

## Germany

**Prof. Dr. Udo MANTAU<sup>1</sup>**,

*University of Hamburg, Department of Wood Science, Section Economics of Forest products, Leuschnerstr. 91, D-21031 Hamburg, Tel: +49/40 73962 115, Fax: +49/40 42891 2665, Email: mantau@holz.uni-hamburg.de*

**Dr. Ulrich SCHRAML<sup>2</sup>**

*University Freiburg, Institute of Forest- and Environmental Policy, Tennenbacher Str. 4, D-79106 Freiburg, Tel: +49/761/203 3721, Fax: +49/761/203 3705, Email: ulrich.schraml@ifp.uni-freiburg.de*

**Dr. Edgar KASTENHOLZ<sup>3</sup>**

*Office for Occupational Safety and Work Organisation  
Rütteberg 10, 79294 Sölden, Phone +49 (0)761 1377 901  
e-mail: edgar.kastenholz@fobawi.uni-freiburg.de*

**Dipl. Forstw. Thomas BROGT<sup>4</sup>**

*University Freiburg, Institute of Forest Utilization and Work Science  
Werderring 6, 79085 Freiburg, Telefon (+49) 761-203 3764, Telefax (+49) 761-203 3763, Thomas.brogt@fobawi.uni-hamburg.de*

### Executive Summary

#### Entrepreneurship in non-industrial commercial timber production

The number on forest owners in Germany varies between different authors from less than one million to one and a half million forest owners because the number of owners with less than 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.

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<sup>1</sup> Chapter 1, 3, 4, 5

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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) lose market shares. Another major 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 m<sup>3</sup> 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

<b>General indicators</b>	<b>2002</b>
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

<b>Wood consumption</b>	<b>2002</b>
softwood lumber in 1.000 m <sup>3</sup>	16.080
hardwood lumber in 1.000 m <sup>3</sup>	1.230
particle boards in 1.000 m <sup>3</sup>	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 loses market shares while finished products (parquet) was more and more imported.

Table 3. Softwood lumber sawmills in Germany, in 1,000 m<sup>3</sup>

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 m<sup>3</sup> cuttings, from 1993 more than 5.000 m<sup>3</sup> roundwood cutting. (estimation factor 1,076)

Table 4. Hardwood lumber sawmills in Germany, in 1,000 m<sup>3</sup>

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 m<sup>3</sup> cuttings, from 1993 more than 5.000 m<sup>3</sup> 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 its 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 18<sup>th</sup> and especially at the beginning of the 19<sup>th</sup> century. This was often due to the super session of user rights and partitioning of municipal forests (Brandl 1993). During the 19<sup>th</sup> and 20<sup>th</sup> 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<sup>3</sup> of harvested wood per hectare and year, while Bavarian surveys show between 3.8 and 5.4 m<sup>3</sup>/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, priority 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
repossessed 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 primary 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 19<sup>th</sup> 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 2<sup>nd</sup> and 3<sup>rd</sup> 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-advertisement** 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<sup>3</sup>/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 assortments 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 <sup>3</sup>	44.4	92.6	0.0 ?	56.2
wood harvest	m <sup>3</sup> /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 <sup>1</sup>	€	- 30	4	100	4

<sup>1</sup>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 assortments 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 assortments 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 assortments 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.

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**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

	<b>Enterprises (number)</b>	<b>Employees (number)</b>	<b>Turnover (in million €)</b>
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.

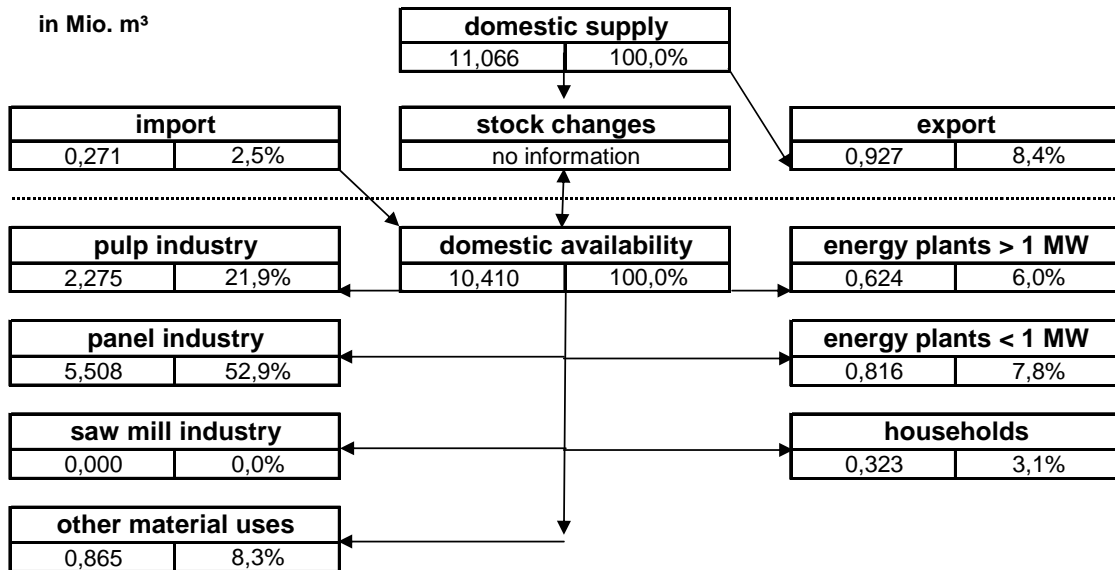


Figure 1. Flow chart of sawmill by products in million m<sup>3</sup> (2002)

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<sup>3</sup>. 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<sup>3</sup>.



Table 11. Sources and uses of wooden resources in different measurements (2002)

Wooden Sources	Uses unit in	domest. availa- bility	material				energy		
			pulp	panels	saw m.	other	>1M	<1M	househ
logs	Fm	30.3	0.0	0.0	29.9	0.4	0.0	0.0	0.0
Industrial forest rest	Fm	17.2	4.1	7.2	0.0	0.3	0.2	0.0	5.4
sawmill by	Fm	7.6	0.0	0.0	0.0	0.0	0.4	1.9	5.4
bark	SRm	10.4	2.3	5.5	0.0	0.9	0.6	0.8	0.3
other industrial	m <sup>3</sup>	6.7	0.0	0.0	0.0	3.6	3.1	0.0	0.0
post-consumer	t lutro	3.4	0.0	1.8	0.0	0.0	1.4	0.2	0.0
landscape care	t atro	6.4	0.0	1.5	0.0	0.2	3.8	0.2	0.8
		0.3	0.0	0.0	0.0	0.0	0.2	0.1	0.0

Fm (Festmeter) = used in forestry – equivalent to m<sup>3</sup>; 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; househ. = energy wood uses in households

The following Table includes the conversion factors for absolute dry tons (t<sub>atro</sub>) and m<sup>3</sup>. These are the most common measuring units for comparisons of volumes and masses.

Table 12. Conversion factors into t(atro) – absolute dry tons and m<sup>3</sup>

Wooden resources Sources	Uses unit in Mio.	conversion factor in t(atro)	conversion factor in m <sup>3</sup>
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	m <sup>3</sup>	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 m<sup>3</sup> (2002)

Wooden resources Sources	Uses unit in Mio.	domest. availa- bility	material uses				energy uses		
			pulp	panels	saw m.	other	>1MW	<1MW	househ.
logs	m <sup>3</sup>	<b>30.3</b>	0.0	0.0	29.9	0.4	0.0	0.0	0.0
Industrial wood	m <sup>3</sup>	<b>17.2</b>	4.1	7.2	0.0	0.3	0.2	0.0	5.4
forest rest wood	m <sup>3</sup>	<b>7.6</b>	0.0	0.0	0.0	0.0	0.4	1.9	5.4
sawmill by products	m <sup>3</sup>	<b>10.4</b>	2.3	5.5	0.0	0.9	0.6	0.8	0.3
bark	m <sup>3</sup>	<b>2.2</b>	0.0	0.0	0.0	1.2	1.0	0.0	0.0
other industrial restwood	m <sup>3</sup>	<b>3.4</b>	0.0	1.8	0.0	0.0	1.4	0.2	0.0
post-consumer wood	m <sup>3</sup>	<b>10.0</b>	0.0	2.3	0.0	0.2	5.9	0.3	1.3
landscape care wood	m <sup>3</sup>	<b>0.6</b>	0.0	0.0	0.0	0.0	0.3	0.3	0.0
<b>total</b>		<b>81.7</b>	<b>6.4</b>	<b>16.8</b>	<b>29.9</b>	<b>3.0</b>	<b>9.8</b>	<b>3.4</b>	<b>12.3</b>

The wooden resource balance summarises the most important results of different studies and thereby gives a good overview on the actual sources and uses.

Table 14. Sources and uses of wooden resources in million m<sup>3</sup> (2002)

Wooden resource balance in Mio. m <sup>3</sup>					
sources	Mio. m <sup>3</sup>	in %	uses	Mio. m <sup>3</sup>	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 households	12.3	15.1
landscape care wood	0.6	0.7			0.0
<b>total</b>	<b>81.7</b>	<b>100.0</b>	<b>total</b>	<b>81.7</b>	<b>100.0</b>

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 m<sup>3</sup> (2002)

Wooden resource balance and potential reserve in Mio. m <sup>3</sup>							
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 restwood	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 households	12.3	13.5	1.2
landscape care wood	0.6	1.4	0.8	<b>potential reserve**)</b>		<b>53.2</b>	
<b>total</b>	<b>81.7</b>	<b>148.0</b>	<b>66.3</b>	<b>total</b>	<b>81.7</b>	<b>148.0</b>	<b>13.1</b>

\*) as far as information is available.

\*\*\*) potential reserve = potencial (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 m<sup>3</sup> 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)

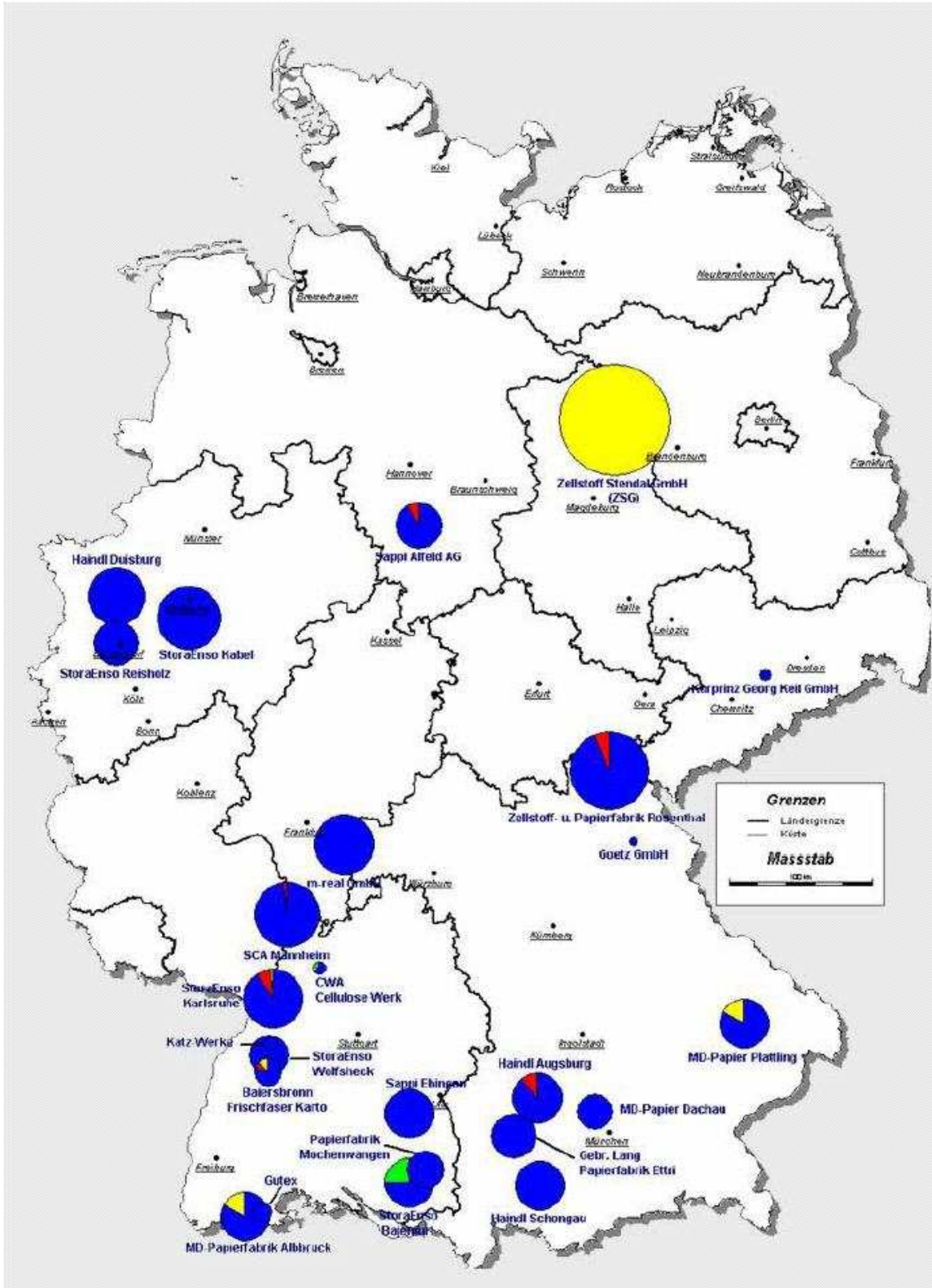
Branch	Sites N	Demand on Raw Material [1.000 Tons,					
		Tota	[%]	Ind. Wood		SawMill by-Pr.	
Mechanical	17	1,31	40.9	1,01	31.4	307	9.5
Sulphite	4	1,25	39.0	773	24.0	484	15.0
Kraft	1	645	20.0	194	6.0	452	14.0
Sum	22	3,22	100.	1,97	61.4	1,24	38.6

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 m<sup>3</sup>. 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)

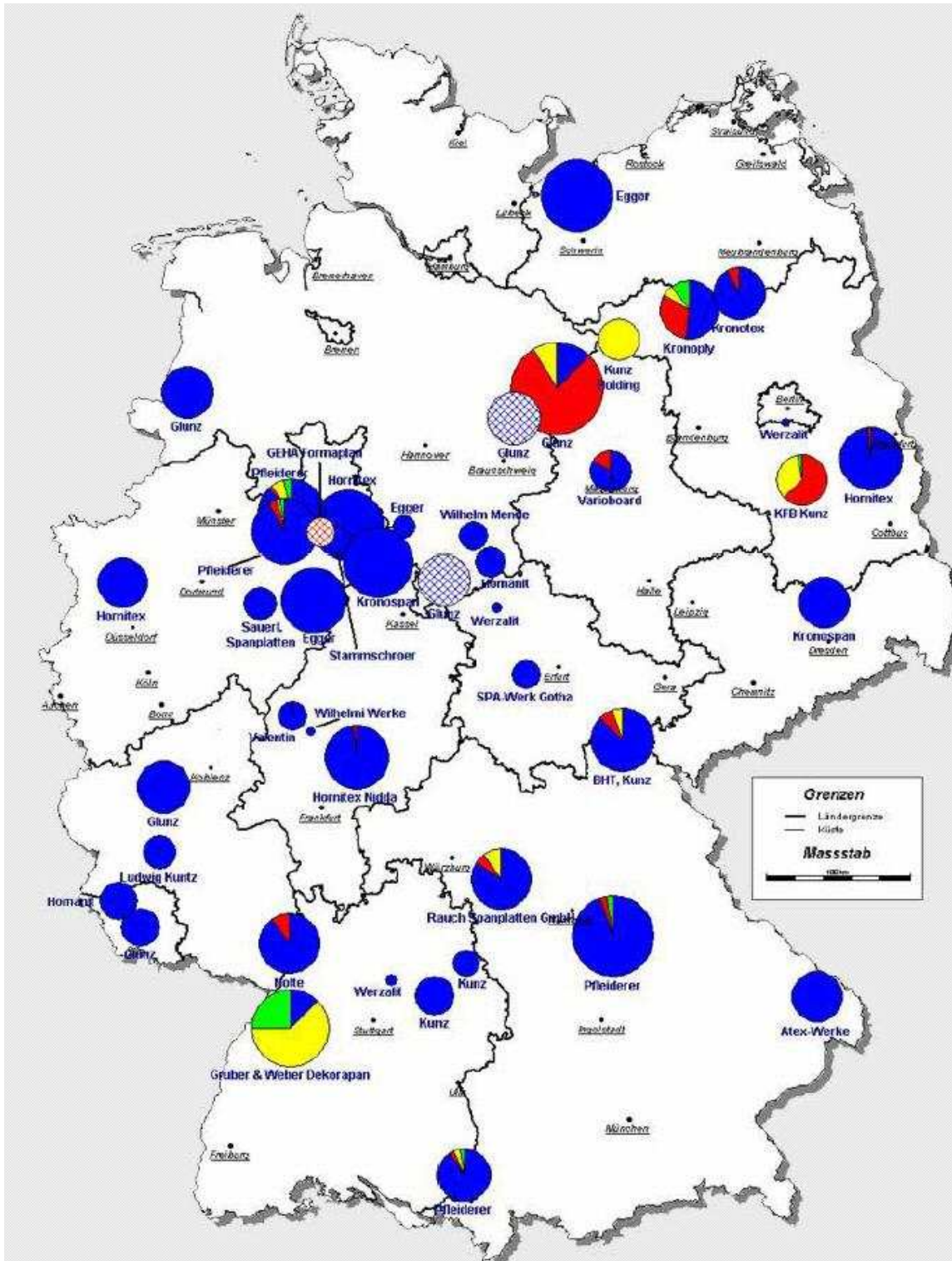
Sites		Demand on Raw Material [1.000 Tons, absolutely dry]									
		Total		Ind. Wood		SawM.by-Pr.		PostCons.W.		Other	
Branche	N		[%]		[%]		[%]		[%]		[%]
Part.Board	27	5,142	61.3	1,253	14.9	2,697	32.2	1,088	13.0	104	1.2
MDF	14	2,730	32.6	1,703	20.3	1,009	12.0	19	0.2	0	-
OSB	3	515	6.1	515	6.1	0	-	0	-	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.

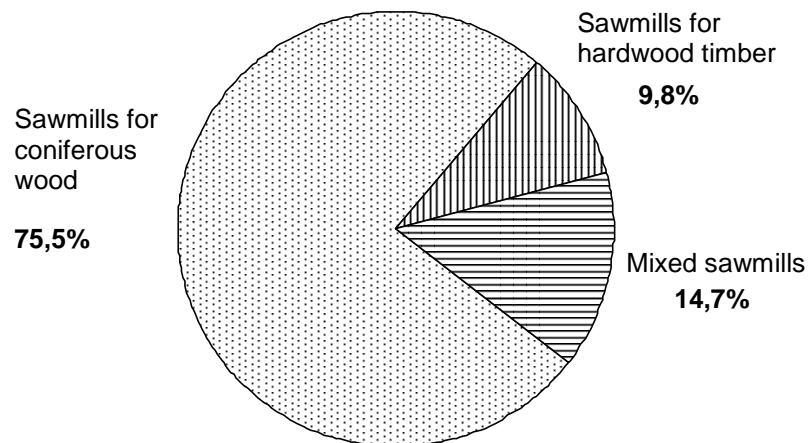


Figure 2. General business registration (Mantau and Sörgel, 2003c)

32.7 million m<sup>3</sup> of wood are cut by 3,038 sawmills. 89% is softwood and 11% is hardwood. The softwood sawmills cut with 28.3 million m<sup>3</sup> the greatest volume of wood. About one 1 million m<sup>3</sup> 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 m<sup>3</sup> 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 m<sup>3</sup>.

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 m<sup>3</sup>. 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 m<sup>3</sup> 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 m<sup>3</sup> 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 Annual Cut [m <sup>3</sup> ]	Cut		Share [%]	Saw Mill Residues	
	[1,000 m <sup>3</sup> ]	[%]		[1,000 m <sup>3</sup> ]	[%]
< 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

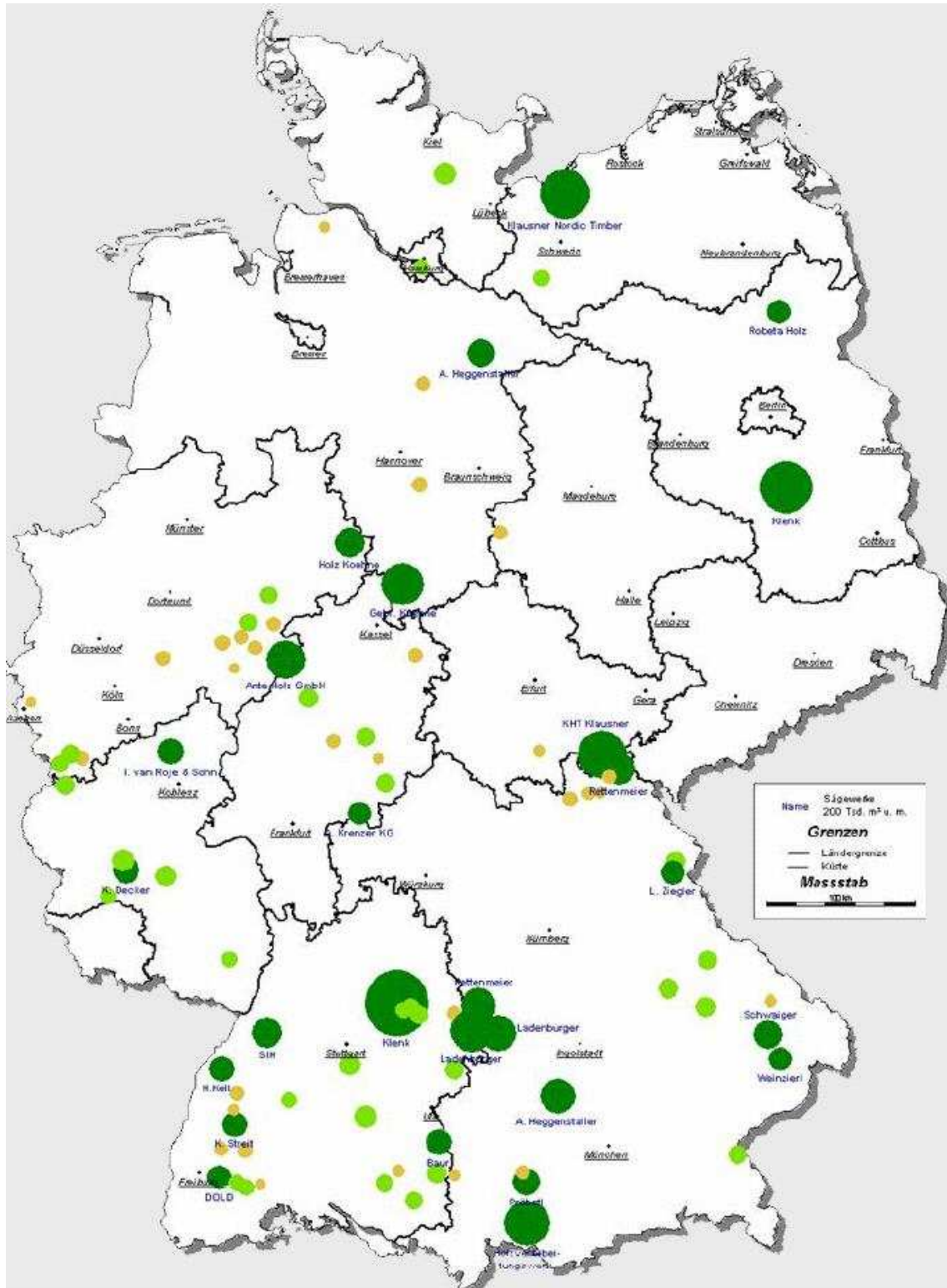
The examination of the sales and utilisation structure showed that the main customer of saw mill by-products is the trade (32%). Significant quantities also flow into the panel board industry (27.1%) and the mechanical and chemical pulp industry (18%). Remarkably high was the sale to other buyers (17.9%). 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.

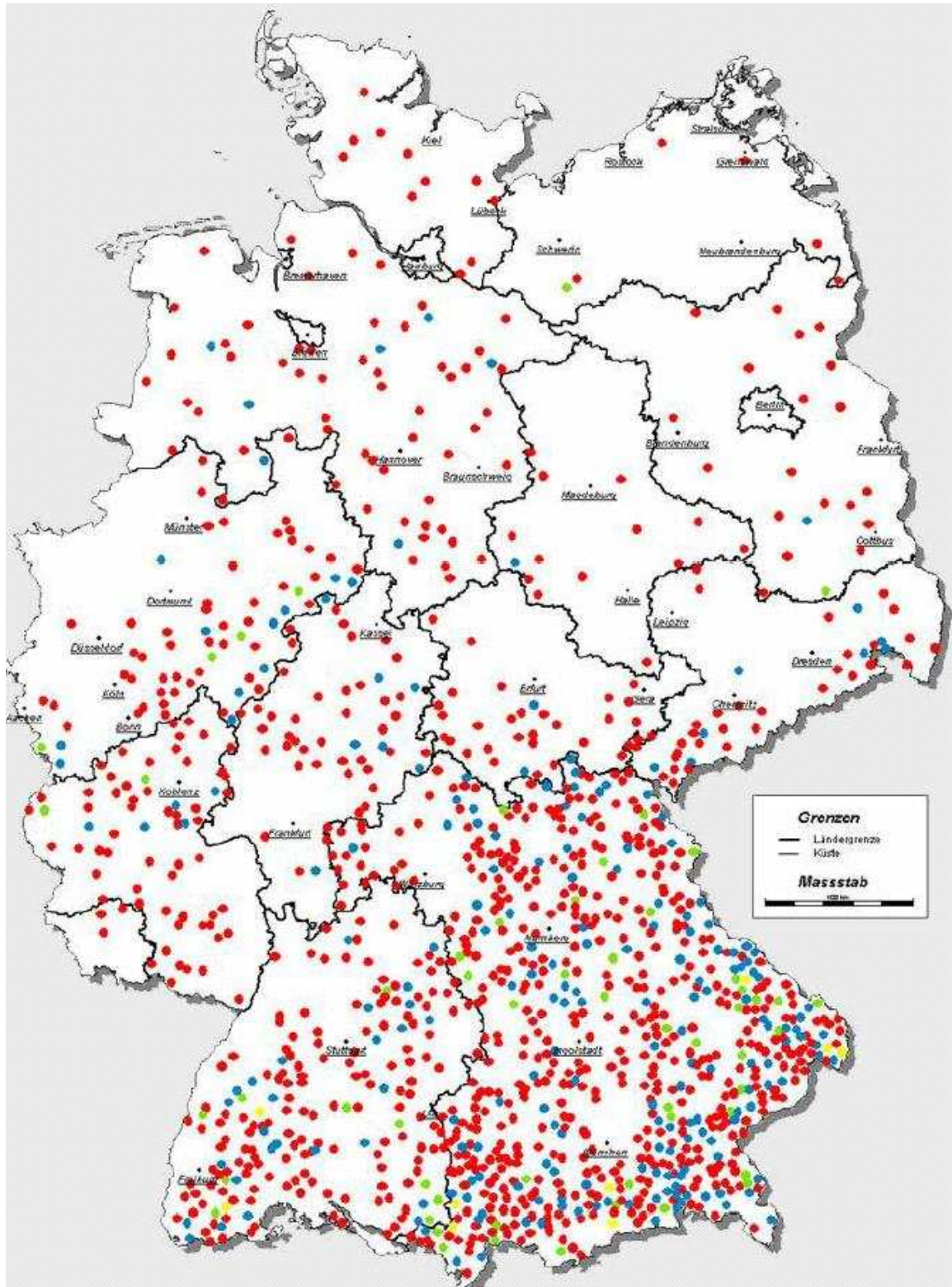
#### The firms of the industry - Contractors

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 m<sup>3</sup> cutting (coniferous logs)

Map 4. Sawmills with less than 5.000 m<sup>3</sup> 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 (Brogst 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.

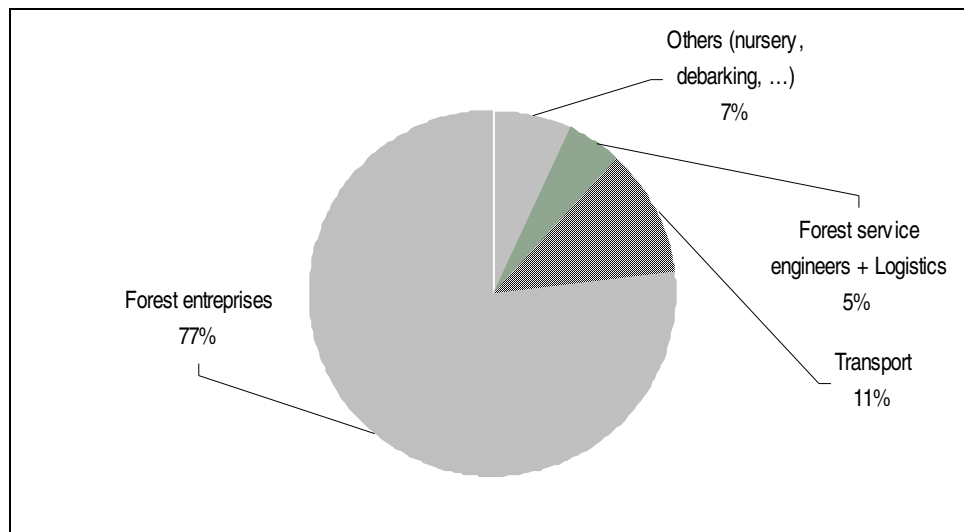


Figure 3. Percentage of different types of enterprises (source: Westermayer and Brogt, 2005)

**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.

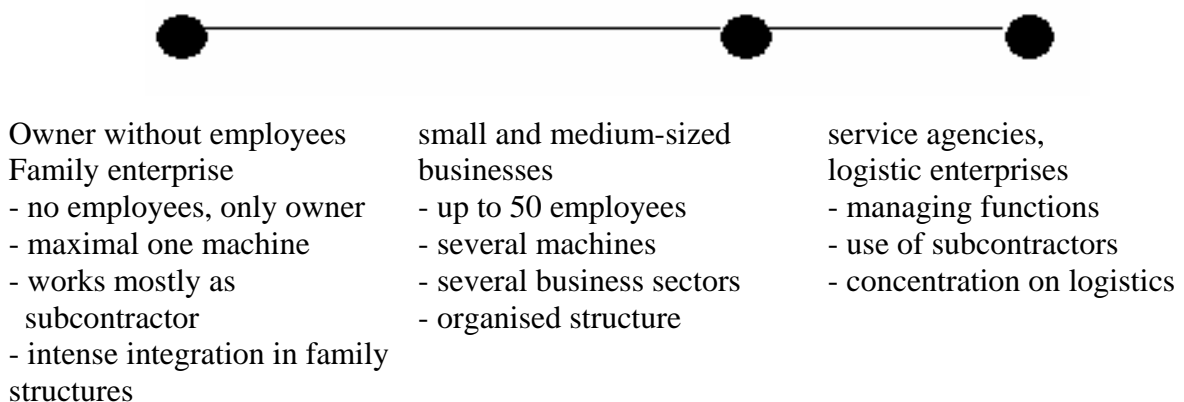


Figure 4. Typing forest entrepreneurs (source: Westermayer, 2004)

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	Blm	Bbg	Bre	Hmb	Hess	MV	Nds	NW	RP	SL	SN	LSA	SH	Thür
Riding admitted on lanes in general „ only on marked lanes	F	N	F	F		F	F	F	F/N	N	F	F	F	F/N	F	F
Riding prohibited on footpaths " on sport and nature paths " on marked hiking lanes	F F F					F F F	F	F		N N	F F	F		F/N		F
Cycling prohibited on footpaths " on sport and nature paths " on bank promenades	F F		F										F F	F/N		F
Riding prohibited away from lanes Cycling prohibited away from lanes	F F	N	F	F		F F		F F				N N	F F			
Duty to mark riding horses Riding levy	F F	N		F			F		F/N	N N		F F	F F		(F) (F)	
Driving by car MOTORSPORT				F, a F, p				F, p F, p						F/N, p		F, p
Camping Caravaning				F, a F, a				F, a F, a							F, p F, p	
Organized sport events Organised meetings Organised gathering of mushrooms	F, a F, a F, a			F, a				F, a						F/N, a F/N, a F/N, a	N, a	F, a
Construction of sale stalls Construction of advertising installations								F, a F, a								
Construction of lanes Construction of recreational facilities Construction of fire places	F, a F, a F, a	N, n F, a F, a	F, a F, a F, a	F, a F, a F, a		F, a F, a F, a		F, a F, a F, a		F, n F, a F, a	F, a F, a F, a			F, a F, a F, a	N, 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](http://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 2<sup>nd</sup> Federal Forest Inventory became an important planning fundament for the German Forest products industry. So far, publication of the results of the 2<sup>nd</sup> 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 2<sup>nd</sup> Federal Forest Inventory

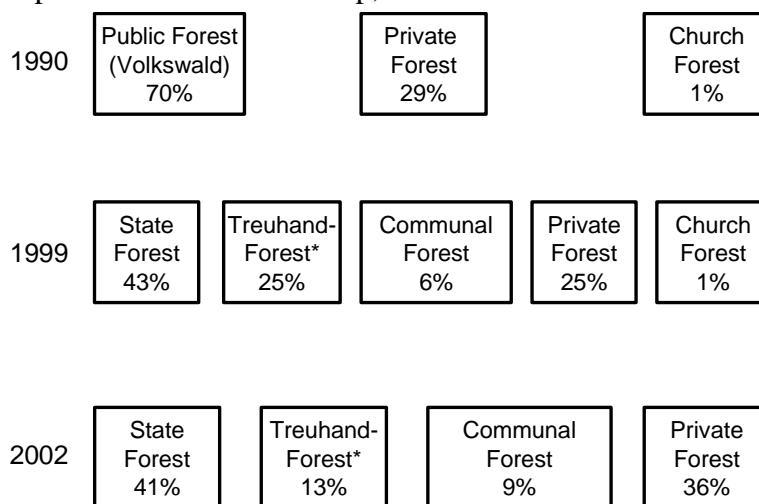
	in ha	in %	in % of
<b>1 total forest</b>	<b>11,075,79</b>	<b>100.0%</b>	<b>100.0%</b>
thereof			
2 not	185,70	1.7%	1.7%
3 accessible forest	10,890,09	98.3%	98.3%
thereof			
4 non-wood-	322,43	3.0%	2.9%
5 wood-	10,567,66	97.0%	95.4%
thereof			
6	66,38	0.6%	0.6%
<b>7 forested</b>	<b>10,501,27</b>	<b>99.4%</b>	<b>94.8%</b>

Source: Federal Forest Inventory II (BWI<sup>2</sup>), 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 (BWI<sup>2</sup>), 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 (BWI<sup>2</sup>), 2004

Growing stock in Germany amounts up to 3.4 billion m<sup>3</sup>, corresponding to 317 m<sup>3</sup>/ha. With a growing stock of 1.2 billion m<sup>3</sup> spruce is the predominant tree species, followed by pine with a growing stock volume of 705 million m<sup>3</sup> and beech with a volume of 583 million m<sup>3</sup> (Table 24). With 348 m<sup>3</sup>/ha growing stock in coniferous forests is remarkably higher than in broad-leaved forests with a growing stock volume of 273 m<sup>3</sup>/ha. Table 25 shows growing stock by ownership categories. With 337 m<sup>3</sup>/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 m <sup>3</sup> /ha	in Mio. m <sup>3</sup>
Oak	286	302
Beech	352	583
OBL*	234	157
OBS**	164	179
<b>Broadleaved - total</b>	<b>273</b>	<b>1,221</b>
Spruce	404	1,231
Fir	480	82
Douglas-Fir	274	50
Pine	282	705
Larch	301	91
<b>Coniferous - total</b>	<b>348</b>	<b>2,159</b>
<b>All species</b>	<b>317</b>	<b>3,380</b>

\* = other broadleaved species with longer life-span

\*\* = other broadleaved species with shorter life-span

Source: Federal Forest Inventory II (BWI<sup>2</sup>), 2004

Table 25. Growing stock by ownership categories

in m <sup>3</sup> /ha	broadleaved	coniferous	total
Federal State Forests	203	248	<b>231</b>
Countries` State Forests	262	335	<b>305</b>
Communal Forests	276	356	<b>314</b>
Private Forests	286	367	<b>337</b>
Treuhand-Forests	254	267	<b>262</b>
<b>all ownership categories</b>	<b>273</b>	<b>348</b>	<b>317</b>

Source: Federal Forest Inventory II (BWI<sup>2</sup>), 2004

Table 26. Changes in growing stock by ownership categories: Western Germany, 1987 - 2002

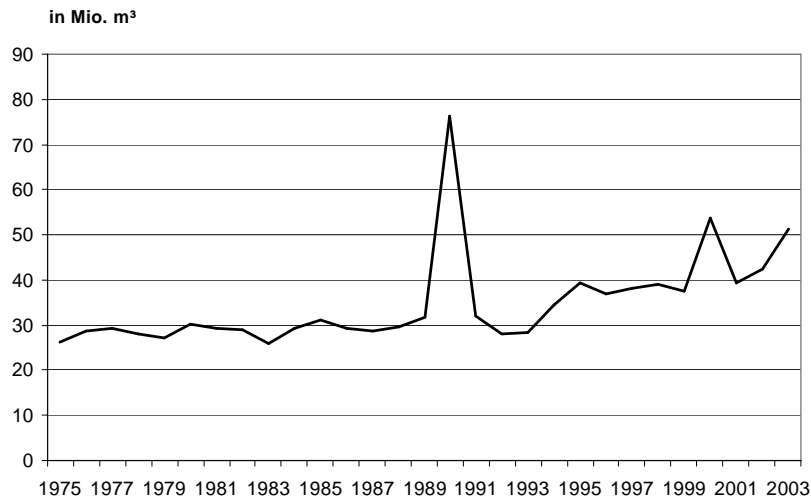
in m <sup>3</sup> /ha	broadleaved	coniferous	total
Federal State Forests	+45	+46	<b>+45</b>
Countries` State Forests	+32	+40	<b>+32</b>
Communal Forests	+35	+47	<b>+36</b>
Private Forests	+66	+92	<b>+79</b>
<b>all ownership categories</b>	<b>+47</b>	<b>+68</b>	<b>+55</b>

Source: Federal Forest Inventory II (BWI<sup>2</sup>), 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 m<sup>3</sup> in 2002 to 51.2 million m<sup>3</sup> in 2003.

Figure 5. Development of roundwood fellings, in million m<sup>3</sup>



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 m<sup>3</sup>. 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 m<sup>3</sup>. The damage was mainly focused on Baden-Württemberg, where 29 million m<sup>3</sup> of calamity wood accumulated.

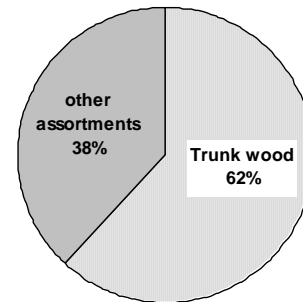
Irrespective of calamities, the 1990s show an increase in trunk wood and pulpwood use. From 1993 to 2002 round wood fellings were increased by 4.1% on an average compared to the preceding year. Forestry reacted to the growing demand from the forest products industry. The German sawmill industry showed 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 m<sup>3</sup>

Fellings by assortments, average 1975 - 2003

Mio. m <sup>3</sup>	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

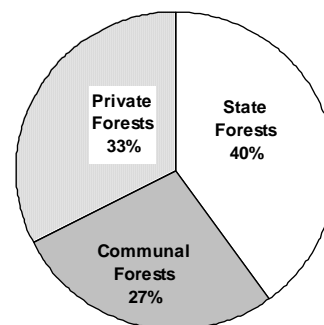
The decreasing share of pulpwood following the storm catastrophe in 1990 can be traced back, amongst others, on the fact that working up of more valuable trunk wood assortments was favoured at first.

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 m<sup>3</sup>

Roundwood fellings by forest ownership categories, average 1975 - 2003

	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

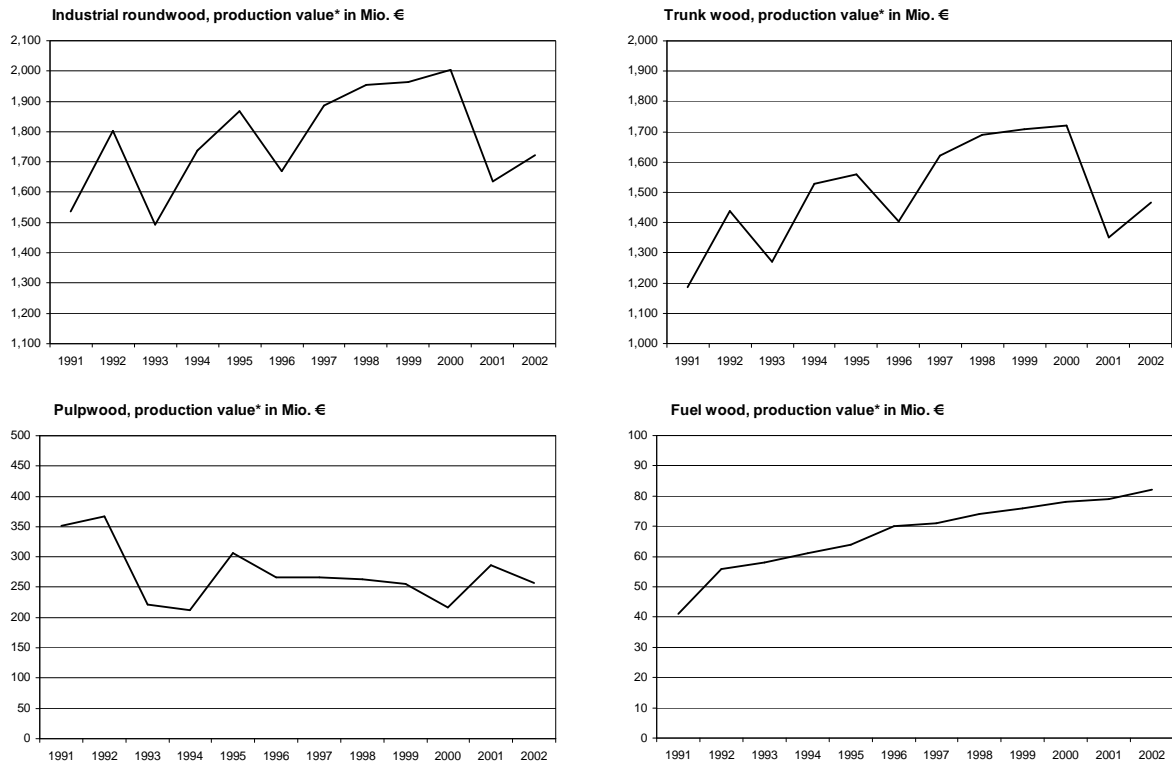


Source: ZMP, 2004

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



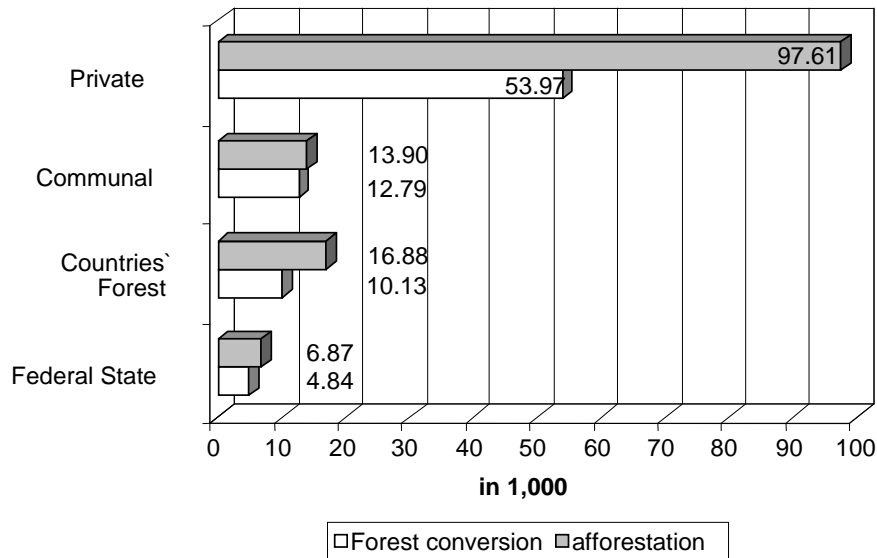
\* : production values including subsidies and taxes  
Source: Dieter/Rosin/Thoroe, 2004

### 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.



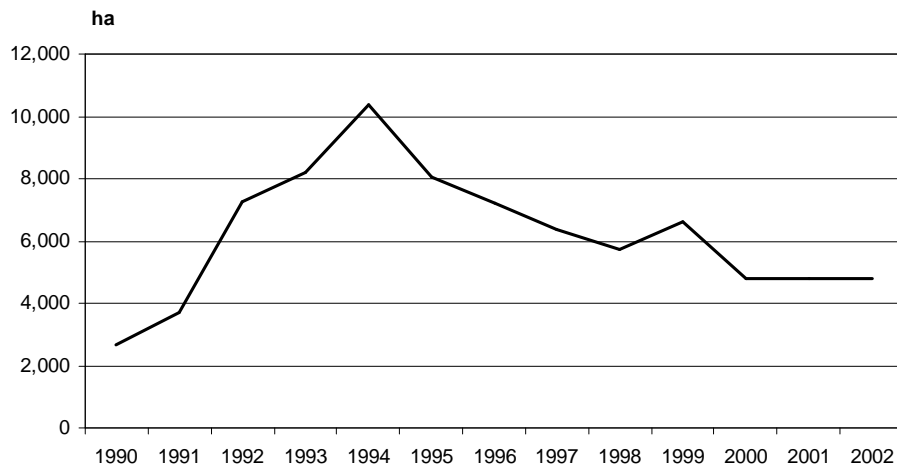
Figure 7. Afforestation and forest conversion in Western Germany, 1987 - 2002



Source: Federal Forest Inventory II (BWI<sup>2</sup>), 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
<i>No active intervention</i>	1.1	I	0	0.0
<i>Minimum intervention</i>	1.2	II	90,831	0.9
<i>Conservation through active management</i>	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<sup>5</sup>.

Table 30. Companies holding forest property in Germany

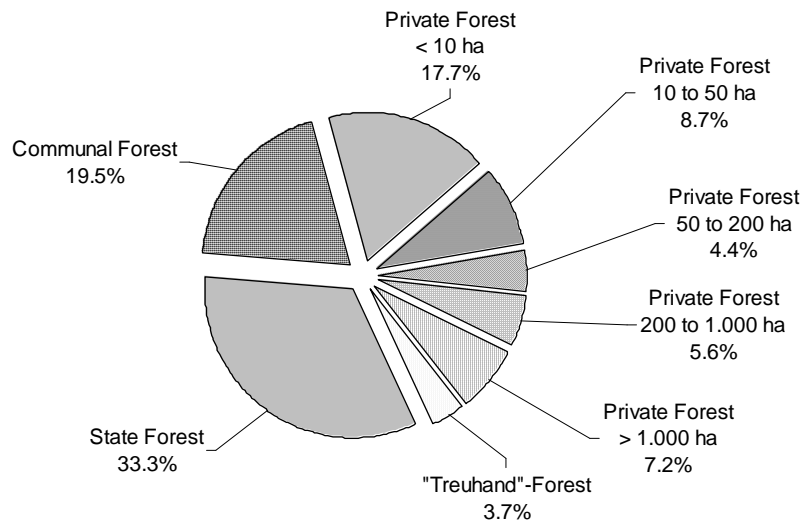
	State Forest		Communal Forest		Private Forest (excl. "Treuhand"-Forest)		Total	
	companies	1,000 ha	companies	1,000 ha	companies	1,000 ha	companies	1,000 ha
less than 10 ha *)					605,425	1,321	605,425	1,321
less than 10 ha **)					197,603	641	197,603	641
10 to 50	35	1	3,317	79	44,722	961	48,074	1,041
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
<b>Total</b>	<b>930</b>	<b>3,686</b>	<b>8,459</b>	<b>2,160</b>	<b>853,825</b>	<b>4,824</b>	<b>863,214</b>	<b>10,670</b>

\*) 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 (BWI<sup>2</sup>), 2004; own calculations

<sup>5</sup> 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 (BWI<sup>2</sup>), 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<sup>6</sup>.

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 [Broggt, Kastenholz, 2005].

The communal forest shows higher average company sizes than the private forest. 83% of the total communal forest area are held by companies with more than 200 ha forest

<sup>6</sup> 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 2<sup>nd</sup> Federal Forest Inventory. Therefore it was implied that non-agricultural private forest owners hold an average 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 privileged consulting, i.e. indirectly subsidized [Brogt, Kastenholz, 2005].

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