 26, private forests show the highest increment in growing stock per hectare since 1987.

Table 24. Growing stock by tree species

Growing stock	**in m³/ha**	**in Mio. m³**
Oak	286	302
Beech	352	583
OBL*	234	157
OBS**	164	179
Broadleaved - total	**273**	**1,221**
Spruce	404	1,231
Fir	480	82
Douglas-Fir	274	50
Pine	282	705
Larch	301	91
Coniferous - total	**348**	**2,159**
All species	**317**	**3,380**

* = other broadleaved species with longer life-span

** = other broadleaved species with shorter life-span

Source: Federal Forest Inventory II (BWI²), 2004

Table 25. Growing stock by ownership categories

in m³/ha	broadleaved	coniferous	**total**
Federal State Forests	203	248	**231**
Countries` State Forests	262	335	**305**
Communal Forests	276	356	**314**
Private Forests	286	367	**337**
Treuhand-Forests	254	267	**262**
all ownership categories	**273**	**348**	**317**

Source: Federal Forest Inventory II (BWI²), 2004

Table 26. Changes in growing stock by ownership categories: Western Germany, 1987 - 2002

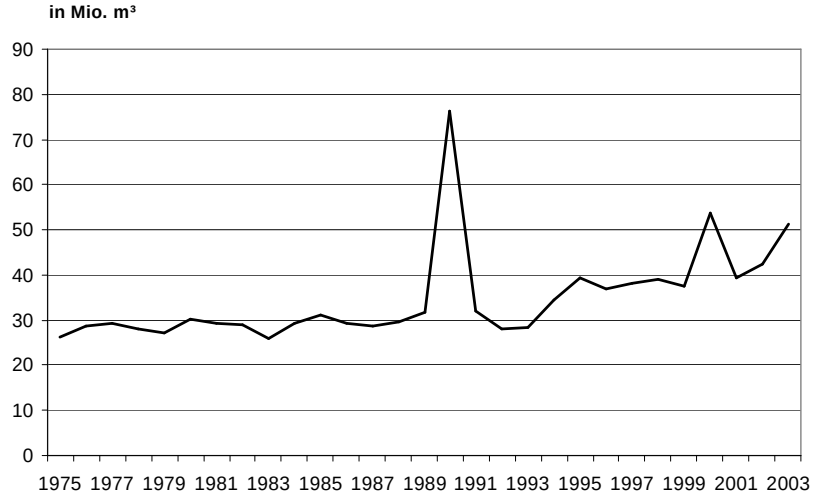
in m³/ha	broadleaved	coniferous	**total**
Federal State Forests	+45	+46	**+45**
Countries` State Forests	+32	+40	**+32**
Communal Forests	+35	+47	**+36**
Private Forests	+66	+92	**+79**
all ownership categories	**+47**	**+68**	**+55**

Source: Federal Forest Inventory II (BWI²), 2004

Forest production and wood procurement

Figure 5 shows the development of round wood fellings in German forests from 1975 to 2003. Round wood fellings augmented from 26.1 million m³ in 2002 to 51.2 million m³ in 2003.

Figure 5. Development of roundwood fellings, in million m³



Source: ZMP, 2004

The impacts of two great storm catastrophes concerning onset of calamity wood can be seen in Figure 5. In early spring of 1990, the hurricanes “Vivian” and “Wiebke” caused calamities of about 72 million m³. All in all, the round wood fellings in 1990 increased by 140% compared to the year 1989. The effects on trunk wood and pulp wood (including other assortments like fuel wood) fellings were different, however. While trunk wood fellings augmented by nearly 200%, the fellings of pulpwood and other assortments increased by 54%.

In December 1999, the hurricane “Lothar” caused calamities of 34 million m³. The damage was mainly focused on Baden-Württemberg, where 29 million m³ of calamity wood accumulated.

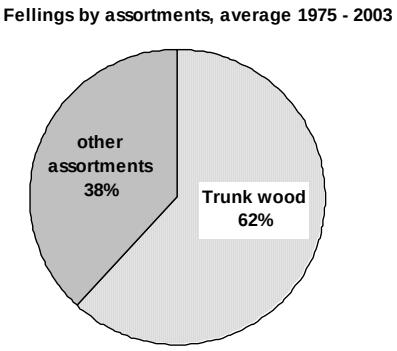
Irrespective of calamities, the 1990s show an increase in trunk wood and pulpwood use. From 1993 to 2002 round wood fellings were increased by 4.1% on an average compared to the preceding year. Forestry reacted to the growing demand from the forest products industry. The German sawmill industry showed remarkable growth rates especially since the end of the 1980s.

Trunk wood was the dominating assortment in round wood fellings, reaching an average share of 62% of total round wood fellings in the period from 1975 to 2003. Other assortments, including mainly pulpwood and fuel wood, reach an average share of 38% (Table 27).

Table 27. Roundwood fellings by assortments, 5-year-average in million m³

Mio. m³	Trunk wood		other assortments		Total
1975 - 79	17.602	63.1%	10.291	36.9%	27.893
1980 - 84	16.508	57.3%	12.288	42.7%	28.796
1985 - 89	17.611	58.5%	12.476	41.5%	30.087
1990 - 94	26.707	67.1%	13.115	32.9%	39.822
1995 - 99	24.176	63.2%	14.074	36.8%	38.249
2000 - 03	28.506	61.1%	18.183	38.9%	46.689
1975 - 03	21.621	62.0%	13.241	38.0%	34.862

Source: ZMP, 2004



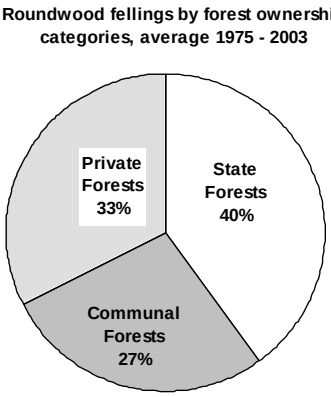
The decreasing share of pulpwood following the storm catastrophe in 1990 can be traced back, amongst others, on the fact that working up of more valuable trunk wood assortments was favoured at first.

As far as ownership categories are concerned, state forests were the dominating round wood suppliers during the examined period from 1975 to 2003 (Table 28). State forests reach an average share of 40% of total fellings, followed by private forests with a share of one third of total fellings, and communal forests with a share of 27%. While the state forests` share in overall supply augmented from 37% to 41% during the examined period, the communal forests` share decreased from 29% to 24%. The share of round wood fellings from private forests was declining from 33% in 1975 to 30% in 1999. The last four years of the examined period show an increase in private forests` share. It must be remarked, however, that this increase is partly due to a change in census by the responsible statistics bureau in Bavaria.

Table 28. Roundwood fellings by forest ownership categories, 5-year-average in million m³

	State Forests		Communal Forests		Private Forests		Total
1975 - 79	10.399	37.3%	8.178	29.3%	9.316	33.4%	27.893
1980 - 84	10.363	36.0%	8.379	29.1%	10.054	34.9%	28.796
1985 - 89	10.987	36.5%	8.859	29.4%	10.241	34.0%	30.087
1990 - 94	16.777	42.1%	11.407	28.6%	11.637	29.2%	39.822
1995 - 99	17.171	44.9%	9.465	24.7%	11.614	30.4%	38.250
2000 - 03	19.068	40.8%	11.252	24.1%	16.370	35.1%	46.689
1975 - 03	13.957	40.0%	9.533	27.3%	11.372	32.6%	34.862

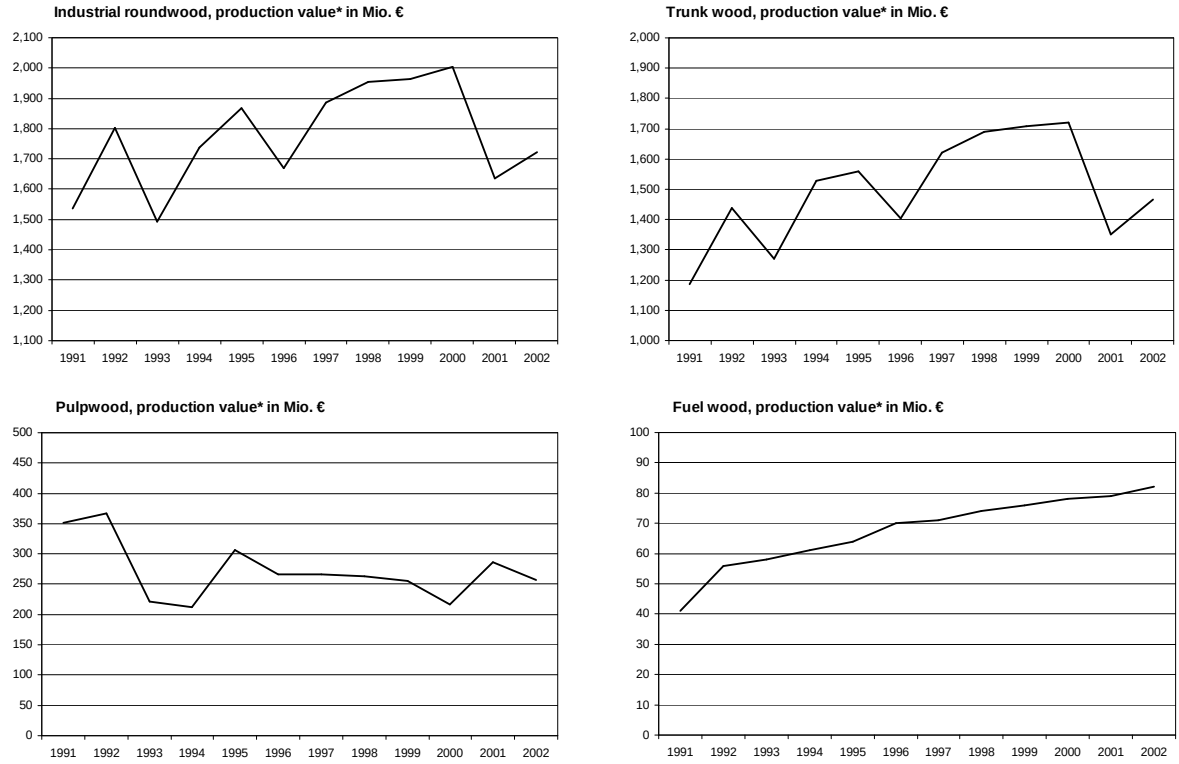
Source: ZMP, 2004



Production values of round wood production in German forestry are shown in Figure 6. The production value of round wood production (including subsidies and taxes) reached 1.7 billion euro in 2002, exceeding the production value of 1991 by 186 million euro.

With a share of 80 – 90% during the examined period, trunk wood was the most important round wood assortment as far as production value is concerned. Variations in the round wood curve's run are mainly driven by variations in trunk wood production value. The influence of the calamities at the beginning and the end of the 1990`s can be seen in all curves except the curve for fuel wood production value. While the curve for pulpwood shows a decreasing run during the examined period, production value for fuel wood has increased by 50%.

Figure 6. Production values of roundwood production in German forests

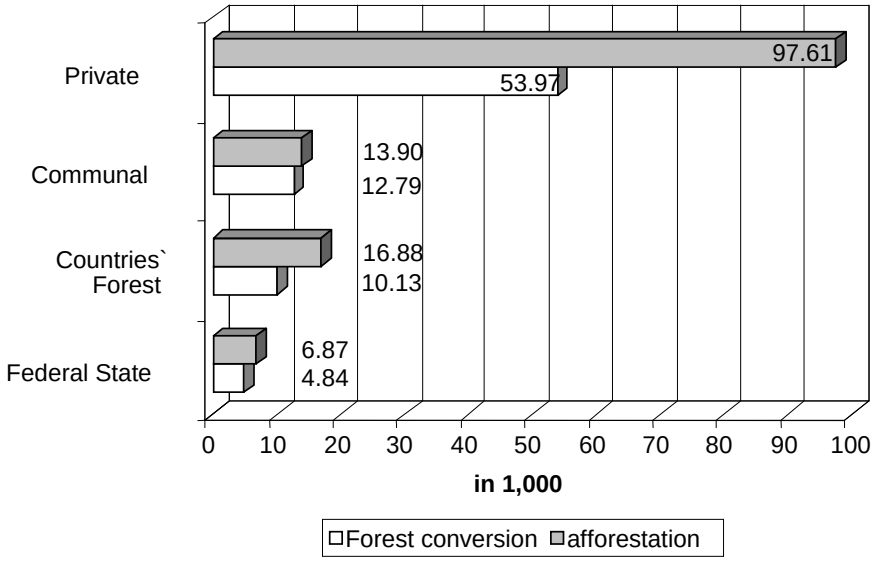


* : production values including subsidies and taxes
Source: Dieter/Rosin/Thoroe, 2004

Afforestation of agricultural land

According to the results of both Federal Forest Inventories, about 135,000 ha of agricultural land were afforested in Western Germany in the period from 1987 to 2002 (Figure 7). During this period, forest area increased by 54,000 ha as a result of both afforestation and clearing (forest conversion). For Eastern Germany, this comparison is not possible, as the first Forest Inventory was already finished up to the time of reunion of both states.

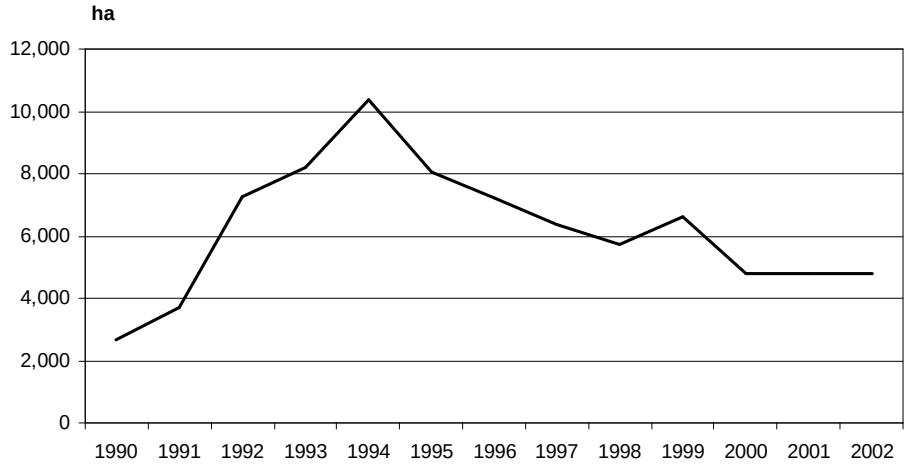
Figure 7. Afforestation and forest conversion in Western Germany, 1987 - 2002



Source: Federal Forest Inventory II (BWI²), 2004

Detailed data concerning afforestation for all Federal States are presented by Gottlob (2004). Gottlob (2004) summarises all afforestation measurements applied for subsidisation. From 1990 to 1999, an afforestation area of about 66,000 ha was applied for subsidisation. From 2000 to 2002, an additional afforestation area of some 14,000 ha was subsidised (Figure 8).

Figure 8. Subsidised afforestation in Germany, afforested area 1990 - 2002



Source: Gottlob, 2004

Protected forests and forests under restricted forestry use

In Germany, a forest area of more than 9 million ha is more or less protected or has protective functions according to the guidelines of the Ministerial Conference on the Protection of Forests in Europe (MCPFE). These guidelines display three classes of protective forest areas, among which overlappings occur, so that the real protected or protective forest area comprises about 75 to 80% of the total area displayed as

protected. Table 29 shows a list of the different protection classes and the respective forest areas. For comparison the classes of the World Conservation Union (IUCN) are added [see Roering, 2004].

Table 29. Forests in Protective Areas in Germany according to MCPFE-Guidelines (2002)

Form of protection	MCPFE class	IUCN class	forest area (ha)	forest area (%) *
Conserving Forest Biodiversity	1	I , III , IV	2,138,422	19.9
No active intervention	*1.1*	*I*	*0*	*0.0*
Minimum intervention	*1.2*	*II*	*90,831*	*0.9*
Conservation through active management	*1.3*	*IV*	*2,047,591*	*19.0*
Protection of Landscapes and Special Natural Elements	2	III , V , VI	4,686,038	43.6
Forests with Protective Functions	3	---	2,980,580	27.8

* of 10.7 Mio. ha, the official forest area before the results of last Federal Forest Inventory

Source: Roering, 2004

Forest ownership

Distribution of forest ownership in Germany is shown in Table 30 and Figure 9[5].

Table 30. Companies holding forest property in Germany

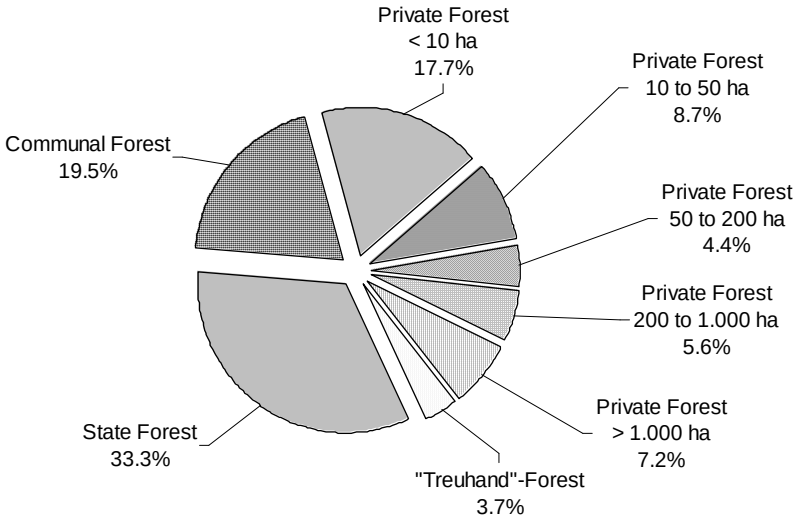
	State Forest		Communal Forest		Private Forest (excl."Treuhand"-Forest)		Total	
	companies	1,000 ha	companies	1,000 ha	companies	1,000 ha	companies	1,000 ha
less than 10 ha *)					605,425	1,321	605,425	1,321
less than 10 ha **)					197,603	641	197,603	641
10 to 50	35	1	3,317	79	44,722	961	48,074	1,041
50 to 200	27	3	2,712	286	4,595	489	7,334	778
200 to 500	49	17	1,345	418	907	332	2,301	766
500 to 1.000	87	62	608	425	349	287	1,044	774
1,000 and more	732	3,603	477	952	224	793	1,433	5,348
Total	**930**	**3,686**	**8,459**	**2,160**	**853,825**	**4,824**	**863,214**	**10,670**

*) estimation using different sources - forest owners not seized by the official statistics, area determined as residual

**) only agricultural companies holding forest property between 2 and 10 ha

Source: Statistisches Jahrbuch über Ernährung, Landwirtschaft und Forsten, 2002 ; Federal Forest Inventory II (BWI²), 2004; own calculations

[5] Note that „Treuhand"-forest area is not included in Table 30.



Source: Calculations by Mantau on basis of - Statistisches Jahrbuch über Ernährung, Landwirtschaft und Forsten, 2002 ; Federal Forest Inventory II (BWI²), 2004;

Figure 9. Distribution of forest property in Germany

The number of forest owners in Germany is not fully seized by the official statistics. As far as the number of private forest owners holding less than 10 ha of forest area is concerned, only estimations exist. Table 30 therefore shows the results of own calculations completing the official statistics` data. According to these calculations, about 860,000 forest owners exist in Germany[6].

With a share of 47% of the total forest area, private forest owners form the most important forest owner category in Germany (including "Treuhand"-forest area). State forests reach a share of 33% of the total forest area, about 20% of the forest land are in communal possession.

Private forest owners in Germany predominantly hold small scaled forest areas. Companies with forest areas larger than 1,000 ha account for not more than 16% of the total private forest area. On the other hand, about 61% of the total private forest area is held by companies with less than 50 ha individual property, companies with less than 10 ha forest area account for 41% of the total area.
Agricultural structures, division of forests, strict heritage rules, afforestation of small agricultural areas lead to this patchwork of private forest ownership. The connection to agricultural businesses became weaker over the last years, and associated is a loss of the sense of responsibility, a lack of forest management knowledge and estrangement. All this brings up huge problems as far as mobilization of growing stock and coordination of forest management are concerned [Brogt, Kastenholz, 2005].

The communal forest shows higher average company sizes than the private forest. 83% of the total cmmunal forest area are held by companies with more than 200 ha forest

[6] The number of private forest owners with less than 10 ha forest area was calculated using the residual area between officially seized forest owners and the whole German forest area according to 2nd Federal Forest Inventory. Therefore it was implied that non-agricultural private forest owners hold an anverage area of two-thirds the size held by agricultural forest owners with less than 10 ha forest area.

area, 65% are held by companies with more than 500 ha and about 44% of the total communal forest area is held by companies with more than 1,000 ha. For comparison only, the smallest company units in Federal States` Forest administration still hold forest areas of at least 1,000 ha.

State forest services still have a predominating role in German forest management, because most of the community forest is managed by state forest staff on the basis of a mutual regional management structure, and a majority of the small scale private forest is managed by state forest district offices under terms of priviledged consulting, i.e. indirectly subsidized [Brogt, Kastenholz, 2005].

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Summary

Hungary is located halfway between Nordic Countries where forests have a dominant wood production function, and Southern European countries with an emphasised protective function of forests. When role of forests in economic development is considered, Hungary is also halfway between developing countries which rely on natural resources to a large extent, and developed countries which mostly focus on the protection and conservation of their forests. As a result of this midway position, Hungarian forest policy focuses on finding a balance between economic and protective functions of forest utilisation. However, economic role of forest is often underestimated: ordinary people or even experts emphasise the importance of environmental factors against economic issues. This general opinion indicates that direction of forest policy will turn toward a more natural management in the long run, but economic factors of forestry cannot be neglected in the forthcoming years. In private forests, conflicts between personal and public interest also have to be taken into consideration.

The main factors, which affect the competitiveness of forest consumer chain, are as follows:
- fragmented ownership system;
- pressure form the state to formulate joint forest estates;
- low wood price;
- lack of investments and capital;
- lack of clear and long term subsidy system and stable state policy toward private forests.

The main problems and research questions for enterprise development in the forest sector:
- How private forest management can be evolved?
- What are the effects of EU accession on private forests?
- How can the forest administration be simplified?
- How can the ownership system be transformed to reduce area of undivided joint ownership?
- How can our knowledge be improved to provide a deeper understanding of local economy?

1 Consumption

1.1 State of the art and historical development

The total area of the country is 9,303 thousand hectares. The population is 10 million. Hungary is in the temperate zone of fronded forests. The forested land is the second largest field of cultivation in Hungary after the plough-land. Unlike the average European conditions, 84.9% of the forested land is deciduous, and 15.1% is conifer forest. 57% of the forest is of native species, 43% consists of extraneous or acclimatised species of tree (locust, pine) or cloned species (improved poplars).

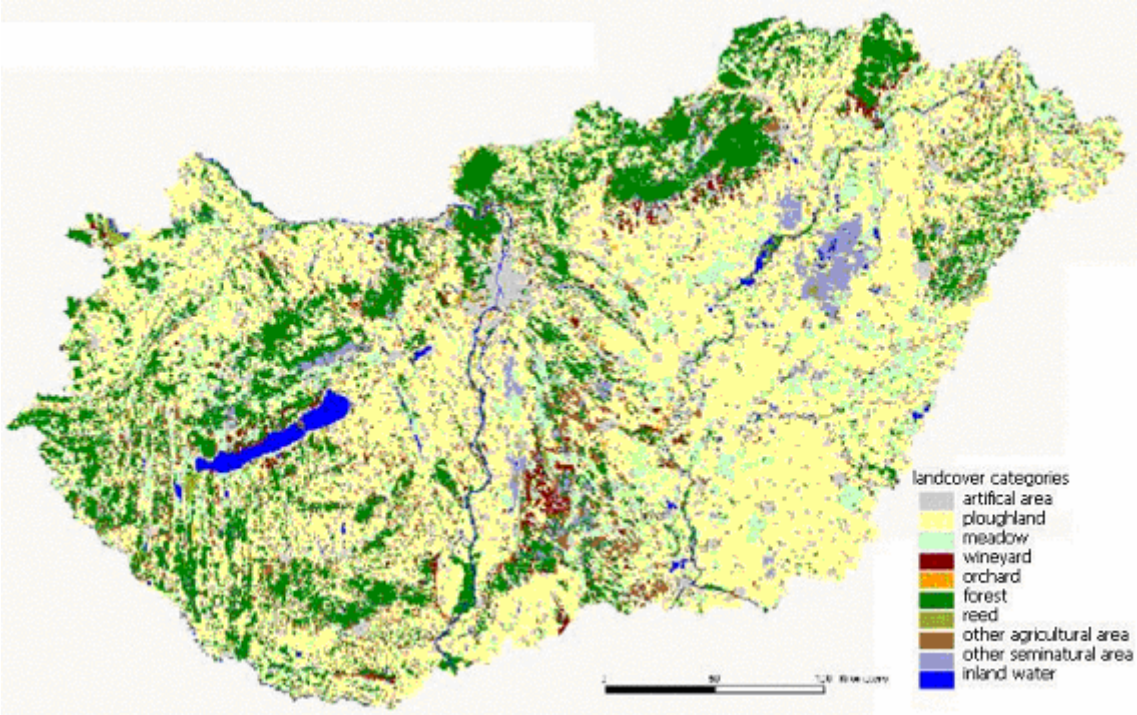

Figure 1. Land cover categories of Hungary

In 1920 on account of the Trianon pacification the territory of forests fell from 7.4 million hectares to 1.2 million hectares. This radical reduction was accompanied by the fact that dominantly low productivity areas remained within the new borders, which had provided fuel-wood for local inhabitants. The 10% proportion of forest cover was one of the lowest among the European countries.

Since 1945, the forest area has increased by approximately 600 000 hectares due to the large-scale afforestation activity. However, the per capita forest area, 0.18 ha, is still one of the lowest in the region.

1.2 Forest products' and services consumption

Consumption in general

Hungary has made the transition from a centrally planned to a market economy, with a per capita income one-half that of the EU average. Hungary continues to demonstrate strong economic growth. The private sector accounts for over 80% of GDP. Foreign ownership of and investment in Hungarian firms are widespread, with cumulative foreign direct investment totalling more than 23 billion US$ since 1989. Hungarian sovereign debt was upgraded in 2000 to the second-highest rating among all the Central European transition economies. Inflation has declined substantially, from 14% in 1998 to 4.7% in 2003; unemployment has persisted around the 5% level.

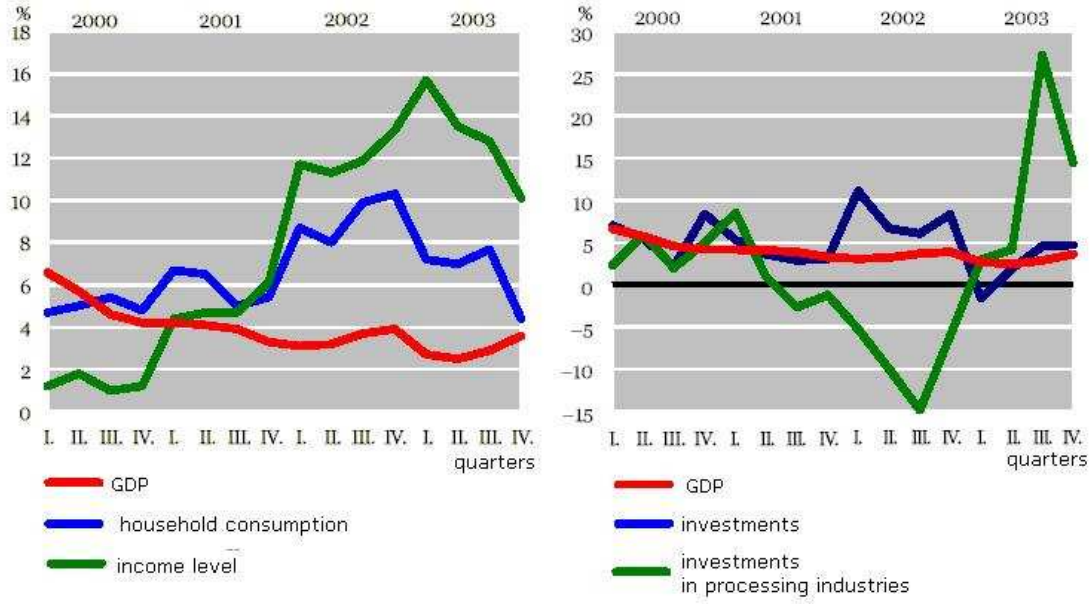

Figure 2. Medium time changes in GDP and income level in Hungary

The contribution of forestry and forest industries to Hungarian GDP is 0.3 % and 0.7 % respectively. The number of employees in the state forest enterprises is approximately 7000, and the staffing level is one of the highest among in regional terms. However, high level of employment may indicate a low level of efficiency: while in EU average level of employment is 2.4 person per 1000 hectares, in Hungary there is much higher level of 7.9 person per 1000 hectares. This can be an explanation why the average labour income in forestry and wood processing industries are below the national average. In medium term a large-scale reduction of employment must be carried out to improve the efficiency of Hungarian forest industry.

Consumption of wood

Forest cover in Hungary today amounts to 1.823 million hectares. Site conditions may vary form semiarid desert (average precipitation 400 mm) to mountain forests. Therefore occurrence of forest is primarily determined by climatic (annual precipitation, relative air humidity, groundwater), edaphic and hydrological factors.

Table 1. Basic data on Forest Resources and Forestry in Hungary

Forest area [million ha]	1823.4
Percentage of forest cover relative to the total land area [%]	19.6
Forest cover relative to the population [ha/capita]	0.174
Land area classified as forest land [million ha]	1955.2
Growing stock [million m³ gross]	330.9
Annual increment [million m³/year gross]	12.3
Total logging [including both thinning operations and regular harvesting; million m³ gross]	7.0
Regular harvesting [million m³ gross]	5.0
Logging area [average annual; 1000 ha]	21.0
Regeneration area (average annual; 1000 ha)	20.3
Afforestation [initial establishment of forests, average annual area; 1000 ha]	22.3
Percentage of forests subject to management plans [%]	100

2003. Ministry of Agriculture and Rural Development, Forestry Department

Total roundwood felling in Hungary will be approximately 7 million m^3 in the next decade. The half of this production is firewood. Sawnwood production is approximately 52% of total industrial wood production. Presently the total wood consumption is approximately 10 million m^3 per year. Within this total amount, share of conifers and hardwood are almost the same. However, 85 % of domestic production is hardwood. Therefore on Hungarian wood market there is a high impact of international prices and markets.

Table 2. Trade balance of wood products (million HUF)

	Export	**Import**	**Balance**
round wood products	17,358	13,948	3,410
sawn wood products	22,577	42,010	-19,433
panel products	24,087	31,834	-7,747
other wood products	44,413	18,504	25,909
total wood products	108,435	106,296	2,139
pulp and paper	295,460	340,537	-45,077
grand total	403,895	446,833	-42,938

Source: ÁESZ. 2003.

Table 3. Production of wood products 2003.

	%	**1000 m^3**
Veneer log	2.0	116.73
Sawn log	23.0	1342.35
Other raw material for saw-milling	6.9	402.70
Pulpwood	10.7	624.48
Bolt for panel	10.0	583.63
Other industrial timber	6.3	367.69
Total industrial wood	58.9	3437.58
Fuelwood	41.1	2398.72
Total removal	100	5836.30

Consumption of paper

Production and consumption of paper and board are both smaller than EU average but increasing. The domestic paper consumption is approximately 74 kg/person, which is third of the EU average. Presently the total consumption of the country is 750 thousand tons which shows a remarkable growth rate (8% per year) compared to the 475 thousand tons consumption level of 1993 which was the deepest level of the last decades due the economic depression if the transmission period.

Table 4. Paper consumption in Hungary (1000 tonnes)

	1995	**1996**	**1997**	**1998**	**1999**	**2000**
Production	321	363	410	434	456	506
Export	79	129	161	170	212	204
Import	267	288	346	390	399	448
Consumption	509	522	595	654	643	750

Table 5.Utilisation of the main paper product groups (million HUF)

	Consumption	**Production**	**Export**	**Import**
Cellulose	32,500	3,500	1,000	30,000
Reutilised paper	7,500	6,500	1,500	2,500
Paper	116,000	82,000	38,500	72,500
Paper based products, total	201,000	179,500	49,500	71,000

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

The importance of the improvement of wood utilisation in Hungary, can be proved by the following statements:

- The number of various sale-works made of wood is over twenty thousand.
- Wood utilisation provides a job possibility for almost hundred thousand workers.
- Average wood consumption is less than 0,6m3/person/year, which is approximately 50-60% of the EU average and a steady progress in expected in this field.
- The carbon-dioxide fixation is over 12 million tonnes per year in the Hungarian forests.
- The life-cycle analysis proves that the environmental damage of wood products is less than in case of products made of other materials (e.g. steel, plastic and aluminium).

When wood utilisation and market demand is evaluated, special interest turns toward fuelwood and bio-energy production. In Hungary, energy production is an important subject as the 72% of total energy consumption derive from import. This large level of dependency from import sources represents a serious risk level for the Hungarian economy, therefore it is a strategic question to decrease energy import. The only way to increase Hungarian energy production is to rely on natural sources to a greater extent.

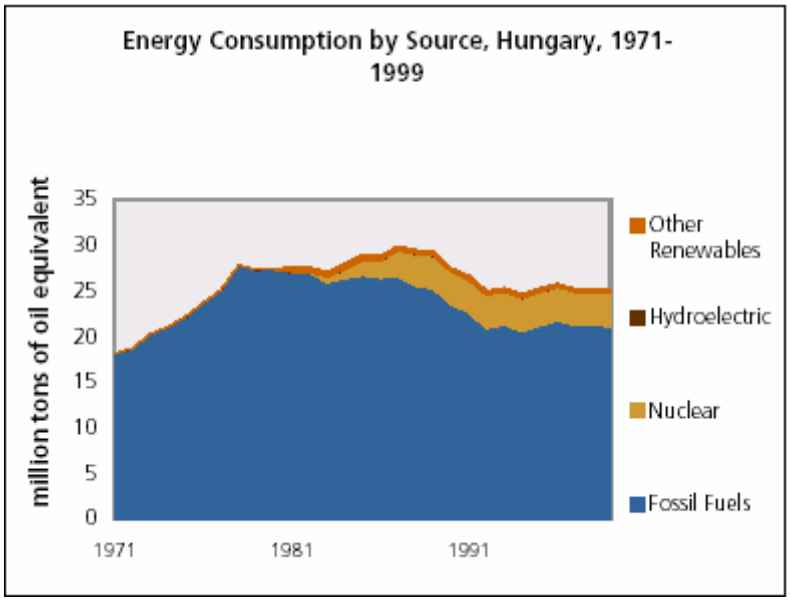

Figure 3. Energy consumption of Hungary

Table 6. Consumption of fuelwood

Year	1990	1998	1999	2000
Thousand tons	752	1085	1089	1194

Source: Hungarian Central Statistical Office, 2002

Currently altogether 3% of the total energy demand derives from renewable source. Within this percentage the most important factor is the fuelwood with 72% (2,8 % of total), which will expectedly increase in the future according to forecasts. The domestic market of fuelwood was growing steadily in the last decade. Moreover, a rapid increase of fuelwood export into Austria and Germany can be perceived in the field of ready to use fuelwood.

Table 7. Proportion of renewable energy resources in 1999 (in percentage of total)

firewood	vegetation	geotermical	water	biogas	solar energy
71.7	11.3	10.8	3.1	2.8	0.2

Source: Marosvölgyi B. 2001.

There is approximately one million ha of arable land, which can be afforested in Hungary. A considerable part of which can be energy-forest. Hungary's estimated total biomass reserves are around 350-360 million tons, and the annual biomass production is around 105-110 million tons. The gross energy content of the annual biomass production is 1185 PJ. It is larger than the country's total energy consumption, which is 1040 PJ/year. Vegetation stores about 30.4 million tons of carbon annually, which is more than twice as much as the carbon content of coal extracted from the mines.

In the long term, consumption of wood products and paper and board in the applicant countries is likely to increase to a great extent. A doubling of sawnwood consumption in the newly joined countries would lead to additional demand of around 10-11 million m^3 of sawnwood Paper consumption in the eastern countries could even triple from its present level. This would result in a corresponding growth in paper consumption of over

15% in the European Union. Although the use of electronic media could check growth in paper consumption in the future, growth potential nevertheless exists for some categories, for example packaging paper and board.

People usually regard wood as a natural and environment-friendly, valuable material, but they can not accept the fact that there is no wood production without forest utilisation (e.g. forest cutting). There is a kind of contradiction between the perception of forests as a natural ecosystem and wood as a raw material. More information about sustainable forest management principals and practices would be essential to be disseminated for local people. This orientation should focus on that woodcutting is a part of the lifecycle of productive forests and does not have real harmful effects on the forest if carefully and properly done.

1.4 Main problems and research questions in consumption for enterprise development

Research questions of enterprise development can be investigated from both sides of producer and consumer. From the side of producer main questions are:

- way of management including regulations and recommendations of forest authority;
- decision about afforestation;
- decision about tree species selection (within the actual site conditions);
- decision about the intensity of forest utilisation.

From the side of producers, there are several external qualifications, which will determine or control the decisions of the producers. In Hungary, tree species selection is one of the most crucial factors of forest management, as various site conditions allow the forest owner to choose between conifers of broad-leaved, between long or short term rotation periods. Actually, forest owners prefer black locust forests, while forest authority makes an attempt formulate state subsidy system in that way to increase share of long term native tree species.

Table 8. Afforestation activities and tree species selection

	1995	1996	1997	1998	1999
Oak	257	739	1041	1176	1190
Other hardwood	466	641	386	642	665
Black locust	1991	2762	3553	3241	3291
Softwood	1297	2047	3034	2833	3288
Conifers	169	421	305	312	280

From the side of consumption there are also several questions wood utilisation. These are the following: consumption of local or import wood, consumption of wood or wood substitutes, packaging materials, etc. When export-import is taken into consideration, it must be clear that Hungary has a small and open market for forest products, with a high share of international trade: Hungary is a net importer of conifer timber and an exporter of broad-leaved timber. Due to the high share of international trade, local and even national consumption is difficult to detect.

Table 9. Timber product balance in Hungary (1000 m^3)

Products	Production	Import	Export	Consumption
Sawn timber	481	695	284	892
conifer	124	659	37	746
broad-leaved	357	36	247	146
Plywood	23	19	30	12
Flax board	764	129	192	701
Wallboard	75	15	52	38
Laminated board	6	26	6	26

Source: FAGOSZ - FATÁJ 2000

In order to clarify problems and development possibilities in enterprise development, a SWOT analysis was carried out to determine the actual situation and possible future directions of Hungarian wood production and wood consumption market.

Strength	**Weakness**
• high share of hardwood production • well developed fuelwood market	• low level of domestic consumption • low level of re-utilisation • high dependency of conifer import • export of hardwood timber instead of domestic processing
Opportunities	**Threats**
• increase of self consumption • development of private forest managing organisations • afforestation • increase of the role of Hungary in wood trade in East-European countries	• changes in exchange rate of HUF • share of complementing products • low interest of new forest owners • lack of capital of further investigations

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

Organisations

University of West Hungary www.nyme.hu
Forest Research Institute www.erti.hu
Central statistical office www.ksh.hu
State Forest Service www.aesz.hu

Publications:

Annual Reports of the State Forest Service, of the Ministry of Agriculture Forestry Authority 1994-2003. Budapest

Horváth , Z. (1994): Country Statement, Hungary – Development of Marketing of Sawnwood Products in Countries in Transition. Sopron

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Jáger, L. (2000): Forestry and rural development: regional forest strategies. In: Sulek, R. Herich, M. (eds.) The forest – economy versus ecology. Zvolen, Szlovákia.

Laskay, L. - Mőcsényi, M.: Fapiaci adatok és elemzések (Fakereeskedelmi Konferenciák 1997-1999) FAGOSZ, Budapest-Siófok

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Makrogazdasági elemzések-prognózis 1999-re. (Macroeconomic Analyses for 1999.) Budapest Bank, Budapest

Monthly Bulletin of Statistics: Hungarian Central Statistical Office 1993-1999, Budapest

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2 Small-scale forestry practises

2.1 State of the art and historical development

In central Europe transformation from feudalism into a civilian society took place in the second part of the XIX century. During this transformation forest ownership was also affected. During the demolition of feudalistic ownership some part of the forest estates had previously owned by landlords was distributed to societies of peasants who managed these forests jointly. As a result of this transformation there is a historical tradition of joint forest ownership in Hungary.

1945, due to the introduction of the communist regime forests larger than 60 hectares were nationalised. As the second step of the nationalisation in 1946 forests exceeding 6 hectares were also transformed into state ownership. From 1960 due to the process of collectivisation small forest lots had previously been owned by private persons, were also taken into public ownership. As a result of this transformation in this period practically no private forest remained in the country.

In the wake of the political reforms of the early 1990s, most of the countries of Central and Eastern Europe adopted new forestry legislation. In most cases the perceived need for new forest law had been related to reforms in the area of land tenure, mainly the recognition of private property rights. The influence of these trends on forest policy and law varied from country to country. In some cases privatisation extended to the ownership of forest resources and lands, while in others governments decided to retain their ownership. Apart from all the other transition countries there was a radical change in the ownership system in the last decade in Hungary. This change did not intend to restore the historical ownership situation, it was not directed by environmental, economical factors. Hungary had chosen a different course than restitution. The process usually referred as "privatisation", or "compensation". The groups involved in were the following:

- people who suffered political suppression (e.g. incarceration), or who sustained material losses under communist rule,
- former employees and members of socialist co-operative farms, who had been forced to merge their private agricultural land during the process of collectivisation.

The process, being part of a wider socio-economic privatisation effort, was not tailored to reflect characteristics of the forestry sector. Valuation of land selected for privatisation only reflected the value of the soil, and ignored both the material, and immaterial value of the growing forest stand. Forests and farmland were basically treated alike.

Former owners do not have legal claims to either their original forest area. Once a resident former members of co-operative had stated this claims, it was assigned parcels of (forest-) land according to the percentage of the member's former individual holding in relation to the total area of a co-operative farm. Non-resident former members received compensation in vouchers. Claimants who had lost valuables (including real estates), or who had suffered unjust persecution, receive vouchers up to a maximum value of 5 million HUF (approximately 16,000 euro). Vouchers might either be used for bidding in land auctions, or freely traded and exchanged. Vouchers have been traded at the Hungarian stock exchange, although at a rather limited scale. The described process

may therefore be generally defined as "privatisation by way of selling productive assets".

The main characteristics of privatisation were as follows:
- Disregarding the value of forest assets;
- Limitations concerning the partakers to be native natural persons of Hungary;
- Possibility of bidding downward on privatisation auctions;
- Absence of minimum limit of property.

As a result of the privatisation process there has been a dominance of undivided common properties in the ownership structure.

2.2 Small-scale forest holding

Role of private forests

A key factor is the improvement of the current unfavourable public opinion concerning private forestry. All the foresters' society is responsible to provide real and positive information, which can be a key issue in the transformation of public opinion. Role of private forestry sector in afforestation, importance of wood as a natural, sustainable resource can be highlighted.

During the transformation of the property relations in consequence of lacking long-term plans, a fragmented estate structure has emerged. The proportion of the unmanaged lands increased because most of the new owners are neither in possession of capital and financial knowledge, nor working tools - except the land.

Structure of forest ownership

The current structure of the forest ownership in Hungary is rather heterogeneous. Besides the great owners possessing several hundred hectares of forest a great number of thousands of small owners having some tenth hectares is typical. As the land registry recording was not able to keep abreast with the rapid changes of ownership, we can only estimate that 250 - 300 thousand new forest owners have to be taken into account, who, in some cases, are not even aware of the location of their forests. Most of the new owners have not dealt with forestry earlier, and the shortage of woodcraft may have a negative effect on the forests. Especially the forests under afforestation are in danger, and deficiency of professional care and cultivation may lead to degradation of these forests.

Forest owners

We must consider many landowners and forest owners as urban inhabitants more than real farmers, since most of them do not have the necessary equipment for agriculture, and they are not typically farmers. In order to establish a successful rural development policy level of knowledge, motivation, opinion and interest of forest owners have to be taken into consideration. Significant divergences can be observed in the intentions of the owners concerning the forests. Besides those wanting to deal with forestry, a considerable number of them do not have any long-term conception. They do not intend to perform forest management, they bought the forest just because it seemed to be a profitable investment, or it was the only way to utilise their privatisation tickets.

The economic orientation of private forest owners is very different. While some forest owners utilise their forest heavily, even without official permission or license, other forest owners practically abandon their forest and do not want to participate in any kind of management activity. The environmental orientation of forest owners is significantly high, compared to their economical orientation. The protection of natural assets and bio-diversity were evaluated as a more important factor than economic functions. The result gives the evidence of the standpoint that private forest owners have a low grade of economical rationality. Within economic functions the primary function of the forest is to develop an asset rather than to provide yearly income.

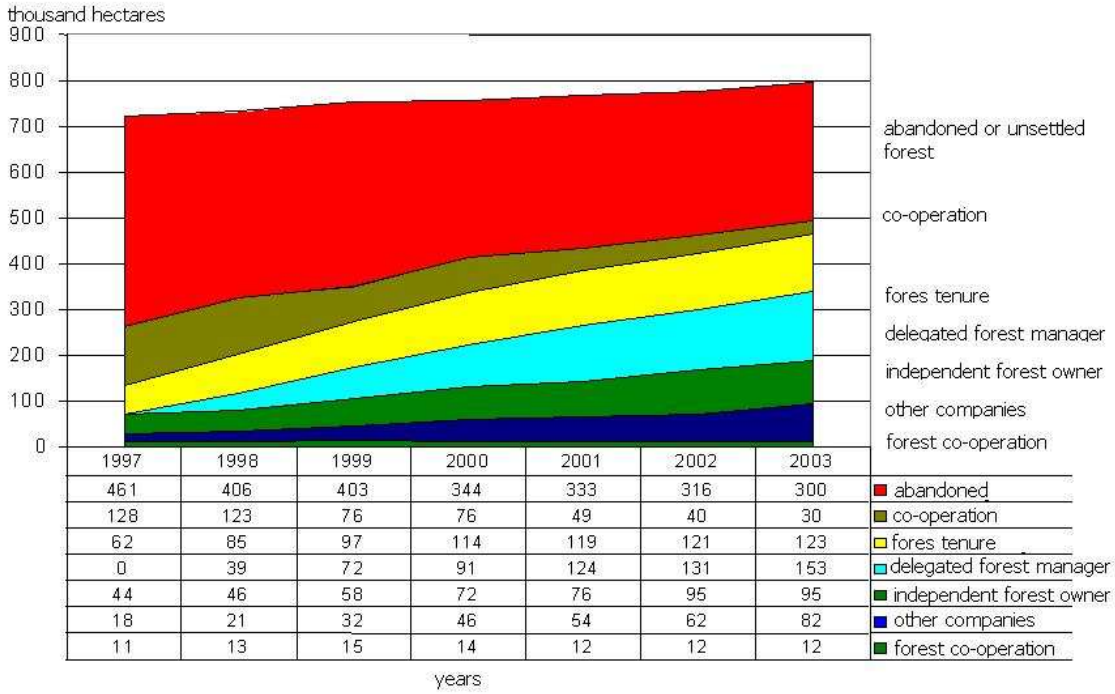

Figure 4. Private forest ownership and forest management

2.3. Small-scale forestry practices

Techniques and practices

In Hungary there is a dominance of oak and beech (deciduous) forests, where the technology of forest utilisation is based mostly on handwork (felling, measuring, cutting, quality control, etc). As a result there is no great difference of the technology applied by a 250 thousand hectares state forest company and a 5 hectares smallholder.

Table 10. Species composition of wood production in 2000 (1000 m^3)

Property form	Oak	Beech	Other hardwood	Black locust	Poplar	Conifers
State-owned	509	307	541	387	545	226
Privately owned	61	31	70	734	595	49
Total	570	348	611	1121	1140	275

Management

Basically two forest management models have been developed in the field of private forestry. At the various forms of joint forest management there is an economic organisation that functions as a property manager (joint-stock company) and settles up with the members annually. The profit or loss is realised by the members in accordance with their share of forest. In case of individual forestry management, the forest owner is responsible for the organisational, file keeping and planning tasks in connection with forest management, as it is common all over in Europe.

The joint forest management came into existence mostly upon the pressure from the forestry authorities since the large number of individual forest owners could hardly fit into the former official system. Moreover it is generally agreed that sustainable forest management was difficult to accomplish in small areas. Apart from size of ownership, it is the distance of the forest and the living place of the forest owner, which modifies the attitude toward joint forest management: urban forest owners usually accept this way of forest management. In case of rural landowners there is a demand toward formulating an independent farm unit, including both agricultural and forested area instead of participating within a joint forest management body.

Cost benefits and profitability

Most of the joint management units, which were formulated in the last decade are usually below the economic threshold and too small to carry out a permanent management. In the long run most of the private forests will act as periodic enterprises when between two active years even several decades may pass. This fact makes evident that instead of great management units a stabile contractor system has to be established.

Table 11. Profit and taxation share of forestry and agriculture within total national economy (million HUF)

	Net profit/loss before taxation	**Profit**	**Loss**	**Tax paid (18%)**
Forestry	2,965	3,606	-640	646
Agriculture (inc. forestry)	11,548	44,198	-32,650	6,303
Total national economy	1,422,579	2,122,614	-700,034	354,843
Forestry/total (%)	0.21	0.17	0.09	0.18

Table 12. Profitability of state and private forestry (Million HUF)

	Financial results	**Net profit**	**Profit**	**Loss**	**Tax paid**
State total	1463	1942	1942	0	331
Private total	753	1263	1904	- 641	373
double entry	281	444	890	- 446	211
single entry	267	579	774	- 195	105
private person	205	240	240	n.a.	57

2.4. Policy framework and production conditions

Legislation about transformation of ownership

The Hungarian constitution constitutes the basis for the entire privatisation process, as it prescribes the right to – and public protection of – individual private property (including means of production and real estates) and declares Hungary's commitment to the rule of law and democratic development. It also declares the state's commitment to environmental protection, and consequently forbids privatisation of formal conservation areas in compliance with nature protection laws. The latter exception, with its reversal tenor to the general commitment to privatisation, thus creates an inherent tension, and calls for due consideration in the course of subsequent legislation.

The Hungarian privatisation process rests on two bases: The law on compensation (passed in 1991, entered into effect in 1992) and the law on the dissolution of socialist co-operative farms (1992). According to the actual legal regulation, it is forbidden to purchase agricultural land and forest by foreign investors. Farmlands up to 0,6 hectare, flats and houses are allowed to sell out to foreigners. In order to maintain this prohibition, companies and enterprises are also excluded from land ownership, since a foreign presence can not be supervised or restricted in any Hungarian companies. As a result, partnerships, legal entities, companies are not allowed to own agricultural land and forest in Hungary. It is a generally accepted opinion that this prohibition was necessary due to the low Hungarian land and forest prices. The emotional part of this debate is also important: it is easy to generate a fear of rich foreign investors, who would buy out the whole country. However, even experts can not agree about the results of this prohibition as this ownership restriction will maintain actual low prices of forest land which is obviously against the interest of local inhabitants.

Legislation of forest management

Main legal measures affecting forestry and forest management:

- Law on Forests and the Protection of Forests, 1996
- Law on Compensation (1991)
- Law on the Dissolution of Socialist Co-operative Farms (1992)
- New state Forest Service (1997) combined functions of planning and of supervision

As a part of the new legislative process after the political and economical changes in the early 90's, three main "green acts" were ratified:

- LIII Act of 1996 on Nature Protection
- LIV Act of 1996 on Forests and the Protection of Forests
- LV Act of 1996 on Game Management and Hunting.

The basis of regulations concerning forestry is the forest law of 1996. As for the non-wood services (others than hunting) their regulation is included in the forest and the nature conservation acts. As the influence of nature conservation on forestry practice is increasing, the LIII Act of 1996 on Nature Protection is valid in forests, which are under any level of protection. Therefore on nature conservation areas every forestry intervention also requires approval of the natural conservation authorities. From 1996, the forest law used to restrict private small-scale forestry strictly, as the fundamental principle of forestry policy was to establish large scale joint private forest entities. The modification of forestry act in1998 provided more freedom for the owner to decide

about independent management. Obviously there had been no reason for the previous practice, when it had been obligatory to establish associated forest management in the existing forests, while in the new afforestation individual forest management was permitted.

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

Compared to other East-European countries, the previous, historical forest ownership pattern was not taken into account during the Hungarian forest privatisation and land allocation. Therefore positive effects of the historical traditions of forest management methods of former centuries could hardly be expressed.

Supporting factors:
- low cost level;
- self interest;
- heavy level of afforestation;
- self consumption;
- fuelwood production which allow small amounts marketing.

Limiting factors:
- confused ownership;
- pressure from the authority;
- low interest of urban forest owners;
- low income of the society as a whole;
- illegal logging.

Threats

According to the forest owners, the most important forest threats are wood thieving, excessive wood harvest and inappropriate forest management. There is no significant difference between the opinion of forest owners and other inhabitants, since forest owners themselves have a contradictory opinion about forest management. The lack of difference is explained by the relatively short time period of private forest ownership.

Due to the high emotional concern most of forest owners would maintain their ownership in the long run. This emotional interest restricts realisation a high level of spontaneous ownership concentration. Forest owners and local inhabitants have a positive relation with forests. This positive relation has not been influenced by the fact that the frequentation of the forest is very low in Hungary regarding to the international comparison. However, the acceptance of free accession into forests is extremely high in Hungary compared with other European countries from the side of forest owners.

The small-scale forest ownership can not be an obstacle in general to prevent owners to achieve a sustainable forest management. In case of independent small-scale forest management units, instead of continuous management a periodical forest management will be carried out. According to the previous statement, there is no reason to enforce joint ownership: a co-operation of forest owners may be based on joint work instead.

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

Organisations studying small-scale forestry

University of West Hungary Faculty of Forestry: http://www.nyme.hu
Forest Research Institute: http://www.erti.hu
Hungarian Federation of Forestry and Wood Industries: http://www.fagosz.hu
National Federation of Private Forest Owners and Forest Managers http://www.pointernet.pds.hu/megosz/
Hungarian Forestry Association http:// www.oee.hu

Main publications

Jáger, L. (1996): Magán-erdőtulajdonosok erdőgazdálkodással kapcsolatos felfogásának és viselkedésének vizsgálata. in: Lükő, I. (ed): "Ember – Technika – Környezet" Környezetpedagógiai és Környezetszociológiai Konferencia, Sopron. p. 125-139.

Jáger, L. – Mészáros, K. (1999): Establishing a forest accountancy network in Hungary with the help of the Guidelines. In: Niskanen, A. (ed). EFI Proceedings 29. Joensuu. p. 85-96.

Héjj, B. – Jáger, L. – Mészáros, K. (1999): Die Rolle der Universitat Sopron im System der forstlichten Fachberantung. In: Jellasic. (ed): Development trends in porduction management for forestry and wood processing. Zagreb, Horvátország. p. 203-209.

Jáger, L. (2000): Az erdő szerepe a vidékfejlesztésben: Esettanulmányok. In: Magda, S. (ed): VII. Agrárökonómiai Tudományos Napok. Gyöngyös. II. p-115-119.

Mészáros, K. – Jáger, L. (2000): Az erdőgazdálkodás és vidékfejlesztés. In: Magda, S. (ed): VII. Agrárökonómiai Tudományos Napok. Gyöngyös. III. p-115-118.

Jáger, L. (2000): Az erdőtelepítés szerepe a vidékfejlesztésben. in: Kovács, T. (ed.): Integrált vidékfejlesztés. MTA Regionális Kutatások Központja, Pécs.

Jáger, L. (2000): Forestry and rural development: regional forest strategies. In: Sulek, R. Herich, M. (eds.) The forest – economy versus ecology. Zvolen, Szlovákia.

Jáger, L. – Dr. Mészáros K. (2001): Current state and conflicts of small-scale forestry in Hungary. in: Niskanen, A. (ed.): Economic sustainability of small scale forestry. Proceedings of European Forestry Institute. Joensuu, Finland. p. 61-70.

3 Wood-processing industries

3.1 State of the art and historical development

From the production point of view, forestry plays a minor role in the national economy. About 35 percent of the GDP was produced by industry, 7 percent by transport and telecommunications, 11 percent by trade and 13.5 percent by agriculture. Forestry's contribution was about 2 percent.

The state forest companies underwent planned development since the late 1960s, and vertically organised wood processing complexes were established. This induced relatively rapid development in the field of processing technologies. A nation wide survey on sawmills was carried out in 1979 in this field. Out of the 654 plants registered, about 33 percent were state-owned while 67 percent, mainly very small mills with a capacity of less than 5000 m^3 per year, were owned by agricultural co-operatives.

During the 1980s, the structure of the state sawmill industry evolved; many small units were closed and the remaining 134 plants produced two-thirds of the total output in 1990. Of the total remaining plants, 35 have a capacity of more than 15,000 m^3 per year, and one of them can process more than 100,000 m^3 of roundwood annually. The state-owned sawmill industry was modernised at the beginning of the past decade and investments were made in the parquet and panel industries. However, the overestimation of desired capacities became the source of many economic problems in the late 1980s and the early 1990s.

The pulp and paper industry operates 30 paper machines in several plants, with a total production of 452,000 tonnes in 1990. There is currently intensive research and analysis being undertaken on the state of the pulp and paper industry. Hungary has great surpluses in pulpwood and a large negative trade balance in pulp and paper, which could be reduced by domestic processing of the available raw materials. It is assumed that the country's economic development will involve much greater paper consumption, which is far below the European average at present. Overall, the sector's production showed a steady increase until the mid-1980s, not only the annual cut was increasing, but so was the output of the wood processing industry. For instance, in 1975 exports of primary wood products were 846,000 m^3, while imports were 1,796,000 m^3. In 1985 exports were 1,303,000 m^3 and imports were 1,329,000 m^3 of roundwood equivalent. Therefore, through the mid-1980s forestry was one of the most successful sectors of the country's economy.

After this time, however, a period of decline started. One of the problems was that, owing to the income produced, harvesting and wood processing gained more and more importance, while silviculture had to face increasingly serious problems. As a consequence of increasing costs, an insufficient labour force, a rainfall deficit, extremely hot summer periods and, last but not least, increased game populations, regeneration did not keep pace with harvesting and often became the limiting factor of the annual cut. Many experts believe that too large a proportion of the income produced by forestry was spent on developing the processing industry instead of being spent on the forest itself.

Nowadays the wood-based panel industry consists of four veneer plants, six plywood plants, two complexes of particle board plants, one flaxboard plant and one fibreboard plant, producing hardboards only.

3.2. Wood processing industries

Transformation of the ownership structure

The decreasing production of the forestry sector has focused attention on the problems of the large vertically organised state companies. Their large processing capacities are not being sufficiently supplied with raw materials and there are difficulties in marketing their products. The recession in the construction and furniture industry is having a particularly negative impact. As a consequence of the political decision to separate wood processing from primary forestry activities, the widespread transformation and privatisation of wood processing units have accelerated. However, the process is expected to be very long because of a lack of domestic investors.

The pulp and paper industry also went through deliberate privatisation and, by mid-1991, more than half of the total capital of the industry was privatised with more than 20 percent of foreign capital. However, the pulp and paper industry is still desperately searching for a way out of its deep recession.

Table 13. Production and future estimation of main timber products (1000 m^3)

Products	**1980**	**1990**	**2000**	**2010**	**2020**
Harvesting	6400	5000	5500	6000	6500
Sawnwood	959	813	350	450	480
Plywood	15	10	30	50	60
Particle board	232	299	489	530	590
Fibreboard	98	50	60	120	120
Total panel production	345	359	579	700	770
Raw material demand of panel production	695	700	1040	1090	1110

3.3. Wood processing industries practices

Structure

The capacity of sawmills is 87% little sawmills (below 5000 m^3), the number of mills processing more than 15,000 m^3 is about 30. The use of the capacity of these mills is approximately 70%. Overwhelming part of the sawmills processed domestic broad-leaved logs, the two biggest mills with a capacity of 60-100 thousand m^3 were using conifer logs imported from the former Soviet Union. To improve efficiency the sawmill industry needed reconstruction.

The production of veneer and wood based panels is of smaller importance within the wood processing industry. The production of particle boards was started in the 50s, two big mills have been operating. Both of the mills were extended and provided with more productive technologies and machines. The fibreboard industry produces only hard fibreboard, and because of the lack of development resources the production of the new types of boards started only slowly, though there would be enough raw material, and a considerable market for the products.

The pulp and pare industry has production plants for half-ready products, and several paper and cardboard mills. In most of the mills the machines are old and there is a need of reconstruction. The smaller capacity paper machines of the former state owned paper industry were ceased production, the bigger ones were renewed, and for the increase of paper production mainly domestic waste paper has been used.

In the short term competition is likely to stiffen slightly in the markets for sawnwood and other wood products, but no major changes are expected in medium term. Hungary is not expected to be the most attractive potential location for investment by forest industry companies based in the EU. Moreover, investments will be held back by a number of factors, including uncertainty about the pace of economic growth and hence consumption of forest-based products.

3.4 Policy framework and production conditions

In order to reduce risk for wood production a harmonisation of the supply of assortments and the wood processing technologies has to be achieved. Because of this in developing technologies in wood processing a greater emphasis should be put on the processing of valuable hardwood sortiments, and processing of sortiments with low diameter with a possibly high added value. To accomplish this there is no, or just very limited capital, and the products need a much bigger market than the Hungarian one. The importance of the use as energy source becomes more and more important, especially with the new afforestations in the framework of the rational land use program.

Wood is amongst the most important raw materials in the world, and the only one, which is renewable and it is considered to be environment-friendly in all its forms. When considering the characteristics of the wood industry of the turn of the century it is useful to investigate the international and first of all the European tendencies. It can be stated, that Hungary has a good supply of hardwoods and softwoods and this means a potential possibility in the development of processing the stacked wood sortiments, and the panel industry may be a major direction in the development of domestic wood processing industry.

According to the statistics available domestic wood production can be increased to an annual 6-7 million m^3 wood. 2 million m^3 out of this is the most valuable log assortment, 0.5 million m^3 are other industrial wood and 4 million m3 are the stacked wood sortiments as pulpwood, bolt for panels and firewood. Afforestation trend shows that an increase is to be expected mainly from the latter sortiments. Markets for fibre and firewood will not increase. In the EU a considerable part of the utilisation possibilities are also left in the forest, and the forced wood export puts the prices low, so in some cases low value sortiments cannot even pay for transportation costs. In sawmill and panel industry production costs are decreasing, and new areas of use become available in the process of technological innovations.

According to the predicted situation the possibilities and tendencies in wood industry can be characterised as follows:

- Complete and full use of the wood material becomes a basic requirement;
- As a result of the technological development some species had not been utilised would be available for the process (poplars, black locust, turkey oak);
- In the domestic sawmill industry the inevitable reconstruction has been started, which enables a higher processing level in case of the use of domestic timber, the production of dried timber and the production of wood;
- It would be very important for the Hungarian wood industry to produce LVL veneer boards using poplar and turkey oak, and the production of OSB particle boards and possibly MDF fibre boards using domestic wood supply;
- As a source of the development common investments with forestry or foreign capital can be considered;
- The proportion of construction material made out of veneer and particle board will increase;
- cement-bounded panels production and MDF boards will increase in the long run;
- and parallel to this – as a result of reusing the used wood material – the raw material requirements of the board industry will not increase considerably.

Furniture industry

In the furniture industry the use of wood based raw materials will be characteristic, and the use of half ready materials will be overwhelming. In the export of furniture chairs and upholstered furniture will be typical. An increase in office and kitchen furniture is also to be expected. The export of high quality furniture may also increase. In order to attend domestic furniture demands the role of the import will remain, in some product areas this may even increase. Import from eastern European countries and from Southern-East Asia may also be considered.

As a summary of the possible development directions of the domestic wood industry it can be stated, that the development is influenced by two basic factors: the use of the domestic wood supply and effect of Hungarian membership in the European Union. The first factor is rather a limiting one, and the latter can contribute to the expansion of the markets. The resources of the development can either come from foreign capital, from joint ventures or from common investments with forestry.

As a result of capital injection foreign companies dealing with primary and secondary production will procure domestically a part the good quality material, formerly designated for export. Hopefully this tendency is going on, and an increasing part of the good raw material can be domestically processed providing additional income for wood production industry.

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

Table 14 . Swot analysis of wood industry

Strengths	**Weakness**
- large scale broad-leaved forests containing many tree species - developed production sector - education centres in the field of industry workers, technical workers and engineers - developed professional press and newspapers, professional associations - international fairs - most of the enterprises can adopt to the changing demand of the market - export oriented large enterprises	- environmental problems and difficulties, - lack of postgraduate and trading education - underdeveloped informational system - lack of co-operation in wood industry, parallel production-capacity in some fields - low level of marketing, lack of wholesale business, underdeveloped retail trade - lack of research and development, enterprises focus on production of 'following products' and produce a minimal level of development
Possibilities	**Risks**
- basis of wood production provides a possibility of expansion of expensive hardwood products - increase of the production level of semi-finished products - development of education and research - participation in international research activities - development of regional co-operation of the fields of raw material production and processing industry	- EU accession may lead to a higher level of import of wood products - reduction of the development of building trade industry - lack of state support in the field of environmental investments - lack of the acceptance of a joint marketing strategy of domestic wood industry enterprises

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

Elementary and secondary education of wood processing industries in Hungary:

- Kaesz Gyula SzKI és SZMK
- Dóri Sándor –Kozma L. Ipari Szakközépiskola OAFSZ Bp-I és Pest M-I Szerv.
- Encs Város Önkormányzat Aba Sámuel Szakiskola
- Hefele Menyhért Építő- és Faipari SzKI és SzMK
- Jelky András Szakmunkásképző Intézet és Szakközépiskola
- Kós Károly Szakképző és Általános Iskola
- Piarista Szakmunkásképző Isk.
- Szegedi Alternatív Kísérleti Speciális Szakiskola
- Tolna Megyei Önkormányzat Ady E. Szki és Kollégium
- Wesselényi SzMK

Other organisations studying wood processing industries:
- University of West Hungary, Faculty of Wood Sciences
- Hungarian Federation of Forestry and Wood Sciences
- Association of Woodworkers and Wood Industry

Online sources:
- www.fakat.hu
- www.fagosz.hu
- www.fa.lap.hu
- www.fafeldolgozas.lap.hu
- www.faipar.hu
- www.profi-fa.hu

4 Non-wood forest products and services

4.1 General information on forest related non-wood processing and services in Hungary

Historical development of non-wood production and services in Hungary

In the previous centuries the wild herbs were the most important NWFP in Hungary. Between I. and II. World War the Hungarian wild herb business prospered on a high level. There was a good demand for herbs in Western Europe, and Hungary had a leading role in this business.

After II World War the collection and utilisation system of NWFP was changed. New directions were adopted into herb business. As a result of state intervention and nationalisation, three divisions of state companies were formulated: trade division, agricultural herb division and industrial-healthy herb division. In spite of the fact that there were many economical and economic conflicts within herb business during this time, this sector met with complete success. The highest production level was reached in 1976-1978. During this time the management (buying up, processing, sales) of NWFP in Hungary was carried out by specialised state-owned companies, as in other Central and Eastern European Countries. After 1989, in the process of transition to market economy, a complete liberalisation of NWFP management was started to open economic markets. State companies were taken out of this economic area and their responsibilities were taken over by small dynamic private companies.

The actual direction of the development of non-wood forest products changes products by products. In many fields, changes in the ownership structure, modification of NWFP collection methods, and transformation of demand towards NWFP have created new dynamic, changeable and complex systems in NWFP management. Presently very little information is available for NWFP management and in case of some product-groups, (e.g. forest fruits) there is no information available. In case of other product, like the honey business, there are several information sources and a market chamber operates in order to achieve development in the production scale and marketing.

NWFP&S definition, classification and relevance in rural economies

Not primarily as timber used forest products are called non-wood forest products (NWFP) in Hungary. Usually terminology of NWFP is divided into two categories, as

shown in Figure 1. This categorisation is based on the importance of the products in the past and at present. The figure shows that in the past there was a wider range of non-wood products than there is nowadays. Some NWFP activities, like hunting and fishing have become independent economic areas.

Within the described categories NWFP can be divided by their linkage to the trees. On the left side there are NWFP which are parts of trees and on the other side there are three non-wood forest product-groups, such as plant, animal and mineral, which are not directly related to trees.

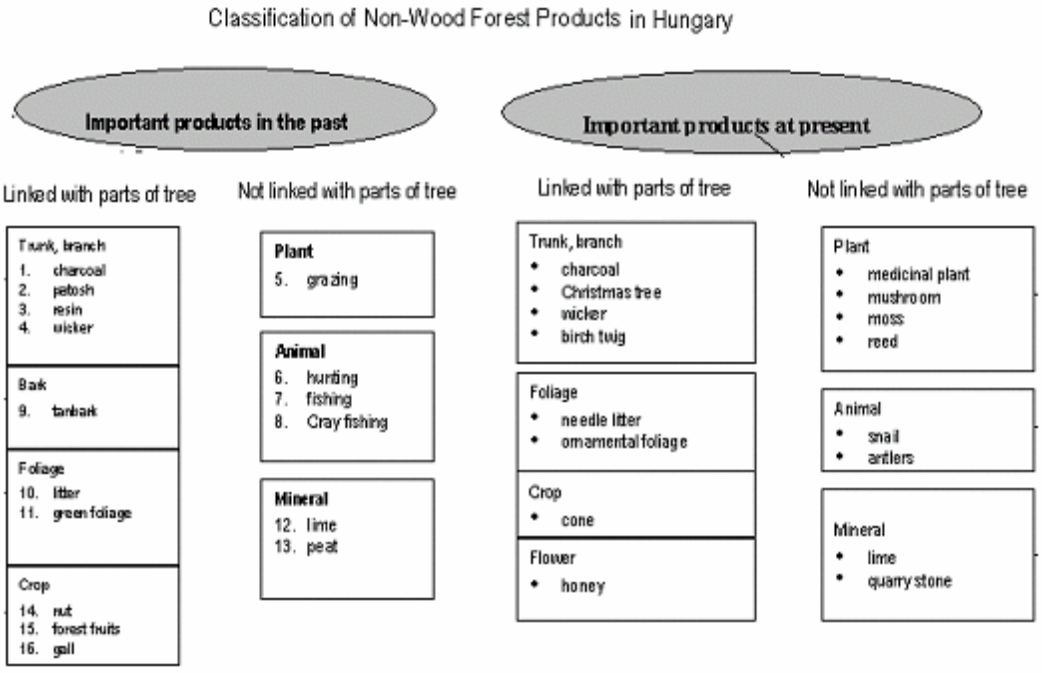

Figure 5. Classification of non wood forest products in Hungary

Role of ownership in NWFP

Presently, the most important products in state-owned forestry management are charcoal, Christmas trees and ornamental foliage. However, the income from these products is as little as 1 percent of the total income from all state forestry activities, with the remaining 99 percent comes from wood lumbering and other activities. In spite of this, state companies do not intend to cease dealing with these three NWFPs.

Investigations on small-scale forestry in Hungary show that the most important non-wood forest products are honey and forest mushrooms in private forestry. 300 different private forest management units were questioned in the study. At the same time the Christmas trees and ornamental foliage have moderate importance, while ivy, pine-cone, black alder, chestnut and reed were indicated as small important non-wood forest products. In relation with regional differences it can be told that the greatest number (nine different products) of NWFP was identified in Transdanubia. The work reported that 23% of the private management units marked some kind of non-wood forest products in Transdanubia. In another respect in Great Plan only 10% of private forest managers indicated non-wood products in their forest management. This indicator is 20% in Northern-mountains.

Property rights regulation system

For the purposes of the Forest Act a forest usufruct shall be considered:

- collection of pine branches, fir-cones and decorative greenery from felled trees;
- collection of mushrooms, wild fruits, moss, flowers, and medical herbs;
- production of sticks, reed, sedge, bulrush and the cutting of grass;
- apiary activities;
- collection of pine resin.

The exercising of the forest usufructs may not damage and/or endanger the surface and subsurface waters, the soil, the regeneration of the forest and the forest biocoenosis. The forest manager may exercise the forest usufructs with the conditions set forth in this Act. In respect of the forests located in a protected natural area the preliminary consent of the expert authority of the nature conservation authority is required for licensing the exercising of the usufructs.

The Hungarian forestry act says that the non-wood forest products are free to collect in state-owned forests for own need, but not for commercial need. For collection on a commercial level, permission from the forest manager is required. It should be declared the own need per person per day per volume. In private forests right of utilisation of non wood products belongs to the owner of the forest. Visitors are allowed to locate in private forests but activities like mushroom picking or honey making can not be accomplished without permission from the owners. This regulation is difficult to execute in practice and pickers collect NWFP without any payment for the owners.

Honey production

In the last decades, a steady development of honey sector could be perceived in Hungary. Since that time Hungary has became an important honey-exporter country in Europe. Presently 1% of global honey production belongs to Hungary. This accomplishment is remarkable, because Hungary's territory is very small compared with other great honey producers as Russia or US.

The total honey production is approximately 15-17 thousand tons per year in Hungary, but adverse weather conditions may reduce the output to a great extent. In 1997 there was a loss of 4-4.5 thousand tons black locust *(Robinia pseudoacacia)* honey production.

Table 15. Statistical data of honey business in Hungary

Years	Honey production (tons)	Export (tons)	Import (tons)	Income (mil. US$)	Export support (mill. HUF)
1992	10,742	6,818	434	11.07	174
1993	15,873	13,369	556	14.60	337
1994	16,236	13,424	700	16.80	500
1995	16,000	13,254	760	23.14	772
1996	16,500	13,159	710	25.13	390
1997	12,200	7,655	410	14.10	151
1998	13,800	9,261	548	19.62	stopped
1999	20,500	9,889	441	15.91	stopped

Source: Honey Advisory Council, 2000

Between 1993-1996 Hungary's honey export volume had doubled (Table 1.) due to a government export subsidy system which is not operating any more due to GATT-WTO agreement in 1998. At present natural lifestyle, bio products including forest mushrooms and medicinal herbs have high value again. Parallel with this trend the income from non-wood forest products is very important for rural people.

Medicinal plants

Medicinal plants are important in private sector. In fact, in Hungary there are currently about 200 companies interested in medicinal plant management. These companies are primarily privately owned, but these companies are not interested in forest management. The revival of this industry, through increased export activity, has resulted a creation of several thousand jobs in rural areas.

Table 16. The most considerable export drugs from wild gathering (1991-1995)

Latin names of drugs	**Volume (tons/year)**
Chamomillae anthodium	50-200
Equiseti herba	20-200
Tiliae flos	20-60
Sambuci flos	60-500
Urticae folium	5-150 (increase)
Achilleae herba	10-50 (stable)
Chelidonii herba	10-60
Taraxi herba et radix	10-60 (increase)
Juniperi galbulus, Crataegi fructus, Cynosbati pseudofructus	100-2000

Source: Hegedűs, 2000

Forest mushrooms.

There are approximately 15 companies interested in forest mushroom business in Hungary. These companies are in a strong competition with each other, occasionally in unfair way, which shows that the market of forest mushrooms is not a consolidated one. The forest mushrooms will be analysed in details in case study.

Forest tourism

In Hungary, limited studies are available describing forest tourism. In 2003, a countrywide survey was made on recreational use of forests, when 1100 people were interviewed. The most important results can be seen in Figure 5 and 6. The investigation shows that approximately 5% of people have visited forested area daily and only less than 10% of the inhabitants has no connection with the forest at all.

The study pointed out that the top five forest-related activities (Figure 7.) are forest walk, trip, bicycling, taking photos and nature observation. The study also mentioned the mushroom picking as a nature-based activity: almost one third of tourists gathered the forest mushrooms during their stay in the forests.

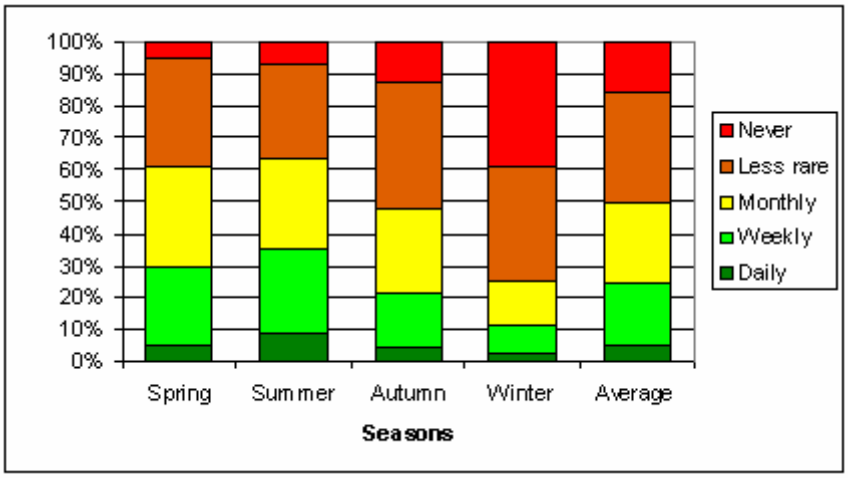

Figure 6. Frequency of forest visits in different seasons

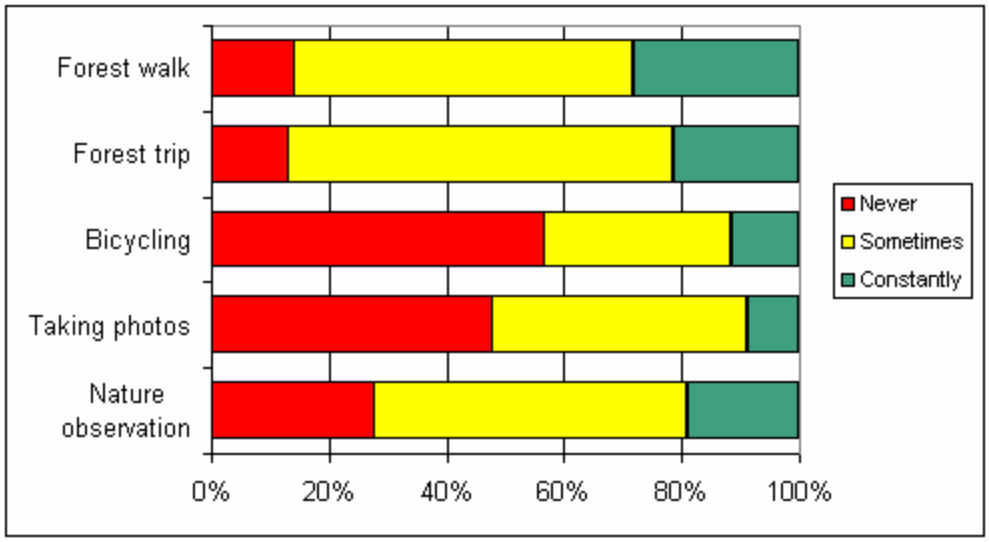

Figure 7. Top 5 forest-based outdoor activities

4.2 Case studies of successful marketing strategies

1. Case study – forest mushrooms

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

This case study focuses on wild forest mushrooms which is one of the most important non-wood forest product in Hungary. As there is no published data regarding forest mushroom production available in Hungary, this study relies mostly on market research and experts' estimation. As it was described before, previously only one state owned enterprise worked in the forest mushroom business. That company did not only gather the mushrooms, but also collected other non-wood forest products, like medicinal plants, snails. Its activities have been taken over by small, dynamic private enterprises. There are currently about 13-17 companies interested in forest mushroom business in Hungary. These companies are privately owned.

In Hungary, the most important forest mushroom species are cep (*Boletus edulis*) and chanterelle (*Chantharellus cibarius*). These species cover 90% of the total mushrooms gathered in revenue value. Apart from the aforementioned species, several other mushroom species are gathered with a moderated volume. Russula sp. and *Cratarellus cornucopiodes* have medium importance, while Morchella sp. and other Boletales sp. are indicated as insignificant forest mushrooms.

In Hungary, the importance of cultivated fungi exceeds value of forest mushrooms. According to several experts' estimation (based on customs statistics) the total export turnover of cultivated Agaricus was 19.84 million US$, the cultivated Pleurotus (oyster mushroom) was 3.2 million US$ in 2001. The total sale volume of export market was 18,200 tons, of which were 16,700 tons cultivated Agaricus in 2001. Boletus export reached 378 tons and there was an app. 22 tons Chantarellus cibarius on the export market in 2001. The total value of forest mushroom production was 1.6 million US$ in 2001.

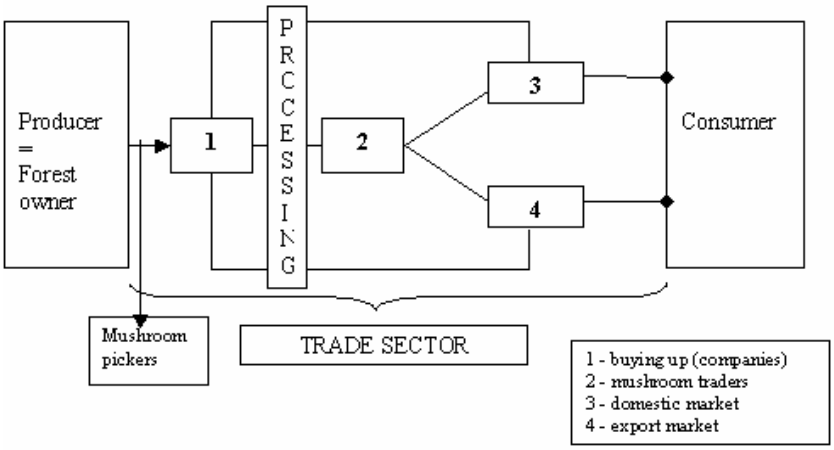

Figure 8. Description of the “product chain” organisation

Most important marketing channels in forest mushroom trade are summarised in Table . On the left side forest owners can be seen as producers. From the sector of producers the mushroom goes into the marketing channel by buying up. This means that companies buy the mushroom from the pickers and not from the forest owners. The mushroom picking is done by individuals. This activity is not a permanent job for rural people only an opportunity to get additional income. In Hungary, mushroom picking appears more a business activity rather than a recreation due to the low level of income of rural society.

In the trade sector the mushroom goes from the above mentioned companies either directly to the market - after processing - or to intermediary mushroom traders who bring it to the market. The term of processing means drying, freezing, powder making and canning. Having access to forest mushroom resources results conflicts in many cases. First, conflict situations can be emerged outside the marketing channel, between forest owners and mushroom pickers. There can also be conflicts inside the marketing channel when different traders occupy new territories. In Hungary, there is a sharpened

conflict between Hungarian traders and temporary foreign trade companies (most of them are Italian-owned), which usually pay more than Hungarians traders.

Figure 9. – One of the largest companies in forest mushroom business

Export/Import

Before the political changes, Hungarian forest mushrooms mostly (90%) went to export market, that trend worked until 1995. From 1995 some positive demand from the home-market can be observed. Still, the Hungarian wild mushroom has two main markets in the European Union: Italy and Germany.

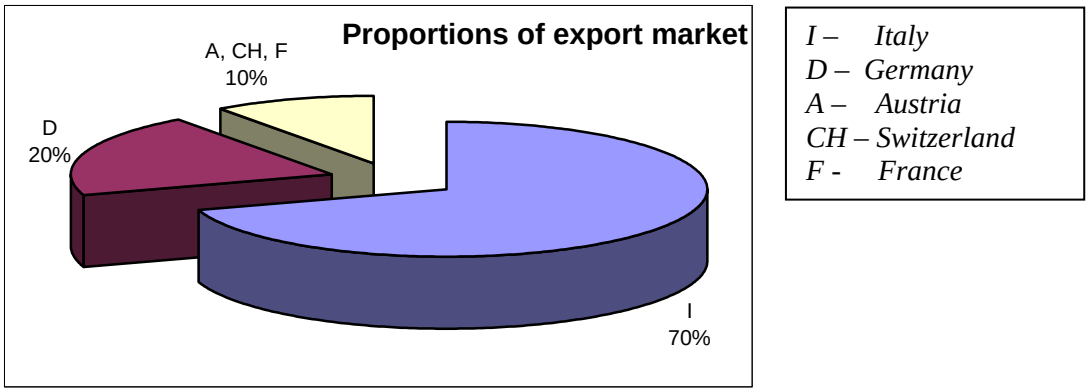

Figure 10. Main directions of export of wild mushroom

In case of Romania and Slovakia import activity can be experienced. There is a high volume forest mushroom in Ukraine, but it is difficult to built fair business connections in this country. Symptoms of grey-economy works are easy to perceive in this sector: the real amount of sold mushrooms is higher than stated in customs statistics. For

instance, during the mushroom season the Austrian restaurant owners usually come to West-Hungary to buy wild mushrooms, because the prices are half of home conditions.

Policy framework

Policy institutions involved in the sector and regulations (esp. property rights regulations) that directly influence the NWFP&S production and harvesting. At present the forestry act declares that the mushroom picking is a free in all state-owned forests for personal need, but not for commercial purposes. For commercial need permission from the local forest manager is required. The mushroom pickers never applied for permits. In practice, the mushroom companies are applying for permits for a territory. All in all, the mushroom pickers enter to forests without any permits and pick the mushroom without any payment for the owners. It should be declared the own need per person per day per volume.

Role of research, education, and training extension services in NWFP&S development

Approximately 13-17 small-medium enterprises are involved in forest mushroom business. They are suitable to summit project proposal for investments. During the accession period it was accessible the Sapard program. One of the Sapard measures was indicated as improvement of processing and marketing of agricultural and fishery products, including forest mushrooms. At present, there are open tenders for these companies supported by National Development Plan, National Rural Development Plan.

Concerning the taxation issues, these companies are under SME's rules.

The Hungarian mushroom products are not certified at all. The Hungarian companies, which are interested in the forest mushroom and wild herb business, formed a NGO (Medicinal Plant and Product Advisory Council) to represent their interests. This organisation has a special group for the forest mushroom companies, so-called Branch for Wild Harvested Mushrooms. Otherwise, the power of this group is quite weak. No real cohesion to enforce their goals, the private business interest stands above branch approach.

The main research area is to study the mushrooms from the ecological point of view. No marketing or economical aspects can be observed. Other important topic is the preservation against forest mushrooms, which are marked as damages.

The Corvinus University, Faculty of Horticultural Sciences, Budapest and the University of West Hungary, Faculty of Forestry, Sopron are organising courses to identify mushrooms. This training is quite popular among students from the universities.

Profitability

No economical data on profitability of forest mushrooms business in Hungary. Three price-groups can be seen on dealer level. The first group holds two mushrooms, Morchella sp. and Chantarellus sp.. They have high values (12.5-17.08 US$/kg), because the crop is small in Hungary. The second one includes the Boletus-family. Boletus has many prices depending on the quality, but the prices are standing on the middle level (7.5-12.25 US$/kg). The last group contains the rest, which have low price mostly under 7 US$/kg. No information available for the turnover at this stage.

About 500-700 tons of Hungarian wild mushrooms are harvested annually. 2002 was an exceptional year from the forest mushrooms point of view. According to the expert estimation during 3 weeks about 2,000 tons mushrooms were appeared on the Hungarian market. The buying up price was very low: 200 HUF/kg (0.83 US$/kg) because the annual crop was very high. The turnover was almost 1.6 million US$ at works parity. The high volume of forest mushrooms in 2002 was favourable for local people, because of picking 30 kg mushrooms per day meant 6,000 HUF (25 US$) as income. On the other hand, between 1,000 and 5,000 HUF/kg/person (4.1-20.8 US$) is determined as potential income level during mushroom season.

Lessons learns/driving forces/factors affecting competitiveness (SWOT analysis)
A SWOT analysis was made to summarise the findings of the wild forest mushroom sector.

STRENGHTS (S)	WEAKNESSES (W)
• Flexibility • Reliability • Expert's knowledge • Stable picking-network • Versatility	• Lack of capital • No real packaging, processing background • No real product innovation • Enterprise management • Marketing knowledge
OPPORTUNITIES (O)	THREATS (T)
• EU accession • Home trade expansion • Forest area expansion • Tax discount • Hungaricum • Increasing processing level • Finance help	• Arid climate • Strong competition • Imported wild mushroom in large quantities • Owners forbidding • Nature conservation • General economy fall down

Investigation of characteristics of technological or organisational innovation behaviour in non-wood production, processing and service industries are also important. The most important areas of innovation are:

- Labelling/certification issues (marked as Hungaricum);
- Development of e-business;
- Value-added processing on local level;
- Improvement of home market;
- Taking full advantages of resources: local mushroom processing can be added the ecotourism services.

Recommendations proposals
A more obvious regulation should be introduced on how the problem between the mushroom pickers and the forest owners, forest managers should be handled. It would also be important to add values to the harvested mushrooms through local processing. This activity can improve the diversification of the rural area, create jobs and extend the value of other non-wood forest products as well.

Taking full advantages of resources: local mushroom processing can be added the ecotourism services. For instance in Finland the local farmer produces own berries, dried mushroom and he also provides accommodation and guides for nature tourism who also appreciate the experience of staying where the products are produced.

It can be significant to launch a development project in the Central-Eastern European Region co-operated with international organisations (e.g. FAO) and international institutions (e.g. EFI). The goal of this project would be to explore the problems of the non-wood forest products sector as well as to figure out the right solutions.

2 Case study – Arnica Montana Co. as specialised in forest recreation and ecotourism

There are different definitions for ecotourism in Hungary. In accordance with the best approach ecotourism means special accommodation, transport and programs together, which minimise the environmental damages for the natural land. Furthermore, the income from ecotourism goes to local people, from which they can manage the natural land in a sustainable way.

In Hungary, there are two types of ecotourism. One of them is when national parks organise ecotourism services. On the other hand, ecotourism has business aspects, when private companies are involved in this kind of environmental service. For instance, there is a micro firm, named Arnica Montana Co, which is specialised in forest recreation and ecotourism service. This organisation is accessible at http://www.castanea.hu/arnika/index.html.

The Arnica Montana Co. started its activities with guiding nature tours for hotel guests in Sopron (this city locates in West-Hungary, close to the border with Austria) in 1997. The denominator of the company was Arnica Montana as a well-known medicinal herb in the region of Pre-Alps. This herb is salve for all kinds of traumas; the plant is also used in homeopathy.

Program for primary school children	Noted days	Nature-based adventure tours
Program for nursery school children	ARNICA MONTANA	Ivy club
Education at the university	Research	Ivy environmental leaflet

Figure 11. Main activities of Arnica Montana Co.

The organisation has been working as an independent forest school since 1998. The most important activity is the implementation of forest school programs for school children. The teaching activities are dealing with 2-3 professional educators with the occasional help of university students. The main event of the year 2000 was the organisation of the conference "Harmony of environment and human" sponsored by PHARE CBC.

To understand the value of the natural environment of Sopron and its unity with this historic town, it is important to glance over this western corner of Hungary for an overview. The nationally unique statement of Sopron is due to the fact, that in its immediate environment 3-4 strikingly different regions and living worlds join hands.
In direction of southwest it can be found cold, shady, alpine-like forests, and only in a distance of 40-50 km there are the 2000 m peaks of the Alps. On the north Sopron leans on the „Bécsi"-hill of Mediterranean features, eastwards lays the famous „Szárhalmi"-forest with its steppe meadows and dry oak stands. Beyond the range hills of Szárhalom, Fertõ, the westernmost alkaline steppe-lake of the continent is situated with its vast reeds.

The Arnica Montana Co. holds its programs in the above described environment. They have different programs for adults and children, as well. Quite popular weekend program among tourists is the "revival with the power of nature". This tour includes massage, forest meditation and special physical training in the forest. Other option within this offer is an adventure walk in the forest.

Figure 12. Website of Arnica Montana (http://www.castanea.hu/arnika/index.html)

Annex: List of statistical information sources, databases, web sites

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Internet sites, institutions

Start point website for honey business http://mez.lap.hu/
Start point website for mushroom business http://gomba.lap.hu
Start point website for herb industry http://gyogynoveny.lap.hu/

National and local organisations studying non-wood forest products

University of West Hungary, Faculty of Forestry, Sopron www.nyme.hu/emk
Corvinus University, Faculty of Horticultural Sciences, Budapest www.kee.hu/ktk
Forest Research Institute, Budapest www.erti.hu
Agro Chamberhttp://www.agrarkamara.hu/
Ministry of Agricultural and Rural Development www.fvm.hu
Ministry for Environment and Water Management www.kvvm.hu
Herbaria Co. www.herbaria.hu
Nagy Mihály Medicinal Plant Ltd. www.nam.hu
Medicinal Plant and Product Advisory Council (GYTT)
Federation for Forestry and Wood Industries (FAGOSZ) www.fagosz.hu
Agricultural Marketing Centre www.amc.hu
Gomba-Mező Ltd. www.boletus.hu
Agro-Quality Ltd. http://www.truffle.hu/
First Hungarian Truffle Society http://falco.elte.hu/emsze/
APIMEL-R. health- and spa-tourism, tourism and honey-processing Reha Ltd. www.apimel.hu
Honey Advisory Council http://w3.datanet.hu/~meheszet/
TERRA FOUNDATION http://www.terraalapitvany.hu/index_en.html

5 Forests and ownership

5.1 State of the art and historical development

The main stages of the changes in the 20th century were as follows: in 1920 on account of the Trianon pacification the territory of forests fell from 7.4 million hectares to 1.2 million hectares. This radical reduction was accompanied by the fact that dominantly low productivity areas remained within the new borders. The 19 % proportion of forest cover was the lowest among the European countries. After World War 2, in 1945 the forests larger than 58 hectares were nationalised. As the second step in 1946 forests exceeding 6 hectares were also nationalised. From 1960 owing to collectivisation the previously privately owned small forest lots were also taken into public ownership.

In the beginning of the 1990s during the social-economic transformation the property relations basically changed due to privatisation. While before the change of regime the percentage of privately owned forests did not reach 1%, now 40% of the forests are in private hands and only 60% is of state property. As a point of interest, only one of the 6 political parties that were formed after the disintegration of the one-party system has set alteration of property structure as a main political goal. This large-scale modification of property structure is a result of a decision of the constitutional court that declared that any discrimination between different former grievances is anti-constitutional.

5.2 Forest resources

Hungarian forests' growing stock was in 2000 estimated at about 318 million cubic metres solid wood, with an average (relative to the total forest area) of 190 cubic metres per ha. Deciduous forest accounts for about 85% the growing stock (for details refer to chart 4 below). The annual increment is estimated at 12 million cubic metres solid wood, with an average (relative to the total forest area) of 6.8 cubic metres per hectare.

Table 16. Felling achievements by groups of tree species in 2002.

Species	1000 m^3	%	Species	1000 m^3	%
Oak	1161	16.6	Black locust	1480	21.1
Beech	618	8.8	Improved poplars	976	13.9
Conifers	774	11.0	Other soft broad-leaved	507	7.2
Turkey oak	973	13.9	Other hardwood	192	2.7
Hornbeam	332	4.7			

Source: FVM Forest Department

5.3 Forest ownership

Out of the 1.9 million hectares officially registered forest land, 1,128 thousand hectares owned by the state, while the area of private forests exceed 732 thousand hectares. Hungarian forests in general are unevenly distributed. The densest, and best-linked up forests are located in highland areas. At the same time, four out of the five most forested counties are in the Southwest. On the other hand, lowland plains like, for example the Puszta have little – if any - forest cover. Large forest blocks dominated by native species remained the property of the state, while private forests (the majority was the property of the agricultural co-operatives before privatisation) are more scattered and comprise mainly fast growing tree species.

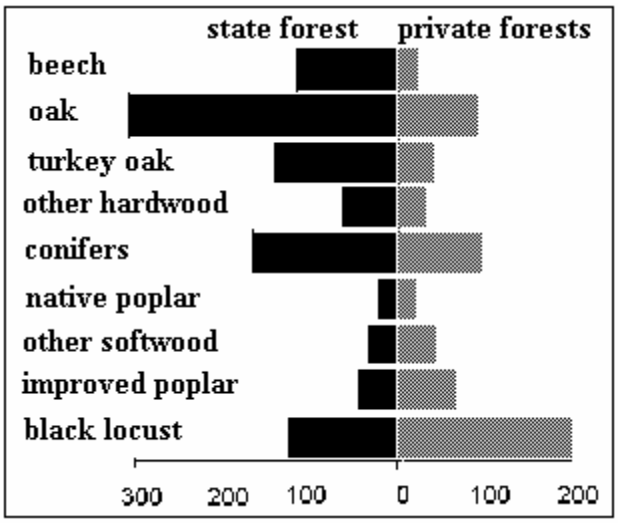

Figure 13. Distribution of different tree species, plotted in state and private ownership forms

Protected forests

Table 17. – Primary functions of the forests in Hungary

Forest land	2000 (%)	2002 (%)
Protection forest	23.2	33.6
Productive forest	74.5	64.8
Health care, social, tourism forest	2.3	1.6
Total	100.0	100.0

Source: State Forest Service, 2003

The high increase in the share of protection forest (Table 1) is a result of a classification development; forest lands under declared nature protection have been reclassified in terms of primary function, become protective forest and the National Forest Database was up-dated accordingly. Protection forest includes protective forest (soil, wildlife, settlement protection etc.) and protected forest (e.g. in protected natural areas). Their share tends to be increased in the next decade.

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

1. The opinion and perceptions of private forests owners in connection with the forests, especially in the area of

- ownership rights;
- income possibilities;
- protection of the property;
- settlement of legal directions;
- and realisation of the objectives of the owners.

2. Whether the formulating private forestry will meet the economic, social demands of the Hungarian society.

- How can sustainable forest management be accomplished in private forestry.
- How will change the public opinion on private forestry.

- How can the recreation effects of private forests be improved.
- What are the main conflicts between forest owners and the society.

3. How will the ownership patterns be modified in the future?
- What kind of long time changes might be expected;
- How can the desired ownership system be described;
- What kind of decisions and tools can be applied to reach a preferred ownership system.

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Summary

For historical reasons there has been little utilisation of forest resources in Iceland. Therefore in order to utilise the forest resources resulting from current afforestation activities research and development of potential markets for all forest products is necessary. Presently the major limiting factor is the absence of raw materials for manufacturing purposes. During the interim, efforts are being made to locate future markets and manufacturing methods suitable for predicted timber harvests.

1. Consumption

1.1. State of the art and historical development

Fossil evidence indicates that Iceland was forested to a considerable extent during the mid to late Tertiary, with tree genera including *Metasequoia, Magnolia, Sassafras* and many others, indicating that the climate was warm-temperate. By the late Pliocene, shortly before the onset of Pleistocene glaciations, coniferous forests predominated including *Pinus, Picea, Abies, Larix, Betula* and *Alnus*, indicative of a boreal climate.

With succeeding glaciations, the Icelandic flora has become ever more depauperate. *Pinus* survived (or was able to return after) the first few glacial periods up to about 1.1 million years ago and fossil evidence of *Alnus* is found during interglacials to about 500,000 years ago. The only forest forming tree species to survive/return to the present interglacial is *Betula pubescens*. Other native tree species found in Icelandic forests are *Sorbus aucuparia*, which is uncommon, and the extremely rare *Populus tremula* (found in only 7 locations) along with *Salix phylicifolia*, which sometimes reaches tree size but is usually a shrub.

At the time of human settlement over 1100 years ago, birch forest and woodland probably covered 25-40% of Iceland's land area (Figure 1). The relatively tall (to 15 m) birch forests of sheltered valleys graded to birch and willow scrub toward the coast, on exposed sites and wetland areas and to willow tundra at high elevations.

As in agrarian societies everywhere, the settlers began by cutting down the forests and burning scrubland to create fields and grazing land. Sheep were important as a source

of wool from the outset, but by 1300 they had become a staple source of food for Icelanders as well. Sheep grazing prevented regeneration of the birchwoods after cutting and/or burning and the area of woodland declined rapidly.

The birchwoods were nevertheless economically essential, especially as a source of charcoal, needed to smelt bog iron and make iron tools, of which the most important were scythes. Utilising birch directly as fodder for sheep and birch charcoal for making scythes necessary for hay-making probably kept the Icelanders from going the same way as the Nordic Greenland settlement, which died out about the time Columbus "discovered" America. Birch was used as a source of charcoal up to 1870, when steel scythes were first imported from Scotland. Woodlands continued to be important as a source of fuel and winter fodder for sheep until the 1930's, after which these economic functions were replaced by geothermal heat, imported oil and cultivated hayfields. The extent of Icelandic birchwoods probably reached a post-glacial minimum, or about 1% cover based on total land area, during the early 20th century and even though improvements in agriculture alleviated the need to utilise birch for fodder, increases in sheep numbers and high levels of summer grazing continue to prevent natural extension of woodlands outside of protected areas.

Today, birchwoods are not of commercial importance, although birch forests within national forests and national parks are popular recreational areas. A small amount of birch is felled each year within two national forests and sold for firewood and small scale handicrafts. (Eysteinsson 2002).

History of forestry and recent trends

Organised forestry is considered to have started in Iceland in 1899 with the planting of the "Pine Stand" at Thingvellir. Forestry efforts focused on protecting birch forest remnants during the first half of the 20th century, with several forest areas being acquired by the Iceland Forest Service (IFS) for that purpose. They, along with more recently acquired afforestation areas and experimental forests comprise the National Forest system today. During the past 50 years however, the emphasis has been on afforestation through planting trees. Native birch has always been a component of trees planted but its popularity has varied as have the reasons for planting it.

From the time the Icelandic Forestry Association was established in 1930 until 1951, native birch was the most planted species in Iceland, with planting ranging from a few thousand to over 150,000 seedlings per year. Until the late 1940's, native birch along with native rowan (*Sorbus aucuparia* L.) and native *Salix phylicifolia* (L.) were practically the only species available from the country's four small tree nurseries at the time.

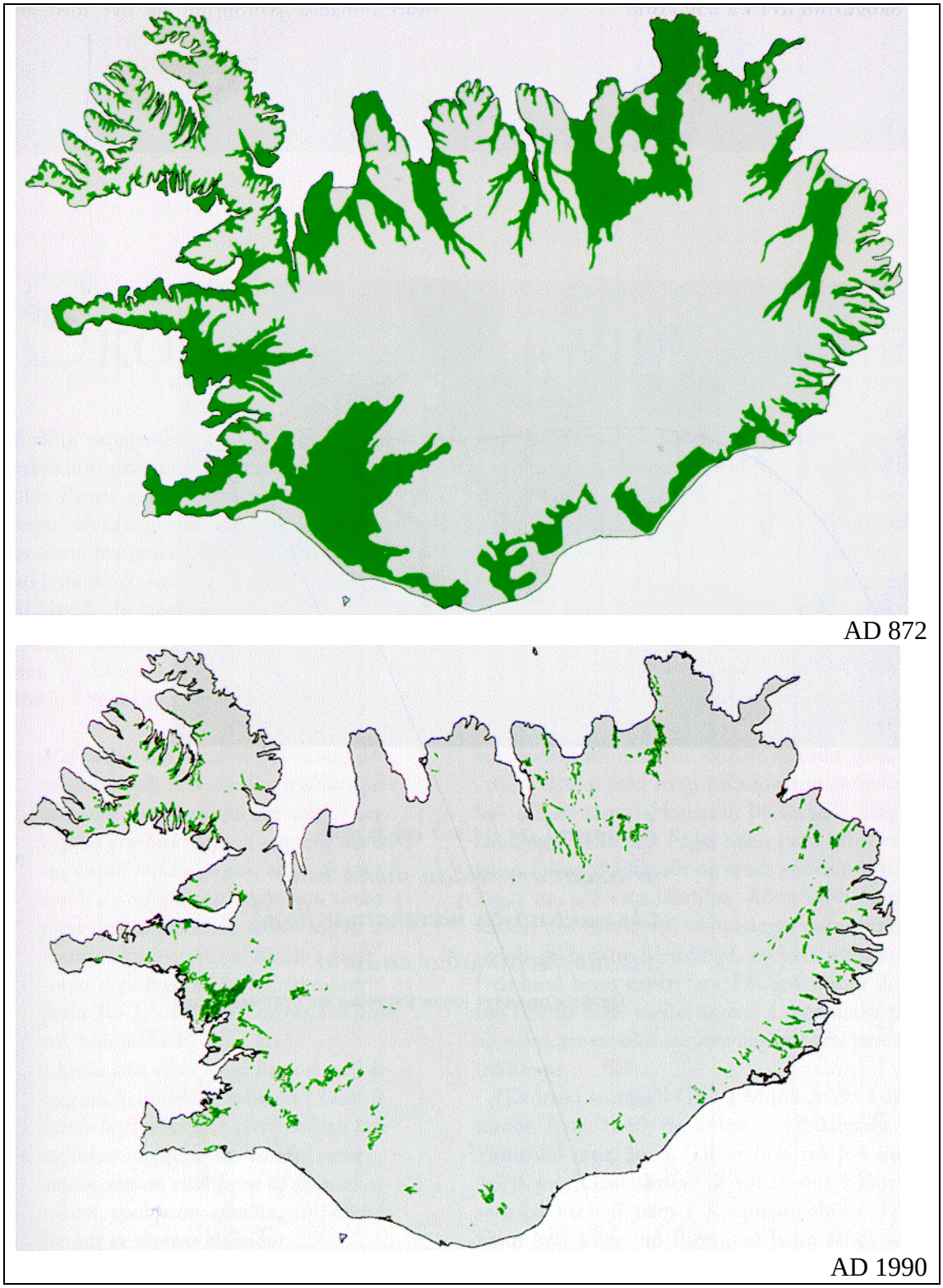

Figure 1-2. Maps showing the estimated extent of birch woodlands in Iceland at the time of settlement (27% of Iceland's land area) and the actual extent in 1990 (1.2%).

Planting by forestry societies and the IFS increased greatly during the 1950's, reaching over 1.5 million seedlings per year during 1960-'62, due solely to increased planting of exotic conifers, principally *Picea abies*, *Picea sitchensis*, *Pinus sylvestris*, *Pinus contorta* and *Larix sibirica*. Planting declined again after 1963 and remained at

500,000 to 1 million seedlings annually from 1963 to 1989. During this entire 40-year period (1950-1990), planting of native birch remained at similar levels or 100,000 plus/minus 50,000 seedlings per year, which means that birch comprised 5-15% of seedlings planted. For the most part though, these 40 years were a time when the emphasis in Icelandic forestry was on experimenting with different exotic species and provenances.

Afforestation through planting has increased again since 1990 to about 5 million seedlings per year at present, which corresponds to an increase in planted area of 1000-1500 ha per year. However during this period, planting of native birch has been increasing proportionate to the total, comprising almost 30% of seedlings planted in 1999 and 2000 and, at 1.4 million seedlings. Birch is again the most planted tree species in Iceland for the first time since 1951. *Larix sibirica* is planted to almost the same extent as native birch (30% each), followed by *Picea sitchensis* (12%), *Pinus contorta* (10%) and *Populus trichocarpa* (6%). Over 20 other species comprise the remaining 12% of trees planted in Iceland.

The IFS planted roughly half the trees planted in Iceland up to 1990, mostly on Forest Service lands. With the exception of some early direct seeding trials, this however included practically no birch since most IFS enclosures were established around remnants of birchwoods where natural regeneration was usually sufficient. For example, the area of birch cover in Hallormsstadur National Forest increased by 130 ha from 1906 to 1995 without a single birch tree being planted and in spite of 200 ha being converted to conifer forest (J. Gudmundsson unpubl. data). The total extension of birch within the enclosure was around 330 ha in 90 years, or an average of 3.7 ha per year, more than doubling the original forest area.

Planting by the IFS has been decreasing in recent years and now comprises less than 5% of the total afforestation planting in Iceland. The main functions of IFS today are managing the National Forests, research, planning and policy matters.

The other half of trees planted up to 1990 were planted by forestry societies, which were mostly involved in afforestation of treeless land. Since 1990, forestry societies have been the main actors in the Land Reclamation Forest project, a co-operative project between the Icelandic Forestry Association (an umbrella organisation for the local forestry societies), the Forest Service, the Soil Conservation Service (both state agencies) and the Ministry of Agriculture, within which about 1 million seedlings are planted annually. The aim is to afforest eroded or degraded land and 40-75% of seedlings planted annually have been native birch even though it is not always the most effective tree species for reclaiming degraded or eroded land.

From its limited beginnings in 1970, state supported afforestation on farms has become the main channel for afforestation activity in Iceland, comprising about 70% of the afforestation effort today. Originally, only farms located within the best areas for afforestation were eligible to participate and the only goal was establishment of plantations for wood production. Therefore, the emphasis was on planting exotics. Since the mid 90's, state support for farm afforestation has spread to all parts of Iceland and afforestation goals have become variable resulting in increased use of native birch and other non-timber species (Figure 2). Exotics are still and will

continue to be the mainstay of farm afforestation, namely, *Larix sibirica*, *Picea sitchensis*, *Pinus contorta* and *Populus trichocarpa* (Figure 3).

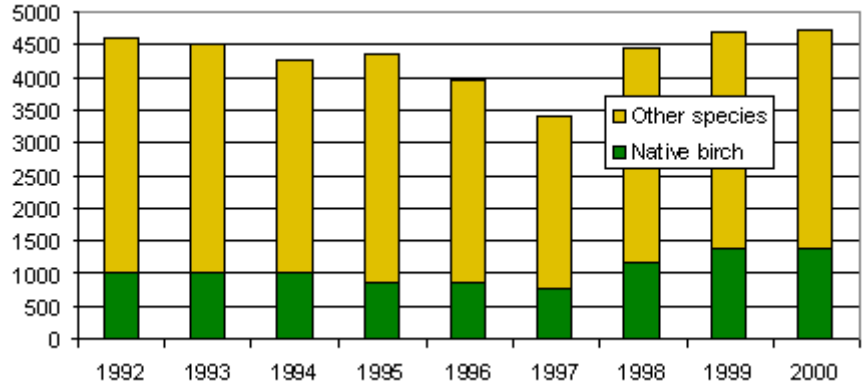

Figure 3. Proportion of native birch planted in afforestation 1992-2000. The trend from 1995 to 2000 represents a 50% increase in planting of birch.

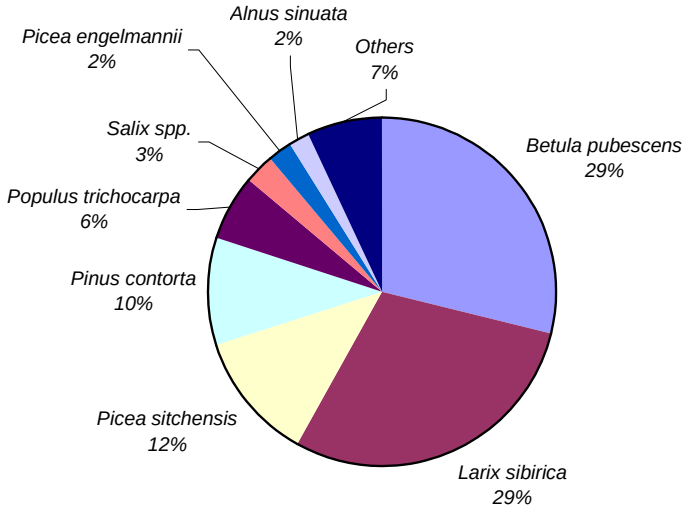

Figure 4. Trees planted in Iceland in 2000 (from Pétursson 2001).

As has happened within National Forests protected from grazing, birch is regenerating naturally within forestry society and farm afforestation enclosures wherever a seed source is available. In some cases, birch regeneration is happening as fast or faster than planting, resulting in interesting mixed woodlands or in some cases plans for planting being abandoned.

Policy goals and legal instruments

Various acts and regulations are in effect pertaining to forestry. Here are some of the main points therein that have policy implications.

- The Iceland Forest Service has as its mandate to: protect and preserve forests and forest remnants, establish new forests where appropriate and advise on forest management and other forestry matters (Forestry Act no. 3/1955).

- Forests may only be harvested through selective thinning (Forestry Act no. 3/1955).
- Clearing of forests and woodlands is prohibited except by permission of the director of the Forest Service, which can be given only if the area will be reforested or a comparable area elsewhere afforested within two years (Forestry Act no. 3/1955).
- Afforestation with the aim of timber production shall be carried out in Fljótsdalshérað, East Iceland through providing farm afforestation grants (Héraðsskógar Act no. 32/1991).
- Afforestation with multiple-use goals shall be carried out by Regional Afforestation Projects through providing farm afforestation grants (Regional Afforestation Projects Act no. 56/1999).
- The aim of each regional afforestation project is to afforest 5% of the lowland area (land below 400 m.a.s.l.) within its region in 40 years (Regional Afforestation Projects Act no. 56/1999).
- Contracted forest farmers shall have preference over others for employment within the project (Héraðsskógar Act no. 32/1991, Regional Afforestation Projects Act no. 56/1999).
- The Nature Conservation Agency shall work with the Forest Service on matters concerning conservation of natural forests and woodlands (Nature Conservation Act no. 44/1999).
- Plans for afforestation of areas over 200 ha in size, afforestation within protected areas and clearfelling of natural forests and woodlands are required to be submitted to the State Planning Agency for determination as to whether or not environmental impact assessment is required (Environmental Impact Assessment Act no. 106/2000)
- Protected areas include: national parks, natural monuments, nature reserves, state parks, areas protected by specific laws, Holocene volcanic formations, wetlands over 3 ha, waterfalls, hot springs, coastal mud flats, archaeological sites, groundwater protection areas, areas protected by international agreements such as the Ramsar and Bern conventions and areas protected through official local planning (Environmental Impact Assessment Act no. 106/2000, Nature Conservation Act no. 44/1999).
- Importers of exotic plants (including seed and other propagation material) shall report imports to the Natural History Institute (Regulation on exotic plant species no. 583/2000).
- Lists of approved and banned exotic plant species shall be created (Regulation no. 583/2000).
- Cultivating exotic plant species is banned in protected areas and above 500 m.a.s.l. (Regulation no. 583/2000).

The laws pertaining to forestry reflect the fact that forests form a very small part if the Icelandic landscape, the main policy points being that existing forests should be protected and afforestation of treeless land is encouraged. These goals have been in effect since the first Forestry Act of 1907. The goal of increasing forest cover through afforestation is re-affirmed by the Regional Afforestation Projects Act of 1999, where for the first time a concrete goal of 5% forest and woodland cover of lowlands within 40 years is set.

In recent years, checks have been put into place regarding certain aspects of forestry through the Environmental Impact Assessment Act and a regulation regarding use of exotic plant species. These legal instruments are the results of EU directives; in other words not the result of a perceived need within Iceland to put checks on forestry. Because of the costs involved, the Environmental Impact Assessment Act effectively puts a ceiling of 200 ha on the size of afforestation areas and prevents or at least discourages afforestation within protected areas. The regulation on exotic plant species has no effect on forestry practices as yet.

The Iceland Forest Service has put forth a set of guidelines to afforestation planners. Some points from these guidelines are:

- Tree species planted should be selected based primarily on site conditions and the goals of afforestation on that site.
- Planting of exotics within natural woodlands is discouraged. Instead planting should be directed toward treeless land to increase the total forest area.
- Wetlands should not be drained for afforestation.
- Care should be taken to avoid planting on sites of special value. These include sites where rare species have been found or rare habitat types, archaeological sites, special landscape features and much visited sites with scenic vistas.
- Planting species mixtures rather than monocultures is recommended.
- Forest edges should be designed specifically so that the cultivated forest blends as well as possible into the landscape.

These guidelines are currently being reviewed in co-operation with other state institutions and NGO's, after which they will be published.

The present population of Iceland is approximately 290,000. Icelandic demographic patterns are the same as those found in other European countries with a definite trend of rural depopulation. In 1991, 57% of the population was located in the capital area, by 2001 the figure had reached 62%.

2 Small-scale forestry practises

2.1 State of the art and historical development

RAPs

Starting with Héraðsskógar in 1991, six Regional Afforestation Projects (RAPs) have now been established to cover all of Iceland. They are governmental “mini-agencies” under the Ministry of Agriculture but financially independent of the IFS. Each has a board of directors composed mostly of local people and a staff of 3-6 including seasonal employees. The function of the RAPs is to manage the government grants scheme for afforestation on farms, each in its own region of the country. This includes making contracts with land-owners, production of afforestation plans, co-ordinating seedling production and distribution, education and extension (usually in co-operation with the IFS) and distributing the grants

Each farm afforestation grant covers 97% of establishment costs, including fencing, roads, site preparation, planting and the first thinning. It is the individual land owner who owns the resulting woodlots or forest stands and bears all legal responsibility. The land owners also usually do the planting, thereby receiving part of the grant as compensation for work. A forest-farmer afforesting a large tract of land can earn what amounts to as much as 2-3 months wages per year.

2.2. Small-scale forest holding

The six RAPs were responsible for roughly 65% of planting in Iceland in 2001. Around 570 farms currently participate in afforestation and/or establishing shelterbelts and there is a waiting list to join of about 500. This is a total of over ¼ of Icelandic farms. Government funding for the RAPs was slightly less than 300 million IKR (about 3.409 million euros) in 2001 and remained unchanged in 2002.

2.3. Small-scale forestry practices

Initially all afforestation was done by the IFS and the Icelandic Forest Societies. The introduction of the RAP’s has changed this pattern such that presently approx.70% of all afforestation is done by individual landowners. After an area has been contracted for afforestation, the first step is the production of forest plan by a forester. Factors taken into consideration in producing the plan are:

- What expectations the landowner has for the future use of the forest
- Other land use patterns such as, grazing, herding and agricultural crops that must be taken into consideration during the planning process.
- Vegetation is mapped in order to determine site preparation and species suitability.
- Environmentally sensitive areas are mapped and detailed. These areas are not part of the formal afforestation plan. No funding is available for afforestation in these areas.
- Landscape, historical and cultural values of the area are mapped and detailed. Areas of high value are also not part of the afforestation plan, nor is funding available for afforestation in these areas.

All of the above factors are taken into consideration when preparing the forest plan. Although the plan is done by a forester, finalization is dependant on the approval of the landowner.

After the final afforestation plan is approved, afforestation operations may begin. Because of open grazing practices, fencing is necessary before site preparation and planting can begin. . The above operations are usually carried out by the landowners themselves. As mentioned above forest owners receive nationally funded loans for 97% of capital costs. Wages are paid separately for the labour required to establish plantations. All forest operations are inspected by a RAP representative before payment is made.

Unlike other farm loan projects, repayment is subject to realisation of a profit by the forest owner. Funds recaptured are earmarked for future use in forestry.

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

Supporting factors

It is the policy of the Icelandic government to support any developments in small-scale forestry and related enterprise development as a part of its attempts to curb rural depopulation. This policy is reflected in recent shift of emphasis within the IFS and its continued support of RAPs.

Limiting factors

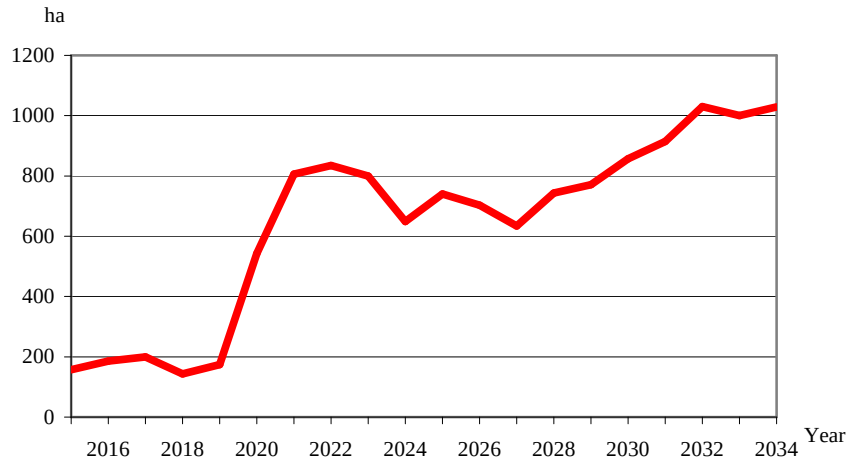

Figure 5. Estimated thinning required in Icelandic forests

Presently the major limiting factor is the absence of raw materials for manufacturing purposes. As shown on the graph below, the amount of small wood available will increase after the year 2020 . During the interim, efforts are being made by the IFS and RAPS to locate future markets and manufacturing methods suitable for predicted timber harvests.

There will be a sharp increase in small wood thinned from Icelandic forests in the year 2019. Figures for small wood production will continue to increase well into the future. This provides what can become a valuable forest resource. (Ó. Eggertsson 2003).

3 Wood-processing industries

It's evident that there is no wood-processing industry in Iceland. Thinning wood is processed in small units on behalf of the Icelandic Forest Service.

4 Non-wood forest products and services

4.1 State of the art and historical development

The state of the art regarding non-wood forest products in Iceland reflects the young age of Icelandic afforestation efforts and a culture adapted through the centuries to life in a treeless landscape. It has only been within the past 20 years or so that Iceland had forests of adequate size to utilise for wood and non-wood products and services to any degree. Most research into forestry has been concerned with identifying suitable species for the growing conditions and the best methods of planting and caring for the young trees. The increased area of forest land and heavier demands for recreational use make increased research into all areas of non-wood resource use essential.

Research regarding non-timber products has been limited to three studies. Two of these were undertaken by the University of Iceland and analysised the chemical content of Downy birch (*Betula pubescens*) and Russian larch (*Larix sukaczewii*) as sources for medicines and food additive production. The third was a study done in eastern Iceland regarding the processing and marketing for culinary purposes of the larch bolete, an edible mushroom found in young larch plantations. None of these projects have been followed up with product development.

Non-timber forest services have received little attention by researchers, although at present there is a movement within the Iceland Forest Service to promote and expand this knowledge. Older research includes user surveys done in recreational forest areas close to the two largest population centers of Reykjavik and Akureyri. The first study was done by the Road Department of Reykjavik and the later by the Eyjaförður Forestry Society. Neither study has been published.

There are two ongoing research projects that address non-timber forest products and services. Both of these projects address both issues, products and services, and are being done within the Iceland Forest Service.

The first of these involves public attitudes towards forestry in Iceland, as well as public demands for services in forest lands. It also addresses to a limited degree the utilisation by the public at large of non-wood forest products. The study is based on a poll done by IMG Gallup and will be published in 2005.

The second ongoing program, Enhancing Local Activity and Values from forest land, is a co-operative effort involving Iceland, Norway, Sweden, Finland and Scotland and has been submitted to the NPP for funding approval. This project involves the development of sub-regional forest planning methods. Plans of this scale and type are necessary tools to prevent possible conflicts of traditional wood use and non-wood forest uses. A part of this project is to identify non-wood forest uses and to promote innovative new uses to provide income in rural areas. Such plans will serve as the basis for maximising forest resources in a socially, economically and environmentally sustainable manner.

As mentioned above, there has traditionally been very little use of Icelandic forests for non-timber purposes, with the exception of animal fodder in the past and recreational use more recently. However the demand for the development of non-timber products and services is increasing. There are several reasons for these increased demands.

With the formation in the last 15 years of the Regional Afforestation Projects the forest cover is increasing and will continue to do so. Many of these areas will not produce high quality timber on a scale that allows economically viable production. For these areas, non-wood resources can form an economic basis for rural enterprises SMEs

The largest demand is for forest services and comes from the urban areas. This demand is the result of changing demographics, economics and infrastructure. Until recently the population of Iceland was basically rural. In 1960, 17.7% of the population was in rural areas. Decreasing demands for sheep production and the introduction of new agricultural practices have drastically reduced the number of people in rural areas to 7.3% in 2003. (Rural areas are defined as areas with a population of 200 or less.) Road conditions in Iceland were historically such that travel within the country was difficult and many people chose therefore to take their holidays within the cities or abroad. The road system has improved as well as the economic standing of most families. Many people now have the necessary recreational vehicles that provide them comfortable access to their own country. Forests owned by forestry societies (NGOs) and the Iceland Forest Service (IFS) are now seen as attractive holiday areas and are experiencing heavy use by recreationists. The 2004 IMG Gallup survey shows that 78.3% of Icelanders visited forestlands in the past 12 months and the average number of visits for this group was 14.7.

Harvesting of non-wood forest products is for the most part done on an individual basis and there are no figures available for the volume and type of products harvested. The same applies to the processing of these resources. Figures from the 2004 survey show that of those visiting forest lands 2.6% went to into the forest to harvest non-wood forest products, presumably mostly berries and mushrooms.

The IFS is the main provider of non-timber forest services. These are mainly recreational and educational services. The IFS has programs for educating both adults and children in and about the forest. The largest of these programs involves "forest classrooms". This is a co-operative effort by the IFS and the state education ministry. Each participating elementary school adopts a forest stand close to the school to be used as an outdoor “classroom”. These classrooms are then used to integrate education in forests with all other facets of the curriculum. The IFS has supervised this program on a national and regional basis.

Information regarding the supply of other forest services is not available outside of the limited figures for visitor-nights kept by the IFS for its land holdings. However, the 2004 survey shows that 94% of visitors during the past twelve months went there because of the services available. (Services include all categories ranging from recreation to information.)

Icelandic law provides free access to all areas, both state and privately owned properties. Harvesting of resources for commercial purposes and camping on private property requires the permission of the land owner. On state owned land, the harvesting of non-wood products is allowed. There is however a provision in the law allowing the Ministry of the Environment to place restrictions on harvesting and the use of mechanised harvesting equipment in environmentally sensitive areas. It is forbidden to harvest naturally occurring materials in areas designated as protected by the Ministry of Environment.

There are no direct provisions in Icelandic law for the promotion of non-wood products. However, the Rural Development Offices, located in all regions of the country can financially support research and development of enterprises utilising these resources. They presently support some activities involving research and development for wood products, but there are no programs currently involving non-wood resources. The IFS is the agency responsible for researching forest resources along with all other facets of forests and forestry. Expertise can also be found in other agencies within the country, for example the University of Iceland, the Food and Drug Agency, the Agricultural University and many others.

University training specifically in the field of non-wood forest products is again not in place. However, university training in related fields such as forestry, chemistry and other related fields is available at the two major universities. Technical training is also available within the country. Graduate degrees in these fields are currently not generally available. Students must go abroad to earn such degrees. This practice is not attributable to lack of qualified teaching personal or facilities, but rather is the policy to promote a wider learning field for Icelandic students.

At present the IFS is the only agency conducting non-wood forest research within the country. The IFS has staff competent to carry out research in all aspects of non-wood forest resources. Several other institutions in Iceland such as the University of Iceland, the Icelandic Tourist Board and the Icelandic Food and Drug Departments are also competent to carry out such research. At present there are no publications concerning non-wood forest product and services in Iceland with general public accessibility.

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

For historical reasons there has been little utilisation of forest resources in Iceland. Therefore in order to utilise the forest resources resulting from current afforestation activities research and development of potential markets and manufacturing processes for all forest products is necessary. Those forest resources resulting from afforestation efforts are for the most part owned by individual landowners. Therefore possible conflicts regarding their harvesting are negligible. The only foreseeable conflict may involve ownership rights to carbon sequestration should this develop into a market commodity.

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Summary

Just over 50% of the productive forest estate in Ireland is less than 25 years of age. The private component of this estate is even younger. Substantial Government and EU grant-aid has been the primary driver to the establishment of private forests. The major factor affecting the competitiveness of the forest – wood / non-wood / services – consumer chain in Ireland therefore is the limited current supply of raw material and the uncertainty about the future supply of roundwood from private forests. Most of these forests are less than 10 hectares in size and are located in inaccessible areas. There are concerns that, due to the lack of economies of scale, harvesting will not take place. The lack of silvicultural skills combined with the absence of an organisational structure among the majority of forest owners makes the economic harvesting and marketing of the timber output from the forests more unlikely.

Species distributions of state and private forests are dominated by *Picea sitchensis*. While the species is suitable for a range of end-uses the opportunities to add value are limited. This is a barrier to the development of value-added enterprises. The development of enterprises using species other than *Picea sitchensis* is difficult due to the limited and irregular supply. The range of non-wood products and services that can be produced within *Picea sitchensis* forests is limited.

The main problem and research question for enterprise development in the forest sector is to identify the appropriate organisational structure that will facilitate the economic harvesting and marketing of the timber output from small-scale forests. If this structure is in place a key barrier to enterprise development in the forestry sector will be removed. Research and development into value-added applications of Irish grown timber, in particular *Picea sitchensis* timber, is required to expand the market for that timber. Markets for a range of non-wood products and services need to be investigated further.

1 Consumption

1.1 State of the art and historical development

The Irish sawnwood market experienced rapid growth in the 1990s with demand growing from 580,000 m^3 in 1992 to 1.24 million m^3 in 2000 (TIDG 2002). This increase in demand was linked to the high level of house building that was undertaken during the period, which saw the number of house completions increase from 21,391 in 1993 to 49,812 in 2000. Current projections for 2004 suggest that 80,000 new homes will be completed this year. Compared to other EU countries the housing stock in Ireland is very low relative to the population. The rapid rise in the number of young adults, strong employment growth, prevailing low interest rates and tax incentives for residential property were key factors in fuelling this increase in house building (AIB Capital Markets and Merrill Lynch 2000).

The furniture market in Ireland has also grown. In 2003 it was estimated to be worth 570 million euro (at manufacturing prices). Of this, 123 million euro was exported.

1.2 Forest products and services consumption

The population of Ireland has increased steadily since 1946. The population at that time was 2,955,107. The population in April 2004 was 4.04 million, the highest figure since 1871 (CSO 2004). The age distribution of the population has also changed during that period with the percentage of the population aged less than 25 years falling from almost 44% in 1946 to 37% in 2002, while the percentage aged between 25 and 44 years (i.e. at house purchasing age) grew from 26% to 30%.

The distribution of the population between urban (where urban is defined as towns with 1,500 or more persons) and rural has undergone a major transformation in the period since the foundation of the State in 1926. At that time less than one-third of the population lived in urban areas. The urban share has increased at each successive census and currently 60% of the population lives in urban areas.

The GDP per capita in 2002 was 33,021 euro. The most recent data on household expenditure patterns show that 27.9% of average weekly household expenditure was on food, drink and tobacco in 2000. The percentage of expenditure on housing was 9.6% with a further 2.5% and 4.6% spent on household non-durables and durables respectively (CSO 2001).

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

There are insufficient data available in Ireland to quantify the urban population's demand for forest related products and services. Thus this section deals with the total demand for these products and services. The market for sawnwood in Ireland comprises construction, pallet, fencing, joinery and furniture. In the year 2000, the Irish sawn timber market (including Northern Ireland) was estimated at 1.48 million m^3 (Table 1) with a value of 266 million. Although the volume of Irish timber sold on the Irish market has grown, market share fell from 60% in 1990 to 42% in 2000. This share varied between the different market segments with a share of 83% in pallets, 71% in fencing, but only 29% in construction (TIDG 2002). The majority of imports of sawn timber are from Sweden and Finland. It is important to note that Irish grown timber has

size and strength characteristics that make it unsuitable for certain construction uses, e.g. roof trusses. As a consequence it is estimated that only 694,000 m^3 of the Irish construction market is actually "available" to the processors of Irish-grown timber (TIDG 2002: 46).

The market for sawnwood is expected to continue to rise reflecting the anticipated requirement of 55,000 new houses per annum over the next 10 years (Bacon and Associates 2003). This strong demand is expected to be underpinned, in the short to medium term, by GNP growth and low interest rates (AIB Capital Markets and Merrill Lynch 2000).

Irish panel board producers export in the region of 75% of their output, mainly to Britain. The total demand for these products has not grown significantly in the past 10 years. It is however expected that demand for medium density fibreboard and oriented strand board will increase by 10% in the short-term (TIDG 2002).

Table 1. Consumption of main wood products in 2000 in Ireland (includes Northern Ireland) ('000 m^3)

Product category	**Domestic production**	**Imports**	**Exports**	**Apparent consumption**
Sawn market				
Construction	348	818	20	1146
Fencing	151	28	82	97
Pallet	356	41	154	243
Other	33	0	33	0
Sub-total	888	887	289	1486
Wood-based panels	745	284	581	448

The most important non-wood forest products are Christmas trees and foliage. Demand for Christmas trees has grown in Ireland over the past number of years. In 2002 an estimated 400,000 trees were sold in Ireland. Demand for forest foliage has increased in Ireland and in larger flower markets in Britain and Continental Europe. The Irish foliage industry started in 1993 and has grown steadily to cover 150 hectares in 2003.

Forests are the most important recreational facility in Ireland. This is due to the fact that unlike most European countries Ireland has no "right to roam" legislation and no designated recreation rights of way such as those that exist in England and Wales. Recreation is generally limited to Coillte Teoranta (The Irish Forestry Board) owned forests (formerly state forests), as private forests in general are not used for recreation. The demand for the use of forests has increased substantially since state forests were opened to the public in 1970. The most recent estimates indicate that the total number of annual visits to Irish forests is 8.5 million (Clinch 1999). The range of activities being undertaken in these forests has expanded. For example, the demand to use forests for cycling, mountain-biking, horse-riding, camping etc has increased especially in forests near large urban centres.

1.4 Main problems and research questions in consumption for enterprise development

Consumption for forest products in Ireland is largely related to the housing boom and related projects (DIY, house extensions). However, industrial development has driven demand for pallets and packaging and infrastructural development has driven demand for fencing and acoustic barriers. Current trends in each of these areas suggest that further growth can be expected over the next 10 years. Product demand is not seen as a problem/barrier to enterprise development in the forestry/wood products sector.

The greatest barrier to enterprise development relates to limited supply and consequently the difficulty of achieving scale at a level similar to competing, overseas companies. The lack of scale limits the amount of retained income that can be spent on new product development and marketing. Consequently, Irish companies may struggle to keep pace with overseas companies. A barrier to enterprise development in non-wood services is the low population density in Ireland.

Annex to Part A: Organisations studying forest products consumption and main publications and information sources

No organisation studies forest products' consumption in any great detail. Responsibility for reporting on consumption rests with the Forest Service of the Department of Agriculture and Food. COFORD, the Council for Forest Research and Development, cooperates with the Forest Service in meeting national reporting requirements. There are no current research projects dealing with forest products consumption. However, COFORD is about to undertake a major project looking at the market potential of engineered wood products in Ireland.

2 Small-scale forestry practises

2.1 State of the art and historical development

The total area of private forest in Ireland, i.e. 282,970 hectares, can be considered to be small-scale private forestry. This is because there is no tradition of forest ownership by municipalities, churches, or industry. Thus for the purposes of this section private forestry is considered to be synonymous with small-scale forestry.

At the beginning of the 20th century just over 1% of the land area of Ireland was afforested. The forests which had covered the country 10,000 years previously had been cleared for agriculture, to provide wood for houses, and for shipbuilding. By the early decades of the 18th century, Ireland was a timber-importing country. Irish farmers, who were tenants on land owned in the most case by absentee landlords, were subsisting on small pieces of land. They could not afforest the land because they did not own it but afforestation was not desirable anyway because they needed the land for agriculture. The landlords did however afforest. Those rearing a family on a few hectares of poor land looked enviously at woodlands on the estates of the aristocracy, which were maintained primarily for hunting and sport. With the passing of the Land Acts in the late 19th century ownership of the estates was transferred to the tenant farmers. Landlords cleared most of the forests before the transfer of ownership. The new owners then cleared the trees that remained so as to remove the symbol of landlordism while also maximising the area available for agriculture. Interest in planting trees fell and remained low until the 1980s despite the availability of state afforestation grants after 1930. The limited amount of private planting that was undertaken was by the small number of landlords that remained in the country and who had a tradition of tree planting. The net result was that prior to 1980 the vast majority of landowners in Ireland had no interest or tradition in forestry.

In 1981 the first round of EU funding for afforestation was made available in Ireland as part of the Western Package Scheme of EU-grants (EC Reg. 1820/80). Funding under this scheme provided for up to 85% of the costs of forest establishment. Only farmers living in the western, more disadvantaged parts of the country were eligible to apply for these grants. Despite the availability of the grant, farmers were not only slow to adopt forestry as a farm enterprise but were extremely antagonistic towards it especially in western counties. There were a number of reasons for this attitude. First, there were historical reasons, i.e. the association of forestry with landlordism; second, forestry was perceived to be only suitable for useless land on mountain tops thus it was perceived as an insult to suggest that a farmer's land was only fit for forestry. Third, large non-resident farms in poor country areas which were earmarked for subdivision by the Land Commission were being bought up by developers on behalf of pension funds, banks and insurance companies. As a result farmers saw their last hope of consolidating their fragmented farms disappearing. Emotions exaggerated the extent of this problem. The introduction of 100% establishment grants, and a scheme in 1987 to compensate those afforesting for income foregone, removed a major barrier to afforestation. The latter scheme was replaced by the Forest Premium Scheme in 1990. Under the conditions of this scheme farmers were paid a premium for the first 20 years of the rotation to compensate them for loss of income from land removed from agricultural production. The net result was a substantial increase in private planting rising from a mere 300 hectares in 1982 to a peak of more than 17,000 hectares in 1995 (75% of total

afforestation) (see Figure 1). In 2003, private planting rates fell to 8,969 hectares as a direct result of cutbacks in funding for forestry. It is not clear how the introduction of the Single Payment Scheme in January 2005 will influence afforestation levels. However, the concession for forestry which allows farmers to continue to receive their full single payment as well as the full forestry premium (under certain conditions) should encourage increased afforestation by farmers.

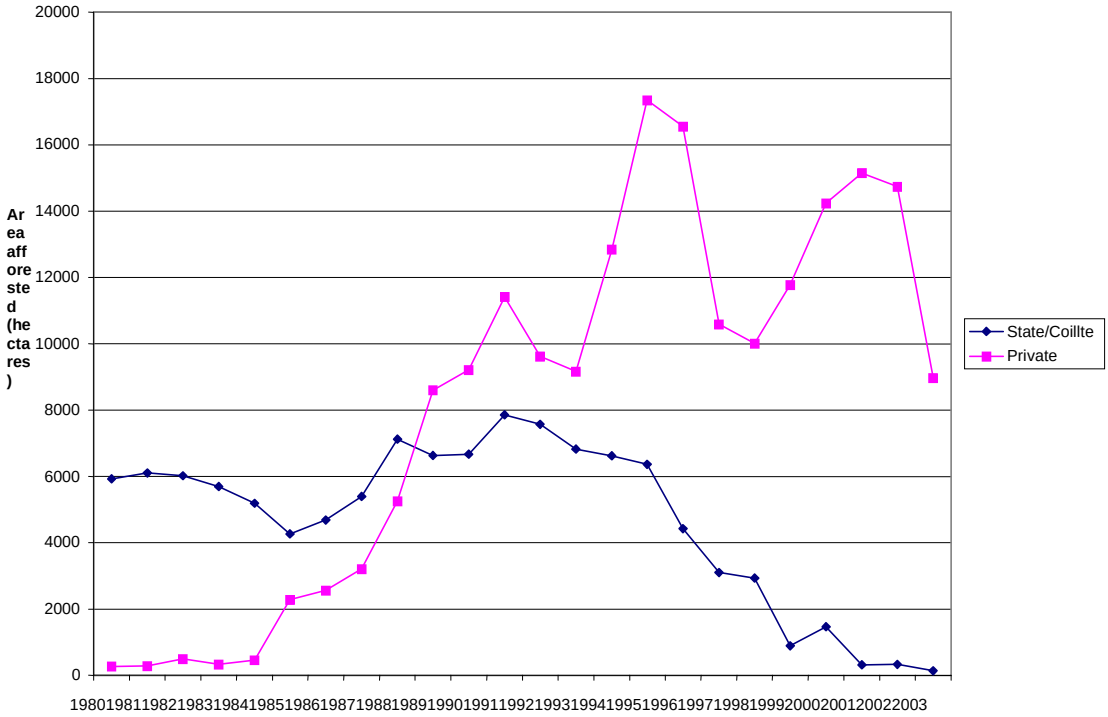

Figure 1. Afforestation rates (State and private) in Ireland 1980-2003.

2.2 Small-scale forest holdings

Small-scale forest holdings are a relatively new phenomenon in Ireland. In 1973, there were only 81,963 hectares of private woodland of which 33,102 hectares were scrub (Purcell 1979). However, since that time, 196,415 hectares have been afforested. It is estimated that there are in the region of 17,000 small-scale forest holdings with an average holding size of 10.6 hectares. However, many holdings are less than 10 hectares (Table 2).

Table 2. Distribution of private holdings established between 1990 and 2002 in Ireland

Area (hectares)	Number of holdings
≤2	2,075
>2 ≤4	3,088
>4 ≤6	2,265
>6 ≤10	3,189
>10 ≤20	3,269
>20 ≤50	1,504
>50 ≤100	209
>100	39
Total	15,638

Most of the owners of small-scale forests are farmers. Approximately, 61% of the forest area planted post 1990 was by full-time farmers; 17% by non-farmers and the remainder by part-time farmers. Among the non-farmers the most common group were professionals or business owners (Wall and Ní Dhubháin 1998). Survey data can be used to indicate the age of those afforesting, with fifty-two percent of owners surveyed by Wall and Ní Dhubháin (*ibid*) aged between 31 and 50 years with only 4% less than 30 years. The vast majority of owners are married (79%) and male.

As mentioned previously, almost all private plantations in Ireland are less than 20 years old. Reflecting the fact that the earlier afforestation grant schemes were only available on lands afforested in 12 western counties, the older private plantation (i.e. greater than 15 years) are found in the west of the country. As a consequence of the age structure of private plantations the volume of wood harvested to date is limited but expected to rise. In the year 2003, of the total timber sales of 3,270,000 m^3, only 5%, or 162,000 m^3 were sourced from private plantations. As the private forests mature output is expected to increase to over 1 million m^3 annually by 2015. Private forests are not open to the public and their use for recreation, hunting and other non-wood activities by persons other than the owners and their families is negligible.

2.3 Small-scale forest practices

The objectives of small-scale forest owners, and the management and work undertaken in their forests, are primarily influenced by the fact that these owners are almost exclusively in receipt of either an afforestation grant or a combination of the grant and an annual premium. The afforestation scheme under which these subsidies are available has timber production as its main objective. Receipt of the subsidies is subject to the forest owner adhering to strict guidelines which reflect this objective. For example, if conifers are to be planted they must be planted at 2 metre square spacing. In the case of broadleaves the spacing is commonly 2 m by 0.75 m. The plantations must be fenced and a management plan produced. Given the overriding emphasis on timber production, it is not surprising that in a survey of over 100 private forest owners 90% gave the production of timber for sale as the main objective for their forest (Ní Dhubháin and Wall 1999). Forty-five percent had planned to use some of the timber output on their farm as fencing or fuelwood. The provision of recreation for the owners and their family was an objective for 42% of owners. Thus despite the emphasis on timber production in the grant schemes, there is evidence of multiple-use management objectives among small-scale forest owners.

Few forest owners undertake the work in and management of their woodland. Instead they employ management companies to do this. The afforestation grant covers all the costs incurred by the person establishing a forest including an overhead to reflect the cost of hiring a company to undertake the work. Almost 80% of small-scale forest owners surveyed in 1996 (*ibid*) utilised the services of a management company while the remainder did their own planning and execution of almost all operations. Many farmers only plant once in their lifetime and with no inherited tradition/experiences, coupled with the fact that there is a 100% grant available for establishment, many of them consider that there is no point learning new skills. Furthermore, they may consider that there would be a greater risk of them not receiving the grant (receipt is subject to

successful establishment of the plantation) if they were to undertake the work themselves rather than employ a professional forest management company.

Most land that is afforested is marginal agricultural land and in upland areas conifers are planted while in lowland areas broadleaves are planted. The most common conifers planted include: *Picea sitchensis*, *Larix X eurolepis* and *Pseudotsuga menziesii* while in the case of broadleaves *Fraxinus excelsior*, *Acer pseudoplatanus*, *Quercus* spp. and *Fagus sylvatica* are most commonly planted. As the quality of land planted during the earliest EU-funded afforestation grant scheme was poor, the older of these plantations comprise pure conifers. Research work on a sample of these older plantations suggests that the growth rates will be quite high with an average yield class of 21 $m^3ha^{-1}an^{-1}$ recorded (Redmond et al. 2003). As a consequence rotation lengths of between 40 and 50 years are expected. The thinning of these plantations is expected to start shortly. The limited amount of harvesting that has taken place to date has been undertaken by the sawmills to which the timber was sold.

The key role that the availability of grants and premiums played in attracting landowners into forestry, should not be underestimated. The afforestation grant covers all the cost of establishment and the majority of those planting already own the land so do not incur the additional cost of land purchase. In addition, many of those that afforest do so on marginal land thus the opportunity cost of converting land to forestry is negligible. In any case the annual premium, which is paid for the first 20 years of the rotation, ranges in value from 209 euro to 500 euo per hectare. Given that many Irish farmers earn annual family farm incomes less than 400 euro per hectare the attraction of the premium is clear. The tax-free status of all income from forestry is an additional incentive to afforest. Thus the owners' investments in small-scale forestry would be considered minimal.

Despite the representation of farmers in private forestry, there is very little integration between forestry and farming in individual farms. The forests are fenced for the whole of the rotation. Much of the work undertaken in the forest is done by contractors rather than the owner thus further reducing the level of interaction between the two activities.

A sizeable number of private forest owners are members of forestry co-operatives which evolved from dairy co-operatives. For example, the Western Forestry Co-operative and 20 farm-owner forest-producer co-operatives have now over 2,500 members owning 16,000 hectares of forestry in over 4,000 small plantations. A further co-operative grouping, which stemmed from the Western Forestry Co-operative, is the Forestry Development Association in the Kilkenny/Waterford/Laois/Offaly region. This association has over 400 members.

Because many landowners plant small areas, to effect economies of scale, better visual layout, accessibility and marketing, the Western Forestry Co-operative tries to get land adjoining an existing plantation afforested to achieve a target minimum size of 20 hectares for a group. While this is developed as one unit each farmer retains full ownership of his/her plantation. It will be co-ordinated by the co-operative for selling as one unit in the interest of efficiency. A small number of the members of the Western Forestry Co-operative are involved in joint forestry developments.

2.4 Policy framework and production conditions

The primary piece of legislation that regulates forestry in Ireland is the 1946 Forestry Act. This legislation contains the provisions for the promotion of forestry, the development of afforestation, and the production and supply of timber. Its provisions also cover the compulsory acquisition of land, the extinguishment of easements, the creation of rights of way and the introduction of restrictions on cutting down and injuring trees. The Act also deals with the licensing of tree felling and reforestation obligations. The Forestry Act 1956 facilitates the acquisition of land for the purposes of the Forestry Act 1946. The Forestry Acts, 1946 and 1956 are currently being reviewed as they were enacted at a time when: the forest estate was smaller; timber shortages following the Second World War required strict control of felling; and the environment, amenity and multi-purpose forestry had not yet emerged as important issues. The National Forest Standard published by the Forest Service outlines criteria and indicators relating to the national implementation of Sustainable Forest Management.

As highlighted earlier almost all afforestation in Ireland is grant-aided. Receipt of this grant-aid is subject to the adherence to strict environmental protection controls. These include a set of eight environmental guidelines relating to interactions between forestry and: water; the landscape; archaeology; biodiversity; and aerial fertilisation. The remaining three guidelines relate to forest harvesting and the environment, forest protection, and forest recreation. The Code of Best Forest Practice describes for each forest operation the best operational practice and potential adverse impacts. Grant-aid is also available to the owners of private forests for woodland improvement, the high pruning of conifers, and the shaping of broadleaves. The building of roads within the forest is also financially supported. Recently incentives to establish woodland with native species only, or to improve existing native woodlands have become available under the Native Woodland Scheme.

Current Government policy is laid down in “Growing for the Future: A Strategic Plan for the Development of the Forestry Sector in Ireland” which was published in 1996. Among the policy aims included in this plan was an afforestation target of 25,000 hectares per annum to the year 2000 and 20,000 per annum in the period 2001-2030. The Minister for Agriculture and Food recently appointed consultants to carry out a review of forest policy in Ireland. The report produced by these consultants has recently been completed (Bacon and Associates 2004).

There is no research institution specifically dedicated to small-scale forestry in Ireland. However, research institutions such as COFORD have funded research into small-scale forestry. The Dept. of Crop Science, Horticulture and Forestry has undertaken some of this research with COFORD funding. Teagasc (The Irish Agriculture and Food Development Authority) has also been engaged in research into small-scale forestry.

Formal education in forestry in Ireland at degree level (full-time four year degree course) is provided by one University – University College Dublin. Diploma courses in forestry are available at two institutes – the Waterford Institute of Technology and the Galway-Mayo Institute of Technology (three-year full-time courses). The Forest Service and Teagasc organise 20-hour training courses in forest operations. The courses are open to private landowners who are planning to afforest or have recently afforested part

of their land. The agencies also organise a large number of field days at demonstration forest sites. Currently, training courses in thinning have been organised. Uptake of these courses is generally poor with over 78% of private forest owners surveyed by Ní Dhubháin and Wall (1999) indicating that they had not attended any of these courses and indeed had no formal education in forestry. Training for those wishing to work as forest workers is provided through the Teagasc College, Ballyhaise in Co. Cavan.

Teagasc employs 12 farm forestry advisors nationally who are responsible for forestry extension. They provide a range of technical services to farmers and organise field days and demonstrations for forest owners in conjunction with the Forest Service.

The national state Forest Service currently employs 25 foresters. However they no longer have a direct role in providing extension services. Instead their role is to promote forestry, to ensure plant health regulations are being observed and to audit existing grant-aided plantations to ensure all that all environmental guidelines and the Code of Best Forest Practice are being adhered to. The Forest Service does however provide extension services indirectly by providing funding to other agencies, e.g. Teagasc, to employ extension foresters and to provide training programmes for private forest owners.

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

Supporting factors

Availability of incentives: The availability of incentives in the form of establishment grants and annual premiums makes it attractive for landowners to afforest land.

Existence of forestry co-operatives and associations: A number of forestry co-operatives and associations have been operating in Ireland for a number of years.

Presence of forest management companies: A number of long-established management companies exist who offer forest owners a service, which includes the establishment and early management of their forests. An increasing number of these companies will now manage the forest for a period up to and including first thinning.

Limiting factors

Size and location of small-scale forests: The majority of small-scale forests are less than 10 hectares and located in inaccessible areas.

Lack of knowledge or experience of forest management: The owners of small-scale forests have no inherited tradition or knowledge of forest management.

Economies of scale: In light of points 1 and 2 above it is difficult to envisage how harvesting can be undertaken economically in small-scale forests. Few forest owners have the experience of harvesting timber and few would have the equipment to undertake this work. The lack of economies of scale would make harvesting within these stands an unattractive option for harvesting contractors especially as most harvesting is mechanised in Ireland.

For a landowner wishing to afforest land there are few barriers to his/her involvement in afforestation. As highlighted above there are indeed a number of factors supporting such

a decision. On the other hand, for those wishing to purchase land for afforestation, the high land prices in Ireland are a barrier. For those wishing to develop an enterprise based on the products of small-scale forests there are a number of barriers. The forests are small and access is poor and harvesting the timber products in these forests presents logistical and economic challenges. Also little is known about the quantity or quality of wood and non-wood products in small-scale forests.

One of the key areas of research in the area of small-scale forestry is to identify the most economic means of harvesting in small-scale forests and to identify the appropriate marketing methods for the harvested products.

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

Organisations studying small-scale forestry in Ireland include:

Teagasc - which provides integrated research, advisory and training services for the agriculture (including forestry) and food sectors. It has also been involved in research on farm forestry.

Western Forestry Co-operative Society Ltd - which is based on the forestry co-operative movement in Denmark. It has a wide range of functions including undertaking research into farm forestry.

Dept. of Crop Science, Horticulture and Forestry. The Forestry Section of this department has been involved in research into small-scale forestry.

The primary publications and information sources on small-scale forestry are:

The Irish Timber Grower's Assocations Forestry Yearbook. Published every year, the book includes statistics and information relating to private forestry.

Forest Service, Department of Agriculture and Food. (http://www.agriculture.gov.ie/index.jsp?file=forestry/pages/index.xml).

3 Wood-processing industries

3.1 State of the art and historical development

The historical development of the wood processing industry in Ireland was linked to the availability of the raw material resource. The land area under forests has increased from 1% in the early decades of the last century to almost 10% in recent years. In the first half of the 20th century small privately owned sawmills processed a high percentage of hardwoods. State afforestation programmes undertaken by the Forest Service focused almost exclusively on planting coniferous species. In the second half of the century sawmills predominantly processed softwoods. Other than the Forest Service, which had two small sawmills, the vast majority of mills were privately owned. Currently there is no primary processing undertaken by the State. Privately owned sawmills are rurally based and dispersed around the country.

In parallel with the growth in raw material supply, a small number of privately owned sawmills made substantial capital investments in primary and secondary processing machinery. An Irish privately owned chipboard plant was established in 1959. This was subsequently acquired by Finsa in 1984, the large Spanish owned board manufacturer. Medite (now Weyerhaeuser) established a medium density fibreboard plant in 1983. This was followed by the establishment of an oriented strand board (OSB) plant by Louisianna Pacific and Coillte Teoranta in 1996. Coillte, which had a 35 per cent shareholding, has subsequently acquired outright ownership of the plant. Masonite, a US based company, established a door skin manufacturing plant in 1997.

In parallel with the increase in planting of coniferous softwood species, the Forest Service commissioned the Institute for Industrial Research and Standards (IIRS) in 1964 to undertake research and development on a range of softwood species to ascertain their physical and mechanical properties. This work led to the production of technical data to international norms for the material. In turn, the data were used to develop national standards and were subsequently fed into the development and production of European standards (ENs).

The introduction of National Standards for structural timber grading and certification in 1988 necessitated the development and implementation of grading and quality control systems in the plants. Training and certification courses were developed for the industry covering primary processing and manufacturing. Quality control systems for timber grading, marking and manufacturing operations were developed. The training and certification work was undertaken under the supervisory control of the Timber Quality Bureau of Ireland (TQBI), a representative body of state, semi-state and industry interest groups. Parallel quality control schemes were established for timber roadside fencing and the use of timber in local authority house building programmes. The training and certification work subsequently transferred to the National Standards Authority of Ireland (NSAI) in 2001.

Ireland participates fully at European level in CEN's work on the development of timber standards. A representative Timber Standards Consultative Committee works with NSAI on national and European standard development work. NSAI has also established an advisory board comprised of industry representatives to assist and review the ongoing range of timber training and certification work. The work ranges across

sawmilling, board manufacture, preservation, phytosanitary regulations, timber frame manufacture, roof truss manufacture, timber fencing, joinery, etc.

3.2 Wood-processing industries

There are three primary categories of wood processing in Ireland. They are:

- Sawmilling;
- Panel board manufacture;
- Furniture/Joinery.

Sawmills

There are approximately 70 mills in total. Most are family owned businesses. Five large mills dominate the sector each with single shift annual saw log processing capacity in excess of 200,000 m^3. A further four medium sized mills have processing capacity in the region of 100,000 m^3. The processing capacity of the remaining mills is significantly smaller. The large and medium sized mills process approximately 90% of saw logs. These mills only process softwood logs. The primary species is *Picea sitchensis*.

Saw logs are categorised into two categories – large and small saw logs. The large saw logs have a top end over bark diameter of 20 + cm. The top end diameter of the small saw log is in the range 14 – 20 cm. Logs of 7 – 14 cm top diameter are categorised as pulpwood and are primarily used in panel board manufacture. The volume of saw logs processed annually is a little over 2 million cubic metres. Log harvesting is undertaken in the main by harvesting contractors. A further 1.3 million cubic metres of pulpwood is generated.

Sawn timber output from the mills in 2003 was in the region of 1.2 million cubic metres. This was processed into four primary categories:

- Construction timber;
- Pallet timber;
- Fencing timber;
- Decking, garden shed and garden furniture timber components.

The breakdown of sawn timber output is roughly 40% construction, 33% pallet and 22% fencing, and 5% other. Turnover for the sector was in the region of 270 million euro.

The domestic market is the primary market for Irish sawn timber. Approximately 30% of output is exported to Britain in the form of pallet, fencing, decking, garden shed and furniture components. Residues, in the form of clean chips, sawdust and bark, represent approximately 50% of output from logs. The clean chips are used as a raw material by the medium density fibreboard and hardboard door skin plants. Sawdust is used by the chipboard plant and as a boiler fuel while the bark is primarily used as a bark mulch.

In 2004 two of the large sawmills installed combined heat and power (CHP) plants utilising biomass from sawmill residues in the form of sawdust and bark. The first is fully commissioned utilising heat for drying kilns and the excess energy is being supplied as electricity into the national grid. The second plant which is due to be commissioned in December 2004, will utilise heat for drying kilns and the

production of pellets while the excess energy will be utilised to generate electricity for the national grid.

Over the past 4 to 5 years the large sawmills invested in excess of 100 million euro in primary and secondary processing facilities. Parallel research and development work was undertaken by larger sawmill companies. This was targeted at the automation of primary processes, increased volume throughput, improved added value and overall efficiency within the plants.

Panel Board Mills

The panel board mills are regionally based across the country. The Weyerhaeuser MDF plant with an output capacity of approximately 400,000 m^3, utilises clean chips and pulpwood raw materials. The Coillte OSB plant has an output capacity of 350,000 m^3 and utilises pulpwood raw material. The Finsa chipboard plant with a capacity of 125,000 m^3 utilises pulpwood, sawdust, chips and recycled timber. The Masonite door facings plant has an output capacity of 120,000 m^3 and utilises clean chips as its raw material.

A high percentage of the output from the panel board mills is exported to the UK, mainland Europe and beyond. Exports account for 80% to 90% of OSB and MDF production while for door facings they account for in excess of 90%. Approximately 50% of chipboard production is exported.

There are five panel board mills operating within the Island of Ireland. They include an MDF plant, an OSB plant, two chipboard plants and a door facings plant. All are part of a larger group employing in excess of 250 people. They are therefore not classified within the SME category. With the exception of the OSB plant which is part of Coillte Teoranta, the rest of the panel board mills are owned by multinational timber companies. Employment within the sector is approximately 1000 (TIDG 2002). Turnover is in the region of 265 million euro per annum.

Panel board mills are stand-alone operations in Ireland. They are not integrated as mills are elsewhere in Europe. Over 300 million euro was invested in manufacturing facilities in a ten year period (TIDG 2002). The companies undertake research and development work and have established a successful track record of innovative product and process development combined with efficient plant utilisation.

The cost of freight and transport is an issue for Irish board mills relative to their European counterparts with better market proximity. Transport represents approximately 12% of the costs of the Irish board mills (TIDG 2002). Energy costs represent approximately 7% of overall costs. Unlike board mills elsewhere in Europe with biomass-based power plants feeding into the national grids thus significantly reducing the cost of power, Irish panel board mills have not as yet established power plants on their sites.

Furniture Manufacture

There are 409 companies in the furniture sector employing 6,615 people. The output from the sector in 2003 was 570 million euro (at manufacturing prices). Of this, 123 million euro was exported. The market size at retail level was 1.3 billion euro of which 800 million euro was domestic furniture. The balance was contract furniture. Irish manufacturing market share was 30% in domestic furniture and 50% in contract furniture.

The key furniture sub-sectors are as follows:

- Living/dining/bedroom;
- Kitchen/bathroom;
- Bedding;
- Upholstery.

Changing market requirements demand high levels of innovation from furniture manufacturers. Larger companies undertake ongoing research and development work on new furniture ranges in response to changing fashion trends and lifestyle needs.

3.3 Wood processing industries practices

In sawmilling there has been a transformation in processing capacity and efficiency over the past 4-5 years. High levels of investment in automated primary and secondary processing have created sawmilling facilities on par with some of the best mills in Europe. The emphasis is on volume throughput, log yield and market value optimisation. As shown earlier, the primary categories of sawn timber produced are construction, pallet, fencing and garden timber components. Sawn timber products compete with imported timber from Scandinavia, the Baltics, Russia, Germany and South America in both the Irish and British markets. Imported timber is generally purchased through Irish or British based timber agents acting on behalf of overseas producers on a small commission basis.

The value added machined timber end of the market used in areas such as flooring, joinery and furniture manufacture is dominated by imported timber. Fast grown *Picea sitchensis* is unsuitable for use in these areas. However, some minor softwood and hardwood species such as *Pseudotsuga menziesii*, *Pinus sylvestris*, *Larix* spp., *Fagus sylvatica*, *Acer pseudoplatanus*, *Quercus* spp, etc are used. The volumes are low and log supply is fragmented. Some of the small sawmills specialise in processing the minor species. Coillte Teoranta, the Irish Forestry Board, coordinates the limited supply of sawn timber from some of the mills. It kiln dries and machine finishes the timber. Employment within the mills is in the range of 2-10 people. These small family-owned mills are spread across the country. In relative terms, the volume output from these mills is very low. The sawn products produced are generally used to service niche speciality market needs within areas such as furniture, joinery, flooring, wood crafts, etc.

Sawmilling capacity currently exceeds sawlog supply. Approximately five per cent of sawlog raw material is imported from Scotland. Coillte Teoranta supplies approximately seventy per cent of sawmiller's needs. The balance is supplied from The Northern Ireland Forest Service and private growers.

High levels of investments were made in large and medium sized sawmills in automated processing and optimisation machinery and equipment over the past five year period. Further investment is now being made with the installation of combined heat and power (CHP) plants in some mills. Research and development on innovative process and product development in both sawmills and board mills is ongoing.

Market prices are dictated by a number of factors. Sawn structural timber is to a large extent dictated by the Scandinavian timber price in the market. Irish timber is generally about three per cent below the Scandinavian price. Pallet and fencing timber prices are driven by competition between Irish, Baltic and Brazilian suppliers and competitive pressures amongst manufacturers. In the board manufacturing sector, prices are determined by supply/demand in British, European and global markets.

3.4 Policy framework and production conditions

In 1996 a strategic plan for the development of the forestry sector in Ireland was published (Growing for the Future: A Strategic Plan for the Development of the Forestry Sector in Ireland). It recommended the establishment of a Timber Industry Development Group (TIDG) to report on the downstream side of the industry. The TIDG was established in 2000 with terms of reference to make recommendations for the optimum development of the industry sectors which process and market Irish wood and non-wood forest products, and to identify economic, marketing, technical and infrastructure issues that impact on the ability of the sector to improve competitiveness and to capitalise on opportunities presented by The National Development Plan for forestry.

The TIDG report was published in 2002. The report reviewed the forestry and processing sectors together with markets for Irish timber. It identified challenges and opportunities and made recommendations for the way forward into the future. The optimum utilisation of the available wood resource over the coming decades in a manner that builds an internationally competitive, profitable and sustainable industry was a primary strategic objective. It recommended that scale be built across the industry through a combination of capacity utilisation, consolidation, strategic alliances, joint ventures, acquisitions, international expansion and co-operative initiatives in areas such as R & D, marketing etc. A common R & D policy focussed on competitiveness, market development and customer satisfaction was recommended.

A TIDG steering group was established to direct and oversee the broad research and development work involved in the production of the TIDG report. A working group was also established to undertake the initial research and analysis necessary to facilitate the TIDG steering group in its deliberations. The Steering Group membership included representatives from Government Departments of Enterprise Trade and Employment, and Marine and Natural Resources, Coillte Teoranta, Enterprise Ireland, COFORD, Irish Timber Council, Irish Timber Growers Association, Irish Timber Trade Association, National Furniture Manufacturers Association, SFADCO, Udaras Na Gaeltachta and a panel board manufacturer.

The above Government Departments, state agencies and timber trade representative bodies together with third level universities and colleges are the primary institutions that

influence policy and direction in wood processing. National and international standards, market requirements and conditions are important considerations in formulating sectoral and sub-sectoral policies and strategies.

Development assistance is provided to companies through semi-state development agencies such as Enterprise Ireland, SFADCO, Udaras Na Gaeltachta, Local Enterprise Boards and COFORD. Financial support is provided for research and development, human resource (HR) development, training, management development, mentor programmes, feasibility studies, etc. The National Standards Authority of Ireland (NSAI) implement product certification schemes for structural timber grading, timber preservation, roof truss manufacture, timber frame manufacture, phytosanitary plant health compliance for timber pallets and packaging, etc. The NSAI also provides Irish Agreement certification for products and components that satisfy stringent test and analysis to determine their end use suitability. An NSAI Timber Standards Consultative Committee with representatives from the timber sectors, trade associations, state and semi-state bodies work together on the development of Irish standards and European norms. A similar representative advisory body works with NSAI on the timber training, certification and quality control programmes.

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

Some of the primary supporting factors are as follows:

Business Environment: There is a good business environment and there are good business supports within the country.

Integrated Industry: The industry is integrated from log supply to sawmilling, HP, board manufacture, pallet, fencing, etc.

Domestic Market: There is a strong domestic market with record levels of house completions.

Export Markets: Large volumes of sawn timber are exported to Britain. A one-day delivery service is provided on a roll on/roll off basis. Board products are exported to European and world markets.

Capital Expenditure: High levels of capital expenditure have generated processing efficiencies on par with international norms.

Some of the primary barriers to entrepreneurship are as follows:

Capital Intensive: Primary sawmilling, board manufacture and secondary processing are highly capital intensive.

Raw Material Supply/Cost: The volume of raw material is relatively low compared to other European countries. The cost of the material is an issue between processors and suppliers. The volume of sawlogs projected for 2004 is 3.1 million m^3 and pulpwood 0.8 million m^3 (TIDG 2002).

Sawmilling Capacity: Large investments in primary processing created some over capacity within the sector. This created increased competition for raw material supplies.

Cost Base: The cost of labour, insurance, energy, services, etc. are relatively high.

Environmental Regulations: Compliance with environmental regulations can add significantly to the establishment and on-going costs.

High Penetration of Timber Imports: There is a high level of sawn and machined timber imports into Ireland from suppliers in Scandinavia, the Baltic countries, Russia, Germany, France, US etc. Importers seek competitive advantage on price, quality and continuity of supply.

Irish Raw Material: The dominant species in Ireland is *Picea sitchensis*. It represents more than 80% of the volume output from Irish forests. It is a good sawlog for the production of structural, pallet and fencing timbers. It is also a good species for use in the production of panel board products. However, due to the characteristics of the timber it is not suitable for machine finishing products such as timber flooring, architrave, skirting, panelling, door framing, joinery, interior furniture, etc. The supply of minor species such as *Larix X eurolepis*, *Pseudotsuga menziesii*, *Pinus sylvestris*, *Quercus* spp., *Fraxinus excelsior*, *Fagus sylvatica* etc is fragmented and not of a scale to support large scale manufacturing operations in the above areas. Supplies of Irish grown minor species are sufficient to satisfy the needs of smaller scale manufacturing enterprises.

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

The primary research institutions undertaking research work for the timber sector include University College Dublin, University College Galway, University of Limerick, Dublin Institute of Technology and Regional Technical Colleges around the country.

Education and training is provided by the colleges listed above. Dedicated education and training is also provided by FAS, The Industrial Training Authority, The Institute of Wood Science through distance learning programmes and by the National Standards Authority of Ireland (NSAI). In-house company training is provided by a range of specialist consultants.

NSAI provides certification and monitoring services across a range of activities including timber grading, roof truss manufacture, timber frame manufacture, roadside and farm fencing and timber in Local Authority housing. It also provides a wood pallet and packaging phytosanitary monitoring scheme to the requirements of the FAO of United Nations (ISPM) No. 15.

4 Non-wood forest products and services

4.1 State of the art and historical development

Since the expansion of forest cover in Ireland from a low of just over 1% of the land area at the beginning of the 20th century to a current 9.7% (2002) of the land area, the emphasis in state forest policy has been on timber production. There has been little emphasis on the development of the non-wood products and services that forests can supply. The private forest estate in Ireland is very young, as highlighted elsewhere in this report, and the primary objective of forest management in private forests is timber production. As a result there is little, if any, non-wood products and services being produced in private forests. At the same time there is no tradition in Ireland of using non-wood products. For example, berry picking and mushroom picking in forests are not routinely carried out by the general public. Similarly, there is no tradition of deer hunting in Ireland. Thus non-wood forest products and services are limited in Ireland to forest recreation, Christmas tree production (see case study 1) and forest foliage (see case study 2).

The common law in Ireland is that one cannot enter onto anyone else's land without consent. If one does it is considered trespass. Thus unlike many other European countries there is no "right to roam". If forest owners opt to allow access to their forests, they could be liable for injuries incurred by visitors to the forest either for recreation purposes or to pick berries etc. Some protection is provided to landowners without insurance under the Occupiers Liability Acts 1995 and 1997.

Statistical information on non-wood products and services in Ireland is very limited. The following however are some useful websites:
Christmas trees:

www.real-irish-christmas-trees.com
www.kildarechristmastrees.com
www.coillte.ie
www.emeraldgroup.ie

Recreation:

www.coillte.ie
www.teagasc.ie

Foliage:

www.coford.ie

Only a small number of organisations are involved in the study of non-wood forest products and services. Teagasc has been involved in research on the foliage industry in Ireland. Some research on recreation has been undertaken by COFORD estimating the value of recreation as well as visitor numbers to forests in Ireland. COFORD has also funded research on Christmas trees. A project, also funded by COFORD, reviewing the markets for non-wood forest products has recently been completed (Collier et al. 2004).

4.2 Case studies of successful marketing strategies

Case study 1: Christmas tree production

The Christmas tree industry has grown dramatically over the past 20 years. The suitability of the Irish climate for growing conifers gave rise to the development of a commercial Christmas tree sector in the 1970s and 1980s. The sector expanded in the 1980s when farmers and other businessmen started to grow Christmas trees for investment purposes. The older Christmas tree farms tend to be located in hilly, mountainous areas where land quality is poor. However, those established since 1990 are located on better quality land. The intention was to produce good quality trees for export on these farms (Bord Glas 2003). In 2002, there were an estimated 600 commercial Christmas tree growers of which five grew Christmas trees on a large scale. Coillte Teoranta is one of the top growers. In total there were 4000 hectares under Christmas trees and the total farmgate value of trees harvested was estimated to be 7.5 million euro (Bord Glas 2003). The most common species grown are *Abies procera* (60% of sales), *Abies nordmannia* and *Pinus contorta* (30% of sales).

The market for the Irish Christmas tree industry can be divided into two categories. The first of these involves trees of moderate quality grown on small-scale sites as a subsidiary enterprise (Ryle 2000). These trees are suitable for the Irish market, which amounts to 400,000 trees annually. The second category involves high quality trees grown on a large scale by about five landowners. These enterprises exported trees worth approximately 4 million euro in 2002 to the UK, Germany, France, Belgium, Netherlands, Switzerland and Italy. However, the Irish market is currently saturated and this has led to a downward pressure on prices. The tendency is for increased demand for high quality trees and it is becoming increasingly difficult to sell low-grade trees.

There is no regulation *per se* in the industry which is one reason why good statistics on the industry are limited. Furthermore, there is no central body responsible for the industry. While the Irish Christmas Tree Grower's Association was founded in 1991, only 80 Christmas tree growers are members.

Christmas tree growing is treated like any other forestry enterprise in Ireland in that the profits accruing from forestry are exempt from income tax. However, unlike afforestation for timber production, no grant-aid (incentives) is available for the production of Christmas trees.

In most Christmas tree farms, the owner and his/her employees are responsible for all the planting, harvesting and marketing of the trees. There is no evidence of joint ventures or networking within the industry (with the exception of the exchange of information that occurs as part of being a member of The Irish Christmas Tree Grower's Association).

Case study 2: Foliage production

The Irish foliage industry commenced in 1993 and has grown steadily to over 150 hectares in 2003. The value of production in 2003 was 3.0 million euro of which 80% was exported. Industry estimates that this figure could rise to 300 hectares by 2006. The main cultivated foliage species include *Eucalyptus*, *Pittosporum* and *Viburnum*. A significant proportion of the foliage exported is wild or woodland foliage. The main woodland species are *Abies procera*, *Pinus* spp. and *Betula* spp. with *Rhododendron* being the main wild species.

There are an estimated three companies involved in forest foliage, all based in the south of the country. The enterprises are owner/family owned and all would be considered SMEs. The largest accounts for over 70% of the total value and employs 50 persons. All foliage is harvested by hand with workers paid on a piece level arrangement.

The area involved in cultivated foliage production is privately owned and there is no general access to the public. Wild and forest foliage is harvested from private and state owned properties. In the case of the latter, one must obtain a licence to harvest and the harvested foliage is certified.

No formal links exist between the various companies but an interagency co-ordination group was formed in 2002, Foliage Ireland. It comprises representatives from Bord Bia, Teagasc, Enterprise Ireland, County Enterprise Boards and industry representatives. This group oversees the orderly and professional development of the industry. Contractual arrangements are in place with harvesting companies and landowners.

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

The supporting and limiting factors for enterprise development in NWFP and the barriers to entrepreneurship vary from product to product. These factors are therefore outlined separately for the three primary NWFP in Ireland, namely recreation, Christmas trees and forest foliage.

Recreation

A recent report (Collier et al. 2004) on the NWFP industry in Ireland identified the following factors as hindering development in the forest recreation sector:

- The lack of data on the current level of participation in and demand for forest-based recreational activities;
- The cost of public liability insurance for forest owners;
- The free access to state forests enjoyed by the general public which limits the development of commercial amenity activities in these and private forests.

The low population density in Ireland is also a limiting factor to enterprise development in forest recreation.

Christmas trees

Many Irish landowners got involved in Christmas tree production in the late 1980s and 1990s on very small areas of land. Maintaining a regular supply of trees from such small farms is difficult but is a vital requirement if markets are to be maintained. Some of these owners did not have the expertise themselves, or available to them, to produce the quality tree that is required for the market. Consequently many of these trees will not be harvested. For those wishing to enter the business of Christmas tree growing technical advice or extension services are not available. The lack of silvicultural skills among Christmas tree farm owners and the limited availability of extension services are the key limiting factors for enterprise development. A further limiting factor is that the main tree species used in Ireland for Christmas trees, *Abies procera*, is site type specific. There are few areas in Ireland with the exception of the Leinster where it is possible to grow high quality *Abies procera*.

Forest foliage

Foliage production and processing is a viable enterprise if carried out on a large scale – a minimum size unit of 10 ha is necessary. There is enormous competition for the commodity product in the market which is impacting seriously on price and subsequently returns. Important factors include access to market and up to date market information. Investment in foliage is made for a market 3 to 5 years away. Therefore market intelligence including future trends is vital. An important factor affecting the competitiveness of foliage production is the need to stay ahead of competition in terms of volume supply as 'new' species and in turn 'new' floral products are regularly introduced. The market for foliage is very buoyant and responds immediately to the supply of innovative, quality produce grown in a sustainable and environmentally conscious manner. This must be maintained and underpinned by a comprehensive research programme with sensible production and marketing strategies.

The key barrier to entrepreneurship in foliage production is the high capital investment required for cut foliage establishment and the long run-in period before any real income is realised. This can vary from 3 to 5 years depending on species and is particularly the case with cultivated ornamental species. The lack of solid data on management of forests for foliage production is limiting the development of the business. Certification and licensing can also impact.

Research requirements

There is a variety of research questions relating to NWFP that need to be addressed. For example, more information needs to be collected on those who currently use forests for recreation purposes. The market demand for new recreational facilities also needs to be investigated. Research is seen to play a key role in developing the foliage industry. Teagasc and the foliage industry are involved in number of research projects (see www.teagasc.ie). However, those in the industry would acknowledge that further technical research in the areas of foliage production and processing is critical for the future. There are threats from new pests and diseases e.g. *Phytophtera ramorum, Psyllid* insect pest on *Pittosporum* to name but two. Environmental pressures are forcing the industry to examine alternative methods of weed control and adopt biological methods of pest control. Collaborative research with countries with a vested interest in foliage

production on topics such as the biological control of Psyllid on *Pittosporum* is required.

New forest and associated ornamental species need to be identified to satisfy a hungry and competitive market. Already, market research shows a demand exists for foliage from a range of forest species and other non-wood products including mosses, lichens etc but there is limited solid scientific information available on the impact of harvesting foliage from a number of these potentially suitable forest species and products. In respect of mosses, there are environmental concerns on the sustainability of harvesting in the woodlands in the long term. Furthermore, there needs to be a management protocol for foliage production developed for individual species and this can only occur if research is carried out.

Continuous market intelligence is critical to ensure that the development of the foliage industry progresses in an orderly and professional manner. The market for foliage is continuously changing as new products such as bouquets and gifts continue to be developed and this impacts dramatically at the primary level where specifications on products can vary from one season to the next. This change can only be dealt with effectively if there is good research and development taking place.

COFORD has been involved in research on some of the key elements of Christmas tree production (Hendrick 2002). These include a study of noble fir provenances, a study of serious diseases in noble fir, as well as a study of field methods to reduce the severity of current season needle necrosis (CSNN). Further research needs to undertaken on species/site type interactions; provenance selection in *Abies procera* and nutrition requirements of Christmas trees.

5 Forests and ownership

5.1 State of the art and historical development

Ireland was once covered by forests, which developed after the last Ice Age. However, the clearance of these forests for agriculture and to supply fuel and raw material for industry left just over 1% of the land area under forest at the beginning of the 20th century. In the aftermath of the First World War the strategic importance of having an ample domestic supply of timber was highlighted, emphasising the need for an afforestation programme. However, in an effort to ensure that land fit for agriculture was not afforested, the Department of Agriculture placed a ceiling on the price that could be paid for land for forestry. This policy restricted not only land acquisition rates, and consequently afforestation rates for the following fifty years, it also influenced the type of land afforested. The majority of the forests established by the State between 1920 and 1980 were located in upland areas or in bogland, on land marginal for agriculture.

While state grants were available for private forestry from 1930, planting by the private sector was negligible until EU grant-aid for afforestation was introduced in 1981. The introduction of compensatory payments in 1987 for landowners who afforested and the Forest Premium Scheme in 1990 accelerated private planting rates (Figure 1). In 1989 afforestation by the private sector exceeded state afforestation for the first time and this trend has continued to the present day. Overall afforestation rates peaked in 1995 (Figure 1). The fall in private planting rates since that time has been attributed primarily to agri-environmental subsidies available to farmers under schemes such as the Rural Environment Protection Scheme. These subsidies have encouraged farmers to keep land in agricultural use rather than forestry.

In 1989 Coillte Teoranta, a semi-state company, was established and it took over the ownership and management of state forests. Afforestation by Coillte Teoranta has however been limited especially since 1996. This is due to a decision of the European Commission that Coillte Teoranta is a public entity and as such could not claim the forest premium. As a result much of the afforestation by the company in the past eight years has been in the form of joint ventures with farmers.

The total growing stock in Irish forests is estimated to be 50,859,000 m^3 overbark. The average growing stock is low at 74 m^3ha^{-1}, as a result of the age-class structure of the forests. Just over 50% of the productive forest estate is less than 25 years of age.

Timber production from Irish forests has reflected the trends in planting rates. As a consequence of the afforestation programmes of the 20th century timber harvesting from state forests has increased from 300,000 m^3 in 1970 to over 3 million m^3 in 2001. Reflecting the relatively recent emergence of a private forest sector, timber harvesting in private forests is almost non-existent at present, but is expected to rise to over 1 million m^3 annually by 2015.

Direct employment in forestry peaked in the 1950s when over 5,000 people were employed in state forests. Despite the high afforestation rates over the past 15 years, employment in forest establishment, management and harvesting has fallen to 3,780 (Phillips 2003) as a result of increases in labour productivity and increased mechanisation of forest operations.

5.2 Forest Resources

Fifty-eight percent of the forest area is owned and managed by Coillte Teoranta. A detailed inventory of these forests is available. The remaining 42% of the forest area is privately owned and the last complete inventory of the private forest estate was undertaken in 1973. The Forest Service is currently developing a national forest inventory using a systematic sampling system based on a 2 km by 2 km grid of the country. It aims to complete the inventory by 2007. Not withstanding the absence of a detailed national forest inventory, Coillte Teoranta publishes forest statistics and the Forest Service publishes summary national forest statistics on an annual basis. The latest national forest statistics indicate that there is a total of 639,330 hectares under forest with a further 41,000 hectares of other wooded land (Table 3). In the past five years an annual average of 0.32% of total agricultural land has been afforested.

Table 3. National Forest Statistics - Ireland

Overall	**1900**	**1920**	**1950**	**1970**	**1980**	**1990**	**2002**
Total land under forest and other wooded land	100,000	70,000	132,935	302,665	390,383	481,215	680,330
Predominately Coniferous	3,000	3,200	52,935	216,665	290,383	373,815	528,008
Predominately Broadleaved	65,500	34,300	37,000	39,000	45,000	50,400	82,972
Mixed Forest	1,500	1,500	5,000	7,500	15,000	17,000	28,350
Other Wooded Land	30,000	31,000	38,000	39,500	40,000	40,000	41,000
Public	**1900**	**1920**	**1950**	**1970**	**1980**	**1990**	**2002**
Total land under forest and other wooded land	300	2,100	53,565	213,979	294,983	346,446	397,360
Predominately Coniferous	0	300	41,265	198,479	274,983	324,646	370907
Predominately Broadleaved	300	1,800	4,300	6,000	6,500	7,000	9,053
Mixed Forest	0	0	2,500	4,000	8,000	9,000	10,800
Other Wooded Land	0	0	5,500	5,500	5,500	5,800	6,600
Private	**1900**	**1920**	**1950**	**1970**	**1980**	**1990**	**2002**
Total land under forest and other wooded land	99,700	67,900	79,370	85,500	95,400	134,769	282,970
Predominately Coniferous	3,000	2,900	11,670	15,000	15,400	49,169	157,100
Predominately Broadleaved	65,200	32,500	32,700	33,000	38,500	43,400	73,920
Mixed Forest	1,500	1,500	2,500	3,500	7,000	8,000	17,550
Other Wooded Land	30,000	31,000	32,500	34,000	34,200	34,200	34,400

Forests where broadleaves are the dominant species account for 12% of the total forest area. However, broadleaf forests comprise only 2.2% of Coillte Teoranta's estate, while the percentage of broadleaves within private forests is much higher (i.e. 26%). The low representation of broadleaves within Coillte Teoranta's estate is partly explained by the relatively poor quality land that the company inherited, which was not suitable for the production of quality hardwood. On the other hand, the better quality land afforested by the private sector in recent years and the availability of higher annual subsidies for broadleaf planting help explain the higher rate of broadleaf planting by this sector. The Government broadleaf planting target has been set at 30% of total annual afforestation by the end of 2006. The Forest Service is currently examining the actions necessary to reach this target.

The dominant species in Irish forests is *Picea sitchensis* accounting for 66% of Coillte Teoranta's estate. The species also dominates in the private sector although the exact proportion will not be known until the national forest inventory is completed although it continues to account for almost 60% of afforestation. The dominance of this species can be attributed to the relatively poor land that was available for afforestation. *Picea sitchensis* was, and continues to be, particularly suited to the moist Irish climate and thrived on the wet mineral soils, achieving average growth rates of 16 $m^3ha^{-1}an^{-1}$. The average yield class of *Picea sitchensis* has increased to 18 $m^3ha^{-1}an^{-1}$ in recent years. This rate of growth, which is the highest in Europe, does have implications for wood quality and results in trees with a high proportion of juvenile wood. This limits the ultimate applications for the timber. However, *Picea sitchensis* is an extremely versatile timber and is suited for a wide variety of end-uses such as structural timber, fencing, and pallet wood. As a consequence of the fast growth rates the typical rotation for *Picea sitchensis* is 44 years. Almost all forests in Ireland can be classed as high forests and the majority is managed for timber production using the clear cutting system.

Resource based factors supporting or limiting enterprise development in the forest sector in Ireland

Supporting **factors**

Increase in the forest estate: Current government plans are that the area under forest should rise from a current 9.7% of the land area to 17% by the year 2030. While it is unlikely that this target will be reached, the area under forest will certainly increase substantially.

Increase in the supply of roundwood: As Coillte Teoranta's estate matures, harvesting levels will increase. Similarly, output from private forests is expected to rise. Recent forecasts indicate that timber production will increase to almost 5 million m^3 by the year 2015, assuming that harvesting is undertaken in private forests.

Limiting factors

Species distribution: Species distributions in both the public and private forest estates are dominated by *Picea sitchensis*. This imbalance is not expected to change in the short-term although there has been, and will continue to be, an increase in broadleaf planting and a slight decline in the planting of *Picea sitchensis*. However, for the foreseeable future, the output from Irish forests will comprise primarily *Picea sitchensis*. This over-reliance on one species, particularly one where the end-use options are not as broad as other species, and where opportunities for adding value are limited, is a concern. It also makes the development of enterprises using species other than *Picea sitchensis* difficult due to the limited and irregular supply. The species distribution and the type of silvicultural management also restrict the potential non-wood forest products that can be produced in Irish woodlands.

Lack of national forest inventory: The current lack of a national forest inventory is another barrier to enterprise development. However, with the anticipated publication of such an inventory in 2007, this barrier will be removed although only national statistics will be produced.

3. Wood quality in private forests: Private forest owners have effectively been responsible for all broadleaf planting in recent years. However, these owners have no knowledge or experience of forest management. In most instances they have contracted management companies to undertake the establishment of their forests. The management of broadleaf species requires much more intensive management than that of conifers especially if wood of high quality is to be produced. There are very strong concerns about the quality of management in these woodlands and about the resulting wood quality.

5.3 Forest ownership

The 282,970 hectares of private forest can be classified as non-industrial private forests or small-scale forests. The majority of the area (95,400 hectares) planted prior to 1980 is in the hands of large estate owners who had a tradition of tree planting. Post 1980 (and post the availability of EU grant-aid), the private forests planted (i.e. 187,570 hectares) are most commonly owned by farmers. The average size of private holding is estimated to be 10.61 hectares (based on available data from 1990 to 2002). Coillte Teoranta's estate is currently divided into 36 management units giving an average management unit size of 10,732 hectares.

There is no tradition in Ireland of forest ownership by municipalities, churches, industry etc. Forest ownership is therefore limited to the State (i.e. Coillte Teoranta) and private landowners. A very small area of state forest (2,820 hectares) is managed by the Department of Environment, Heritage and Local Government. Most of this forest is in National Parks and harvesting is restricted in these areas.

There is no tradition of collecting non-wood forest products in Ireland. Thus, while Coillte Teoranta-owned forests are open to the public, the use of the forests by the general public is limited to recreation and licensed deer hunting. "Everyman's right" does not apply in Ireland and thus the general public do not have access to private forests. Ownership based factors supporting or limiting enterprise development in the forest sector in Ireland

Limiting **factors**

Lack of organisational structures in private forestry: The private forest estate is owned by an estimated 17,000 private forest owners. While some of these are members of co-operatives or associations, the vast majority are not. This lack of organisational structure in private forestry makes it difficult for a potential entrepreneur to source suppliers of roundwood.

Monopoly in supply of roundwood: As a consequence of the skewed age-class structure of private forests, the major supplier of roundwood is, and will continue to be for some time, Coillte Teoranta. Thus entrepreneurs who would require roundwood would be restricted in their ability to negotiate price levels.

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

Irish grown *Picea sitchensis* timber has size and strength characteristics that make it unsuitable for certain construction uses. At the same time, the species dominates the Irish forest estate. Research and development into other applications, such as engineered products, could increase the scope of the market that is available to Irish sawn timber.

Many private forest owners have planted broadleaves. Research needs to be undertaken into the silviculture of broadleaves. The results of this research should be made available to private forest owners.

The development of an appropriate organisational structure for private forest owners is imperative. The various organisational structures that exist in other countries need to be investigated and their suitability for use in Ireland assessed.

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