integral Future-oriented integrated management of European forest landscapes

SEVENTH FRAMEWORK PROGRAMME

"Impact of selected structural factors on the forest-based sector in the European Union"

Work Package 3.1

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I. Introduction

This study describes selected driving forces that have affected the forest sector, especially forest management practices in Europe and / or at global level in the past and are likely to affect the sector in the future. The study follows the structure given by the "Protocol on agreed conceptual and analytical framework" in INTEGRAL and is divided into eight chapters, describing:

- social developments such as demographic changes and changes of public opinion,
- the European forest policy regime; political coherence and relevant discourses,
- the main economic and technological developments,
- changes in the forest ownership structure.

According to the conceptual and analytical framework in work package 3.1 the data analysis at the landscape and national level in INTEGRAL is being conducted for different purposes [Handbook / INTEGRAL: 29]. The study on selected structural factors at the EU and global levels shall contribute to at least two of the tasks in this context. These are as following:

- [Path 1] Data analysis for comparison and synthesis for policy, practice, and research (D 3.2 "Synthesis report on barriers and drivers of integrated forest management")
- [Path 2] Data analysis and inventory of influential factors for WP3.2 (D3.3 "Integrated forest management scenarios in Europe")

Path 1 refers to a synthesis report, based on the findings of the case studies. This report will contain a cross-case comparison and a synthesis of the results. The synthesis shall consider the main findings of the study on structural factors at EU and global level as well.
Path 2 refers to the development of land-use scenarios. The main findings of this study will be selected and documented in a glossary for work package 3.2, referred to as level "macro +".

In order to contribute to the above mentioned task, this study aims to describe how the changes of the selected structural factors have affected the forest sector in the past decades, based mainly on findings of reports on observed long-term historical trends and on statistical data. Projected future trends will not be considered. The study is based only on results from desk research, using secondary data.

II. Demographic Changes

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1. Introduction

The topic "Demographic Changes" aims to follow the main developments in the EU population over the past 60 years and outline their role as exogenous driver on the European forestry and forest management. There is a recognised relationship between demography and forests in the big picture: The change in number, structure and organisation of European society affect the forests along with other results of other human activities [FAO 2010b: 98]. Due to the complexity of both domains and massive backward and forward linkages to other disciplines (e.g. economic or institutional, political or environmental developments), the interconnection of population change and forestry is handled in the literature mostly indirect and tracking a certain impact of one demographic factor in short or long run is not a common practice. Accordingly, this topic treats the complex interplay of the factors by approaching the research field in two separate steps:

- Part 1: "EU-27 demographic trends since 1960" describes the main historic trends in the EU population change after 1950 and provides statistical basis for scenario development;
- Part 2: "Demographic change impact on European forests" gives a brief descriptive overview of the research literature on the implications of demographic change on forest management in EU member states, naming the critical population change factors and outlining the most prominent effects.

2. EU 27 Demographic Trends Since 1960

The first chapter addresses the selected demographic developments and trends in the European population in 60 years' time. The introduced variables for population change have been selected according to the literature reviewed in part 2 of this topic, where they arise as potential impact on the development of European forest, its management practices, as well as co-related processes such as landscape transformation and land use.

Scope and trend overview

The first group of trends is related to the recent natural demographic change, e.g. population change in number and ageing, as well as developments in fertility and mortality. The second group deals with the distribution and mobility patterns of people in Europe, observing the net migration flows, population density, housing preferences, rural settlement and urbanisation levels.

The addressed time period spans from 1950 to 2011, depending on data availability. Two types of sources have been used while preparing this overview:

- Crude statistical data: European population statistics (if nothing else stated Eurostat Population Demography Report 2010) and the estimates of United Nations Department of Economic and Social Affairs;
- Demographic trends visualisations partly adopted from FAO / UNECE studies like the late issues of *The European Forest Sector Outlook Study* and other comparable resources.

The immediate interest of the chapter is directed towards the emerging historical trends, though for selected purposes data peaks amongst the member states may be viewed additionally. The observed trends relate to the European Union in general, some critical data though, like population age or density, are provided with additional figures for each of the member states. Population projections are not the main interest of the study and should only be briefly treated at the end of the chapter as well as the development of the global population trends and their possible impact on the European demography.

Statistical adjustments and regional generalisations

When speaking of historical demographics in the European Union, one has to keep in mind the geo-political processes, which are an important external driver of EU-population change. Founded in the late 1950s, the European Union has undergone several enlargements that have significantly modified its demographic profile in both number and structure. Thus, has the expansion of 2004 raised the number of countries from 15 to 25, and brought in almost a 21 percent total population increase contributing in sum over 103.3 million people. The quantity shifts in population numbers resulting from these and other processes beyond natural population change and migration are typically considered in the statistical administrative adjustments and corrections.

Population increase is only one side of the changes that have occurred as the EU has been expanding. Due to the significant regional differences between the member states many structural factors in the demographics of the Union have been affected, e.g. in terms of population density there is an enormous difference in the case of Finland with about 15 persons per square km and Slovakia with

an average of 114. Therefore, while analysing the given trends one always has to consider the occurred and planned enlargement steps over the time span.

The presentation of the demographic patterns on the EU-level is in other words a matter of immense generalisation. Some scholars while handling the impacts on forest management in the European domain apply a regional approach [e.g. Elands et al. 2004: 472]. As there are no uniform data immediately available for the regional presentation of EU historical population trends, the overview below does not follow this approach displaying the figures for the single member states and trends for the EU 27 as a whole.

2.1 Population Growth and Change

Above the new member states accession, the major sources for EU demographic developments since the second half of the 20th century are continuous population growth, on-going ageing and expanding migration.

Population growth

Population growth dominates the EU's demographic trends over the past 60 years (Table 1): The total number of Europeans increased by almost 100 million from 1960 (402.6 million) to 2011 (c. 502.5 million). The strongest annual population growth with over 3 million persons per year has been reported in 1960, reaching a maximum rise of 2 million p.p.a. over the last ten years (Figure 1) [Eurostat 2011b: 123]. The growth rate has been gradually slowing down, from the annual average of 8 per 1000 inhabitants per year in the 1960s to 3.2 per 1000 inhabitants per year in the beginning of the first decade of 21st century [Eurostat 2011c: 59].

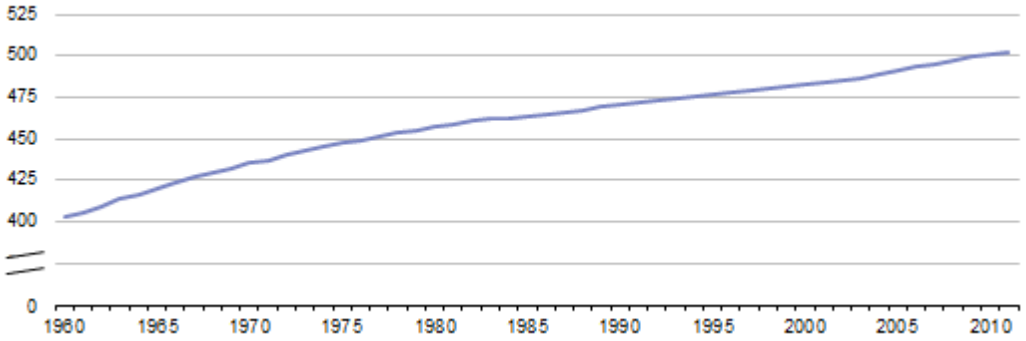
The increase has run uneven amongst the EU 27 states: The biggest population change has been contributed by France (+ 20.956 thousands p.), the least – by Malta (+ 105 thousands p.) [Eurostat 2011c: 60].

Table 1: Total EU 27 population, 1950-2010

1950	1960	1970	1980	1990	2000	2010
373 269	402 931	435 441	457 918	470 958	481 465	500 441

Source: [UN STATS 2012]; both sexes combined; as of 1 July; in thousands.

Figure 1: Population EU 27, 1960-2011

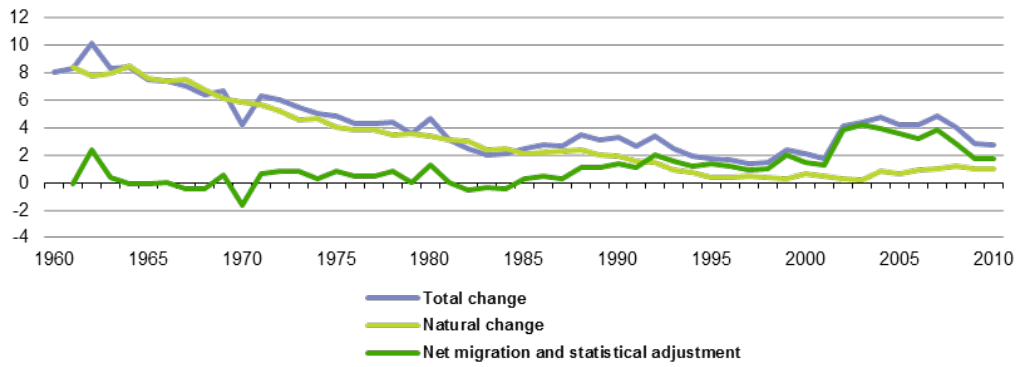


Source: [EUROSTAT 2012ahttp://appsso.eurostat.ec.europa.eu/nui/show.do]; at 1 January, million persons.

Component change

The change of EU population size has been determined by the natural population's change followed by migration that has overcome the latter in significance around 1990. The annual EU 27 birth rate lies around 5 million children whilst over 2 million people immigrate every year from third countries; at the same time, births overcome deaths each year by several hundred thousand persons, whereas net migration is well over a million. In other words, while the natural change has remained very low over the past decades, showing a declining trend (Figure 2), migration has become the main driver of population increase, peaking in 2003 with the total growth contribution of 95 percent and slightly giving up the positions afterwards. The following two parts of the chapter deal with aspects of natural change and migration patterns.

Figure 2: Population Change by Component (Annual Crude Rates), EU 27, 1960-2010

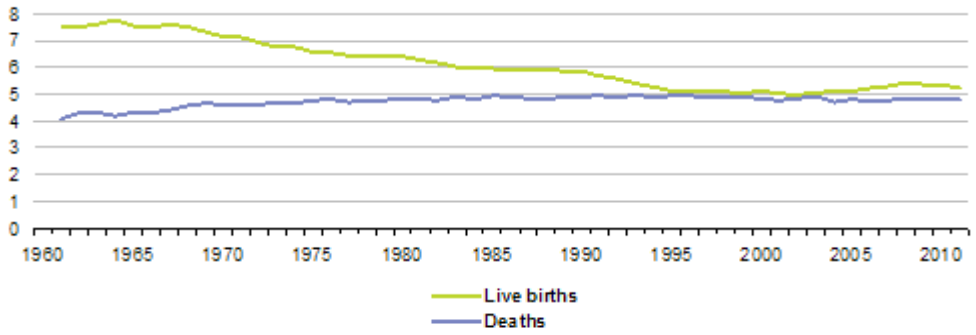


Source: [EUROSTAT 2012a]; per 1,000 inhabitants.

Natural change

Natural change (or natural increase) in the population is constituted by the difference between live births and deaths. The historical EU-trends of these variables (Figure 3Figure 3) show that while mortality has remained on a somewhat constant level from 1960 onwards, fertility rates have been significantly decreasing. The gap between both trends has notably narrowed, almost reaching parity in 2003 before slightly diverging again in late 2010. Since the 1890s, the Western European countries are said to be passing through the second demographic transition, associated with a shift from high to low both in mortality and fertility rates [PRB 2004: 6]. The last phase of demographic transition is bound with progressive ageing: the share of the working-age population declines while the oldest age group experiences the heaviest increase. This situation currently takes place in the most Western European countries [Amcoff / Westholm 2006: 4].

Figure 3: Births and Deaths, EU 27, 1961-2010



Source: [EUROSTAT 2012a]; million persons.

The EU 27 fertility trend reveals an influential negative dynamic. Total Fertility Rates (TFR, "the mean number of children that would be born alive to a woman during her lifetime if she were to pass through her childbearing years conforming to the age-specific fertility rates of a given year" [Eurostat 2011c: 26]) have dropped since the post-war "baby-boom" peak of above 2.5 children that have been born per woman almost in all European nations in the 1950-60s, to over 1.97 in 1980 to 1.48 in 2005. The recent distribution indicates a slight rise – average European TFR has been approaching 1.59 children per woman in 2010.

The development of fertility rate has been very uneven on the national level (see Table 2) in size and timing. The disparity may reach up to 60 %, for example, in comparison of the rates for Poland (average 1.3 children per woman), Ireland or France (with rough 2 children per woman).

Still, European countries remain currently below the 2.1 mark, which indicates the level needed for generation replacement. The main cause of this tendency is the sharp decline in births among young women that has been taking place since the 1980s.

At the same time the fertility of women after 30 has been continuously rising, first of all in the newer member states leading to the general postponement in child birth. Other demographic factor positively influencing the fertility rates are the new family building patterns with lower numbers of marriages, higher divorce rates and the growing popularity of cohabitations. By and large, modern Europeans tend to be getting fewer children later in life than previous generations.

Table 2: Total Fertility Rate, 1960-2011

	1960	1970	1980	1990	2000	2005	2009	2010	2011
EU-27	:	:	:	:	:	1.51	1.59	:	:
Belgium	2.54	2.25	1.68	1.62	1.67	1.76	1.84	:	:
Bulgaria	2.31	2.17	2.05	1.82	1.26	1.32	1.57	1.49	1.51
Czech Republic	2.09	1.92	2.08	1.90	1.14	1.28	1.49	1.49	1.43
Denmark	2.57	1.95	1.55	1.67	1.77	1.80	1.84	1.87	1.75
Germany	:	:	:	:	1.38	1.34	1.36	1.39	1.36
Estonia	:	:	:	2.05	1.38	1.50	1.62	1.63	1.52
Ireland	3.78	3.85	3.21	2.11	1.89	1.86	2.07	2.07	2.05
Greece	2.23	2.40	2.23	1.40	1.26	1.33	1.52	1.51	1.43
Spain	:	:	2.20	1.36	1.23	1.34	1.39	1.38	1.36
France (1)	2.73	2.47	1.95	1.78	1.89	1.94	2.00	2.03	:
Italy	2.37	2.38	1.64	1.33	1.26	1.32	1.41	1.41	:
Cyprus (2)	:	:	:	2.41	1.64	1.42	1.51	1.44	1.35
Latvia	:	:	:	:	:	1.31	1.31	1.17	1.34
Lithuania	:	2.40	1.99	2.03	1.39	1.27	1.55	1.55	1.76
Luxembourg	2.29	1.97	1.50	1.60	1.76	1.63	1.59	1.63	1.52
Hungary	2.02	1.98	1.91	1.87	1.32	1.31	1.32	1.25	1.23
Malta	:	:	1.99	2.04	1.70	1.38	1.43	1.38	:
Netherlands	3.12	2.57	1.60	1.62	1.72	1.71	1.79	1.79	1.76
Austria	2.69	2.29	1.65	1.46	1.36	1.41	1.39	1.44	1.42
Poland	:	:	:	2.06	1.37	1.24	1.40	1.38	1.30
Portugal	3.16	3.01	2.25	1.56	1.55	1.40	1.32	1.36	1.35
Romania	:	:	2.43	1.83	1.31	1.32	1.38	1.33	1.25
Slovenia	:	:	:	1.46	1.26	1.26	1.53	1.57	1.56
Slovakia	3.04	2.41	2.32	2.09	1.30	1.25	1.41	1.40	1.45
Finland	2.72	1.83	1.63	1.78	1.73	1.80	1.86	1.87	1.83
Sweden	:	1.92	1.68	2.13	1.54	1.77	1.94	1.98	1.90
United Kingdom	:	:	1.90	1.83	1.64	1.78	1.94	1.98	:
Iceland	:	2.81	2.48	2.30	2.08	2.05	2.23	2.20	2.02
Liechtenstein	:	:	:	:	1.57	1.49	1.71	1.40	1.69
Norway	:	2.50	1.72	1.93	1.85	1.84	1.98	1.95	1.88
Switzerland	2.44	2.10	1.55	1.58	1.50	1.42	1.50	1.52	1.52
Montenegro	:	:	:	:	:	1.60	1.91	1.69	:
Croatia	:	:	:	:	:	1.41	1.49	1.46	:
FYR of Macedonia	:	:	:	:	1.88	1.46	1.52	1.56	1.46
Turkey	:	:	:	:	:	:	2.08	2.04	:

(1) Excluding French overseas departments, up to and including 1990.
(2) Break in series, 2010.

Source: [EUROSTAT 2012]; live births per woman.

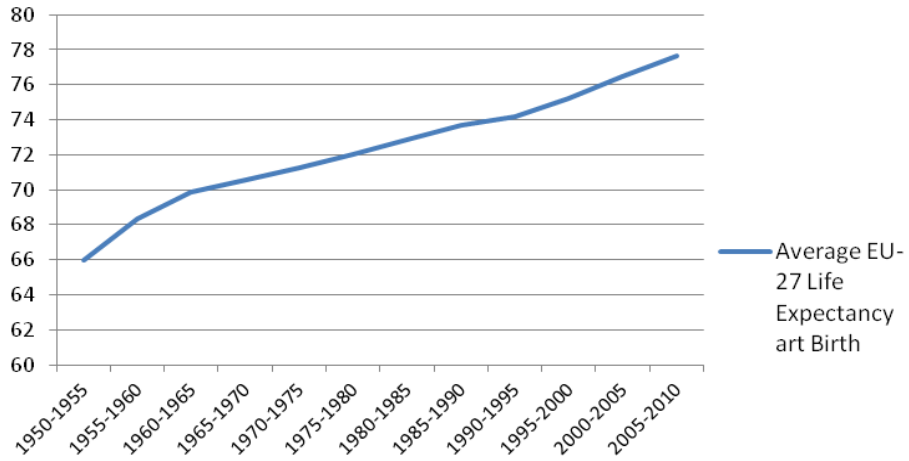
On the other hand, people in the modern EU seem to be living longer and healthier lives than their ancestors. As it may be seen in Figure 3, mortality has remained fairly stable in the past 30 years. Since the late 1960s the annual number of deaths in the member states has increased slightly, reaching the 5 million mark in 2009. This rise correlates positively with general population growth dynamics and negatively with the growing longevity of the population. The significant demographic changes in the Europe of the late 20th century are associated above other factors with the consequences of the World War II such as rapidly risen death rates and a drop in fertility rates, followed by a post-war baby boom. Due to historical events and economical pathways, various lifestyle factors and sometimes national differences in the effectiveness of or access to healthcare, the mortality in the Central and Eastern European member states was significantly higher than in the former EU 15 countries.

Mortality rates decrease, which has been observed in many European countries in the last century, has led to the extension of general life span length and strongly determines on-going population ageing.

Population age and longevity

A common and powerful variable visualising longevity is Life Expectancy at Birth, which represents the number of years persons of different ages may expect to live under current mortality conditions. The average life expectancy has expanded by over 10 years for both male and female Europeans since the 1950s (see Figure 4 and Table 3).

Figure 4: EU-27 Life Expectancy at Birth Trend, 1950-2010

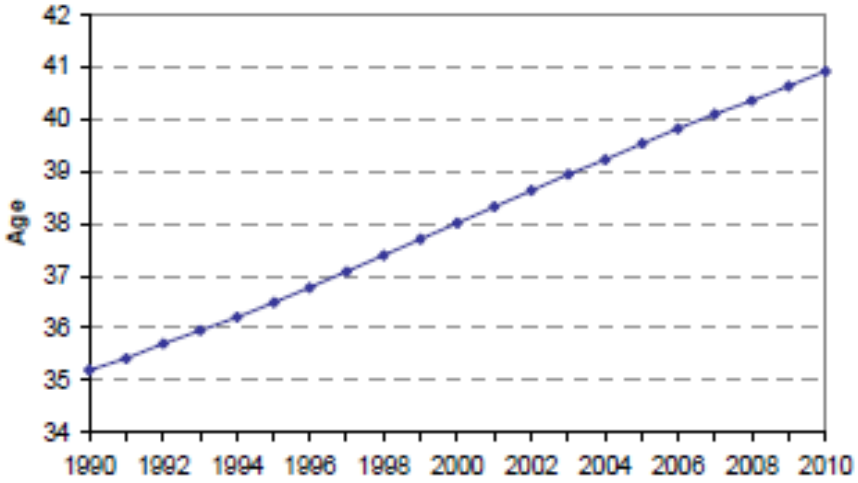


Source: Own graph based on data from [UN STATS 2012].

Born in Europe of the 2010s, one may have a statistical average chance to grow to 77 (if male) and to 83 (if female) years old. Persisting differences between the member states as well as the gender gap have to be taken into account while analysing this population trend.

The rise of life expectancy due to the falling infant mortality, industrialisation, economic development, improved living standards, sanitation and nutrition comes hand-in-hand with the decline of birth rates as a result of shrinking families, later marriage ages and expanding urban lifestyle (/urbanisation) [PRB 2004: 11].

Figure 5: EU-27 Median Age of the Total Population, 1990-2010[1]



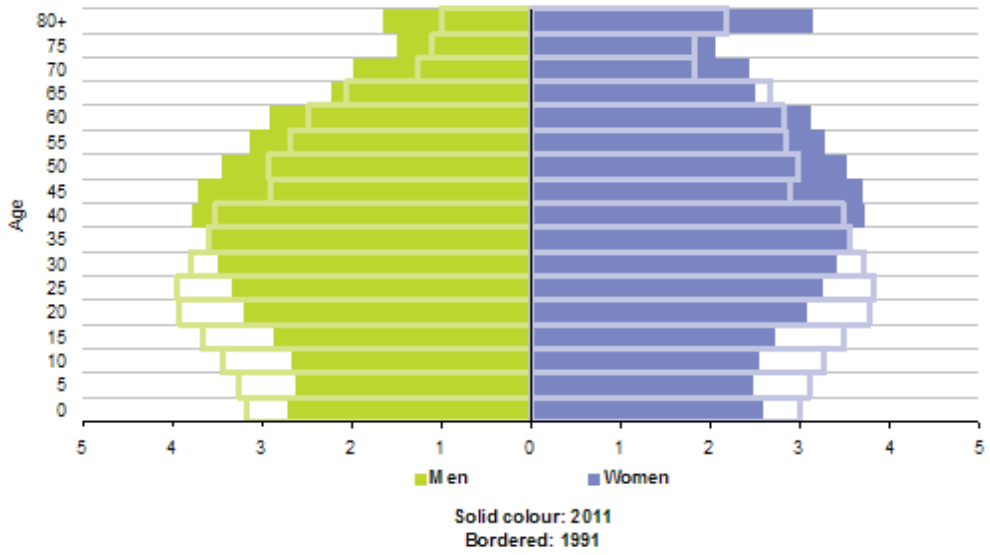
Source: [EUROSTAT 2012]; in years; (1) EU 27 excludes France's overseas departments.

The other side of this trend is the persistent progressive ageing of the Europeans that may be followed on the development of the median population age. This variable has been continuously growing on the European level, from around 30 years in 1950 to about 40.9 years in 2010 (see Table 4, Figure 5), meaning that half of the contemporary EU-population are currently in their early forties. It shows also no uniformity across the member states. The highest positive trend may be observed in Greece (+ 15.4 years from 1950 to 2010), the slowest change has occurred in Luxembourg (+ 3.9 years from 1950 to 2010).

Europeans are not only living longer, but also longer healthy lives, states the conclusion of the recent *EUROSTAT Demography Report*: "There is evidence that the process of ageing, during which people become progressively disabled until they die, is not becoming slower; rather, it is progressively delayed." [Eurostat 2011c: 27] The reduction of mortality in older years contributes to the change in the age pyramid of the European population. The latter has also experienced a notable shift towards

its upper half under the influence of the later and lower fertility as well as the soon reaching of the retirement age of the post-war baby-boom generation (cf. Figure 6).

Figure 6: Population Pyramides, EU 27, 1991 and 2011



(1) 2011, provisional.
Source: Eurostat (online data code: demo_pjangroup)

Source: [EUROSTAT 2012a]; percent of the total population.

Table 3: EU 27 Life Expectancy at Birth, 1950-2010

Country	1950-1955	1955-1960	1960-1965	1965-1970	1970-1975	1975-1980	1980-1985	1985-1990	1990-1995	1995-2000	2000-2005	2005-2010
Austria	68,37	69,99	70,06	70,68	71,63	72,71	73,89	75,62	76,39	77,49	78,18	79,77
Belgium	61,95	66,30	70,05	70,90	71,10	71,12	71,24	71,34	71,12	70,89	72,09	72,71
Bulgaria	66,73	68,74	70,42	71,91	73,18	74,28	75,26	76,14	76,93	77,65	78,32	78,94
Cyprus	67,02	69,59	70,38	70,02	70,29	70,64	70,78	71,46	72,50	74,24	75,54	77,01
Czech Republic	70,90	72,04	72,39	72,84	73,56	74,23	74,41	74,71	75,19	75,99	77,21	78,25
Denmark	65,33	67,70	69,80	70,40	70,50	69,70	69,33	70,35	68,52	69,43	71,31	73,91
Estonia	66,09	68,04	69,06	69,58	70,82	72,55	74,28	74,76	75,74	77,03	78,27	79,34
Finland	67,27	69,40	70,75	71,46	72,43	73,67	74,78	76,14	77,35	78,46	79,61	80,95
France	67,50	69,10	70,30	70,80	71,00	72,50	73,80	74,85	76,02	77,36	78,69	79,85
Germany	65,86	67,86	69,51	71,00	72,34	73,68	75,24	76,67	77,37	77,95	79,03	79,52
Greece	64,02	66,91	68,79	69,45	69,41	69,59	69,08	69,42	69,42	70,91	72,59	73,64
Hungary	66,68	68,95	70,10	70,75	71,16	71,93	73,09	74,11	75,30	75,94	77,62	79,68

Ireland	66,32	68,39	69,62	70,83	72,14	73,44	74,76	76,29	77,39	78,68	80,20	81,37
Italy	66,02	68,90	70,33	70,41	70,10	69,23	69,25	70,20	67,91	69,87	71,30	72,27
Latvia	64,80	67,78	70,39	71,34	71,29	70,76	70,78	71,68	69,90	70,61	71,91	71,31
Lithuania	65,92	67,47	69,04	69,69	70,14	71,35	72,78	74,37	75,61	76,81	78,10	79,39
Luxembourg	65,83	66,85	68,40	69,80	71,16	72,41	73,59	74,74	75,82	76,85	77,85	78,80
Malta	71,93	72,94	73,46	73,64	74,11	75,17	76,13	76,73	77,26	77,85	78,68	80,20
Netherlands	61,31	65,77	68,29	69,81	70,57	70,65	70,98	70,96	71,14	72,76	74,53	75,51
Poland	60,03	62,09	64,24	66,24	68,17	70,11	72,33	73,84	74,68	75,85	77,33	78,59
Portugal	61,05	64,10	66,80	66,80	69,21	69,46	69,66	69,53	69,36	69,72	71,47	73,16
Romania	64,45	68,74	70,63	70,33	70,07	70,48	70,63	70,97	71,61	72,76	73,84	74,72
Slovakia	65,57	67,85	69,15	69,18	69,82	70,97	71,10	72,51	73,67	75,12	76,68	78,59
Slovenia	64,12	67,49	69,70	71,22	72,51	74,14	75,95	76,70	77,41	78,48	79,64	80,48
Spain	71,72	72,85	73,44	74,07	74,78	75,31	76,38	77,17	78,14	79,20	80,05	80,88
Sweden	69,28	70,54	71,01	71,68	72,15	72,93	74,11	75,02	76,16	77,08	78,35	79,58
United Kingdom	68,37	69,99	70,06	70,68	71,63	72,71	73,89	75,62	76,39	77,49	78,18	79,77
Total Average	**66,00**	**68,32**	**69,85**	**70,57**	**71,29**	**72,04**	**72,83**	**73,70**	**74,15**	**75,19**	**76,48**	**77,63**

Source: [UN STATS 2012]; both sexes combined.

Table 4: EU 27 Median Age of the Total Population, 1950-2010

Country	1950	1960	1970	1980	1990	2000	2010
Austria	35,7	35,5	33,9	34,7	35,7	38,2	41,8
Belgium	35,5	35,3	34,6	34,1	36,3	39,1	41,2
Bulgaria	27,3	30,4	33,2	34,2	36,6	39,7	41,6
Cyprus	23,7	23,0	26,0	28,3	29,9	31,8	34,2
Czech Republic	32,7	33,0	33,6	32,9	35,1	37,4	39,4
Denmark	31,7	33,0	32,5	34,3	37,1	38,4	40,6
Estonia	29,9	32,0	33,7	33,9	34,4	37,9	39,7
Finland	27,7	28,2	29,6	32,8	36,4	39,3	42,0
France	34,5	33,0	32,4	32,4	34,8	37,7	39,9
Germany	35,4	34,7	34,3	36,4	37,6	39,9	44,3
Greece	26,0	29,1	33,4	34,2	36,1	38,3	41,4
Hungary	30,1	32,1	34,2	34,3	36,4	38,5	39,8
Ireland	30,0	30,1	27,4	26,6	29,2	32,5	34,7
Italy	28,6	31,6	33,0	34,2	37,0	40,2	43,2
Latvia	30,5	32,3	34,2	35,0	34,6	38,1	40,2
Lithuania	27,8	28,5	30,8	32,0	32,7	35,9	39,3

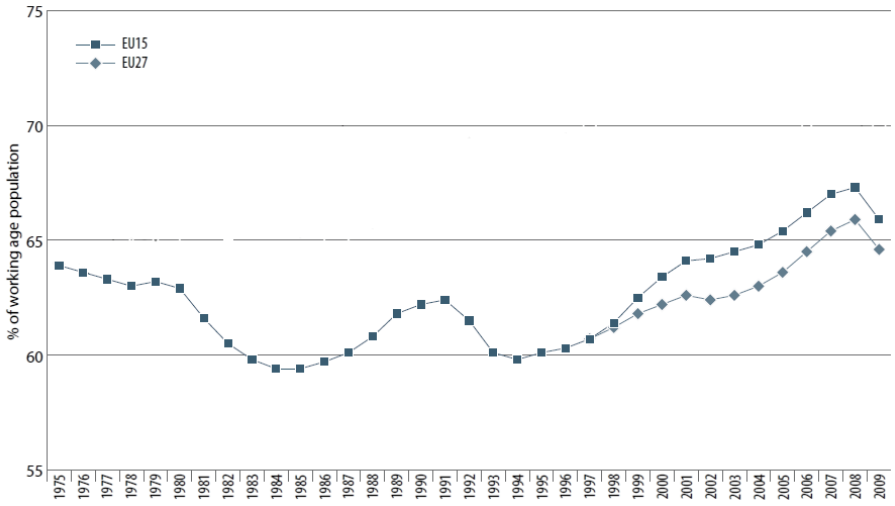
Luxembourg	35,0	35,2	35,4	35,0	36,4	37,3	38,9
Malta	23,7	22,3	24,6	29,1	32,4	36,1	39,5
Netherlands	28,0	28,7	28,6	31,2	34,4	37,3	40,7
Poland	25,8	26,7	28,2	29,5	32,3	35,3	38,0
Portugal	26,1	27,9	29,6	30,6	34,2	37,7	41,0
Romania	26,1	28,4	30,9	30,7	32,6	34,7	38,5
Slovakia	27,0	27,5	28,1	28,7	30,9	33,6	36,9
Slovenia	27,7	29,3	31,0	31,7	34,1	38,0	41,7
Spain	27,5	29,4	30,2	30,7	33,7	37,6	40,1
Sweden	34,3	36,2	35,4	36,2	38,3	39,4	40,7
United Kingdom	34,9	35,5	34,2	34,4	35,8	37,7	39,8
Total Average	29,7	30,7	31,6	32,5	34,6	37,3	40,0

Source: [UN STATS 2012]; in years.

Working age and EU employment trends

Demographic change is predicted to limit the scope for future employment growth as the working population is gradually ageing. The EU employment rate of the working population (15-64 years) develops progressively in the long run (Figure 7), having achieved over the 10 years from 2000 to 2009 a 64.4 percent growth (2.4 percentage points). The member states report a substantial increase of 43 percent in the employments of older workers (55-64 years of age), while the youth unemployment continues to rise [European Commission 2010c: 68].

Figure 7: Employment Rates in the EU, 1975-2009



Source: adapted from [European Commission 2010c].

The employment rates of women have moved closer to those of men, though in most member states the gender gap remains substantial. The employment market is sensitive towards the global economic development, so the financial crisis of 2008-2009 has severely affected the EU labour markets, as almost 6 million jobs have been lost during the recession. The recovery has run uneven on the national level ranging in 2011 from 4.1 percent unemployment rate in Austria to 22.8 percent in Spain [European Commission 2012b] (cf. chapter III. Economic Development).

2.2 Population Distribution and Migration Patterns

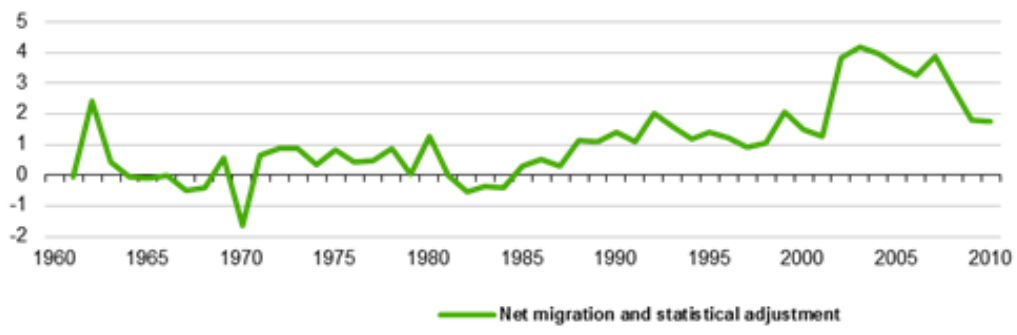
The density of population settlement, patterns of its distribution over the urban and rural areas in the European Union, as well as external migration exchange is the subject of this section.

Net migration

Western European countries have become a destination for international migrants in the second half of the 20th century, followed by some new member states in the recent years. Net migration has remained positive, meaning that more immigration than emigration has taken place.

The overall migration trend developed variably over the past 6 decades (Figure 8, Figure 9). It has shown a general positive dynamic, progressing from the estimated 233 thousands migrants to the EU 25 area in 1960 to the total of c. 2 million people that have immigrated into the EU 27 during 2009. Together with statistical adjustments, the highest positive contribution to the population change only through migration on the national level in 2010 took place in Italy, mostly through net migration (and statistical adjustments) in Belgium, Czech Republic, Denmark, Greece, Luxembourg, Malta, Austria, Finland, and Sweden. The decline in population change mostly through migration in the same year has been stated only in Lithuania [Eurostat 2012].

Figure 8: EU 27 Net Migration, 1950-2010



Source: [Eurostat 2012a]; statistical adjustment; per 1,000 inhabitants.

Different migration types (e.g. labour migration, student migration, refugee- and asylum seekers) as well as distinctive EU-intra migration and external migration have played a role both historically and regionally in the given period [Eurostat 2011c]. Figure 8 illustrates major phases of net migration development, which correlate with the changing economic and political conditions. The peak of 1950-1965, for example, corresponds to the rise in migration flows into the Western European countries as a result of national programs to recruit foreign workers in order meet the labour force demand of the booming economy. These programs have been stopped in the early 1970s giving up a sharp decline in the trend. In the 1990s, the migration flows are rising again because of the political climate change in Eastern European countries that are experiencing the fall of the "Iron Curtain" and the number of asylum seekers, e.g. during the national conflicts and wars in the former Yugoslavia [Eurostat 2012: 45f.].

The estimations of migration flows in European countries depend on the complex and unpredictable nature of the socio-economic and environmental drivers, they are not based on a unified methodology and therefore are not considered as comparable and exhaustive (well-known lack of reliable international migration statistics) [Bonifazi et al. 2008: 108; Bell et al. 2010; Eurostat 2011b; EEA 2011].

Figure 9: Past Trends in Migration Flows

Country	1961	1970	1980	1990	2000	2005	2009
Austria	-2679	10406	9357	58562	17272	49938	21067
Belgium	-39859	-32718	-2436	19547	12836	49186	64037
Bulgaria	-67	-11031	-5	-94611	0	0	-15729
Cyprus	-6519	-903	836	8708	3960	14421	1846
Czech Republic	4911	-121345	-41216	-58893	6539	36229	28344
Denmark	2745	21113	570	8553	10094	6734	15341
Estonia	8506	6066	6052	-5623	224	140	30
Finland	-11815	-36381	-2180	8604	2410	9152	14566
France	:	:	:	:	166761	187185	70288
Germany	118435	-271686	304410	656166	167863	81578	-10681
Greece	-16761	-46393	55777	63920	29401	39974	35099
Hungary	909	0	0	18313	16658	17268	17321
Italy	-136302	-107276	4914	22260	49526	303640	318066
Latvia	15467	6734	2445	-13085	-5504	-564	-4700
Lithuania	3690	14025	2122	-8848	-20306	-8782	-15483
Luxembourg	2415	1084	1344	3937	3431	6106	6583

Malta	-6037	-1944	380	857	873	1612	-1561
Netherlands	5924	32516	50557	48730	57033	-22824	38522
Poland	-61865	-293620	-24125	-12620	-409925	-12878	-1196
Portugal	-38078	-121955	41969	-39107	47000	38400	15406
Romania	-41623	-12190	52937	-86781	-3729	-7234	-1605
Slovakia	-5636	-35091	-11493	-2322	-22301	3403	4367
Slovenia	-4489	3713	5420	-245	2747	6436	11508
Spain	-82664	72947	112659	-20007	389774	641199	50780
Sweden	13115	46726	9606	34814	24386	26724	62614
United Kingdom	87400	-14821	-33485	24662	143871	231337	182370
EU-27	**-26925**	**-712311**	**589797**	**655279**	**722714**	**1760933**	**879644**

Source: [European Commsission 2012a: 48].

Population density

Like population size, the density of people's distribution across the EU 27 reveals a slight but continuous positive trend: over the past 10 years there has been a shift in average population density ratio from 93.6 persons per km^2 in 1960 over 112.5 in 2001 to 116.5 in 2010 [Eurostat 2011b].

The density of European population shows strong variation in national level. The lowest numbers of inhabitants per km^2 have been observed in the northern European countries like Finland (11.9 in 1950 to 15.9 in 2010) and Sweden (15.6 in 1950 to 20.8 in 2010). The other extreme is presented in the cases of Malta (987.3 in 1950 to 1318.1 in 2010) and in the Netherlands (241.5 in 1950 to 400 in 2010). The lowest change in population density over the 60-years period has taken place in Bulgaria (+2.2 persons per km^2 over 60 years) the highest consequently in Malta (+330.8 person per km^2 over 60 years).

Table 5: EU 27 Population Density by Major Area, Region and Country, 1950-2010

Country	**1950**	**1960**	**1970**	**1980**	**1990**	**2000**	**2010**
Austria	82,7	84,0	89,0	90,0	91,5	95,5	100,1
Belgium	282,6	299,8	315,3	322,6	325,9	333,3	350,9
Bulgaria	65,4	70,9	76,5	79,9	79,5	72,2	67,6
Cyprus	53,4	61,9	66,3	74,1	82,9	102,0	119,3
Czech Republic	112,5	120,7	124,1	130,1	130,6	129,9	133,0
Denmark	99,0	106,3	114,4	118,9	119,3	123,9	128,8
Estonia	24,4	27,0	30,3	32,7	34,8	30,4	29,7
Finland	11,9	13,1	13,6	14,1	14,7	15,3	15,9
France	75,9	82,8	92,0	97,7	102,8	107,1	113,8

Germany	191,5	204,0	218,9	219,3	221,6	230,7	230,5
Greece	57,3	63,2	66,6	73,1	77,0	83,3	86,1
Hungary	100,4	107,3	110,9	115,0	111,5	109,8	107,3
Ireland	41,5	40,3	42,2	48,6	50,3	54,1	63,6
Italy	153,9	164,3	177,0	186,6	188,6	189,1	201,0
Latvia	30,2	33,0	36,6	38,9	41,2	36,9	34,9
Lithuania	39,3	42,4	48,0	52,5	56,6	53,6	50,9
Luxembourg	114,5	121,4	131,2	140,8	147,4	168,4	196,2
Malta	987,3	990,2	960,8	1033,9	1163,1	1257,7	1318,1
Netherlands	241,5	275,0	312,0	339,2	358,6	382,0	400,0
Poland	76,8	89,8	100,6	110,1	117,7	118,5	118,4
Portugal	91,5	96,6	94,4	106,4	107,9	112,4	116,1
Romania	68,4	77,2	85,0	93,1	97,3	93,1	90,1
Slovakia	70,1	83,5	92,0	101,2	107,5	110,2	111,4
Slovenia	72,7	78,0	82,4	90,4	95,1	98,0	100,2
Spain	55,5	60,1	66,8	74,1	76,9	79,6	91,1
Sweden	15,6	16,6	17,9	18,5	19,0	19,7	20,8
United Kingdom	208,4	216,3	229,1	231,8	235,5	242,4	255,4

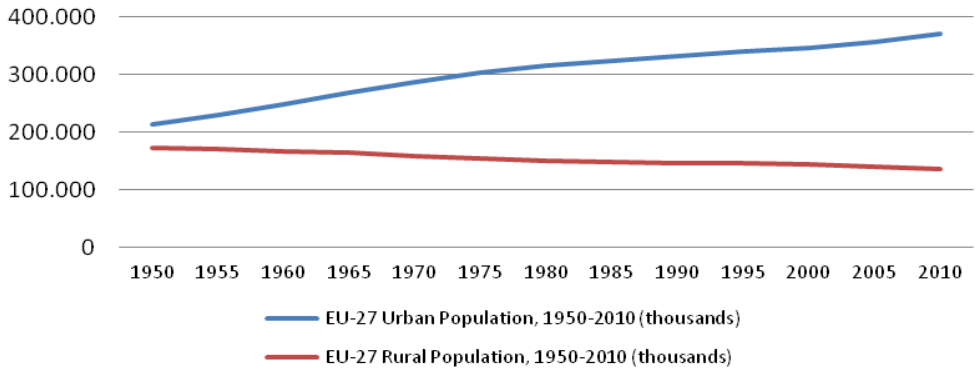
Source: [UN STATS 2012]; in persons per square km.

On the EU regional level (NUTS3) the criterion of population density is being applied amongst other factors to distinguish and define rural and urban areas [e.g. European Commission 1997] (see the latest EC rural-urban typology combining the OECD threshold approach with 1 km^2 spatial grid mapping) and to give a picture of population settlement patterns across the member states.

Urban/rural distribution

Regarding the urban-rural distribution of the population, the EU 27 demonstrates a historical trend of urban growth and rural decline (Figure 10). The rural population share has been steadily falling since 1950s [Champion 2008: 144]. For the moment, about 56 percent of the EU 27 population lives in rural areas, which cover 91 percent of the overall territory [Eurostat 2011a: 5].

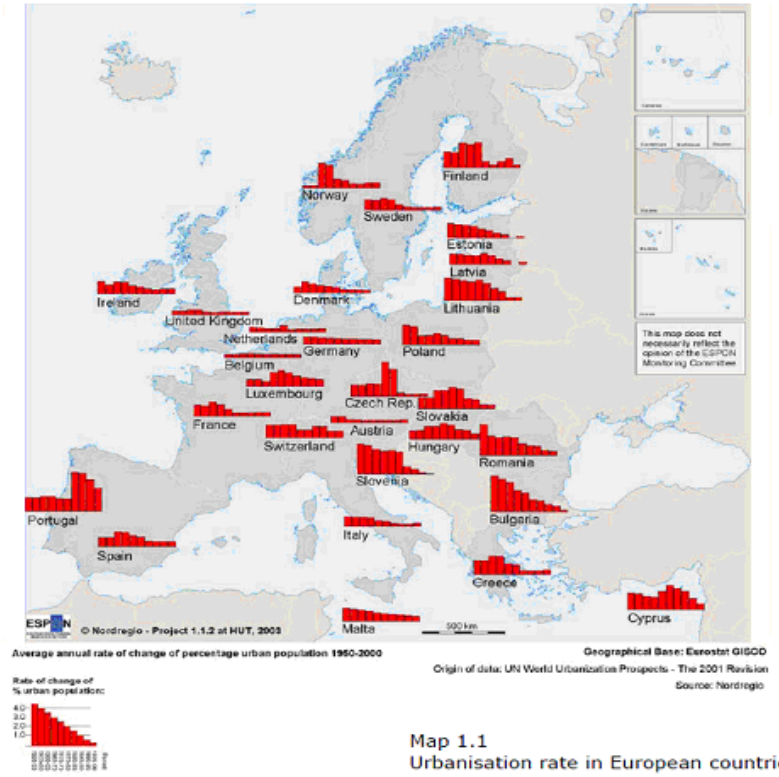
Figure 10: EU 27 Urban and Rural Population Dynamics, 1950-2010



Source: [UN STATS 2012]; in thousands.

The expansion of European cities since 1950 is estimated by over 78 percent [EEA 2006: 11]. The strongest urbanisation took place in the Republic of Moldova (+ 53.1 percent since 1950), the smallest change in the number of people, living in the cities, has experienced the United Kingdom (+7 percent since 1950). At the same time, the urban population has grown for about 33 percent.

Figure 11: EU-27 Urbanisation rate in European Countries, 1950-2000



Map 1.1
Urbanisation rate in European countries 1950–2000.

Source: [ESPON 2005: 60].

This phenomenon of urban sprawl, describing the physical expansion of urban areas, is driven amongst others by the demographic factors of population growth and changing family structures. It is characteristic also for the countries currently experiencing population decrease like Germany, Spain, Portugal or Italy [cf. Piorr / Ravetz / Tosics 2011: 21; Nilsson / Nielsen 2010]. Figure 11 demonstrates the average annual urbanisation growth in the member states in the time span of 1950 to 2000.

2.3 EU Historical Population Trends and Projections in Brief

Looking back, the trends in European population development may be summarised as follows:

- As population continues to grow in size, the Europeans become more numerous;
- EU-Population age is increasing with strong divergences between „old“ and „new“ (especially eastern) member states;
- Fertility rates are slightly recovering but remaining under the replacement level, overall trend in postponement of child-bearing;
- Europeans are living longer and healthier lives, and life expectancy is on the rise;
- Population density develops positively, and the spatial distribution of the population shows an on-going urbanisation trend („Urban Sprawl“) as well as rising tendencies towards the peri-urban settlement;
- Urbanisation is in trend – urban areas expand faster as the population grows;
- Migration flows run positively but unevenly over the years and contribute considerably to the population change.

According to the estimations [European Commission 2007b; European Commission 2012a], the outlined historic developments are expected to continue in the future:

- **The EU population is projected to increase up to 2040 and decline thereafter**: In 50 years' time, the European population is to slightly increase from 501 million in 2010 to 526 million in 2040 – an increase of almost 5 percent. By 2060, the population shrinks to 517 million – a steady decline of nearly 2 percent.
- **Significant changes in age structure**: The age structure of the population within the EU 27 is projected to change dramatically as elderly people will account for an increasing share of the population. The projections point to a significant reduction in the population aged 15-64, and an increase in persons aged 65 or more leading to a doubling of the old-age dependency ratio in the EU.

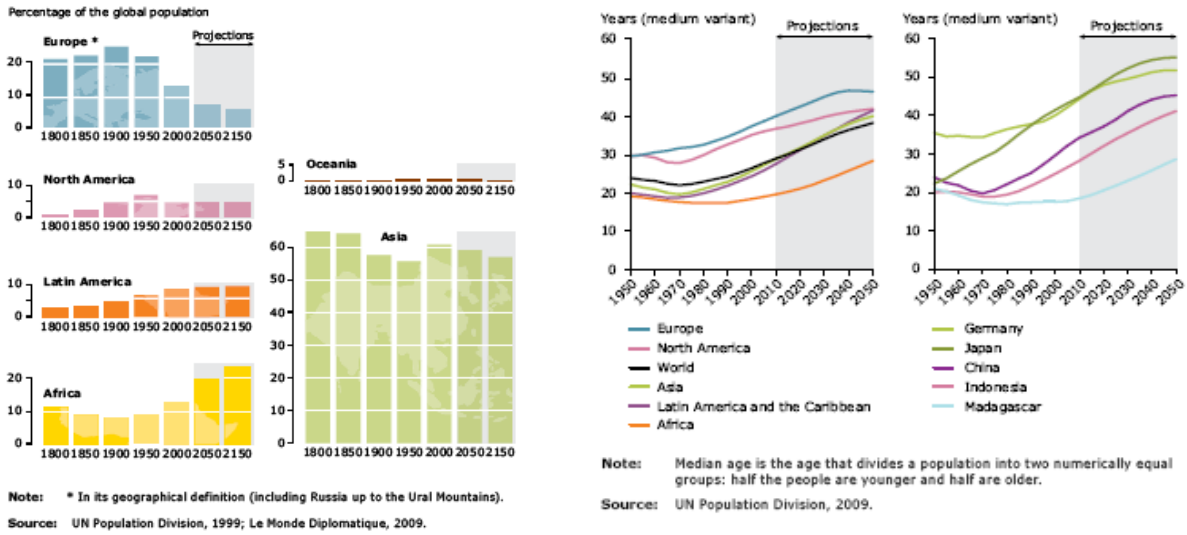
- **Slight increase in fertility rate**: According to the projections, in nearly all EU 27 countries the total fertility rate will gradually increase from 1.59 in 2010 to 1.64 in 2030 and further to 1.71 by 2060 remaining under the natural replacement rate. The largest TFR rise is to be reached in Latvia, Hungary and Portugal.
- **Further life expectancy gains**: By 2060 life expectancy at birth is expected to rise, beholding the strong convergence between males (84.6) and females (89.1), whereas the largest increases are to take place in countries with the lowest current life expectancy like Bulgaria, Estonia or Latvia.
- **The working-age population is expected to decline,** whereas the employment rates of older workers (over 64 years) and female employment rates are projected to increase.
- **Continued, but decelerating inward net migration to the EU**: Fifty-five million people are expected to constitute the cumulated net migration to the EU from 2010 to 2060, concentrated in Italy, Spain and the UK. EU 27 annual net inflows are projected to gain from about 1,018,000 people in 2010 (equivalent to 0.2 percent of the natural population) to 1,217,000 by 2020, with a decline afterwards to 878,000 people by 2060.

2.4 Global Megatrends in Population Change

Throughout the 21st Century the global population is expected to experience following demographic changes [EEA 2011]:

- An ageing of societies, which will spread to most countries: the average age is expected to rise, especially in developing countries (notably China, some Pacific islands and central Asian states);
- Slower global population growth, with major regional differences;
- Migration, especially caused by environmental factors is expected to become the most significant demographic change over the next 50 years.

Figure 12: Megatrends in Global Population Growth and Age



Source: [EEA 2011].

These developments in global demography are predicted to affect Europe's markets, international migration flows, land-use patterns and resource competition. So, the growth in global population leads to an increase in international migration flows, which may compensate Europe's population and workforce decline. It would also likewise influence ethnic diversity and age composition. European markets may experience the consequence of the future demographic trends through rising export demand for goods and, afterwards, a need for new market integration policies. A rise in migration also leads to progressive urbanisation as well as rising demand for natural resources and increasing environmental pressures [EEA 2011].

3. Demographic Change Impact on European Forests

Methodological considerations

This chapter provides a summary of existing literature findings, aiming to describe the cross-European developments in forest management driven by population change. It compiles the results of an extensive data and information sources analysis. Primary and secondary data and information sources have been filtered, checked, included in the chapter and quoted. Literature of two types has been considered:

a. Forestry studies and reports prepared by the European and international organisations [EUROSTAT / EC / FAO / UNECE / UN];

b. Scientific investigations in the fields of European forestry, forest management, land use and landscape transformation.

Dealing with demographics as a forestry driving force on a cross-European level one faces a complex, inconsistent, fragmented and opaque research field with extensive interlinkages to different disciplines. Population is a most frequently invoked and controversial factor in relation to the change in forest area. Interdependences between demographic change and developments in forest management practices have been broadly addressed by scholars and international organisations [Klijn 2004: 201f.; UN 2011; Malmberg 2009]. No (global or European) impact assessment framework has been established so far, and a lack of agreement on conceptual basics and statistical incoherencies in the research field have been observed [Mather/ Needle / Fairbrain 1998: 1984].

There is little explicit research on demographics compared to other forest development drivers. The majority of the reviewed sources handle the consequences of population change in general terms, focussing on selected aspects like progressive ageing or migration patterns. The relationship between forest development and demography is claimed to be "poorly understood" [Mather/ Fairbrain / Needle 1999: 71]. A qualitative/quantitative analysis is a rare case attempted in specific studies, e.g. land use modelling [Kroll / Haase 2009; Convery 1973]. The role of human drivers on forest change and management is difficult in estimation, as the variables are of differently quantifiable degrees: the socio-economic factors may easily be measured, where the cultural factors are generally problematic [Mather/ Needle / Fairbrain / 1998: 1984].

A notable methodological problem stated in the literature concerns the consistency and reliability of the statistical data, both on the side of forestry and the demographics [Mather / Needle / Fairbrain 1998]. Few studies are available for the EU 27. Some impacts mentioned in this chapter have been formulated for the forest-based sector in the developed countries in general or non-European regions like USA, Australia or Canada [Marcin 1993; Stewart / Race / Curtis 2010] and will be considered as an input due to the absence of further, more specific research. The reviewed literature focuses mainly on international or national/regional levels; there is a small part of the studies that deal with the impacts solely in the European context.

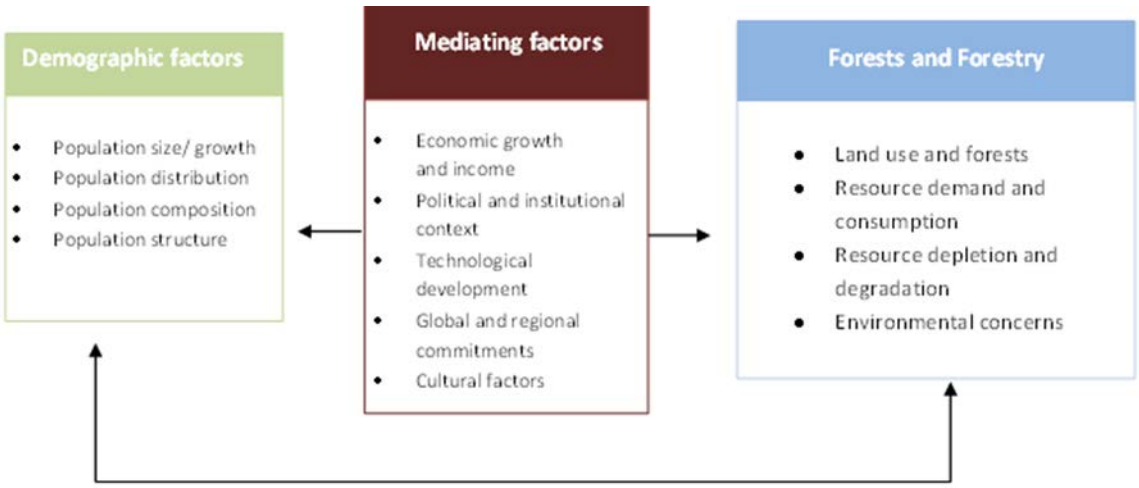
<u>The link between forestry and population</u>

Demographics as a driving force for forests and forestry is a complex phenomenon that comprises the changes in population size, composition, structure and distribution [cf. Hunter 2000; FAO 2010b]. The tangible critical factors named by the research community in this context are population growth,

ageing, international migration, and rural-urban distribution with special emphasis on urbanisation (Figure 13).

The driver itself is characterised as both long-term and indirect. It has a slow-dynamic influence on forest management practices and long-term transformations of wooded landscapes [FAO 1995: 8; Marcin 1993: 42; Klijn 2004; FAO 2010b: 99], working through other drivers or "mediating factors" like geopolitics, markets, climate change or technology [Mather / Needle / Fairbrain 1998: 1986, Sandsröm et al. 2011; Fyles et al. 2008: 9; Hunter 2000].

Figure 13: Framework Considering the Link Between Population Change and Forestry



Source: Adapted from [Hunter 2000] and [FAO 2010b].

<u>The structure of the chapter</u>

The second part of the topic "Demography" focuses on the impacts of population change on the European forest-based sector. To handle the outlined complexity of the research field, the three most prominent aspects addressed in the literature will be presented in more detail including the corresponding critical demographic factors. As there is little quantitative cross-country research in this field, the argumentation is limited to the descriptive presenation.

- The first section of this sub-chapter deals with the development of recreational and cultural functions of European forests that have taken place in recent decades and are related in the literature with such demographic processes as gradual population growth, ageing and urbanisation. Population ageing is viewed here as a driving factor for social, cultural and economic change.

- Change processes in forest land use, associated with demography are the topic of the second section. Here, the implications of migration and rural change as well as urban growth for the European forest management practices are reviewed.
- The third section gives an overview of the major demographic trends influencing the economic function of the forests. The effects of population growth, fertility, ageing and changing family structures on the development of the forestry demand structures and labour markets are observed.

3.1 Population Change and Cultural Demand

Recreational and cultural functions of European forests

The traditional view of forestry as primarily economic activity and forest management has been limited on serving the wood supply and timber [Blombäck / Poschen / Lövgren 2003]. Since the 1950s international forestry research has broadened its focus from the timber production and environmental management towards other forest functions [Elands / Wiersum 2003: 8; UNECE / FAO 2005]. The multifunctional view of forests as "landscapes consisting of heterogeneous rather than homogenous goods" [Sandström et al. 2011: 220] in general has become a discussion issue handling the assessment of agricultural production, industrial use, recreation, housing, water extraction, nature conservation etc. [Vos / Meekes 1999: 7; Pistorius / Schaich / Winkel 2012; Köhl / Rametsteiner 2009; Handbook / Integral 2012: 10].

According to the literature, the recent demographic trends create new competing pressures on the forests and promote their multifunctional use [Cordell / Macie 2002: 27; Sandström et al. 2011]. The cultural dimension has been predominantly addressed by the research in this respect, e.g. the increasing demand for forest amenities like urban forestry and recreation [FAO 2009: 6; Hörnsten 2000]. European forest incorporates natural monuments, places of cultural and spiritual meaning, multiple archaeological sites and is an attractive place for recreational activities [Cordell / Tarrant 2002: 29]. As in 2005, about 90 percent of European forest lands have been reported as open to the public and the area accessible for recreational purposes is constantly growing. Meanwhile, less than 10 percent of forest managers name meeting the recreational demand as their main management goal, though this number is expected to grow in the near future [Köhl / Rametsteiner 2009: 59].

The increasing role of recreational function affects Europe's forests in many ways. According to the literature, it leads to the change in management practices e.g. in terms of visitor management, as the "higher visitor density requires more frequent management actions" [Elands / Wirth 2010: 167]. This is particularly true for urbanised [Vos / Meeks 1999: 7], but also remote and protected forest areas.

The challenge of nature conservation and adequate infrastructure provision are named amongst the challenges of recreation planning and management especially in the densely populated regions [Elands / Wirth 2010: 173]. Another management challenge is associated with government of competing demands on that arise from multifunctional use of limited forest resources (e.g. timber, biodiversity, recreation, etc.) [Sandström et al. 2011; Elands / Wirth 2010]. Thus, the conflicts between internal and external forest functions increase management costs: "Conflicts arise between similar uses because of crowding; between non-similar uses because of incompatible norms, values and goals; and between users and providers because of problems owners sometimes encounter." [Cordell / Tarrant 2002: 30] In order to address the growing pressure and "mitigate resource damage and competition among recreation users" [Cordell / Tarrant 2002: 29], labour markets are experiencing an emerging need for forest managers, especially in public sectors.

The increasing role of recreation impacts consumption patterns of wood- and non-wood products. European countries reported to the FAO (1995) in this respect a demand for different kinds of nuts and berries, mushrooms, game meat, honey as well as Christmas trees or medicinal plants (cf. Chapter III. Economic Development). On the other side land-use takes place for cultural and recreational activities associated with non-measurable products, e.g. outdoor activities, tourism, photographing natural objects and scenery, hunting, fishing or different sports. Northern European countries like Sweden or Finland report a change in the trend of recreational activities, from harvesting of berries or mushrooms towards pure recreational visits in the nature [Hörnsten 2000: 18].

Amongst other named effects is the establishment of new, (peri-) urban forests, that experience more public involvement and are more intensely used [Cordell / Tarrant 2002: 29] (the uprising urban forestry will be handled in the next part of this chapter with greater details).

The valuation of forest recreation is considered to be a complex issue that is hard to estimate [FAO 2005; Hörnsten 2000]. Whilst the population change is easily measurable, the cultural factors are often avoided in the assessment research [Mather / Needle / Fairbrain 1998: 1984]. Comparable figures in this field are limited: almost no statistics is in hand on the number of visits for all of the member states. Chapter III. Economic Development handles the data available on the quantity of marketed non-wood forest products, some of which are associated with the cultural or recreational activities. In the reviewed literature there was scarcely mentionable research on the corresponding situation in the South-Eastern European countries – countries with high population density and alternating economic situation as well as public forest types and forest use practices, like Greece, Romania or Malta.

Population ageing as socio-economic change driver

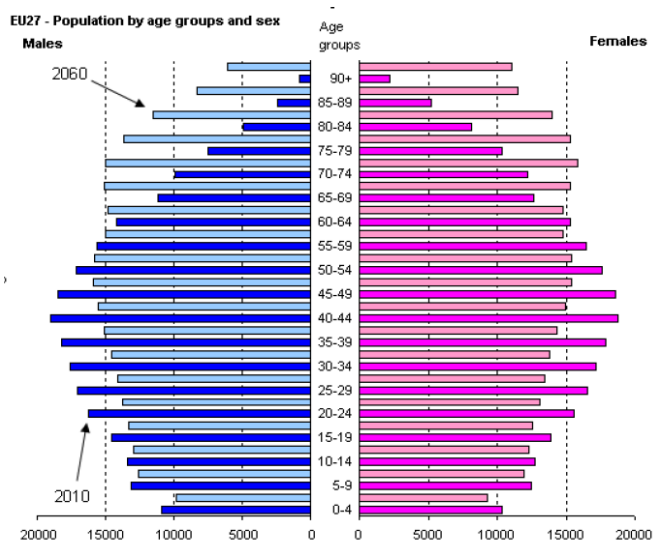
Back to population change, growing recreational demand is strongly correlated with population growth and ageing. Due to specific habits and preferences the dominating older population cohort may affect the forest utilisation towards more recreational use, especially amongst the urban population and people living close to the forests. This is not a cross-European trend: while being considered as one of the important forest functions in all or most forests in the Nordic regions and most urbanised Atlantic countries, for Central and Eastern European regions this change is still to come. With the progressive development of their economies and living standards of societies recreational use of forests is expected to merely gain on weight in these regions and thus to increase the challenges and needs for management and planning in this parts of Europe [Elands / Wirth 2010: 172].

Box 1: Population Ageing as Socio-Economic Change Driver

Ageing is considered to be one of the most perceivable demographic causes of developments in European forest-based sector and, following, the change in forest management practices (FAO 2010b: 100; Malmberg 2009: 9; Marcin / Lime 1977; FAO 2005). The upwards shift in the age pyramid of European population took place since 1950 and is predicted to rise (Figure 14), especially in Western Europe, as the generation of baby-boomers to reach the retirement age by 2020.

According to the studies, the consequences of progressive population ageing on the long run are likely to cause socio-economic shifts in: consumption patterns, attitudes and behaviours of population, the housing demand, (geographical) demand for wood and wood products, overall economic performance and labour availability, alternative utilisation of forests [Marcin 1993; Malmberg 2009]. For example, the housing demand is expected to change as the numerously dominating population group is reaching the pre-retirement age of 45-65: “As baby-boomers reach middle age, they may seek more vacation and second homes in forested areas, creating the potential for more residential interface with forest management issues such as protection and timber-cutting.” [Marcin 1993: 41]

Figure 14: Age structure of the population in 2010 and 2060, EU 27



Source: [European Commission 2012a].

The gradual ageing of the Europeans is interconnected with other influential demographical variables like family status, income, career stage, physical capacity and education. As the population ageing is currently characteristic for the Western and Nordic European countries, in the new member states the impacts are observed to a less degree.

3.2 Population Change and Forest Land Use

Migration and Rural Change

Europe is a dynamic migration region: migration flows and processes are interrelated and it is difficult to make a clear distinction of their impacts. Migration flows have had both short- and long-term impacts on the size and structure of the European population. It accounts, for example, for the largest proportion of the EU's population growth, lowers the age pyramid towards the working-age medium [Eurostat 2011c: 2] or reinforces the existing urbanisation patterns, as the most immigrants tend to settle in the urban areas [European Commission 1999: 58].

The major internal migration trends of the recent 60 years are: movement from rural to urban areas and counter-urbanisation. Migration from rural to urban areas is characteristic for the Eastern European countries, Portugal and Nordic countries and leads to significant urban growth and densification [see Bell et al. 2010: 28].

In the 1970s the some major urbanized regions have started to experience a population turnaround and urban decline [Antrop 2004: 14]. This process is observed to be characteristic for people aged 60 and over, but also the younger cohorts of the working-ages population: "The most important one is the urban exodus or 'counter-urbanisation' of people aged 30-44 and, to a lesser extent, those aged 45-59, who stay in rural districts and age there." [Champion 2008: 148] Counter-urbanisation took place in older member states like UK, France, Spain or Italy and contributed to countryside gentrification and regeneration of rural areas.

Bell et al. [2010: 32 f.] distinguish 10 migration types that affect land use, out of which some directly affect forestlands. For instance, several EU 27 regions like remote areas in the Baltic states, parts of Poland, Bulgaria, Romania, Portugal, Spain, Austrian, Italian and Greek mountains have experienced rural land abandonment associated with migration of young working age people to the cities, leaving the rural areas to the older residents [cf. Amcoff / Westholm 2006: 4]. The consequence of this migration flows is the progressive "wilderness" of the landscapes. Reduced population pressure on the land promotes the afforestation of the regions, as the forests are colonising the uncultivated fields and empty farms [FAO 2005: 209; Nikodemus et al. 2005]. In other rural regions of Eastern Finland, Eastern Germany, Central Sweden, Italy, Hungary or Eastern France, through the flow of young people out of the regions to the cities and general depopulation, the extensification of agriculture and forestry is observed. Extensive models of farming and industrial forestry, where more land is being farmed by fewer people, are observed here, supported by the agricultural policy measures.

Impact of urban growth on European forest management

Urbanisation is related to the change from rural to urban lifestyle and is defined as "complex process that transforms the rural or natural landscapes into urban and industrial ones forming star-shaped spatial patterns controlled by the physical conditions of the site and its accessibility by transportation routes" [Antrop 2004: 10]. An immediate process associated with growing urbanisation is the "citification" of the forest [Paris 1977]. Almost one third of Europeans live in major metropolises, another third choose small and medium-sized cities outside the agglomeration. The historical urban settlement process in the EU starting from the post-war period is said to have undergone a full change cycle: urbanisation – suburbanisation – counter-urbanisation – re-urbanisation [EEA 2006: 9]. This development is interconnected by the researchers (along with the affluence and industrial development) with the demographic processes, like change in the age and gender structures, migration patterns or even educational level [Antrop 2004; Peña et al. 2007]. A significant reinforcement of urbanisation patterns comes from the international migration flows, as the most

immigrants settle in the urban areas [European Commission 1999: 58]. While Central, Eastern and Nordic European countries and countries experience migration flows from the rural areas to the urban, in others like Spain, UK, France, Italy a counter-urbanisation trends tend to dominate [Bell et al. 2010: 28].

The effects of increasing urbanisation, according to the estimations in the literature named above, are likely to be the on-going incorporation of the rural landscapes into the urban areas and creation of the new cross-European afforestation programs. One direct consequence of the expanding urbanisation for the European forestry is the establishment of the urban forestry as a new forest management practice.

Box 2: Urban Forestry

Although de facto present from the middle-ages, the concept of "urban forestry" is gaining weight over the past two decades. First developed in North-America in the 1960s as an innovative approach for the management of natural resources in rural environments, urban forestry has been widely adopted by European researchers and forest managers. European urban forests are commonly characterised by near densely-built urban areas, high numbers of recreational facilities as well as fragmentation in size and ownership structures. Due to shared responsibilities between the local public and government, urban forests require different management practices with specific actors and strong protectoral policy frameworks. Characteristic are frequent and diverse social conflicts about the use of urban forests as well as specific funding problems related to high urban land costs. The main functions of the urban forests are limited to protection, recreation and nature conservation. Productive function is mainly of secondary importance [Guduric et al. 2011: 337].

There are not much comparable overviews available on the history of European urban forests, as the existing research in this context has focused merely on parks and city trees as well as gardens and aspects of landscape architecture. Some researchers note the challenge caused by the expanding wildland-urban interfaces – in the heavily populated forest areas. On the one side, there is a problem in clearly differentiating "urban" and "rural" forests due to wide-spread peri-urban expansion [Hoogstra et al. 2004: 442]. On the other side there is an extended demand for effective fire management and corresponding public education in these issues [Konijnendijk 1997: 33] (see also Chapter VIII Public Opinion: Urban Forestry Discourse).

Looking at the big picture, the changes in rural areas and growing urbanisation lead to the shift in the functions of forestry, as the protective (ecological) and amenity services of the forests are getting more and more attention in addition to the primary wood production function [Elands / Wiersum 2001: 6; European Commission 1997: 24]. In addition, the increasing share of urban lifestyle is likely to cause a shift in "perception of the role of forests in the modern life", according to FAO [2005: 130] (cf. VIII. Public Opinion).

Land use change and nature conservation

The outlined marginalisation and intensification trends in land-use are acknowledged to be transforming the European (i.a. forest) landscapes affecting in the short-run the quality of land and water as well as leading to the loss of ecological diversity; in the long run threatening the landscape heterogeneity and scenery quality [Meeus 1995; Noble / Dirzo 1997]. A call for integrated policy approach on landscape conservation, development and management is expressed in the literature in this respect: "The landscape should be treated as environmental resource and an integrating factor in the process of sustainable development." [Meeus 1995: 77]

Comparative assessments of demographic change and land use correlate population pressure with environmental hazard and climate change, e.g. in terms of rapid population growth, deforestation, urbanisation and land abandonment or changing agricultural/forest management practices [cf. Turner / Moss / Scole 1993]. These relationships however partly considered to be controversial, as they are based on inconsistent statistical outliers and seem to be more characteristic for developing countries than for Europe [Angelsen / Kaimowitz 1998]. A certain demographical link with deforestation has been recognised for some developing world's regions like Asia, South America or Pacific [Basnyat 2009]. However, for the Western European countries, where the birth rates remain under/around the replacement level for decades and the forest management practices have a long history (like in Germany or Sweden) as well as they underlie established and proofed governmental regulations, deforestation threads seem not to be of such dramatic relevance [see review by Angelsen / Kaimowitz 1999: 88].

3.3 Population Change and Forest Markets

Demographic changes are also widely recognised as key drivers for wood consumption and markets of forest resources. Population growth and ageing as well as the changes in family structures and settlement preferences have been considered as tangible driving forces [Fyles et al. 2008; Turner/ Moss / Skole 1993].

Both population growth and ageing affect forest-product markets. Total population growth causes an increasing demand for wood, fuel wood, timber and other forest products [Angelsen / Kaimowitz 1999: 87]. Positive change in population size fosters economic growth, increases the demand pressure and enlarges the domestic market. In the long term, wood removals are expected to increase in line with growing populations and income, which in turn translate into higher demand for and consumption of wood products. This trend is expected to continue in the next decades [FAO 2010b: 103; FAO 2009].

The ageing also induces the emerge of so-called "silver-economy" – "when the growing share of gray-haired elderly with strong purchasing power become major actors in the economy" [Malmberg 2009: 10; cf. Marcin 1993: 41]. FAO outlines in this respect a "historical trend towards greater public interest in forest services" [FAO 2005: xix], that is likely to strengthen as the population ages, becomes wealthier and demands for more non-wood forest services. Thomas / Malmberg (2005) outline a "clear effect of demographic change on residential construction" [14] grounding in the variation in residential investment, as the individual demand for housing construction is declining in the +75 cohort: "Working age populations is recognised to positively affect the residential investment, while the dependent age groups have a depressing effect" [Thomas / Malmberg 2005:3].

Another influencing demographic factor on the economy of European forestry is the growing number of households. This factor is related to the changing family structures, which are getting smaller over the years as well as the changing lifestyles with the improving overall economic situation after 1950: "The changes encompass, for example, the increasing demand of living space per person and the shrinking number of people per household." [Hersperger / Bürgi 2007: 55] The increasing household number by current homebuilding practices is expected to cause growth in demand for housing and furniture, implying a rise in demand for sawnwood and wood-based panel products. This should be taken into account when predicting or planning future timber consumption [Marcin 1993: 41; Jonsson 2011] (see more in III. Economic Development).

Labour force availability

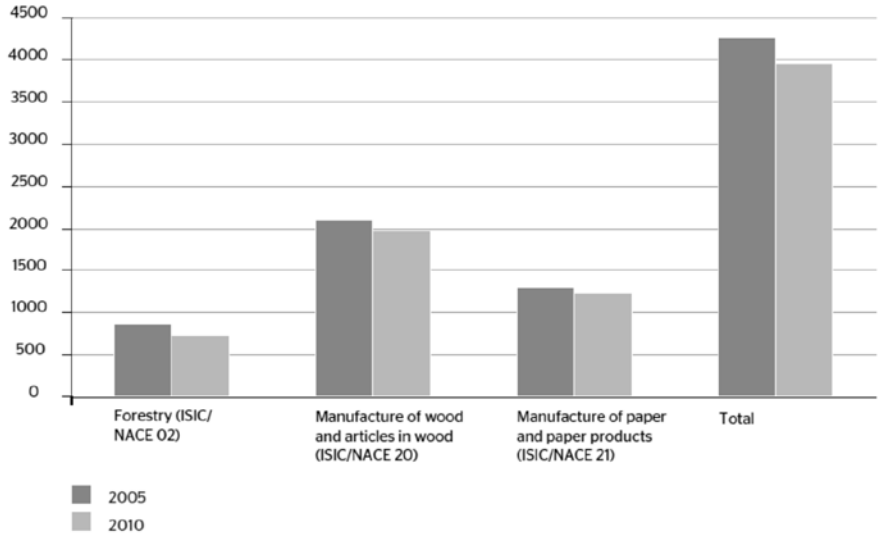
Demographic change and ageing of the working population are considered to be a "critical threat for sustainable development in all economic sectors" [Forest Europe / UNECE / FAO 2011a: 124; FAO 2009]. This is true for the European forestry employment, which engages about 4.3 million people and shows a continuous decrease over the last years [Köhl / Rametsteiner 2009: 58] as the share of prime-aged male workers is progressively shrinking. Employees over 50 years and older constitute about 25 percent of the overall forestry work-force in the EU and about 20 percent of the wood manufacturing industry. The regional divergences are significant, as in the Northern Europe share of

elder employees reaches 37 percent. The South-Eastern regions report about 22 percent in this age group, which has been also growing in the recent years (>3 percent annual growth) [Forest Europe / UNECE / FAO 2011a: 124f.].

The share of female workers in the EU forestry has been reported to remain relative stable over the last decades. The share of women in the total employment is about 25 percent in the overall forestry workforces, under 20 percent in the wood- and around 30 percent in the paper industry. On the national level the EU member states show in this respect a strong differentiation as well. It is notable, that in the Nordic regions with high level of mechanisation, productivity and labour per forest area ratio the male employees considerably dominate on the forestry labour market [Forest Europe / UNECE / FAO 2011a: 124].

The overall development trend of the European forestry employment in last decades shows a reduction in the major sectors (see Figure 15). This development is likely to be caused by the on-going mechanization and varies on national level: “While in some countries, like Finland and Sweden, the numbers provide an indication that the labour market in forestry and in wood industries has more or less stabilized at a rather low level over the last five years, countries in Central-East Europe observed a rather sharp reduction of the work-force.” [Forest Europe / UNECE / FAO 2011a: 126; see also Blombäck / Poschen / Lövgren 2003] The past and current trends in labour productivity associated amongst others with technological change may help predicting the future employment volume [UNECE 2003: 4] (see chapter IV. Technological Development, Section Technological change in forestry and labour productivity for more details).

Figure 15: Employment by Sector Data for 2005 and 2010 in Europe



Source: [Forest Europe / UNECE / FAO 2011a], 1 000 persons

Rural population decline also causes the deficit in forestry labour force availability [Elands 2009: 17; Jonsson 2011; FAO 2005; FAO 2010b]. These studies predict that the labour costs in the sector are expected to rise as the potential employees are progressively ageing or moving from the rural areas to the cities. FAO makes also the assumption that the labour force shortcomings may affect the markets, as "this will encourage the greater substitution of capital for labour in end-use market (e.g. construction), which is likely to lead to greater demand for engineered wood products as opposed to simpler sawnwood and panel products" [FAO 2005: xix; Chapter III. Economic Development].

4. Conclusion

The chapter has reviewed the main developments in the EU population over the past 60 years, and investigated their role as an exogenous driver on European forestry and forest management as they are presented in international forestry research. The major relevant historic trends in EU population change after 1950 have been outlined in the first part, and the estimated implications of demographic change on European forest management have been reviewed in the second part. The findings above can be summed up within the context of the following theses:

1. The outlined EU population change shows a positive trend over the past 60 years towards a more numerous, longer living and proportionally older population. As the European countries are passing through the demographic transition, where both fertility and mortality rates remain low, the population is getting older and the negative natural change is supported by the international migration. All demographic trends are showing strong divergences on national level, especially between the „old" and „new" member states.
2. The Europeans are becoming increasingly mobile and tend toward urban settlement. International migration to Europe is on the rise since 1950s, accounting for the largest proportion of the EU's population growth, lowering the age pyramid towards the working-age medium and reinforces the existing urbanisation patterns.
3. Progressive population ageing is one key demographic factor of European forest change. It is likely to affect the social, economic and environmental functions of the forests, causing long-term shifts in forest management practices and policy. Due to specific habits and preferences of dominating older population cohort, forest utilisation in Europe develops towards more recreational use, especially in urban and forest-near areas.
4. Population density develops positively and very uneven on the regional/national level. Internal migration flows shape the urban-rural settlement: while urbanisation is an

influential positive trend under the land use patterns, some rural areas experience severe population decrease. The consequence of these migration flows is the progressive "wilderness" of the landscapes. Reduced population pressure on the land promotes the afforestation of the regions as well as the extensification of agriculture and forestry.

5. Increasing urbanisation leads to the on-going incorporation of the rural landscapes into the urban areas and the establishment of the new forest management practice – the urban forestry. The latter is characterised by more intense management and governmental attention and public involvement.
6. Both population growth and ageing affect the forest-product markets. The outlined change in population fosters economic growth, increases the demand pressure for more non-wood forest products and has the potential to enlarge the domestic market. The increasing household number by current homebuilding practices is expected to cause growth in demand for housing and furniture, implying the growing calls for sawnwood and food-based panel products.
7. The European forestry employment market shows a continuous decrease over the last years as the share of prime-aged male workers is progressively shrinking, the rural depopulation causes labour-force deficits and the number of older employees is growing. The employment market shortcomings and growing wages may affect the forest markets and foster technology development.

III. Economic Development

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1. Introduction

This chapter provides a global overview of the economic development of the main forest- and wood-based industries, the main drivers of change, and describes some specific developments of the recent past in the last section. The global view was chosen here because forest based industries experienced the same increase in direct and indirect interdependence of economic activities that all other industries experienced as well. The most visible result of these developments is the increase in trade volumes in general and tremendous shifts in the direction of trade flows. Additionally, the forestry sector is such diverse on a regional or national scale that it is almost impossible to provide meaningful insights without getting overwhelmed with important national, regional, or local peculiarities. Most of the analysis focuses on the period from 1960/70 to 2011 and on broad country groups or areas to keep the text concise and relevant. The aim is to provide a general overview of the industry, its main products, markets, and producers and to present the most important changes in these areas. The focus is on a few broad product categories – namely roundwood, sawnwood, wood-based panes, and paper and paper products – to exemplify general trends in production, trade, and consumption. For individual countries or regions, these categories and trends are too broad to capture relevant developments; therefore the last section includes some specific topics in further detail.

The main sources for this chapter are the publications by the FAO and Eurostat – the latter being more specific for Europe. As this chapter aims at providing a global picture only very few economic data could be included, because data on productivity or gross value-added are only available for selected countries. Especially for less-developed countries and countries experiencing fundamental transitions, economic data is sparse and often not comparable over long periods. Additionally, as this overview should inform subsequent scenario analysis of forest management systems, it seemed prudent to focus on quantities rather than monetary values.

In activity-based economic classifications, forest- and wood-based industries comprise the ISIC Rev. 3.1 (International Standard Industrial Classification of All Economic Activities) divisions forestry (02), manufacture of wood and wood products (20; Manufacture of wood and of products of wood and cork, except furniture; manufacture of articles of straw and plaiting materials), and manufacture of

paper and paper products (21). The manufacture of furniture is most often not included in production statistics because it was included in a residual manufacturing division (36; Manufacture of furniture, manufacturing not elsewhere classified), which is most often not further subdivided. Also not included are marketed non-wood services that forests provide as these are mostly contained in various classes of the section agriculture.

Table 6: Geographical Regions

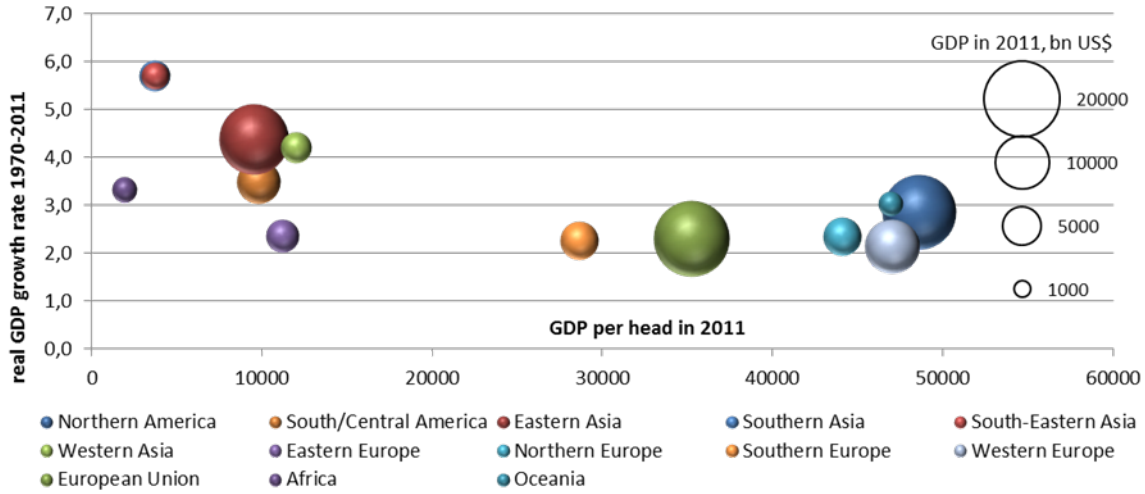
Geographical Area	Countries in Area
Africa	all countries in Africa
Northern America	Canada, Mexico, United States of America (for non-forest related statistics also Bermuda, Greenland
Latin America	all countries of South America, Central America, and the Caribbean
Eastern Asia	Japan, North Korea, South Korea, Mongolia, China incl. Honkong, Macau, Tai-wan
Southern Asia	Afghanistan, Bangladesh, Bhutan, India, Iran, Maldives, Nepal, Pakistan, Sri Lanka
Central Asia	Kazakhstan, Kyrgyzstan, Tajikistan, Turkmenistan, Uzbekistan
Western Asia	Armenia, Azerbaijan, Bahrain, Cyprus, Georgia, Iraq, Israel, Jordan, Kuwait, Lebanon, Occupied Palestinian Territory, Oman, Qatar, Saudi Arabia, Syria, Turkey, United Arab Emirates, Yemen
South Eastern Asia	all other Asian countries
Eastern Europe	Belarus, Bulgaria, Czech Republic, Hungary, Moldova, Poland, Romania, Russia, Slovakia, Ukraine
Northern Europe	Denmark, Estonia, Finland, Iceland, Ireland, Latvia, Lithuania, Norway, Sweden, United Kingdom
Southern Europe	Albania, Andorra, Bosnia and Herzegovina, Croatia, Greece, Italy, Kosovo, Malta, Montenegro, Portugal, San Marino, Serbia, Slovenia, Spain, FYR Macedonia
Western Europe	Austria, Belgium, France, Germany, Liechtenstein, Luxembourg, Monaco, Netherlands, Switzerland
Oceania	all countries in Oceania

Source: Own allocation based on [FAO STAT 2012].

Depending on the source of data, some dependent territories or states of disputed sovereignty status are also included in the above defined geographical areas to present complete information regarding the specific area.

Population and economic growth are the two main driving forces of change in the demand for wood-based products. From 1970 to 2011, global real GDP (Gross Domestic Product) grew by over three percent annually, therefore more than tripling. Figure 16 presents the distribution of GDP growth rates over the major global areas and the respective size of the economy in 2011 as well as GDP per head as a crude indicator of economic prosperity. All European areas grew less than the rest of the world, while the fastest growing areas were all in Asia. The Americas grew at the global rate of around 3 percent per year.

Figure 16: Main Areas, GDP and GDP per Capita, 2011



Source: Own calculations based on [UN Stats 2012].

The changes in the shares of global GDP over the period 1970-2011 are in Table 7 along with the nominal size of each area's economy. All economic data are in US dollars. The biggest shifts in importance were the decline of Eastern Europe (primarily the former Comecon states) and the rise of almost all Asian regions except Central Asia (the five former Soviet Republics Kazakhstan, Kyrgyzstan, Tajikistan, Turkmenistan, Uzbekistan). The other European areas also registered lower than average economic growth rates over the whole period, but due to exchange rate fluctuations, their share of global nominal GDP in 2011 is almost the same as in 1970.

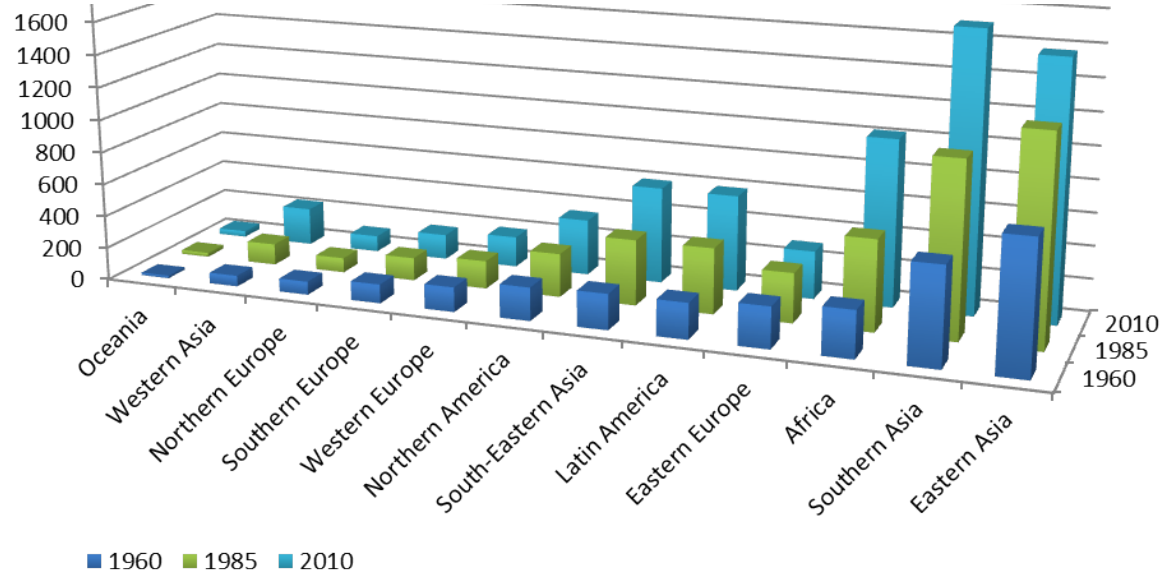
Table 7: Main areas, current GDP, 1970 to 2011

Year	1970		1980		1990		2000		2005		2011	
Area	bn US$	global share	bn US$	global share	bn US$	global share	bn US$	global share	bn US$	global share	bn US$	global share
World	3,295	100%	11,904	100%	22,275	100%	32,371	100%	45,849	100%	70,202	100%
Africa	91	3%	434	4%	495	2%	599	2%	1010	2%	1,905	3%
Americas	1,291	39%	3,811	32%	7,463	34%	12,833	40%	16,500	36%	22,528	32%
Northern America	1,155	35%	3,265	27%	6,629	30%	11,265	35%	14,551	32%	17,892	25%
Latin America	136	4%	546	5%	835	4%	1,568	5%	1,949	4%	4,636	7%
Asia	504	15%	2,485	21%	5,503	25%	9,204	28%	11,990	26%	23,068	33%
Eastern Asia	324	10%	1,540	13%	4,040	18%	6,971	22%	8,270	18%	14,957	21%
Southern Asia	95	3%	332	3%	510	2%	716	2%	1,251	3%	2,835	4%
South-Eastern A.	37	1%	203	2%	367	2%	614	2%	932	2%	2,211	3%
Western Asia	48	1%	409	3%	533	2%	863	3%	1,447	3%	2,794	4%
Europe	1,355	41%	4,970	42%	8,432	38%	9,257	29%	15,453	34%	20,984	30%
Eastern Europe	505	15%	1,118	9%	900	4%	649	2%	1,604	3%	3,294	5%
Northern Europe	206	6%	885	7%	1,728	8%	2,304	7%	3,699	8%	4,378	6%
Southern Europe	187	6%	849	7%	1,923	9%	2,000	6%	3,497	8%	4,431	6%
Western Europe	457	14%	2,118	18%	3,882	17%	4,304	13%	6,654	15%	8,881	13%
European Union	854	26%	3,733	31%	7,313	33%	8,478	26%	13,768	30%	17,591	25%
Oceania	53	2%	204	2%	381	2%	477	1%	895	2%	1,716	2%

Source: Own calculations based on [UN Stats 2012].

One important determinant of the shifts in economic importance is the shift in global population patterns (Figure 17, Table 8). Besides this, population growth in some areas puts their economic growth into perspective. This is especially the case for Africa and Southern Asia, where GDP per head grew considerably less than headline GDP, e.g. in Africa GDP per head grew 0.8 percent annually over the whole period whereas the global average was 1.5 percent and in the fastest growing area South-Eastern Asia 3.8 percent.

Figure 17 : Population in 1960, 1985, and 2010



Source: Own calculations based on [UN DESA 2012]; main areas, millions.

Both developments influence the demand for forest-based products. To some extent, forest-based products are inputs for other industries; demand for this type of forest product therefore depends on the absolute size of the economy. Growth in the absolute size of the economy results then in higher demand for forest-based products. A rise in GDP per head leads to two individual changes in demand: On the one hand, the rise in income leads to overall higher demand for consumption products. On the other hand, changes in relative affordability lead to changes in the composition of consumption. Also, population changes directly affect demand, and through labour availability, possibly the production of forest-based products. Production is always indirectly affected by changes in demand, insofar as forest-based products are less traded than most other products due to their comparably low value per volume or mass. Over the last decades, the trade intensity or forest-based products increased along the overall increases in trade, but most of the global production of forest-based products is still consumed regionally. The next section will focus on the main developments of the production and trade of forest-based products. Not specifically included in this appraisal are the influences of demographic changes (chapter II.), technological developments (chapter IV.), and institutional, political or societal changes (chapters V.-IX.).

Table 8: Population, Main Areas, 1960-2010

Area	1960	1965	1970	1975	1980	1985	1990	19995	2000	2005	2010
World	3038	3333	3696	4076	4453	4863	5306	5726	6123	6507	6896
Africa	287	324	368	420	483	555	635	721	811	911	1022
Americas	424	472	518	565	617	669	724	778	835	886	935
Northern America	204	219	231	242	254	267	281	296	313	329	345
Latin America	220	253	286	323	362	402	443	483	521	557	590
Asia	1708	1886	2135	2393	2638	2907	3199	3470	3719	3945	4164
Eastern Asia	801	866	984	1099	1179	1263	1359	1435	1495	1537	1574
Southern Asia	596	664	746	835	945	1065	1196	1329	1460	1585	1704
South-Eastern Asia	219	250	285	322	359	402	445	486	524	560	593
Western Asia	67	77	87	99	114	131	149	167	184	206	232
Europe	604	634	656	676	693	707	720	727	727	731	738
Eastern Europe	253	267	276	286	295	304	311	310	304	298	295
Northern Europe	82	85	87	89	90	91	92	93	94	96	99
Southern Europe	117	122	127	132	138	141	142	144	145	150	155
Western Europe	152	160	166	169	170	172	175	181	183	186	189
European Union	403	421	435	448	458	464	471	477	481	490	500
Oceania	16	17	20	21	23	25	27	29	31	34	37

Source: Own Calculations based on [UN DESA 2012], millions.

2. Major Economic Developments in the Forest Sector Since 1960

Economic impacts are one of the most fundamental forces that are influencing the forest sector on global and EU-levels [FAO 2011c: 31]. The following chapter will focus on the main trends of economic developments and their influences on the forest industry, on forest products and service markets within the last decades.

2.1 Changes in Forest Area – Potential Wood Supply

The following is based primarily on the 2010 edition of the Global Forest Resources Assessment of the FAO [FAO 2010a]. The long-term development of forest-based industries is determined by the potential supply of wood. While in the short- to medium-term wood removal in excess of wood growth is possible, in the long run removal quantities are determined by the regeneration of wood biomass. The development of the area of forest-lands (and of other wooded lands) is therefore decisive to assess the potential wood supply in the long run. Unfortunately, comprehensive and

temporal comparable global assessments on the extent of forests and contained biomass do not exist prior to 1990 [c.f. Lanly 1982; cf. FAO 1995; and earlier assessments].

Table 9: Global Changes in Forest Area, 1990-2010

Area	Forest area (1,000 ha)				Annual rate of change					
	1990	2000	2005	2010	1990-2000		2000-2005		2005-2010	
					1000 ha/yr	%	1000 ha/yr	%	1000 ha/yr	%
World	4,168,399	4,085,168	4,060,964	4,033,060	-8323	-0.20	-4841	-0.12	-5581	-0.14
Africa	749,238	708,564	691,468	674,419	-4067	-0.56	-3419	-0.49	-3410	-0.50
Americas	1,654,837	1,609,819	1,587,554	1,569,744	-4502	-0.28	-4453	-0.28	-3562	-0.23
Northern America	676,764	677,083	677,823	678,961	32	n.s.	148	0.02	228	0.03
Latin America	972,171	926,302	903,003	883,850	-4587	-0.48	-4660	-0.51	-3831	-0.43
Asia	576,110	570,164	584,048	592,512	-595	-0.10	2777	0.48	1693	0.29
Eastern Asia	209,198	226,815	241,841	254,626	1762	0.81	3005	1.29	2557	1.04
Southern Asia	90,587	90,522	92,255	92,733	-7	-0.01	347	0.38	96	0.10
South-Eastern Asia	246,292	222,189	218,696	213,320	-2410	-1.03	-699	-0.32	-1075	-0.50
Western Asia + Central	29,063	29,782	30,456	31,088	72	0.24	135	0.45	126	0.41
Western Asia	16,289	16,874	17,482	18,076	59	0.35	122	0.71	119	0.67
Europe	989,471	998,239	1,001,150	1,005,001	877	0.09	582	0.06	770	0.08
Eastern Europe	851,254	852,641	852,968	854,267	139	0.02	65	0.01	260	0.03
Northern Europe	69,038	70,585	71,812	72,350	155	0.22	245	0.34	108	0.15
Southern Europe	37,839	42,411	43,348	45,069	457	1.14	187	0.44	344	0.78
Western Europe	31,320	32,582	33,001	33,294	126	0.39	84	0.26	59	0.18
European Union	144,375	151,695	154,342	156,865	732	0.49	529	0.35	505	0.32
Oceania	198,744	198,381	196,745	191,384	-36	-0.02	-327	-0.17	-1072	-0.55

Source: Own calculations based on global tables in [FAO 2010a].

As depicted in Table 9, the decrease in global forest area was around 0.2 percent annually in the 1990s. Earlier assessments [FAO 1995] point to similar magnitudes for the period 1960-1990, even though the assessments are not directly comparable due to differing definitions of forests as well as the combination of forests with other wooded lands in the earlier assessments. In the recent past, the reduction in global forest area slowed as result of reforestation in some countries, especially China, and reductions in deforestation rates in South-Eastern Asia and some other countries. Altogether, absolute forest losses tend to decline globally for quite some time, but the still shrinking forest area means that relative losses are decreasing less. One important caveat remains for long-term comparisons: in contrast to current forest resource assessments, forests and other wooded lands were put together in earlier ones. This means that conversions from forests to other wooded lands are now counted as forest loss, but were not before 1990. In Europe (including Russia) and

North America, the long-term trend of stable or growing forest area is maintained; the increase in growing stock or biomass per hectare is sustained, meaning that wood resources are also growing.

Table 10: Planted Forests, 1990-2010

Area	Area of planted forest (1,000 ha)				Share of total forest area	Annual rate of change					
						1990-2000		2000-2005		2005-2010	
	1990	2000	2005	2010		1000 ha/yr	%	1000 ha/yr	%	1000 ha/yr	%
World	171,332	214,619	242,960	264,001	6.5	4329	2.28	5668	2.51	4208	1.67
Africa	11,580	12,873	14,032	15,326	2.3	129	1.06	232	1.74	259	1.78
Americas	28,171	40,244	46,909	52,480	3.3	1207	3.63	1333	3.11	1114	2.27
Northern America	19,295	29,438	34,867	37,529	5.5	1014	4.31	1086	3.44	532	1.48
Latin America	8,876	10,806	12,042	14,951	1.7	193	1.99	247	2.19	582	4.42
Asia	70,873	92,871	109,670	122,777	20.7	2200	2.74	3360	3.38	2621	2.28
Eastern Asia	53,392	67,494	80,308	90,232	35.4	1410	2.37	2563	3.54	1985	2.36
Southern Asia	7,316	8,843	11,166	11,863	12.8	153	1.91	465	4.78	139	1.22
South-Eastern A.	6,387	11,737	13,042	14,533	6.8	535	2.36	261	2.13	298	2.19
Western Asia	2,396	3,117	3,427	4,396	24.3	72	2.67	62	1.91	194	5.11
Europe	58,166	65,309	68,500	69,318	6.9	714	1.17	638	0.96	164	0.24
Eastern Europe	34,775	37,870	39,712	40,052	4.7	310	0.86	368	0.95	68	0.17
Northern Europe	11,630	14,252	15,489	15,619	21.6	245	1.93	247	1.68	26	0.17
Southern Europe	4,123	5,350	5,452	5,770	12.8	45	1.04	20	0.38	64	1.14
Western Europe	7,638	7,837	7,847	7,877	23.7	20	0.26	2	0.03	6	0.08
European Union	36,719	40,676	42,085	42,500	27.1	301	0.79	282	0.68	83	0.20
Oceania	2,542	3,322	3,849	4,100	2.1	78	2.71	105	2.99	50	1.27

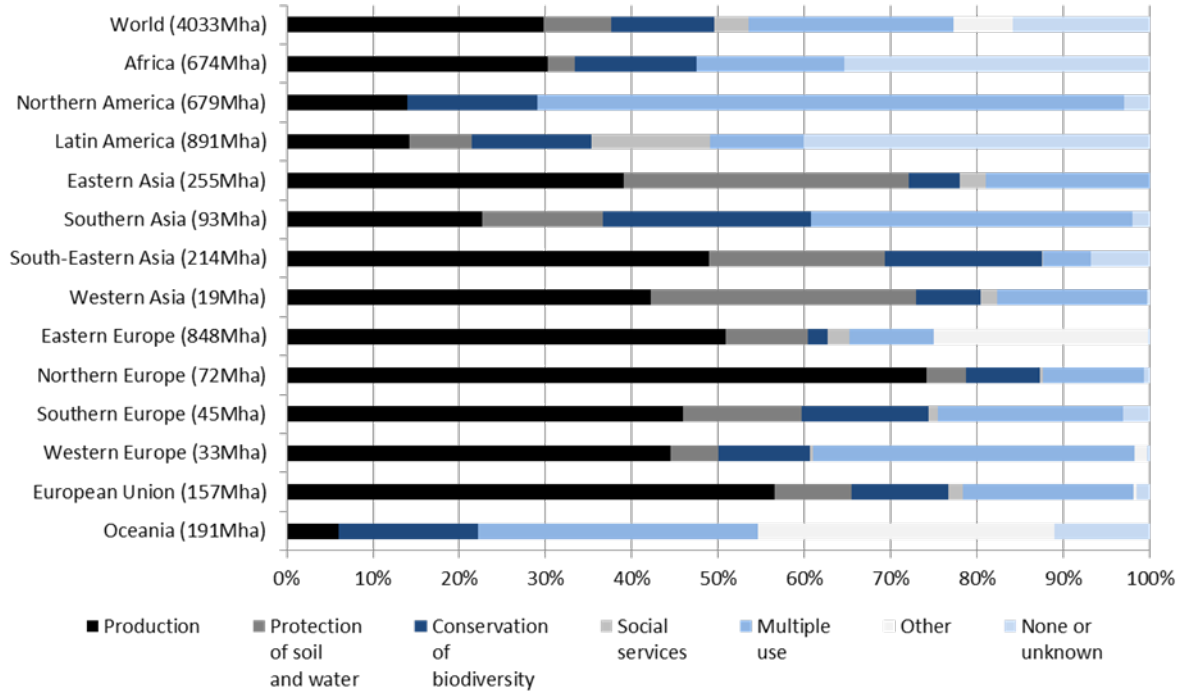
Source: Own calculations based on global tables in [FAO 2010a].

The planting of forests is the main reason for increases in forest cover in Asia, especially through ambitious programmes in China, India, and Vietnam [FAO 2009: 9]. In North America and Europe, the increases in planted forests are mainly a result of replanting forests after wood removal. In the rest of the world, planted forests are of less significance; nonetheless, the area of planted forests is in all areas fast growing compared with relative changes in overall forest area (Table 10). The share of planted forests to total forest area is very different in the regions; especially high are shares in East and Western Asia as well as the European Union. The two Asian regions are characterised by ambi-

tious afforestation programmes, whereas planted forests in Europe are primarily the result of reforestation and form an integral part of forest management [FAO 2010a: 94f.].

The designated primary functions of forests are unfortunately not very helpful in answering the question about potential productive usage, because the categories of "multiple uses", "other", and "none" include almost 50 percent of the global forest area (Figure 18). Furthermore, the designation of a primary function does not preclude other (secondary) functions. Nonetheless, the area of forests designated for productive uses declined over the last decades (around -0.2 percent annually) whereas protective uses increased. The treatment of how to designate forest functions varies considerably between countries, and constricts comparisons across countries, regions, and even time periods due to reclassifications [FAO 2010a: 90, FAO 2009].

Figure 18: Primary Designated Functions of Forests, 2010



Source: Own calculations based on global tables in [FAO 2010a]; forest area in million hectare.

2.2 Forestry

This section covers the removal of wood from forests as industrial roundwood and as fuel wood. To enable an appraisal of the amount of removals, Table 11 presents some information on the total amount of wood in global forests. Unfortunately, some countries did not provide information on this topic (e.g. Australia), so these results should be interpreted with care [FAO 2010a: 35f.]. Interesting

to note are the differences in stock per hectare indicating different forest densities as a result of different growth environments and age of the forests (e.g. tropical and boreal forests, forests in Western Europe or in East Asia). Overall, growing stock and forest area are highly correlated, so that the trend in forest area is representative of the growing stock [FAO 2010a: 38]. Nevertheless, the density of forests is generally increasing in all regions with the exception of South and South-Eastern Asia due to Indonesian developments. This might be an indicator for less than full exploitation of remaining forests. Global growing stock on other wooded lands amounts to 15 billion m³, representing less than three percent of total growing stock [FAO 2010a: 37].

Table 11: Growing Stock in Forests and Forest Area, 2010

Area	Growing stock[a] in forest			Total forest area	
	Total (million m^3)	Per hectare (m^3)	Global share (%)	Global share (%)	Total (1 000 ha)
World	527,203	131	100	100	4,033,060
Africa	76,951	114	14.6	16.7	674,419
Americas	263,631	167	50.0	39.1	1,576,677
Northern America	82,941	122	15.7	16.8	678,961
Latin America	180,690	203	34.3	22.1	890,783
Asia	53,685	91	10.2	14.7	592,512
Eastern Asia	21,337	84	4.0	6.3	254,626
Southern Asia	7,612	82	1.4	2.3	92,733
South-Eastern Asia	21,903	102	4.2	5.3	214,064
Western Asia	2,205	116	0.4	0.5	19,004
Europe	112,048	111	21.3	24.9	1,005,001
Eastern Europe	89,617	106	17.0	21.0	847,694
Northern Europe	8,647	120	1.6	1.8	72,350
Southern Europe	4,489	100	0.9	1.1	45,069
Western Europe	7,905	237	1.5	0.8	33,294
European Union	23,964	153	4.5	3.9	156,865
Oceania	20,885	109	4.0	4.7	191,384

Source: Own calculations based on global tables and page 35 in [FAO 2010a]; (a) Growing stock refers to volume over bark of all living trees.

Industrial roundwood

The production of industrial roundwood generally follows economic development. Over the last 50 years, roundwood production increased by half to over 1.5 billion m³, with the majority of production

in Northern America, the European Union, Russia, and Latin America (Table 12). Until 1990/91, the distribution of global production was fairly stable; beginning in 1990 production in Russia decreased significantly and has not fully recovered since. Northern European countries filled part of this reduction. Following the decline in housing construction in the United States, the production of industrial roundwood also decreased considerably between 2006 and 2009, and remained at that low level. Production increased substantially in Latin America and South-Eastern Asia, but barely in Eastern Asia, even though economic and population growth was considerably higher in the latter region than in the former. Part of the answer is the high import intensity in Eastern Asia leading to roundwood consumption 50 percent higher than production. In South-Eastern Asia, production increases were mainly exported in the 1960s and 1970s, but during the 1980s and 1990s consumption increasingly approached production levels and the trade surplus almost vanished. Globally, trade in industrial roundwood did not change much over the whole period. Traded volumes accounted for between five and eight percent of global production, with an increase in the 1960s and the late 1990s/early 2000s. The global recession led to a slight decrease in absolute trade volume, but the volume caught up again in recent years. Europe is the most integrated market for roundwood with comparably high export and import intensities (export/import as a share of production); besides the flow of wood from Eastern Europe towards Western and Southern Europe, there is also substantial intra-regional trade.

Table 12: Global Production of Industrial Roundwood, 1961-2011

Area / Year	1961	1966	1971	1976	1981	1986	1991	1996	2001	2006	2011
World	1018	1153	1296	1370	1412	1593	1558	1486	1541	1677	1578
Africa	25	33	41	43	51	54	60	68	69	77	72
Americas	369	443	487	521	551	672	666	732	731	783	646
Northern America	335	403	436	455	456	563	542	591	586	593	426
Latin America	34	40	51	65	95	110	125	141	145	190	220
Asia	132	153	177	216	224	255	258	264	234	251	276
Eastern Asia	87	92	91	107	110	132	120	133	112	115	126
Southern Asia	15	19	23	26	29	34	32	26	27	31	31
South-Eastern Asia	28	38	57	76	78	82	100	94	84	92	103
Western Asia	2	4	5	7	7	8	6	10	10	13	17
Europe	476	507	571	565	557	581	539	380	459	516	524
Eastern Europe	297	319	351	360	335	353	320	141	187	227	240
Northern Europe	90	90	111	93	102	103	99	127	148	144	155
Southern Europe	21	28	31	32	36	40	38	31	34	38	33
Western Europe	68	70	78	81	84	85	82	81	90	107	96

European Union	192	204	237	225	238	245	227	274	310	337	335
Oceania	16	18	21	24	28	30	34	40	48	51	59
	Share of global production (%)										
Africa	2	3	3	3	4	3	4	5	4	5	5
Northern America	33	35	34	33	32	35	35	40	38	35	27
Latin America	3	3	4	5	7	7	8	9	9	11	14
Eastern Asia	9	8	7	8	8	8	8	9	7	7	8
Southern Asia	1	2	2	2	2	2	2	2	2	2	2
South-Eastern Asia	3	3	4	6	6	5	6	6	5	5	7
Western Asia	0	0	0	0	1	0	0	1	1	1	1
Eastern Europe	29	28	27	26	24	22	21	10	12	14	15
Northern Europe	9	8	9	7	7	6	6	9	10	9	10
Southern Europe	2	2	2	2	3	3	2	2	2	2	2
Western Europe	7	6	6	6	6	5	5	5	6	6	6
European Union	19	18	18	16	17	15	15	18	20	20	21
Oceania	2	2	2	2	2	2	2	3	3	3	4

Source: [FAO STAT 2012], million m³.

The biggest European roundwood producers are included in Table 13 along their respective production of industrial roundwood and wood fuel. The country sorting follows 2011 production of industrial roundwood.

Table 13: Important European Wood Producing Countries, Production of Industrial Roundwood and Fuel Wood, 1961-2011

Country	Industrial roundwood					Fuel wood				
	1961	1989	2011	1961-1989	1990-2011	1961	1989	2011	1961-1989	1990-2011
	million m³			average annual change (%)		million m³			average annual change (%)	
USSR/Russia	253.3	305.4	153.2	0.7	3.9*	97.7	81.1	43.8	-0.7	1.7*
Sweden	40.2	51.4	66.2	0.9	1.4	4.8	4.4	5.9	-0.3	1.4
Finland	37.5	43.3	45.5	0.5	0.6	13.2	3.8	5.2	-4.4	1.6
Germany	31.1	43.8	45.4	1.2	-2.7	3.5	4.4	10.8	0.8	4.4
Poland	14.5	19.0	32.2	1.0	3.5	1.6	2.3	5.0	1.3	3.8
France	21.9	34.3	28.4	1.6	-0.5	12.0	29.7	26.7	3.3	-0.5
Austria	10.2	13.6	13.6	1.0	-0.2	1.5	2.7	5.1	2.2	3.1
Czechoslovakia/Czech Republic	11.7	16.9	13.5	1.3	0.9*	1.6	1.4	1.9	-0.4	7.0*

Latvia	-	-	11.6	-	4.6*	-	-	1.2	-	-0.1*
Spain	4.3	15.7	11.5	4.8	-0.9	10.0	2.2	5.1	-5.3	4.1
Romania	12.0	13.5	10.3	0.4	-0.2	7.7	2.1	4.0	-4.5	3.1
Ukraine	-	-	8.0	-	3.8*	-	-	9.5	-	10.6*
Italy	4.9	4.7	1.7	-0.2	-4.5	6.3	4.1	4.6	-1.5	0.6
Yugoslavia/Serbia	8.1	11.6	1.4	1.3	0.0*	8.6	4.0	6.3	-2.7	-

Source: [FAO STAT 2012]; * 1995-2011.

Wood energy/Fuel wood

In developing countries, most of the wood produced is burnt as fuel (Table 14). In South and South-Eastern Asia, fuel wood represents 93 percent and 62 percent of total wood production; in Africa and Latin America, the shares are 90 percent and 57 percent. In South-Eastern and Eastern Asia, this share has declined considerably over the last decades, while in Southern Asia and Africa it remained stable. With a few exceptions, in developed countries the use of wood as fuel was restricted to residual wood and waste products from wood processing plus, in some countries, small-scale private wood resources. In recent years, this began to change due to fast rising prices of other energy sources, notably oil. A related cause for the rising consumption of wood fuel in developed countries is climate change and the associated mitigation and prevention policies, because wood is seen as carbon-neutral fuel [FAO 2009: 27f.]. This rise in energy usage has lead also to the introduction of wood chips, pellets, and briquettes as fuel; creating a market for processed fuel products [UNECE/FAO 2010: 37]. Becker et al. [2007: 5] projected further fast increases in fuel wood consumption in Europe while recognizing that current estimates of fuel wood consumption are too low due to high levels of indirect wood energy production and consumption. These indirect sources are primarily black liquor in the pulp industry and wood residues, both being used mainly to generate energy and heat in integrated processes.

Wood fuel can be used directly and burnt for heat generation (e.g. in combined heat and power plants) or used indirectly in integrated industrial processes, e.g. pulp and saw mills. Traditionally, private households in Europe used wood exclusively to generate heat, but in recent years small scale combined heat and power units have became increasingly available. These are not only used in private households but also for commercial power and heat generation. This makes the separation of wood usage for heat and for power all but impossible. A related problem in the quantification of power generation from wood is that most of the respective power plants can use a broad variety of biomass as fuel, e.g. wood, straw, and other agricultural waste.

Total energy consumption – for both heat and power generation – from wood and wood residues in the European Union increased from around 50 million tonnes of oil equivalent in 2000 to over 80

million tonnes in 2011. This represents almost half of all total energy consumption from renewable sources [Eurostat 2011a: 94]. As part of the Europe 2020 strategy, the European Union adopted a target for 2020 of 20 percent of energy consumption to come from renewable source, of which biomass is to be a major part. Following this, all member states did develop national and sometimes even regional and local energy strategies to implement this aim. In addition to this, the European Commission produced a number of further more detailed policy declarations and programmes. Increasing the use of wood, wood residues and other solid biofuels is very often an important part of these strategies, especially in countries with sizeable forest cover.

Table 14: Global Production of Fuel Wood, 1961-2011

Area / Year	1961	1966	1971	1976	1981	1986	1991	1996	2001	2006	2011
World	1499	1526	1550	1615	1703	1780	1863	1781	1802	1861	1891
Africa	252	282	305	327	366	411	455	521	547	593	631
Americas	217	208	222	233	292	332	350	315	316	324	332
Northern America	48	37	39	39	82	107	110	60	49	48	44
Latin America	169	171	184	194	210	225	240	255	267	276	288
Asia	839	848	866	914	905	891	896	834	801	786	756
Eastern Asia	302	304	311	339	326	303	290	254	232	213	195
Southern Asia	202	225	250	277	302	331	358	360	361	385	390
South-Eastern Asia	327	308	294	283	261	246	237	210	201	181	165
Western Asia	7	11	12	15	15	11	10	10	7	7	7
Europe	183	181	149	132	133	138	153	100	126	146	162
Eastern Europe	112	116	100	94	93	95	91	35	62	73	73
Northern Europe	20	15	12	9	9	9	8	14	17	19	20
Southern Europe	32	27	20	14	13	15	13	14	13	15	23
Western Europe	19	23	18	16	17	18	40	38	34	40	45
European Union	71	66	81	41	43	48	64	69	68	80	92
Oceania	8	7	8	8	9	8	10	11	13	11	11

Source: [FAO STAT 2012]; million m^3.

Besides fuel wood, wood chips and particles, pellets, briquettes, and charcoal are used as fuel but on a much smaller level. Unfortunately, global production statistics do not yet provide information on pellets and briquettes, restricting the analysis to data on chips and particles, wood residues, and charcoal. Only for the latter are data available from 1960 onwards, for the former two relibale prodcution data is only available since the mid-1990s. Whereas global fuel wood (see Table 14) and charcoal production increased slowly and steadily (charcoal from 16 million tonnes in 1961, 30

million tonnes in 1991 to 49 million tonnes in 2011), production of wood residues increased substantially from mid-1990s (70-80 million m³) to 2000 (around 100 million m³) and then again in the mid-2000s (to 130 million m³) and levelled off (from 2005-2011 production was close to 130 million m³). Global production of wood chips and particles rose from 151 million m³ in 1998 to 247 million m³ in 2011, with most of the increase in the period up to 2004. As wood chips, particles, and residues might be also used in the production of wood-based panels, pulp, and in other uses, which prevents a direct assesment of the usage as energy source. Nevertheless, the production and consumption data provide estimates for the upper limit of such usage.

The most important producers and consumers of wood residues as well as wood chips and particles are Europe (wood residues: 45 percent of global production/47 percent of global consumption; chips and particles: 30/33 percent), Northern America (23/16 percent; 36/35 percent), and Eastern Asia (18/18 percent; 10/25 percent). These areas are also the main trading partners, with the majority of trading in residues taking place in Europe (around 90 percent), while Eastern Asia is the main importer of chips and particles (60 percent of global trading volume) mainly from South-Eastern Asia and Oceania.

Fuel wood is a local (or at most regional) energy source. Global trade of fuel wood amounts to approximately 0.3 percent of current production. Europe is the only area with noteworthy trade volumes, and even there they amount to less than 10 percent of production. Overall, just slightly over 2 percent of all wood energy was generated from imported wood fuel in 2009 in reporting countries [UNECE/FAO 2009].

Box 3: Trade in fuel wood in Europe

Europe accounts for over 90 percent of global trade volumes in fuel wood. The ten biggest exporting and importing countries and their respective trade volumes are included in Table 15 (please note the unit m³ instead of million m³ as in all other tables). The big difference between export and import volumes seems persistent and stable; therefore, at least the trends in trade should be reliably interpretably. A comparison with Table 13 reveals that only a tiny amount of production is traded in Europe.

Table 15: Top 10 Exporting and Importing Countries in Europe, 2001 and 2011

Export				**Import**			
Area/Country	2001	2011	Global share (%)	Area/Country	2001	2011	Global share (%)
World	3.882.038	7.704.244		World	2.066.935	5.498.989	
Europe	3.477.950	6.980.107	90,6	Europe	1.747.313	5.021.566	91,3
EU27	2.051.270	4.361.095	56,6	EU27	1.617.730	4.679.736	85,1
Ukraine	34.265	1.143.785	14,8	Italy	510.000	1.048.000	19,1
Latvia	105.400	863.679	11,2	Austria	173.000	824.891	15,0
France	313.057	848.153	11,0	Sweden	155.840	794.746	14,5
Bosnia and Herzegovina	–	597.000	7,7	Germany	73.000	436.039	7,9
Croatia	135.000	484.000	6,3	Greece	267.083	320.330	5,8
Bulgaria	27.045	411.528	5,3	Denmark	85.000	309.718	5,6
Hungary	288.000	398.657	5,2	Norway	65.000	285.967	5,2
Slovenia	54.620	334.147	4,3	Slovenia	900	202.556	3,7
Russia	1.200.000	270.905	3,5	Slovakia	200	138.467	2,5
Estonia	200.680	188.982	2,5	Hungary	8.000	109.753	2,0

Source: Allocation based on [FAO STAT 2012]; m³.

2.3 Wood-Based Production Sectors

Sawnwood

Global sawnwood production rose considerably during the 1960s from around 320 million m³ to around 400 million m³ and stayed – with small variations – at that level during the 1970s and early 1980s (see Table 16). Production reached a high in 1988 at 470 million m³ and started to fall in 1989, mostly in Eastern Europe. The low was in the second half of the 1990s with around 380 million m³; production increased again beginning in 2002, until the great recession of 2009 reduced demand, mainly in Northern America.

Table 16: Global Production of Sawnwood, 1961-2011

Area	Year	1961	1966	1971	1976	1981	1986	1991	1996	2001	2006	2011
World		324	359	401	407	403	447	418	387	380	447	406
Africa		3	4	5	6	8	8	8	8	8	8	8
Americas		85	99	106	115	115	146	145	167	178	195	143
Northern America		73	86	90	94	89	117	118	133	140	152	101
Latin America		12	14	16	21	26	29	27	34	38	43	42
Asia		50	64	77	85	91	101	100	92	59	85	103
Eastern Asia		40	50	60	60	59	60	54	56	29	43	59

Southern Asia	3	4	6	9	13	19	20	13	10	18	18
South-Eastern Asia	6	8	9	13	15	16	21	19	15	18	19
Western Asia	1	2	2	3	5	5	5	4	5	7	7
Europe	181	186	208	195	183	186	160	113	128	150	144
Eastern Europe	126	130	143	133	117	120	90	36	37	47	53
Northern Europe	20	20	24	21	24	24	24	34	42	45	40
Southern Europe	8	9	11	11	12	12	11	8	9	10	8
Western Europe	27	27	30	30	30	30	35	35	40	49	44
European Union	62	65	74	71	71	70	69	82	98	112	102
Oceania	5	6	5	6	6	6	5	7	8	9	8

Source: [FAO STAT 2012]; million m^3.

Compared with roundwood, sawnwood is traded substantially more, leading to considerable differences between production and consumption in some areas. In 2011, Africa (180 percent), Western (206 percent) and Eastern Asia (152 percent) as well as Southern Europe (176 percent) all consume more than one-and-a-half of their own production. In absolute terms, Eastern Asia (30 million tonnes) is by far the biggest net importer and Eastern Europe (27 million tonnes) the biggest net exporter; Northern America (29 million tonnes), Northern Europe (23 million tonnes), and Western Europe (17 million tonnes) are also important exporters, but registering at the same time substantial imports.

Even though trade volumes grew substantially from 1960 to 2011, the trading positions of the areas did not change with the exception of Western Europe, which went from a sizeable trade deficit to an even trade balance. Growth in the important export areas was fairly equal, with Western Europe registering the fastest growth. Import volumes grew the most in Eastern Asia and Northern America, but the great recession lead to a steep fall of imports in Northern America in recent years. Northern and Southern Europe were also negatively affected by the recession, notably Spain, Portugal, Italy, Greece, Latvia, Ireland, and Finland. Altogether, trade intensities grew in two steps: first, in the 1970s mainly in Northern America and Asia, and, second, in the 1990s. This second expansion in trade took place more globally than the first – especially imports in Asia and Africa and exports in Europe.

The biggest European consumers of sawnwood are included in Table 17, together with their respective production, export, and import volumes.

Table 17: Important Sawnwood Consuming European Countries, 1961-2011

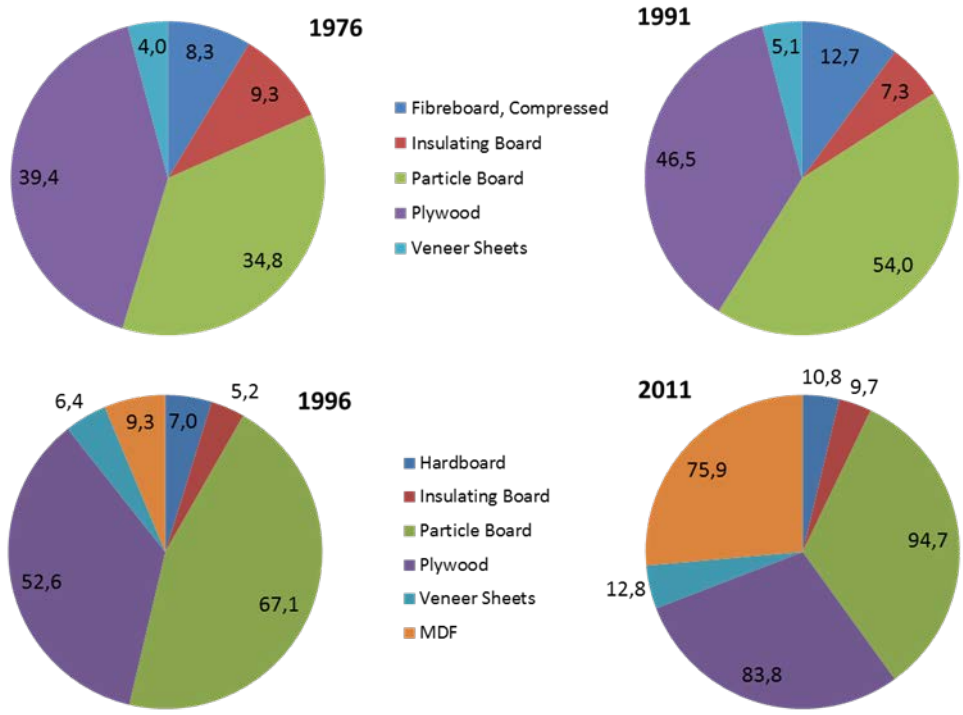
Country	Production					Export			Import		
	Million m³			Average annual change		Million m³			Million m³		
	1961	1989	2011	1961-1989	1990-2011	1961	1989	2011	1961	1989	2011
USSR/Russia	108.9	104.8	31.7	-0.1	1.1 (1995)	5.4	7.8	<0.1	0.5	0.2	<0.1
Germany	11.7	13.9	22.6	0.6	2.1	0.2	1.4	7.3	4.6	6.0	4.4
Sweden	8.3	11.5	16.8	1.2	1.6	4.6	7.0	11.7	0.3	0.3	0.4
Finland	8.1	7.8	9.8	-0.2	1.3	5.2	4.6	6.1	0.0	0.1	0.5
Austria	4.9	6.9	9.6	1.2	1.2	3.1	4.4	5.7	0.0	0.7	1.9
France	8.3	10.7	8.7	0.9	-1.1	1.2	1.2	0.8	1.0	2.4	3.4
Czechoslovakia/Czech Republic	4.2	4.9	4.5	0.5	1.5 (1995)	0.6	1.1	3.3	0.2	0.1	0.6
Romania	4.4	2.9	4.4	-1.6	2.0	1.6	0.5	3.1	n.s.	n.s.	0.1
Poland	6.6	4.9	4.4	-1.1	0.3	0.5	0.4	0.5	0.0	0.1	0.9
Latvia	-	-	3.4	-	6.3 (1995)	-	-	2.2	-	-	0.2
Spain	1.6	3.0	2.2	2.2	-2.0	0.0	0.1	0.2	0.3	1.8	1.1
Ukraine	-	-	1.9	-	-2.7 (1995)	-	-	1.5	-	-	0.0
Yugoslav SFR/Serbia	2.5	4.5	0.5	2.2	-	0.6	1.0	0.1	0.0	0.1	0.3
United Kingdom	1.0	2.2	3.3	2.9	1.8	0.0	0.0	0.2	8.7	9.5	4.9
Italy	2.0	2.0	1.3	0.1	-2.1	0.0	0.1	0.2	2.8	6.0	6.0

Source: [FAO STAT 2012].

Wood-based panels

Wood-based panels comprise a number of different products, namely veneer sheets, plywood, different sorts of particle boards including oriented strandboard (OSB), and fibre board (hardboard, medium-density fibreboard (MDF), other fibreboard). The production shares of the different panel types vary regionally and also over time. OSB and MDF in particular became increasingly important over the last 30 years (see Figure 19).

Figure 19: Structure of Global Wood Based Panel Production 1976, 1991, 1996, 2011



Source: [FAO STAT 2012]; million tonnes.

Production of wood-based panels increased faster than more traditional sawnwood products; production volumes multiplied tenfold from 1961 to 2011. Eastern Asia registered the biggest increase with most of the growth occurring in the last decade (Table 18: Production of Wood-Based Panels (Table 18). Northern America and Europe are the two other important producing areas, but in both areas production declined over the last few years. The decline was most pronounced in the United States, Canada, Germany, and Spain. As in all forest related industries (and likewise in almost all other industries) production in Eastern Europe fell heavily after 1990 and began to rise again in the mid-1990s, but – unlike other industries – production of wood-based panels surpasses earlier highs since 2005 and is still growing fast.

Table 18: Production of Wood-Based Panels

Area Year	1961	1966	1971	1976	1981	1986	1991	1996	2001	2006	2011
World	26	51	78	96	101	120	126	148	183	264	288
Africa	0	1	1	1	1	2	1	2	3	3	3
Americas	13	25	33	37	37	47	46	56	66	77	57
Northern America	12	24	31	34	32	42	41	49	56	62	41
South/Central America	1	1	2	3	4	5	5	7	10	15	16
Asia	3	6	14	16	19	24	29	42	49	100	149
Eastern Asia	2	5	11	12	13	13	14	20	28	73	118
Southern Asia	0	0	0	0	0	1	1	1	2	4	5
South-Eastern Asia	0	1	2	2	4	9	14	18	17	18	18
Western Asia	0	0	0	1	1	1	1	2	2	5	8
Europe	10	19	30	41	43	47	47	46	61	80	74
Eastern Europe	3	6	10	15	16	20	16	9	14	24	30
Northern Europe	2	3	4	5	5	5	5	7	9	10	9
Southern Europe	1	2	4	6	7	7	9	9	13	14	10
Western Europe	4	7	12	15	15	15	18	21	26	32	25
European Union	7	13	21	28	28	28	33	40	53	66	58
Oceania	0	1	1	1	1	1	2	2	4	4	4

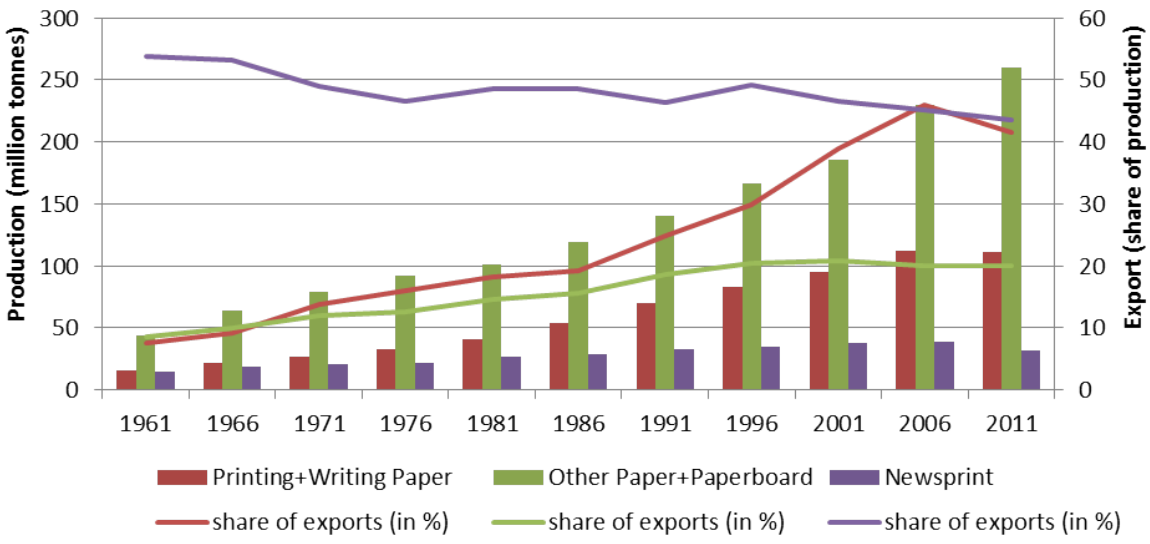
Source: [FAO STAT 2012]; million tonnes.

Around one quarter of global production of wood-based panels is internationally traded; global trade intensities and development equal those in sawnwood, but on regional scales differences become apparent. Eastern Asia became a net exporter in the last few years after being the biggest net importer of wood-based panels during the 1990s and early 2000s. During this time, the biggest net exporter was South-Eastern Asia. Generally, production and consumption volumes are fairly similar in the respective areas with the exception of Western Asia, which depends heavily on imports to satisfy demand. The biggest exporters in 2011 are Western (14 million tonnes) and Eastern Europe (10 million tonnes), Eastern (13 million tonnes) and South-Eastern Asia (12 million tonnes), while the biggest importers are again Western Europe (13 million tonnes) and Eastern Asia (10 million tonnes) as well as Northern America (11 million tonnes). As in almost all forest industries, Europe and especially the European Union are the biggest trading bloc, both in import and export quantities as well as (monetary) value. While imports increased continuously in Western Europe (around 3 percent annually), exports started to decline in the last few years (-30 percent from 2007-2011); in contrast to Eastern Europe where exports were fast growing (around 6 percent annually).

Paper and paper board

Similar to wood-based panels, production and trade flows of paper and paper board changed markedly during the last 50 years. The importance of newsprint as the product with the highest trade value in the early 1960s has shrunk dramatically since then, being overtaken by other paper and paperboard already in 1965. Since the mid-1980s, this decline accelerated as production in the developed world began to stagnate and in some countries even declined, e.g. United States. But as newspaper production is a rather local and regional industry, it is difficult to extrapolate from these developments. Other paper products, on the other hand, grew fairly continuous in production and trade intensity (Table 20), partly as a result of increasing trade and the corresponding need for packaging material. In current years, the production of printing and writing paper also stagnated as electronic information exchange increased. Nonetheless, it is not clear if these trends will persist, given that the development of printing on demand and office printing might counter the savings of paper from electronic information.

Figure 20: Structure of Global Production and Trade of Paper and Paper Board, 1961-2011



Source: [FAO STAT 2012]; million tonnes.

Production of paper and paper board was heavily concentrated in Northern America and Europe in the 1960s and 1970s, with Japan gaining importance during the 1970s and 1980s. Since the mid-1990s, production in Northern America stagnated, while European production continued to rise until the current economic crisis (Table 19). In the last two decades, production in South-Eastern Asia and in Latin America started to grow, reducing in both areas the need to import. But while South-Eastern

Asia became self-sufficient, Latin America is still a net importer. Western Asia and Africa are the two areas most dependent on imports (covering more than 50 percent of consumption in 2011), but their overall imports are comparably small (7 and 4 million tonnes, respectively). Other important net importers are Latin America (6 million tonnes, total imports 9 million tonnes) and Southern Asia (4 million tonnes, total imports 5 million tonnes). The biggest net exporters are Northern Europe (13 million tonnes) and Northern America (11 million tonnes), while Western Europe (28 million tonnes) is the biggest exporter overall, closely followed by the other two areas. These relations have not changed much in the period under investigation. In the last few years, Northern American consumption declined even faster than production, resulting in growing net exports even though overall exports were also declining since 2006. The tremendous growth in production in Eastern Asia in recent years was almost matched by an equal increase in consumption. During the 1990s, the area was a net importer but became self-sufficient in 2006 and has since remained a small net exporter. Eastern Europe became a net importer since 2005 even though production there increased considerably in the early 2000s. Western Europe experienced a contrarian development: the decline in consumption surpassed that in production and the area therefore became a net exporter.

Table 19: Production of Paper and Paper Board

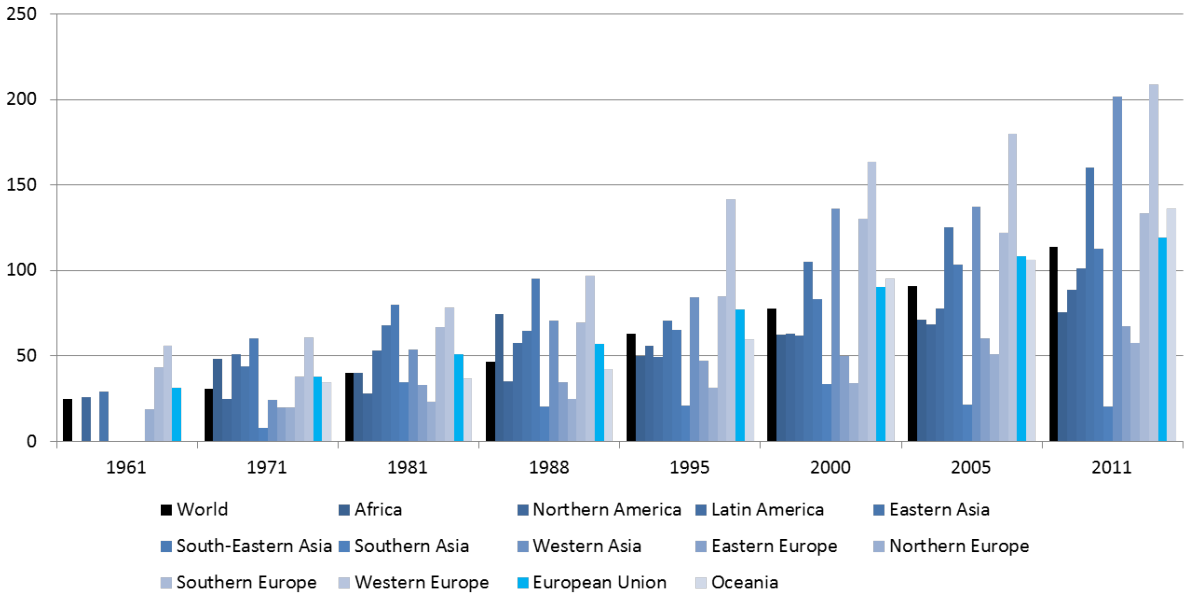
Area / Year	1961	1966	1971	1976	1981	1986	1991	1996	2001	2006	2011
World	74	104	128	146	169	202	243	284	319	380	403
Africa	0	1	1	1	2	2	3	3	4	4	3
Americas	40	54	62	69	78	90	100	115	116	121	110
Northern America	39	51	58	64	72	80	89	103	101	103	89
South/Central Am.	2	3	4	5	6	10	11	13	15	19	20
Asia	9	13	18	23	29	41	60	82	96	136	179
Eastern Asia	8	12	16	20	26	37	53	69	77	111	141
Southern Asia	1	1	1	1	2	2	3	4	5	6	12
South-Eastern Asia	0	0	0	1	1	1	4	8	12	16	21
Western Asia	0	0	0	0	1	1	1	1	2	3	5
Europe	24	35	45	52	58	67	77	82	99	115	107
Eastern Europe	5	7	10	13	13	15	13	7	11	15	16
Northern Europe	10	13	15	15	17	21	24	28	32	35	29
Southern Europe	2	4	6	8	9	10	11	14	17	21	19
Western Europe	7	11	14	16	18	22	29	33	38	45	42
European Union	18	27	34	39	44	51	63	74	88	101	93
Oceania	1	1	2	2	2	2	3	3	4	4	4

Source: [FAO STAT 2012], million tonnes.

Recycling

The share of pulp from recycled paper has increased considerably since 1990. In 2011 recovered fibre pulp accounted for over 40 percent of global pulp for paper production. Unfortunately, international statistical sources do not directly provide data on the amount of pulp from recovered paper, likely because the recovered paper is processed together with wood raw materials in integrated pulp mills, so that it is not feasible to partition the end product. It is also not clear how much of the recovered fibre pulp originates in recovered paper and how much is from other sources. Figure 21 provides an overview of paper recovery in terms of total consumption of pulp for paper (please note that this implies a 1:1 conversion of paper to pulp which is definitely wrong, but assuming a fixed conversion rate for all areas, the resulting picture with the true (unknown) conversion rate would be unchanged). Recovery rates are globally steadily increasing and begin in some regions to get close to full recovery (e.g. Western Europe). The increasing availability of recovered paper as a source of fibre makes the production of pulp and paper less dependent on local or regional wood sources and might therefore be partly responsible for the recent shift in global paper production to Asia, besides the need to produce close to the market.

Figure 21: Recovered Paper in Relation to Pulp for Paper Consumption, 1961-2011



Source: [FAO STATS 2012]; percent.

The recovery of other wood products to recycle them in the production process is even harder to quantify than for paper, but their recovery rates seem to be increasing too [UNECE/FAO 2005: 65ff.].

This concerns particularly wood residues that can then be further processed into wood-based panels, pulp, or used as wood fuel [UNECE/FAO 2005: 69]. This variety of potential applications for recovered wood products and wood residues makes it likely that the respective recovery rates will rise in the future, especially if roundwood supply in the fast developing countries is not rising in company with demand for wood products.

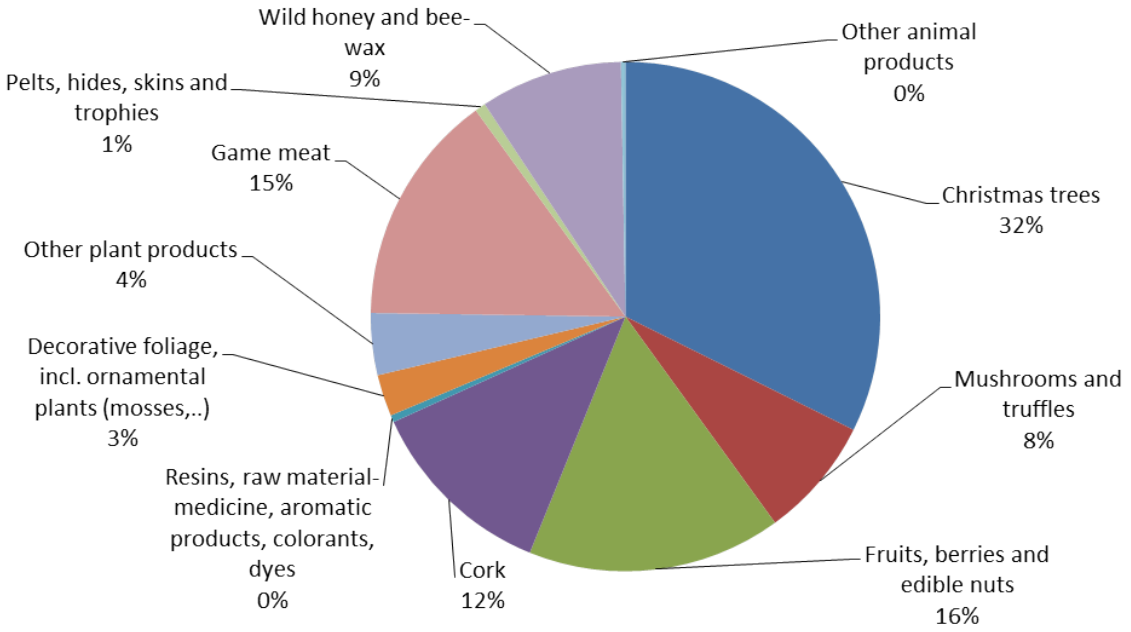
2.4 Non-Wood Forest Products

Non-wood forest products comprise a wide range of different goods that originate in forests such as gums and resins, game and bush meat, mushrooms, cork, dying and tanning material, berries, honey, bamboo and rattan, medicinal plants, or Christmas trees. Globally, the majority of these goods are either used for subsistence or traded informally in local and regional markets. International trade in non-wood forest goods is minuscule and of decreasing importance [cf. FAO 2005: 15f.]. The most important internationally traded goods are bamboo and rattan, cork, maple syrup, gum and resin, herbs and other medicinal plants, mushrooms, and spices. Unfortunately, trade statistics and the respective classifications do not distinguish the product source. Most non-wood forest products can be produced in plantations and farms or collected in (natural) forests [cf. FAO 2005: 17]. To assess the importance of forests as a source of such products, their share of production in these goods needs to be established. Further increases in production and trade could be detrimental to forests if these increases are generated through intensification of production in farms and plantations or the depletion of wild stock up to distinction of many species. [cf. FAO 2005: 17].

With increasing incomes, simple collection of non-wood forest goods becomes increasingly unattractive for rural people [FAO 2005: 17]. On the one hand, this could lead to reductions in the supply of such goods; on the other hand, it can also lead to intensification and industrialisation of production mostly outside natural forests, e.g. oil- and cocoa palm, bamboo, and cardamom plantations. Nevertheless, for some products and regions increasing commercialisation might improve livelihoods and generate income for rural communities [FAO 2007: 18].

In Europe, marketed non-wood forest products accounted for 2688 million Euros of sales in 2010 [Forest Europe / UNECE / FAO 2011a: 302f.]. The shares of the different goods are presented in Figure 22. Interpretation of these figures has to take account for the different degrees of further processing needed to produce the final goods, e.g. Christmas trees receive almost no further processing and therefore generate substantial income for the forest owner, while for other goods most of the market value is generated through gathering (berries, mushrooms) or other processes.

Figure 22: Marketed Non-Wood Forest Products From Forests and Other Wooded Land in Europe



Source: Own calculations based on [Forest Europe / UNECE / FAO 2011a: 308f.]; share of total value.

Personal consumption is excluded from these data on marketed goods, even though it represents a significant share of total production for many non-wood forest products, especially mushrooms, fruits and berries [cf. Forest Europe / UNECE / FAO 2011a: 58].

Non-wood forest products are highly specific to their respective region. This is indicated in the information in Table 20 for European regions. The production of Christmas trees, as the most important good, is concentrated in Western and Northern Europe, mainly Denmark, Germany, and France. Cork, on the other hand, is only produced in Southern Europe, namely Portugal, Spain, and Italy (the production in France is negligible). Unfortunately, it is not possible to present any sensible information on long- or medium-term trends in the production of non-wood products, as respective data gathering started only recently and the 2007 survey was characterised by significant gaps in reporting.

Table 20: Quantity and Value of Marketed Non-Wood Forest Products, 2010

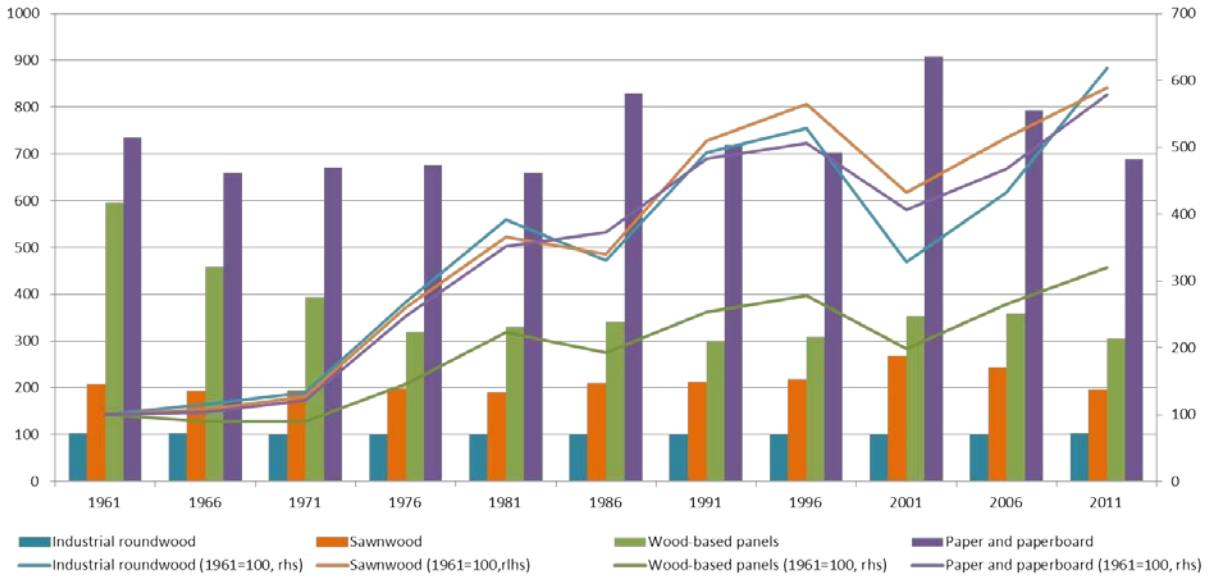
Product	Unit	Europe	Eastern Europe	Northern Europe	Southern Europe	Western Europe	EU27	Russian Federation
Christmas trees	1000 pcs	53,786	940	19,758	540	31,550	51,846	6
	€1000	869,215	2,885	208,104	338	654,900	853,476	4
Mushrooms and truffles	tonnes	398,707	23,208	3,279	367,538	4,232	387,859	9,332
	€1000	206,242	32,387	13,043	132,812	22,600	169,409	21,006
Fruits, berries and edible nuts	tonnes	330,982	76,814	13,320	240,714	123	281,178	49,053
	€1000	433,117	133,785	15,113	283,722	460	324,124	105,501
Cork	tonnes	169,215	–	–	167,665	1,550	169,215	–
	€1000	324,625	–	–	323,850	775	324,625	–
Resins, raw material-medicine, aromatic products, colorants, dyes	tonnes	14,366	6,012	15	8,155	184	9,307	5,059
	€1000	12,074	9,482	7	2,364	221	4,213	7,861
Decorative foliage, incl. ornamental plants (mosses, ...)	tonnes	948	250	662	–	–	512	–
	€1000	71,092	4,101	65,884	887	–	69,395	–
Other plant products	€1000	105,466	1,816	632	34,491	68,556	105,090	–
Game meat	tonnes	45,217	26,237	5,502	2,885	8,894	25,951	16,945
	€1000	397,357	18,597	13,791	152,564	201,105	379,543	2,240
Living animals	1000 pcs	106	106	–	–	–	106	–
	€1000	1,769	1,769	–	–	–	1,769	–
Pelts, hides, skins and trophies	1000 pcs	633	249	38	14	287	392	182
	€1000	18,176	3,399	346	7,493	6,738	16,679	623
Wild honey and bee-wax	tonnes	127,279	85,000	200	38,479	3,050	41,119	85,000
	€1000	242,864	112,500	1,200	104,748	17,416	119,704	112,500
Raw material for medicine, colorants	tonnes	25	–	25	–	–	25	–
	€1000	1,995	–	182	1,813	–	182	–
Other animal products	€1000	3,799	2,459	–	–	1,340	3,799	–

Source: Own calculations based on [Forest Europe / UNECE / FAO 2011a: 308f.].

2.5 Prices

Information on prices for wood based products is only available for internationally traded volumes in the form of export and import volumes as well as values. From this information one can deduce implicit export and import prices for the respective region and product. Unfortunately, this approach precludes production prices and therefore also the establishment of regional consumption prices. Thus it is not possible to analyse trade flows and developments in terms of price competitiveness except for the question of which of the possible regions supplies but not what determines the decision to produce domestically or import or even produce for export. Furthermore, regional trade prices fluctuate considerably more than global ones over time but also over product categories. General developments, as depicted in Figure 23, are a substantial decrease in the price of wood based panels relative to all other products during the 1960s and 1970s and two peaks in the price for paper and paper board in the mid-1980s and after 2000. In the latter period the prices of all processed products rose relative to roundwood. The prices relative to 1961 reveal the reason for this price shift, as roundwood prices fell considerably more in the second half of the 1990s than all other prices; during the last decade this development was reversed.

Figure 23: Global Import Prices of Wood Based Products, 1961-2011



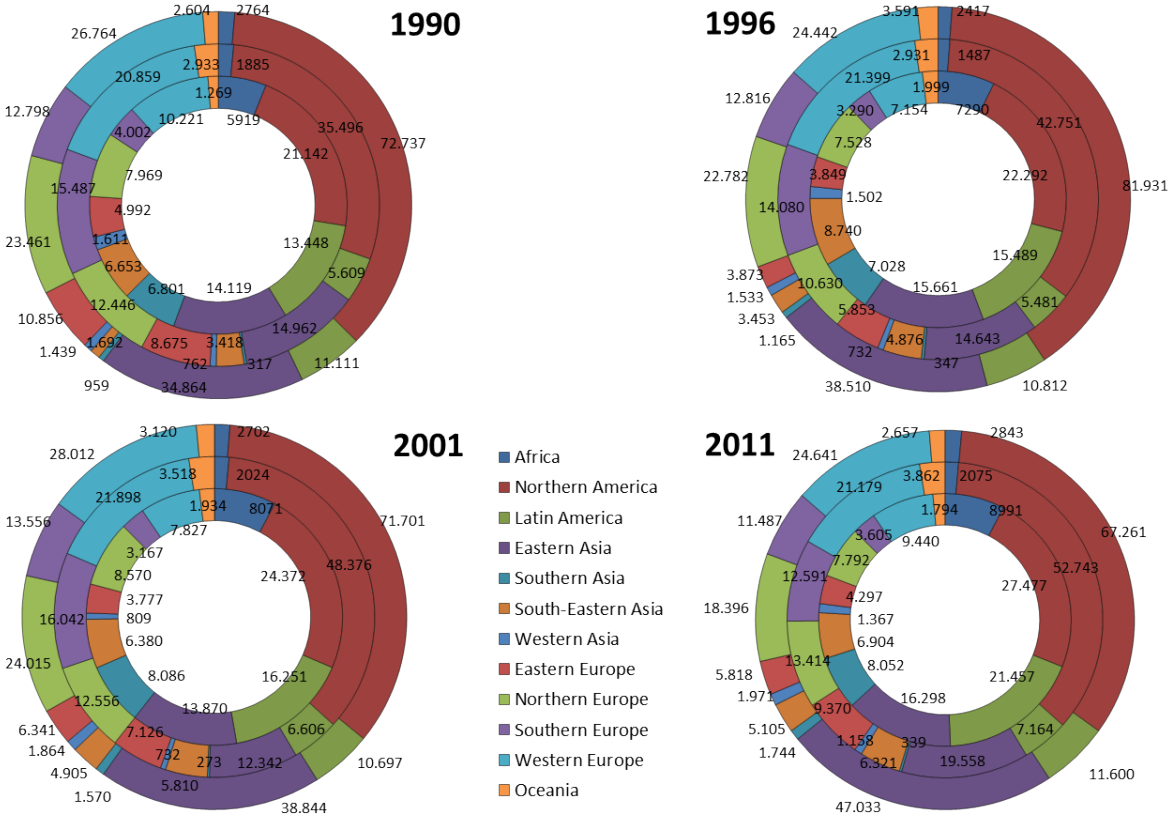
Source: [FAO STAT 2012]; roundwood=100; bars: price relative to roundwood (roundwood=100); lines: relative price development (1961=100).

3. Current Developments

Data collection and processing on value-added and employment is often part of national accounting. This ensures for countries with developed national accounting statistics a high quality and a high degree of comparability over time and other economies. But in countries and areas without such a developed national accounting system, information on value-added is less comparable and often of uncertain quality. As part of national accounting, data on value-added is governed by national accounts classifications and rules. Information for forest-based industries is accordingly only available for the three ISIC divisions forestry, wood industry, and pulp and paper industry. Exchange rate and price fluctuations hamper international long-term comparisons. The following is therefore based on Lebedys [2008], who collated and harmonised virtually all available information on this topic to provide a global view. In the three industries together, worldwide real (i.e. adjusted for inflation) gross value-added did not change much between 1990 and 2006 [Lebedys 2008: 26] and stood at around US$ 450 billion or less than one percent of global GDP. There is a slightly increasing trend in absolute value but yearly fluctuations are almost as big as the overall increase; the increasing trend might therefore be a statistical artefact. In relation to GDP the share of forest-based industries fell continuously over this period. The most important industry is pulp and paper with around half of total value-added, followed by the wood industry with around 30 percent and forestry with around 20 percent. Towards the end of the observation period the share of pulp and paper industry decreased a bit while the share of the two other industries increased proportionally.

3.1 Value-Added and Employment

Figure 24: Value-Added in Forestry (Inner Ring), Wood Industry (Middle Ring), and Pulp and Paper Industry (Outer Ring), 1990-2006



Source: Own calculations based on [Lebedys 2008: 92ff.]; million US$.

Because of high levels of subsistence and unofficial employment official statistics are only rough indicators for the importance of forest-based activities in developing economies [Lebedys 2008: 8, 12]. Official employment follows mainly the trends in value-added, but due to rising productivities with a declining trend from 15.7 million in 1990 to 13.7 million in 2006 [Lebedys 2008: 17]. The employment shares of the three industries were almost equal in 1990 with 34 percent in forestry, 38 percent in wood industry and 28 percent in pulp and paper industry. Over the period to 2006 the share of forestry fell to 29 percent, while both other industries grew equally in importance (to 40 and 31 percent, respectively).

The regional distribution of employment is markedly different to that of value-added, due to respective productivity differences and differences in product range. Northern America, Western and Northern Europe have comparably low employment compared with value-added, Latin America,

Southern and South-Eastern Asia the other way round. Generally, developed economies exhibit a falling employment as a result of increases in productivity and capital intensity [Lebedy 2008: 18]. Latin America is the only major area with increasing employment, all other regions feature more or less stable employment over the period 1990 to 2006.

3.2 China

China experienced tremendous economic growth during the last three decades of around 10 percent annually resulting in 13-fold increase in real per capita GDP and a 17-fold increase in real GDP. Even though forest-based industries in general grew less fast, the rise of the Chinese economy resulted in substantial changes in global wood- and forest-based product markets. Table 21 presents information on selected products either whose production grew especially fast or whose Chinese trade volumes account for a significant part of global trade. It is noteworthy that China is a net importer mainly in raw materials like roundwood, sawnwood, and pulp while it is increasingly becoming a net exporter in further processed goods like paper or panels. Especially the production of wood based panels increased vastly and in 2011 China accounted for more than half of global MDF production and over two fifths of global hardboard production. While most of this production is consumed domestically and replaced former imports, already small variations in consumption could potentially lead to significant additional export volumes with all respective consequences for other trading countries.

On the other hand has China become one of the biggest purchaser of raw wood materials, especially roundwood and pulp, to supply its processing industries. Changes in domestic or international demand in these products could cause related changes in Chinese import demand for raw materials.

Table 21: Production and trade of selected products in China, 1991-2011

Product	Unit	Production					Share of world production		
		1991	1991-2001	2001	2001-2011	2011	1991	2001	2011
		1000 tonnes/m³	% pa	1000 tonnes/m³	% pa	1000 tonnes/m³	%		
Industrial roundwood	m³	89750	0,4	93464	1,0	103035	5,8	6,1	6,5
MDF (since 1995)	m³	540	46,0	5224	23,9	44596	9,5	22,1	58,7
Plywood	m³	1568	20,2	9885	16,4	45298	3,4	18,1	54,0
Veneer sheets	m³	30	35,1	601	17,9	3123	0,6	7,3	24,4
Hardboard (since 1995)	m³	1169	-13,4	492	24,6	4437	11,6	8,0	41,1
Insulating board	m³	n.s.	–	1		300	0	0	3,1
Chemical pulp	tonnes	1436	2,2	1790	13,1	6127	1,3	1,5	4,7
Semi-chemical pulp	tonnes	62	39,3	1710	–	1710	0,2	20,3	20,1
Dissolving pulp	tonnes	241	-24,2	15	0	15	6,0	0,6	0,4
Newsprint	tonnes	486	13,8	1768	8,3	3927	1,5	4,6	12,2
Printing and writing paper	tonnes	5199	5,3	8684	11,2	25039	7,4	9,2	22,6
Wrapping, packaging paper and board	tonnes	6387	12,6	20911	11,5	62331	6,0	14,0	29,4

Product	Unit	Export intensity 3-year average (in %)		Export share		Import intensity		Import share	
		1991	2011	1991	2011	1991	2011	1991	2011
Industrial roundwood	m³	0,5	0,1	0,5	0,1	9,8	35,2	10,3	32,9
MDF (since 1995)	m³	2,1	5,1	0,4	13,7	81,2	1,2	16,8	3,6
Plywood	m³	43,7	21,5	4,9	9,4	179,9	2,5	17,1	36,6
Veneer sheets	m³	26,0	8,1	0,6	9,1	455,1	12,2	4,8	6,9
Hardboard (since 1995)	m³	2,8	7,3	1,6	8,0	9,3	0,7	6,2	0,6
Insulating board	m³	∞	4,3	0,4	0,7	∞	11,5	2,3	1,4
Chemical pulp	tonnes	1,4	0,5	0,3	0,1	75,6	203,4	3,8	27,2
Semi-chemical pulp	tonnes	0	0	0	0	59	84,2	5,8	51,3
Dissolving pulp	tonnes	–	97,5	0	0,3	60,6	8323	9,6	38,4
Newsprint	tonnes	2,0	0,5	0,1	0,8	84,3	14,5	2,8	4,2
Printing and writing paper	tonnes	5,1	11,7	1,1	5,8	14,6	6,3	3,6	3,5
Wrapping, packaging paper and board	tonnes	15,0	4,0	3,4	4,7	15,0	4,5	5,6	6,4

Source: [FAO STAT 2012]; Trade intensity refers to the ratio of domestic trade volumes to domestic production, trade share to the ratio of domestic trade to global trade volumes; n.s. = not significant.

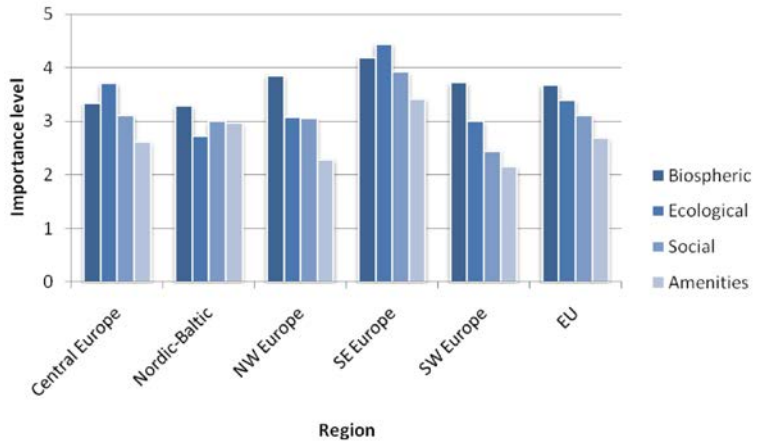
3.3 Marketed and Non-Marketed Services

Marketed and especially non-marketed services of forests have markedly gained in importance in the public and political sphere during the last decades. A major result is the promotion of sustainable forest management and, accompanying this, the need to quantify the amount and value of forest services. Given the difficulties of defining and especially delimiting marketed and non-marketed goods and services, the rest of this paragraph follows the EFIMED et al. study [2008] in using a functional classification to group forest services into the broad categories resources, biospheric, ecological, social, and amenities [EFIMED et al. 2008: 12, annex 4, annex 6]. Marketed services are services which are sold and bought on markets irrespective of who is the ultimate economic beneficiary. The products from the resources category are mainly marketed. Marketed services are for example hunting licenses, outdoor activities or renting of houses, huts, etc. Environmental and protective services are usually non-marketed even though some smaller financing schemes or pilot schemes exist. In most of the non-marketed forest services the public goods properties are big relative to private goods characteristics. This is either the result of legal regulations on the use and the degree to which economic values can be appropriated by the owner of the forest or the usage rights (appropriability) (e.g. social) or of naturally public goods (e.g. good air quality). In many cases it is theoretically possible to create a market for these services through specific property rights and market rules but the allocation of such property rights is often socially and politically controversial [EFIMED et al. 2008: 47].

Figure 25 and

depict the assessment of official sources of the importance of different non-marketed goods and services in the EU. In 2010 in reporting countries marketed services accounted for around 800 million euro, half of which for social services, and a quarter each for biospheric and other services [Forest Europe / UNECE / FAO 2011a: 60]. The latter includes mainly licenses that regulate land use for gravel extraction, telecommunication masts, wind farms, and electricity distribution. Hunting licenses represent the major part of social services.

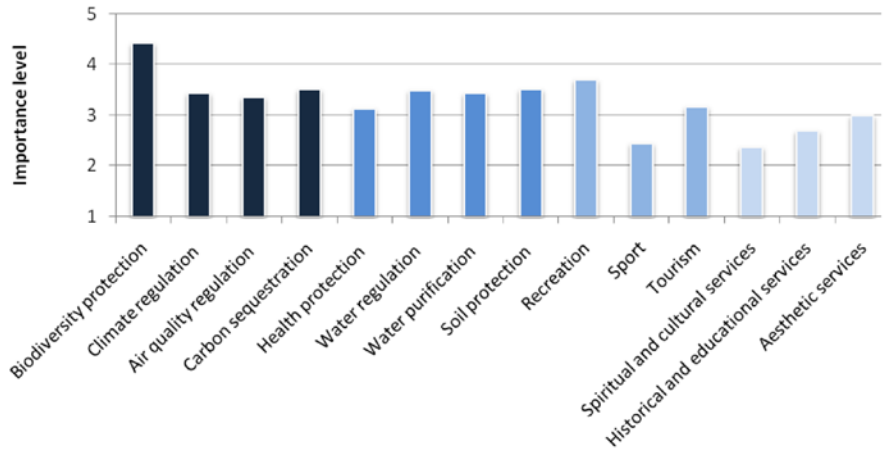
Figure 25: Importance of different groups of non-market forest goods and services



Source: [EFIMED et al. 2008: 18]; 0 – not important, 5 – very important.

A multitude of approaches exists to quantify the value of non-marketed goods in general and of forest services in particular. The study from EFIMED et al. [2008] presents a huge number of estimated values for the specific non-marketed forest services. Unfortunately, these estimates are very context specific, i.e. they depend on the respective method used, on the specific wording of questions, on the location of the forest, and on the design of the study. Up to now, this precludes the establishment of a general value of such services and aggregation for countries or bigger areas. What they do allow is a general assessment of the economic importance of such services: Non-marketed services represent a sizeable share of total economic value of forests and non-market and market values are often inversely related – forests of low value of wood and non-wood products are often of high value for protective or amenity services.

Figure 26: Importance of Different Non-Market Forest Goods and Services in the EU 27



Source: [EFIMED et al. 2008: 19]; 0 – not important, 5 – very important.

3.4 Europe: Selected Products in Selected Countries

Europe´s forestry and wood-based industry is very diverse already at country level and even more so at regional level. In many product categories, Europe is the major global producer and in almost all product categories it is the major trading bloc. A few countries mirror at least in part this broad global influence in forest and wood products – namely Sweden, Germany, Finland, and Russia. But even among those four countries some specialization is apparent. Of the other European countries, a sizeable number has no forest-based industries to speak of, but then all of those countries are economically and geographically small. All other countries exhibit some degree of specialization in forest- and wood-based industries. The globally most important production or trading specializations are included in Table 22. A market share of over 3 percent for production and over 10 percent for trade had to be exceeded over the years 2009-11 for inclusion in the table. For Sweden, Germany, Finland, and Russia, the thresholds were 5 and 15 percent.

Table 22: Global market shares of selected products of European countries, 2011

Product	Element	Country	2011		Compound annual rate of change		
			Market share	Volume	1995/2000	2000/2005	2005/2011
Bleached sulphite pulp	Production	Germany	17.6	609,000	-1.9	4.9	-4.2
		Austria	12.7	438,329	2.2	1.1	-0.3
		Sweden	11.2	388,151	1.0	-2.4	-6.9
		Czech Republic	7.4	255,700	4.6	5.1	-1.5
		Portugal	3.4	118,209	2.1	2.5	2.0
	Export	Czech Republic	20.0	185,500	6.9	4.6	-5.5
		Portugal	12.5	115,744	2.3	6.4	1.8
Unbleached sulphate pulp	Production	Sweden	6.6	2,037,000	0.1	1.5	-2.1
		Russia	6.3	1,948,000	8.8	3.5	-0.4
	Export	Russia	28.4	477,240	12.9	5.9	0.3
Unbleached sulphite pulp	Production	Russia	8.1	280,000	-7.3	2.6	-2.9
Mechanical wood	Production	Sweden	12.1	3,558,000	2.9	0.9	0.5

pulp		Finland	10.7	3,173,062	2.6	-2.2	-3.2
	Export	Norway	18.5	154,005	-7.9	9.8	-4.6
		Estonia	16.9	140,706	–	–	23.1[2]
	Import	Italy	9.2	87,166	4.4	-2.3	-5.8
Recovered fibre pulp[1]	Production	Spain[3]	5.6	4,300,000	–	–	1.1
		United Kingdom	4.2	3,194,000	–	-1.5	-3.0
	Export	Germany	29.2	115,991	–	-4.0	15.4
		Switzerland	19.3	76,715	–	-36.2	55.6
	Import	Germany	18.4	55,210	–	-28.5	35.3
		France	12.9	38,678	–	-19.6	96.2
Recovered paper	Production	Germany	7.2	15,262,000	0.9	5.6	1.0
		United Kingdom	3.8	8,036,000	6.9	7.8	0.7
Household/sanitary paper	Production	Italy	5.0	1,502,327	17.5	3.4	0.7
	Export	Italy	13.5	283,081	-5.9	4.4	5.3
	Import	United Kingdom	15.5	374,954	-5.7	4.3	13.1
Fibreboard	Production	Germany	4.9	4,747,533	28.3	13.2	-2.5
		Poland	3.1	3,018,134	14.2	13.0	4.4
	Export	Germany	13.8	2,981,402	52.3	11.2	-3.8
		Poland	6.4	1,381,995	14.5	17.2	1.7
Hardboard	Production	Germany	18.3	1,976,784	6.9	38.9	2.2
	Export	Germany	32.9	1,174,773	-10.1	8.0	58.7
Insulating board	Production	Germany[4]	12.1	1,177,113	22.4	-100.0[5]	31.5[6]
		Poland	6.6	641,792	5.2	16.2	4.0
		Switzerland	3.4	333,000	9.0	-2.2	21.6
	Export	Poland	19.1	488,800	19.6	17.8	0.4
Particle board	Production	Austria	2.4	2,250,000	3.0	4.2	-1.2
	Export	Austria	8.3	1,795,857	6.3	6.0	-0.6
Wood residue	Production	France	6.5	8,633,232	4.9	-0.8	2.4
		Russia[3]	6.0	7,900,000	–	–	-2.1
		Poland	4.1	5,500,000	28.4	15.5	7.9
		Finland	4.0	5,294,237	–[7]	1.0	-4.2
		Sweden	3.0	4,000,000	-16.0	2.3	-3.7

	Import	Demark	14.5	3,662,393	135.0	13.6	21.1
		Belgium	11.6	2,915,927	–[7]	12.2	9.4
		Italy	11.4	2,881,946	6.9	25.4	5.8
		Netherlands	8.8	2,211,200	3.3	39.3	15.4
Industrial roundwood	Production	Russia	9.7	153,182,789	5.0	5.5	1.8
		Sweden	4.2	66,203,333	-0.8	10.0	-5.4
	Export	Russia	17.8	20,428,938	10.9	9.3	-13.3

Source: [FAO STAT 2012]; 1: first data collection 1998, 2: 2006-2011, 3: some years FAO estimate, 4: FAO estimate, 5: from 2001 till 2006 no production data available, 6: 2007-2011, 7: first data collection 2000.

The development of the depicted products in the respective countries is surprisingly uneven, which is a reminder that local and regional specificities play an important role in forest- and wood-based industries. In many of these product markets, the European development has been at least as good as the global development, i.e. market shares were stable or increasing. In recent years, the competitive position worsened slightly, likely as a result of the economic and fiscal crisis in Europe. Nevertheless, up to now the European forest and wood based industries were able to withstand the rise of Asian producers. Nevertheless, the development towards a global market for wood-based products (decreasing transportation costs, establishment of plantations, spatial separation of fibre production and further processing [UNECE/FAO 2005, Whiteman 2005]) poses significant challenges to European producers, especially in capital intensive large scale industries and in industries dependent on very cheap fibre, e.g. the pulp and paper industry.

4. Conclusion

This chapter dealt with global economic developments in the forest- and wood-based industries in the period from 1960 to 2011. A broad view was chosen with the aim to identify and present the key global trends without being overwhelmed with minute data and region-specific peculiarities.

Production in forest-based industries grew fairly steadily over the investigation period, but considerably slower than overall production as measured by GDP. The biggest shifts in production and consumption occurred after 1990 in association with, first, the transformation in Eastern Europe and, second, the economic rise of China. Production as well as consumption declined considerably in Eastern Europe which was and again is one of the major wood producing areas in the world. China, however, which was still in 1990 an economically minor power, became the second biggest economy in the world and its forest- and wood-based industries grew correspondingly, although primary wood

production in China is still comparatively low due to small natural wood resources. Both of these developments led to substantial changes in global trade patterns in wood and wood-based products.

Until now, the big wood producing countries in the developed world and Russia exhibit growing forests and increasing wood densities in its forests. These countries are also the major producers of industrial roundwood and further processed wood products. On the other hand, most of the tropical countries exhibit decreasing forest areas and forest densities. The main forest product in these regions is fuel wood which is almost exclusively consumed locally. Even though total wood removal in these countries is as big as in the developed world, the respective economic value is only a negligible fraction of the former. This might change in the future, when these countries' economies reach the level of today's middle per capita income countries – similar to the development in China.

In Europe, the development of the fuel wood sector might influence forestry and wood processing industries in the future. During the 2000s, growth in fuel wood production and consumption reached heights not foreseen in the decades before. The reason is primarily the presumed carbon neutrality of wood as fuel compared with fossil fuels. Given the relatively low efficiency of wood in the conversion of solar energy into heat and the price increases of wood residues in Europe, it is not clear if this trend towards increased usage of wood fuel will be maintained in the future. Up to now, most countries follow policies to increase the share of wood as an energy source. Trade-offs between forests as source for fuelwood and as carbon sink are already recognised [Forest Europe / UNECE / FAO 2011a: 223]; the competition between material and energy uses is also increasingly recognized.

IV. Technological Development

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1. Introduction

The chapter "Technological Developments" provides a general overview of technological changes in selected areas within the forest-based sector. In addition, it addresses the changing perception of technology change and innovation since the second half of the last century. The main sources for this chapter are publications by the FAO/UNECE Forestry & Timber Section and peer-reviewed articles from scientific journals.

Technology and technological changes

In a narrow sense, technology can be seen as tools, without considering the environment. In this case, new technology can be understood as an item (tangible skills and things) coming from outside, a view, which implies a one-way causality: from a novel technology towards society [cf. Rip / Kemp 1997]. In a more systemic view technology can be understood as "the set of knowledge, skills, processes, and techniques on how to combine resources to produce desired products, to solve problems, satisfy needs, or adapt to changes" [Mery et al. 2010: 158].

The success of both single firms and of national economies depends on their effectiveness in gathering and using knowledge and technology. For the dynamic process of technological development Schumpeter distinguishes three phases. In the first, a new process or product is being developed (invention). The second phase refers to the first commercial application (innovation). The last phase (diffusion) means the widespread use of innovation in relevant applications. The economic and environmental impact of the new technology results from all three phases [cf. Jaffe / Nevell / Stavnis 2002].

2. Technological Change and Innovation

Understanding the drivers of technological changes has been of growing interest throughout the 20th century. Technological development has been defined as one of the key driving forces for economic growth and a wide range of economic modeling approaches have been introduced after

the Second World War. Dealing in detail with the various modeling approaches for (exogenous or endogenous) growth would go well beyond the scope of this study. Broadly speaking technological development is usually acknowledged today as a necessary thought not a sufficient factor for increasing long-term growth rates.

As the main determinants of investing in product or process development have been considered the market demand, technological opportunities and the nature and strength of appropriability conditions (e.g. patents). Diffusion of technologies depends strongly on the price of innovation, on its quality and the available information on it and on risk and uncertainty factors. In addition, policy regulations have played an increasing role in determining development of new products and processes and their diffusion [see eg. Oosterhuis et al. 2006].

In the last decades, not only economic benefits but also the possible negative side effects of technological development have attracted an increasing attention. In addition to the goal to reduce (socio-ecological) negative effects of technological change on environment also the generation of low-cost solutions to environmental problems is subject of political focus (e.g. reducing the effects of climate change by employing forestry mitigation technologies). Jaffe et al. explain the raising interest for the relationship between technological change and environmental policy as follows: “first, the environmental impacts of social and economic activity are greatly affected by the rate and direction of technological change; and second, environmental policy interventions themselves create new constraints and incentives that affect the process of technological developments”. [cf. Jaffe/ Nevell / Stavnis 2002: 20].

More recently, innovation and diffusion of technology have been increasingly seen in interaction with the systems in which the technology is embedded (innovation process). Broadly speaking, not only the hardware (what is being created) but also the software (how it is being created and implemented) [Mery et al. 2010: 158] has gained in importance. The innovation system (IS) approach proved to be more appropriate to study innovation as a complex phenomenon in a systems view than the concepts from the 1970s, which suggest that technological change is a linear process. [cf. Rametsteiner / Weiss 2005:692]. The Oslo Manual [OECD / Eurostat 2005], which is the standard EC reference for innovation surveys in the business sector, defines innovation as the “[….] implementation of a new or significantly improved product (good or service), or process, a new marketing method, or a new organizational method in business practices, workplace or organization or external relations”.

A strong feature of innovation system theories is path dependency or the tendency to "lock-in" phenomenon. Path dependency in this context means that due to "learning by doing and using" and network externalities historical events or decisions amplify the initial advantages of the innovation over time and thus contribute to system stability. Considering only short-term advantages the whole socio-economic system may be "locked in" to a technology. Complex and integrated processes of changes are needed to change the direction of technological changes [see e.g. Arthur 1989].

Shaping innovation processes at regional, national and European level became more and more important in the last decades. Market failures and system failures have been usually used to justify political intervention [Rametsteiner et al. 2010:2]. Innovation policy (including technology and science policy but also aiming at influencing innovations from the demand side) is increasingly being seen as a horizontal policy issue fostering not only economic growth but also the development of solutions of a wide range of societal problems [cf. Rametsteiner et al. 2007].

2.1 Technological Change in the Forest-Based Sector

Today the forest-based sector contributes approximately 8 percent of manufacturing added value of the European Union and ensures an income for about 16 million forest owners (according to the Forest-Based Sector Technology Platform). It provides up to four million industrial jobs in Europe [CEI-Bois]. In addition to the production of a wide range of products and materials made from wood, European forests provide various ecosystem services. Due to the socio-economic importance of the sector, it´s capacity to innovate has received increasing attention in the last decades. From the late eighties the sector in Europe faced new challenges due to changes in the economy, growing interest in sustainability and increasing concern about climate change.

Driving forces of technological change in the forest-based sector

In general, the wood product markets in the countries of the European Union are characterised by growing internationalisation since the late part of the 20th century (see also chapter III. Economic Development). Gradual removal of trade barriers and radically decreasing transport costs made it possible that a large number of firms has started to act globally. This led on the one hand to increased exports (e.g. sawnwood and some wood-based panels) and on the other hand new competitors could enter the European markets. For example, a couple of years ago China became the largest exporter of furniture of the world, jeopardizing the traditional market position of the Swedish and Finnish wood industry [UNECE / FAO 2012]. In parallel, for many decades the wood industry has

demanded increased mobilisation of wood resources due to the growing total demand and high costs for raw material in Europe. Due to the exhaustion of certain non-renewable raw materials and fuels in the near future, the demand for wood from the energy sector has been increasing.

Generally, there is a growing interest for engineered wood products in Europe, not least because of environmental consciousness of consumers. In addition, energy regulations support the use of wood in construction. In the retail segment, the wood product suppliers are faced with growing consumer demands towards a large product range [ibid.].

Climate change mitigation efforts also include research on different mechanisms by which wood substitution affects energy and greenhouse gas balances. The overall goal is to increase the use of wood to reduce CO^2 emissions and oil use.

To summarize, Europe´s wood industry today is under high pressure due to

- increased competition in the global market
- sharpened competition for raw-material
- growing concern of climate change and
- higher consumer demand for greater product differentiation.

In parallel, there is a growing awareness in Europe for the conflicting demands of the society for the goods and services from forested landscapes (see chapter II. Demographic Changes) and the forest-based industry must consider political commitments in the majority of the European countries with regard to sustainable forest management.

Technological innovation in wood-based industries

The wood processing and the pulp and paper industry are categorized according to their research and development (R&D) intensity as Low-Tech industries (Table 23). This classification however refers only to their internal R&D expenditure, indicating that only R&D activities can result in innovative products and processes. R&D is indeed an essential factor for maintaining the competitiveness of fast growing industries but as Arundel stresses, not the only way to innovate. “Non-RD-innovators” perform activities like technology adaptation, incremental changes or a combination of existing knowledge creating customized products or modified processes Despite new approaches exploring innovation activities (including innovation without performing R&D), R&D intensity is still being the usual proxy for innovation output [Arundel et al. 2007].

Table 23: Classification of manufacturing industries into categories based on R&D intensities

High Technology Industries	Aircraft and spacecraft
	Pharmaceuticals
	Office, accounting and computing machinery
	Radio, TV and communication equipment
	Medical, precision and optical instruments
Medium-high-technology industries	Electrical machinery and apparatus, n.e.c.
	Motor vehicles, trailers and semi-trailers
	Chemicals excluding pharmaceuticals
	Railroad equipment and transport equipment, n.e.c.
	Machinery and equipment, n.e.c.
Medium-low-technology industries	Building and repairing of ships and boats
	Rubber and plastics products
	Coke, refined petroleum products and nuclear fuel
	Other non-metallic mineral products
	Basic metals and fabricated metal products
Low-technology industries	Manufacturing, n.e.c.; Recycling
	Wood, pulp, paper, paper products, printing and publishing
	Food products, beverages and tobacco
	Textiles, textile products, leather and footwear

Source: [OECD 2011].

Rametsteiner et al. argue, referring to product, process, marketing and organisational innovation as basic categories (Oslo Manual_2005), that high tech and low tech industries show different patterns of innovation. Thus, the wood products, pulp, and paper manufacturing industries in Europe are today characterised rather by incremental innovation instead of radical innovation. That means that they focus on advancing existing technological innovations step-by-step (e.g. modular improvement of a core product design) [Rametsteiner et al. 2007:80]. The competitive advantages of the companies are in highly efficient production processes and in logistical processes. Since there is increasing competition from low-cost countries, stronger costumer focus in business strategies becomes very important (e.g. customization concerning products but also customer support services). Modular product systems with standardized components enable cost reduction of product differentiation. The innovation areas can differ significantly between enterprises with different size and value chains. For

example large companies in secondary wood processing industries tend to focus on continuous exploitation of existing innovations in order to increase operational efficiency (technology-push type innovation process); small firms rather follow costumer-oriented business models (demand-pull type innovation) [ibid.:83].

In general, the wood product, pulp, and paper manufacturing industry are being characterized as technological mature and scarce of R&D opportunities. Radical innovations (e.g. in industrial biotechnology techniques) usually take place outside of the sector. Technological innovation within the sector goes rather towards product differentiation and customization. After examining the sector in several European countries, the experts of the COST Action E51 concluded that firms in the wood manufacturing sector in most of the cases were concerned with traditional products and diffusion. [Rametsteiner et al. 2010]

Policy instruments

There is a wide range of policy instruments at the European Union level which are being used in implementation of new order to support the development of new or improved products and processes and to foster both the marketing methods (entailing changes in product design, promotion or packaging) and new organizational methods (in the internal and external relations of the firm). Innovation policy seems to be still a confusing term, which has often been mixed up with R&D policy. Thus, Bertenrath et al. suggest distinguishing between innovation (fostering innovative performance of the economy), technology (fostering advancement and commercialisation of sectorial technical knowledge) and science policy (fostering production of scientific knowledge instruments [IW consult Köln 2011].

Currently, several funding programmes and supporting initiatives exist, financed by the European Union and the European Science Foundation, which aim to foster integrated technological research in the forest-based sector (see also chapter VII. Political Coherence). A private sector initiative is the Forest-based Sector Technology Platform (FTP), which was set up in 2005. Its overall goal is paving the way towards a more knowledge-based, costumer-oriented and innovation-focussed industry by facilitating the integration of the priorities of industry and research in European research programmes (FP7, ERA-Net and Cost Actions) [FTP]. In his vision for its future development up to 2030 the FTP formulates the goal to achieve the paradigm shift from resource-based to knowledge based industries by not only developing better materials and products, which are carefully tailored to the requirements of the customers, but also by strengthening the ability to create breakthrough innovations, which

would allow a widening sustainable raw material base. This includes also application of radical innovations from other sectors (biotechnology or ICT) in the forest sector [FTP 2005].

3. Changing Technologies in Harvesting and Wood Processing

The technical measures involved in the conservation and use of forests and in wood processing and product development have changed much in the second half of the twentieth century. The implications are manifold; among others the implementation of new techniques can result in increased labour productivity, higher rate of recovery, and changed raw materials but also in reducing negative environmental impacts of operations and effects of climate change.

The following sub-chapter highlights some of the technological improvement of the last decades. Additionally an outlook on future technologies that are likely to be deployed will be given.

3.1 Forest Inventory

In the last decades the primary objective of forest management has usually been the production of wood products with growing emphasis on “sustained yield” (see also chapter VI. Forest Policy Regime). National forest inventories in Europe provide a general overview on the status of big areas (such as provinces or Bundesländer) but they are not appropriate to provide forest owners and enterprises and forest administration with exact data on the status of the actual forest resource and wood potential. Technological developments like geographic information systems (GISs) and global navigation satellite systems enable better spatial and temporal data analysis, making forest monitoring more cost-effective and consistent. New techniques like airborne light detection and ranging using lasers provide forest managers with precise information on the height, structure, density and composition of forests. Remote sensing can be applied to assess forest health. This is becoming a particularly important issue since forest damages and invasions have increased in the last decades, which have been seen as a consequence of climate change. [Mery et al. 2010: 173]

3.2 Harvesting Operations

In Europe forest harvesting practices vary a lot for a wide range of reasons. Timber harvesting practices in different countries reflect not only different site, climate and locational condition but also different societal forces. Furthermore, the choice of a harvesting method (and system) depends on the form of wood required at mill. Nevertheless, the increased mechanization of operations can be considered as a common trend, not only all over Europe but worldwide.

Probably the most important radical innovation in logging was the chain saw, which led to increased wood working productivity and quickly replaced the bucksaw and axe. The widespread use of the technology was driven by the increasing wood demand. Chainsaw, additionally to adapted agricultural skidders, is still preferred in self-employed timber harvesting in many European countries (to lesser extent in the Nordic countries e.g. Sweden). Due to aiming at higher profitability, there is a growing tendency in whole Europe that professional contractors, using efficient and expensive equipment, are being engaged, following the example of the north European countries such as Sweden or Finland [cf. Sedjo 1997]. Another solution for ensuring the use of fully mechanized machines is seen in setting up co-operations of forest owners in machinery employments. However, these harvesting techniques, originally developed for big scale forest operations, are not always suitable for privately owned small wood parcels. Becker at al. suggest that further development of adapted small-scale technology is needed in order to mobilise available wood resources [Becker at al. 2007].

In addition to the aim to produce higher yields, the development of new, highly mechanized technologies in harvesting in Sweden was strongly stimulated by the government in order to overcome labour shortages in rural areas shortly after the Second World War. The consequence was a dramatic fall in the logging employment by constant harvest levels [Sedjo_1997:18]. In the second half of the 20th century, the workforce in forestry in Sweden has been reduced by approximately 90 percent [Axelsson 1998]. The site and climate conditions like relatively flat terrain and relatively long cold periods in northern Europe are favourable for the use of improved mechanized timber harvesting systems in large-scale harvesting operations. The technology for large-scale operations has developed rapidly. Nordfjell et al offer a comprehensive review of harvesting machine development in Sweden between 1985 and 2010. They refer to the replacement of the tree-machine system (feller-buncher, processor and forwarded) by the two-machine system (harvester and forwarder) in 1985 as an important milestone in the development in mechanized harvesting. Today, harvesting operations in northern Europe are highly mechanized, aiming to maximise profitability, cost efficiency and operational control. [Nordfjell et al 2010].

In many European countries, similar to Sweden, the mechanization of harvesting operations is being forced by decreasing workforce and increasing labour costs. In addition, harvester/forwarder systems are suited for small-sized timber, which is becoming increasingly important in the wood-based industry (e.g. veneer production). The use of mechanized harvesting systems was first largely restricted due to different climate and site conditions. On sensitive forest sites, mechanized harvest operations can have harmful impacts on the environment. According to Nugent et al. sensitive forest site is "[…] where alterations to normal mechanised harvesting practices are required in order to avoid adverse effects on the ecological, economic and social functions of the forest" [Nugent et al. 2003]. Increasing land-use pressure sped up the development of site-specific harvesting solutions. Harmful environmental impact could be successfully reduced by using on-board electronic systems in order to plan, monitor and control harvesting operations. An example for a sophisticated solution in harvesting operations are integrated telemetric systems (originally developed in the telecommunication engineering) which make possible that the forwarders can be tracked in the forest and soil damage can be reduced [Owende / Lyons / Ward 2002].

In addition to operational (such as effective scheduling, control and monitoring of operations) and environmental (such as avoiding tree root damage; minimising road damages) considerations also increasing occupational safety and health play an important role in the further development of harvesting machines. At the beginning of the mechanisation in harvesting operations, the accident rate was particularly high during maintenance of the machines and noise and vibration caused new health hazard [Axelsson 1998]. The accident rate could be partly reduced by improvements concerning the machine reliability and maintainability (e.g. permanent lubricated bearings or slip-proof surfaces) and the noise level and whole body vibrations could be reduced below the health-based limit values.

The choice of harvesting methods is strongly influenced among others by the costs of the systems. Fully mechanised systems work highly efficient but they involve large capital investments. Decision support tools for timber harvesting have been improved much in the last years. Conventional planning methods, mostly based on linear programming, usually focus on minimising costs and on maximising revenues. Multi-criteria decision approaches (e.g. the multi-criteria approval method) have been increasingly used in order to approach the complexity of objectives (such as minimising logging damages or safeguard the recreational value) which affect the selection of timber harvesting methods [cf. Laukkanen et al. 2005].

Vanclay offered an overview of literature on possible future improvement in harvesting operations [Vanclay 2011]. The paper considers the following possibilities of technological development in the next two decades (selected examples):

- Additional sensors may allow assessing forest stands faster and better and thus enabling remote support services and off-site guidance.
- Physical and chemical properties of stem wood may be gauged by using near infrared or other spectral analyses.
- Laser scanners, mounted on an autonomous scout, by utilizing multiple viewpoints and processing data before the machine reaches tree, may allow continuous scanning of the forest stand.
- Ground-penetrating radars may provide information on soil depth, carbon content and organic matter.
- Real-time information may allow tree-by-tree decisions about harvesting options.
- Improvements biomass-to liquid technology may allow on-site diesel manufactures.

Technological development in forestry and labour productivity

As already mentioned, technological development can have a considerable impact on the speed of production and on the quality and quantity of products. Moreover, it can lead through higher production to lower employment (if demand is increasing less than production). The example of the sub-sector forestry shows that it is not easy to obtain sectorial data over time. The reason why reliable data for employment in the forestry subsector for the EU27 are difficult to find is that in official statistics part-time employment and seasonal employment are often not considered. In addition, informal employment is significant in some of the Eastern European member states [Lebedys 2008].

Table 24 shows that decline in employment in forestry has been a continuous trend in Europe in the last decades (see also chapter III. Economic developments). It is also apparent that there are different trends among European regions and countries. Even if one can only approach these figures very tentatively, the usual interpretation is that increased mechanization in forestry accounts for the majority of job reductions [Forest Europe / UNECE / FAO 2011s].

Table 24: Annual change rate of forestry employment by region for European countries (data calculated only for in total 18 countries where a full time series was available)

Area	Annual Change rate (%)		
	1990-2000	2000-2005	2005-2010
Russian Federation	0.83	-3.29	-15.32
North Europe	-3.05	-2.70	-0.73
Central-West Europe	-2.33	-4.23	0.16
Central-East Europe	5.70	-0.87	-3.70
South-West Europe	0.21	0.33	0.72
South-East Europe	-0.02	-13.16	4.35
Europe withouth the Russian Federation	0.33	-1.91	-1.10
EU-27	-1.54	-2.50	0.35

Source: [Forest Europe / UNECE / FAO 2011s].

Technology is an important determinant, although not the sole one, of labour productivity. (Labour productivity means in a broad sense the amount of goods and services which is produced by a unit of labour during a given period of time.) Additionally to technological change, there are also other factors which influence productivity growth like capital intensity. Despite this, in the longer-term view labour productivity is usually reduced to improvements in technology. There are a few analyses of past trends (of the last few decades) for labour productivity for the European forest-based sector and for its different subsectors [e.g. Lebedys 2008], but they should be interpreted with caution. On the one hand, they only cover selected value chains of the sector. Differences in forestry practises in different countries are not considered, therefore, even if for example many people are employed in tree planting in one country they appear to have a low productivity because it is defined as roundwood production per employee [Lebedy 2008:21]. On the other hand, as it was already pointed out, comparable data over time are not available for all countries. Moreover, as Teischinger [Teischinger 2009: 8] stressed, different statistics and information on the forest based sector at the European level provide incoherent information due to lack of common understanding on the sector's boundaries (e.g. in some statistics furniture manufacturing is included in the sector, in others not).

Very general, it can be said that in 2008 labour productivity in forestry in Europe was the highest in the North European countries (in particular in Sweden and Finland) and in Austria (countries with a high level of mechanization in forest operations) and the lowest in the countries of Eastern Europe (including the Russian Federation). In many of these latter countries, production fell approximately

50 percent in the early-1990s but employment has not reduced by as much (the consequence was a decline in labour productivity) [Lebedy_2008:21]. It is expected that in the next years increasing diffusion of technology (especially improved harvesting technologies and logistics) will lead to a stark decline of unskilled labour in Eastern European countries [Nilsson 2006].

3.3 Sawmilling Technologies

Sawmills utilize forest resources and produce sawn timber which is being used mainly in construction and in manufacturing windows and doors and furniture. Through the introduction of computer-supported manufacturing processes in sawmilling since the early 1990s there have been considerable improvements in the rate of recovery. The main recent innovations in sawmilling enable better information on log diameter, length and shape by using laser and X-ray scanners together with high-power computing. Woods, which are subject to major defects (e.g. knots), can benefit from the application of new sensor techniques for the detection of defects. New methods in drying could speed up the drying process. High-temperature drying of softwoods and lighter hardwoods replaced the low-temperature kiln dryer (which was widely used in the 1970s) and vacuum technologies (e.g. vacuum drying with superheated steam) have been introduced for drying hardwood species [Sales 2001]. Table 25 shows some trends in sawmilling starting from the seventies until 2020, compiled by Homila. [Usenius et al. 2010].

Table 25: Recent and future trends in sawmilling

Process	1970	2000	2020
Log Sorting	Shadow measuring 20 sorting bins	Speed 13.000 pcs/8 h 40 or more sorting bins	Speed 15.000 pcs/8 h 3D + x-ray scanning Better measuring of logs → better control of final products Increased number of bins Bucking also at cross cutting terminals
Sawing	Frame sawing Cant sawing Manually controlled edging of sideboards	Circular and band sawing Cant sawing Automatic edging	Circular and band sawing Cant and live sawing Sophisticated edging Better guide systems for blades

			Higher sawing speed
Drying	Compartment and progressive kilns	Increased number of progressive kilns	Intensifying of present drying methods
Final sorting	Manual sorting Limited number of grades, no costumer grades, length sorting at separate plant	Automatic sorting	Self-learning sorting automats. Knots could be scanned at green sorting and knot information could be used at final sorting by using marketing of sawn timber pieces. Final sorting can also be carried out at green sorting

Source: [Usenius et al. 2010].

Technological innovation in sawmilling and veneering has not only affected product quality but also enabled better utilization of small-dimension timber. Small-diameter logs are traditionally used to manufacture pulp but in the last 10-15 years they have been increasingly used also to generate energy, especially in countries with abundant forest resources like Sweden. Since in many EU member states subsidies and various incentive policies have been introduced in order to foster energy from biomass and the prices for fossil fuels have continuously increased, the demand for forest residues but also for pulpwood raised. Simultaneously, small-diameter logs have been increasingly used as a raw material for the manufacture of structural and non-structural panels. The multiple opportunities to use small-diameter trees encourage plantation development and maintenance of relatively fast-growing trees in management planning [cf. Kong / Rönnqvist /F risk 2011]. Depending on the changes of price relations, price level and logging costs the multiple options for utilizing small-diameter logs can affect decisions on the optimum rotation period [cf. Jöbstl 2011].

The sawmill industry is affected by the type of activities in the construction industry. In Europe, until the early 1990s wood was mainly used for single-family houses, but for larger buildings usually steel and concrete structures were chosen as construction material. Due to changes in the regulatory conditions for constructing multi-storey buildings in European countries and simultaneous development of technologies such as finger-jointing, edge-jointing and glue laminating techniques and the introduction of stress graded wood products the use of wood for constructions purposes of multi-storey buildings has been raised [see more e.g. Sathre / Gustavsson 2009]. Furthermore, there is a

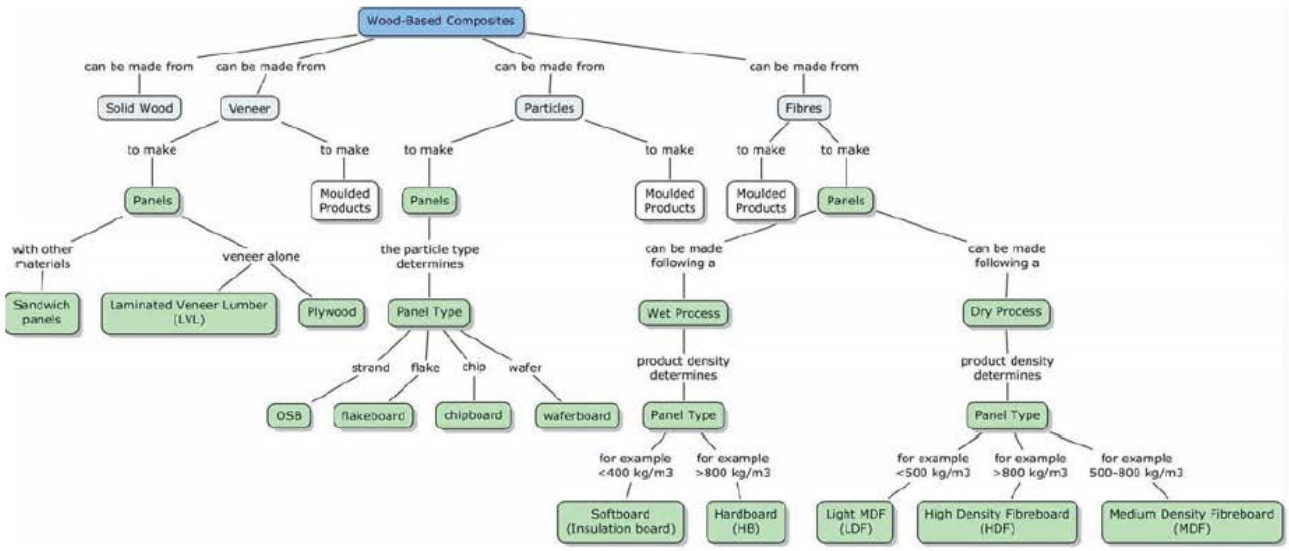
growing awareness of customers towards wood as a construction material due to its climate change mitigation potential.

Definitions for green building vary widely across countries in Europe. A simple definition is that green buildings have more and better sustainable features that conventional ones. Regulatory incentives and mandates support the mainstreaming of green buildings in Europe. However, there are a number of limiting factors for moving to greener buildings such as varying building codes or lack of a transparent data sources for Europe that would demonstrate the financial performance premium of green building over conventional buildings [cf. Nelson 2010]. The level of wood use in construction in Europe varies significantly between countries, being relatively high in the Nordic countries. However, currently the Euroconstruct region is experiencing a downturn of demand resulting, among others, from the recession of 2008 and 2009 and severe economic (and political) crises of the Eurozone [cf. UNECE / FAO 2012].

3.4 Wood-Based Panels

The term wood-based panel refers to a wide range of different board products (Figure 27) such as veneer sheets, plywood, particle boards (e.g. oriented strandboard (OSB), and fibre board (e.g. medium-density fibreboard (MDF).

Figure 27: A map summarizing the wide range of wood composites that can be made



Source: [Thoement / Irle / Sernek 2010].

Broadly speaking, the technology development of manufacturing wood-based panels was triggered on the one hand by increasing costs of logs and lumber and on the other hand by consumer demands for

better furniture and building materials. For manufacturing most of the panel products (with some exceptions like plywood), cheaper raw material than high-quality wood is required, for example sawmilling residues, bark, low grade logs such as small-diameter logs or recovered wood. Figure 18 in chapter III Economic Developments illustrates well the market acceptance of wood-based panels especially in the case of MDF and OSB. Wood-based panels can on the one hand be substituted for products that are made of solid wood and on the other hand allow wood to be used in applications that are traditionally dominated by steel, concrete or other materials.

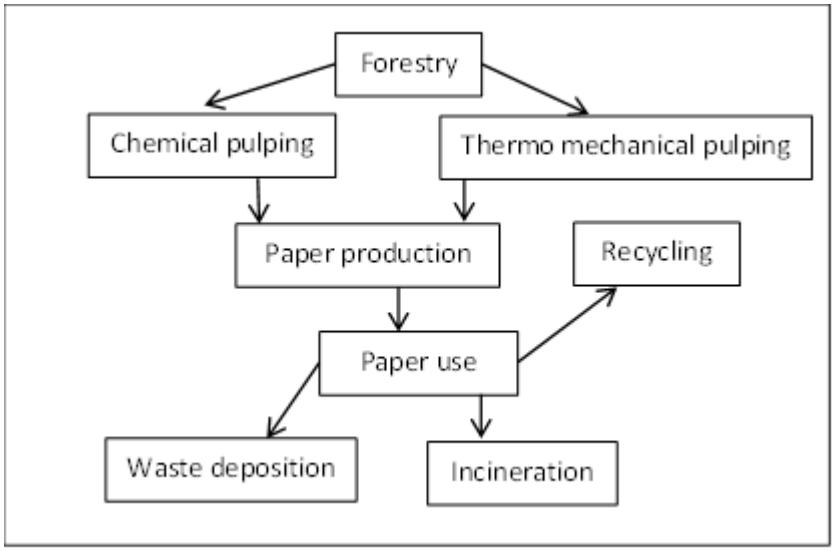
Intensified competition for raw materials with other wood industries and the energy sector forces the wood-based panel industries to mobilize alternative sources and continuously modify and optimize manufacturing processes. Research activities and technology development have focused especially on improving adhesive formulations, production technology and measuring and control techniques, aiming at better product quality and economising costs in manufacturing. Furthermore, reducing negative environmental impacts has become increasingly important and fostered the use of advanced drying techniques (e.g. application of secondary filtering equipment) and more environmental-friendly binding chemicals [cf. FAO 1997]. Harmful formaldehyde emissions could be considerably reduced in the last decades and on-going research activities focus on further reduction. Reducing volatile organic compounds in order to minimize negative effects on human health is another focus of research.

One example for current research approaches is the development of dense or porous monolithic carbon materials using cellulose for example wood-based composites. The carbon materials can be used either directly as for example electrodes or after further conversion as silicon carbide ceramics (their fields of application are combustion chambers, heat exchangers etc.).

3.5 Pulp and Paper Manufacturing

Paper is made of natural fibres, which are either from wood or from recycled materials. Figure 28 illustrates the simplified process of paper production including paper post-use (recycled paper and landfilled or incinerated waste material).

Figure 28: Paper production system



Source: [Oosterhuis et al. 2006]

Technological innovation in the pulp and paper industry is driven not only by cost considerations, competition and consumer demand but increasingly by environmental policies. Since the late 1980s technological developments have increasingly focussed on raising energy efficiency and reducing CO^{2e} emissions. Today, most modern paper mills have their own combined heat-and-power unit in order to meet the heat demand during processing. Resulting from rapidly developing improved pulping and bleaching technologies the negative environmental impacts of processing could be significantly reduced. For example, reduction of volume and toxicity of effluence could be achieved and through the chlorine-free bleaching process (starting with elemental chlorine-free "ECF" and now increasingly used totally chlorine-free "TCF" bleaching technologies) emission of toxic pollutants could be reduced. In addition, using ECF technology, which was triggered by demanding environment-conscious consumers, the raw material input could be reduced [cf. FAO 1997 and Kuik 2006].

Black-liquor gasification and advanced drying technologies are examples for technologies, which can considerably contribute to energy saving. The synthesis gas, produced using black-liquor gasification combined cycle (BLGCC), can be utilized in gas-turbine power generation or as a feedstock to produce chemicals or biofuels. The BLGCC method allows a more efficient utilization than burning black-liquor in conventional recovery boilers. Paper drying accounts for 25-30 percent of the total energy used in the pulp and paper industry therefore research efforts concentrate on more efficient water removal techniques (e.g. by combining increased pressing with thermal drying). [Gielen / Tam 2006:12].

Technological advances in processing techniques have significantly contributed to the diversity of supply sources for the pulp and paper industries. For example, hardwood species with shorter and weaker fibres can be better utilized today due to modern technologies. Advanced techniques in chemically treating or refining the pulps resulted in high quality products from cheaper input fibres. Taking a global view, the importance of fast growing forest plantations has been growing and the dominance of supply of fibres started to shift from the traditional supplier countries of the Northern Hemisphere (e.g. Sweden and Finland in Europe and Canada and USA in America) to countries in the South (e.g. Brasil, Chile, Australia or New Zealand) [cf. Whiteman 2005].

In the coming years, the increased development of new energy and water saving processes is expected (driven by energy and water scarcity). Furthermore, technology research will continue to focus on development of natural and biodegradable process chemicals, fillers and binders. Biorefining process optimization will enable better utilization of multiple feedstocks (such as harvesting residues, fractions of pulping liquors, recycled paper) in integrated biochemical, thermochemical and physical-chemical conversion processes [cf. Mery et al. 2010].

Paper recycling

Further focus of technology improvement was better utilization of recovered paper for paper-making. The main drivers for increased recycling were limited raw material resources and environmental concerns. There is a growing preference among consumers for eco-friendly products. The rate of recycling has been increased in the last decades in Europe (see also figure 21 in chapter III. Economic development) and have led to reduced demand for virgin fibre from pulpwood or wood chips. The production capacities of paper mills in Europe using entirely or predominantly recovered paper and board as “raw material” have increased in the last 10-15 years. At the same time, the competition for recovered paper and board is increasing due to growing demand from the bioenergy sector.

For some years now, diverse policy regulations at the national level in European countries and at the EU-level have stimulated investments in energy saving and environmentally friendly manufacturing solutions. However, according to the conclusions of Stawicki, policy implementation has been slowed down due to discussions between the regulators and the pulp and paper industry about the performance goals and adequate policy measures (regulation versus self-regulation; standards, fiscal incentives or taxation). [Stawicki / Read 2010:155].

Changes in recycling technologies in the future are expected due to changes in paper additives (e.g. green chemicals, organic or hybrid pigments) and changes in fibre types (such as functionalised fibres

and nano-fibres). Furthermore, new printing and converting technologies and improvements in papermaking technology should influence recycling technologies [ibid.:123].

4. Conclusion

This chapter dealt with technological development in the forest-based sector in the last five decades. In general, technology changes such as mechanisation of harvesting operations have led to increased productivity and efficiency of processing wood and to reduction of workforce. The growing competition for wood as raw material has sped up the development of techniques that enable diversification of input materials for processing. In the pulp and paper industry for example, the supply of virgin fibres have started to shift from the northern European and northern American countries towards countries of the southern hemisphere partly because modern techniques have allowed better utilization of hardwood fibres. The utilization of recovered wood and fibres have been significantly increased due to improved collecting and sorting systems and treatment technology but at the same time there is a growing competition for these materials with the bioenergy sector. Since the pulp and paper production is highly energy- intensive, scientific and technological research has concentrated at increasing energy (and material) efficiency.

Due to increasing awareness for environmental concerns of customers and policy regulation, reducing negative environmental impacts of processing has been another focus of process development. The industries in the forest-based sector have increasingly made use of enabling technologies (ICT solutions or industrial biotechnology techniques) but radical innovations usually have taken place outside the sector.

V. Forest Ownership and Tenure Arrangements for Forest Land Use

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1. Introduction

Forests are complex ecosystems and perform a wide variety of functions. Understanding the concept of forest tenure is essential for all actors concerned with forests, indicating the authority determining the function and use of forest and other wooded land.

The objective of this chapter is to achieve an understanding of selected aspects of the broad concept of forest tenure within the European Union and its relation to and impact on the management of forested landscapes. Therefore, the forest ownership structure as well as tenure arrangements for forest-land use in the European Union will be described, considering the main characteristics, and major changes in the past and (where possible) its – evident or presumed – impact on forest management.

The first section will give an overview of the global and European forest cover and determine the forest ownership structure in Europe. The main classes of ownership in the EU 27 will be defined, taking into account that since the 1980's new ownership patterns evolved: the fragmentation of forest ownership will be highlighted within this section, as well as the increase and importance of private forestry. Furthermore, the section will have a look at managed and certified forest areas in the EU 27, as they are considered to be one prerequisite for sustainable forestry.

The second section will have a look at tenure arrangements that support sustainable forest management, ranging from state-managed forests to the allocation of management rights to non-state actors, such as communities or private forest owners. It will introduce and give a broad overview of the main tenure arrangements relevant in the European Union, illustrated by selected examples.

<u>Theoretical background</u>

The term "tenure" refers to a variety of arrangements for the access to and the use of forests and its resources. Above all, forest tenure determines who can use what forest resource, for what period of time and under what conditions [see Romano 2006: 5]. The theoretical background for the concept

of tenure is given by Edella Schlager and Elinor Ostrom [1992], who define tenure rights to forest resources as a conceived "bundle of rights", ranging from access and use rights to management, exclusion and alienation rights. As the FAO states, "[different] tenure arrangements allocate different combinations of rights to the bundle, such as rights to use, manage, control, market products, inherit, sell, transfer, dispose of, lease or mortgage" [FAO 2011a: 5]. It is hereby important to distinguish the concept of tenure from that of ownership: Forest tenure includes – besides tenancy and other arrangements – the concept of ownership; this being "a particular type of tenure in which strong rights are allocated to the landholder" [ibid.].

Data sources and data records

The chapter provides a summary of the results of an extensive data and literary analysis. The data and corresponding information presented are based solely on a review of existing (statistical) data, official documents, scientific papers and articles, and published reports. Its primary purpose is to provide a comprehensive background of tenure arrangements and ownership structures within the European Union, highlighting selected examples, and its relation to and impact on the management of forested landscapes.

Significant information sources can be differentiated into two main categories:

a) studies prepared by European and international organisations (e.g. EUROSTAT, FAO, UNECE, UN, World Bank), and
b) scientific and other secondary literature.

Despite the importance of forest tenure and ownership, it has only recently received the attention of the European research community [see Muller 2011], and there is a lack of available information and data as only few countries keep accurate tenure data [see White / Martin 2002: 3; UNECE / FAO 2000]. Besides, forest tenure and data about forest ownership and management status are very contextual, as national and local laws have unique terms and rights assigned [see RRI 2011: 3]. Therefore, as a result of the complexity of the combinations of forest tenure rights, summaries for the countries of the European Union are inevitably imprecise.

Scope and selection of countries

Most studies prepared by European and international organisations do not exclusively focus on the 27 countries of the European Union, but present data on a global or pan-European level (including, e.g., the Russian Federation, Norway, Switzerland and other European countries that are not part of the European Union). As this chapter is a compilation of data from different sources, different

geographical regions have been focused on. For the purpose of this chapter, countries were mainly grouped as follows (according to UNECE / FAO 2005):

- Western Europe (Austria; Belgium; Denmark; Finland; France; Germany; Greece; Iceland; Ireland; Italy; Luxembourg; Netherlands; Norway; Portugal; Spain ; Sweden; Switzerland; and United Kingdom);
- Eastern Europe (Albania; Bosnia and Herzegovina; Bulgaria; Croatia; Czech Republic; Estonia; Hungary; Latvia; Lithuania; Poland; Romania; Serbia and Montenegro; Slovakia; Slovenia; The former Yugoslav Republic of Macedonia (TFYR Macedonia); and Turkey);
- CIS-countries (Belarus; Republic of Moldova; Russian Federation; and Ukraine).

If other geographical regions (like Central Europe or the Atlantic countries) have been investigated within a certain study or scientific paper, the region will be defined and the countries specified. However, within the framework of this study, the focus of this chapter was explicitly on the EU 27, and wherever possible, respective data were extracted. If appropriate, data for the European Union were compared with other regions of the world in order to gain a better understanding of changing structures. If for a certain factor no study on the EU 27 or European level existed, but the factor has been investigated on a global or on country level and can give insights that are important also for the European level, than this study will be considered as well.

Time period

Data about the overall forest ownership structure and tenure arrangements within the European Union have only recently been collected, analysed and compared. A comprehensive analysis of forest ownership and forest tenure in the EU 27 has been conducted within the Forest Resource Assessment (FRA) by the FAO for the first time in 2005. Since 2010, even more information about different types of private ownership as well as who manages public forests have been included [FAO 2005 and 2010]. Within the *State of Europe's Forests* (2007 and 2011), changes in the share of different forest ownership patterns in the MCPFE regions are presented from 1990 to 2005 [Forest Europe / UNECE / FAO 2007 and 2011a].

It is therefore possible not only to refer to the state-of-the-art, but also to cover the present situation and its changes up to the past 20 years. If further data existed for a certain factor covering a broader time period, then these data will be taken into account as well.

2. Analysis of Components of the Forest Tenure and Ownership System

This section will have a look at the global and European forest cover and determine the forest ownership structure in Europe. The main classes of ownership in the EU 27 will be defined, taking into account that since the 1980s new ownership patterns evolved: the fragmentation of forest ownership will be highlighted within this section, as well as the increase and importance of private forestry. Furthermore the section will have a look at managed and certified forest areas in the EU 27 – the latter possibly being one indicator for the quality of forest management as the area of certified forests has been growing.

2.1 Global and European Forest Cover

To have an overview of the European forest cover is a first step towards unravelling the complexity and variety of European forest types and structures. Thereby, the forests of the European Union should not be viewed in isolation, but in a global context.

Global forest cover, as estimated by the FAO, amounted to just over 4 billion hectares in 2010. The data of the FAO tend to be the point of reference for all organisations with a professional interest in the status of global forests, although there is disagreement about the interpretation and analysis of the data (for a detailed critique of the FAO data see [Mathews 2001] or [WRM 1999]). Despite diverse efforts to protect forests, the cover of the world's forests tends to decrease rapidly. In 2005, the FAO estimated that the global deforestation rate was about 13 million hectares – an area the size of Greece – during the period 1990-2005 [FAO 2006a]. Conversely, forest areas can be increased to mitigate the net loss of total forest area, through either afforestation or by the natural expansion of forests. Nevertheless, it is estimated that the world lost about 3 % of its forests between 1990 and 2005. At present, about 200 km^2 of forest area is lost each day [UNEP / GRID-Arendal 2009: 10]. The forests of Europe account for about four percent of the world's total forest area. Contrary to what is happening in other parts of the world, forest cover in Europe is slightly increasing (see chapter III Economic Development).

There are significant differences in forest cover throughout the European countries, with the highest percentage of forest cover found in the very Northern and Southern parts of Europe (see Table 26). The differences in the forest cover are, among other things, to a large extent dependent on historical development, population densities and climatic conditions [see Elands / Wirth 2010: 142]. In 2012,

the EU 27 has approximately 178 million hectares of forests and other wooded land, corresponding to 42 % of its land area. Over the past 20 years, this had gradually increased by approximately 0.3 % per year, although the rate varies substantially between the member states of the European Union [Eurostat 2012: 122].

Table 26: Forest Cover of the Countries of the EU 27, 1990-2010

Country	Forest Area (per 1,000 ha)			
	1990	2000	2005	2010
Austria	3,776	3,838	3,862	3,887
Belgium	677	667	673	678
Bulgaria	3,327	3,375	3,651	3,927
Cyprus	-	-	-	-
Czech Republic	2,629	2,637	2,647	2,657
Denmark	445	486	534	544
Estonia	2,09	2,243	2,252	2,217
Finland	21,889	22,459	22,157	22,157
France	14,537	15,353	15,714	15,954
Germany	10,741	11,076	11,076	11,076
Greece	3,299	3,601	3,752	3,903
Hungary	1,801	1,907	1,983	2,029
Ireland	465	635	695	739
Italy	7,59	8,369	8,759	9,149
Latvia	3,173	3,241	3,297	3,354
Lithuania	1,945	2,02	2,121	2,16
Luxembourg	86	87	87	87
Malta	n.s.	n.s.	n.s.	n.s.
Netherlands	345	360	365	365
Poland	8,881	9,059	9,2	9,337
Portugal	3,327	3,42	3,437	3,456
Romania	6,371	6,377	6,391	6,573
Slovakia	1,922	1,921	1,932	1,933
Slovenia	1,188	1,233	1,243	1,253
Spain	13,818	16,988	17,293	18,173
Sweden	27,281	27,389	28,203	28,203
United Kingdom	2,611	2,793	2,845	2,881

Source: [FAO 2010a: 229-233]; n.s. = not significant.

2.2 Forest Ownership Structure

As mentioned above, 178 million hectares or 42 % of the EU 27 land area are forests and other wooded land. Not only European forest cover reflects the great diversity throughout the countries of the European Union, but also the forest ownership structure varies greatly, as this section will show.

Data sources and time period

Data about the overall forest ownership structure of the European Union have only recently been collected, analysed and compared within studies of European and international organisations. A comprehensive analysis of forest ownership and forest tenure in the EU 27 has been conducted within the Forest Resource Assessment (FRA) by the FAO for the first time in 2005. Since 2010, even more information about the different types of private ownership as well as who manages public forests have been included [FAO 2005 and 2010]. Furthermore, within the Private Forest Ownership project, a joint enquiry by UNECE/FAO Forestry and Timber Section, the Ministerial Conference on the Protection of Forests in Europe (MCPFE) and the Confederation of European Forest Owners (CEPF) analysed data from private forest owners within 23 European countries (altogether, 23 reports out of the 38 MCPFE countries were received, out of which 19 countries belonged to the EU 27: Austria, Belgium, Bulgaria, Cyprus, Czech Republic, Finland, France, Germany, Hungary, Ireland, Latvia, Lithuania, the Netherlands, Poland, Romania, Slovakia, Slovenia, Sweden, and the United Kingdom). The corresponding publication is one of the most comprehensive surveys demonstrating the significance of private forestry in Europe [Schmithüsen / Hirsch 2010]. As a result of the 2006-2007 enquiry, a Private Forest Ownership Database was established in 2007. Within this section, these data are complemented by scientific and other secondary literature to give a comprehensive overview of the historic emergence and present situation of the forest ownership structure of the EU.

Definition(s)

Forest ownership generally refers to the legal right to freely and exclusively use, control, transfer, or otherwise benefit from a forest [see introduction, also FAO 2010a]. The main classes of forest ownership in Europe are private ownership and public ownership (see Table 28). Another category of ownership, which is sometimes included in certain reports and enquiries, is the ownership by

indigenous or tribal peoples [e.g. see UNECE / FAO 2000]. However, this category is less relevant for the countries of the EU 27 (in comparison to other parts of the world like Australia, South America or Asia) and will not be considered in the frame of this study. Corresponding to Eurostat [2009], the two main categories – private and public ownership – are defined as follows:

- Private ownership refers to land owned by individuals, families, private co-operatives, corporations and enterprises, religious and educational institutions, pension or investment funds, or other (academic, financial) private institutions.
- Public ownership refers to land owned by the state, state-owned institutions or corporations or other public bodies, including cities, municipalities, villages and communes.
- Other ownership refers to land that is neither 'public' nor 'private'. It includes land for which ownership is unknown or undefined.

A forest holding is defined as one or more parcels of forest and other wooded land which constitute a single unit from the point of view of management or utilization, as commonly accepted by UN-ECE and FAO specialists on the Temperate and Boreal Forest. In the case of state holdings, a holding should be defined as an area forming a major management unit administered by a senior official, e.g. a Regional Forestry Officer [UNECE / FAO 2000: 102].

Table 27: Ownership of the World's Forests

Region / Year	Forest Area (per 1,000 ha (%))							
	Forest Area		Public		Private		Other	
	2000	2005	2000	2005	2000	2005	2000	2005
Africa	708.564	691.468	539.248 (97.6%)	634.571 (94.5%)	9.951 (1.8%)	25.710 (3.8%)	3.127 (0.6%)	10.487 (1.5%)
Asia	570.164	584.048	534.845 (94.4%)	475.879 (81.5%)	28.239 (5.0%)	107.520 (18.4%)	3.214 (0.6%)	640 (0.1%)
Europe	998.239	1.001.150	897.059 (89.9%)	897.453 (89.6%)	99.631 (10.0%)	101.817 (10.2%)	1.380 (0.1%)	1.847 (0.2%)
North and Central America	705.497	705.296	462.477 (66.2%)	432.307 (61.7%)	208.525 (29.9%)	222.799 (31.8%)	27.284 (3.9%)	46.040 (6.6%)
Oceania	198.381	196.745	125.527 (61.3%)	121.316 (61.9%)	48.575 (23.7%)	72.677 (37.1%)	30.831 (15.0%)	2.088 (1.1%)

South America	904.322	882.258	103.379 (75.9%)	641.505 (75.3%)	23.528 (17.3%)	180.602 (21.2%)	9.333 (6.9%)	29.522 (3.5%)
World Total	4.085.168	4.060.964	2.662.534 (84.4%)	3.203.040 (80%)	418.538 (13.3%)	711.125 (17.8%)	75.170 (2.4%)	90.654 (2.3%)

Source: [FAO 2010a: 122, 263-267]; [FAO 2005: 122].

Past development

The forest ownership structure in Europe emerged over the course of history, dating back to medieval edicts. When legal conditions of forests arrived in Western Europe in the 6th century, the Germans were the first to give legal worth to the forests as royal hunting reserves (silva regalis) [Paletto / Sereno / Furuido 2008: 25-32]. The hunting tradition is one of the most significant historical influences on forest ownership throughout Europe, and former royal hunting forests still form the backbone for recreation and nature-based tourism in many Atlantic countries (Belgium, Denmark, Iceland, Ireland, the Netherlands, United Kingdom) as well as in Austria, France, Germany, and Switzerland [see Elands / Wirth 2010]. Shaped by the past, in modern history governments have legally owned the majority of the forests [White / Martin 2002: 2]. This is however beginning to change, as the following chapter will show.

Main characteristics

The number of forest holdings and their ownership are assumed to have implications for forest management and various other socio-economic circumstances, although the report *State of Europe's Forests* emphasises that these relationships vary across countries [Forest Europe / UNECE / FAO 2007 and 2011a]. Clarity of ownership structures is essential for the sustainable management of forests in the European Union in avoiding and resolving tenure-related conflicts.

In the EU 27, there is an overall balance between public and private ownership of forests and other wooded land: on average, 47.6 % is privately owned and 47.5 % publicly (in 2005, see Table 28). However, there are large differences in the ownership structure at country level. In Austria, France, Portugal and Sweden, privately owned forests account for more than ¾ of the total forest area, whereas in Bulgaria, the Czech Republic, Greece, Poland and Romania they represent less than ¼. Some countries are characterised by a relatively balanced forest ownership structure, especially Belgium, Germany, Hungary, Ireland, Latvia, Luxembourg, the Netherlands and Slovakia.

Table 28: Ownership Structure of Forests and Other Wooded Land, 2005

Country	Ownership Patterns (%)		
	Public	Private	Other
Austria	19	81	0
Belgium	44	56	0
Bulgaria	89	11	0
Cyprus	-	-	-
Czech Republic	76	24	0
Denmark	30	69	1
Estonia	40	43	17
Finland	32	68	0
France	26	74	0
Germany	53	44	4
Greece	77	23	0
Hungary	58	42	n.s.
Ireland	58	42	0
Italy	34	66	0
Latvia	54	46	n.s.
Lithuania	66	34	0
Luxembourg	47	53	0
Malta	100	0	0
Netherlands	49	51	0

Poland	83	17	0
Portugal	2	98	0
Romania	80	20	0
Slovakia	52	43	6
Slovenia	26	74	0
Spain	29	66	5
Sweden	24	76	0
United Kingdom	35	65	0

Source: [FAO 2010a: 236-237]; n.s. = not significant.

The EU's forests vary from small private to large state forests, from small family owned holdings to large estates owned by companies, many as part of industrial wood supply chains. The number of forest holdings is partly or completely missing for some countries of the EU 27, making it impossible to describe the exact status of the various regions. The following Table 29 illustrates – where possible – the number of forest holdings and their average size within the countries of the EU 27. As a generalisation,

(1) … the number of holdings of forest and other wooded land in private ownership is much higher than that of public holdings. In 22 of the EU 27 countries (data missing for Cyprus, Finland, France, Ireland and Romania), there are approximately 4,696,604 holdings of forest and other wooded land in private ownership, which average size shows that small scale land holdings prevail in private European forests [UNECE / FAO 2000: 116]. Contributing to the *Global Forest Resources Assessment 2000*, the data of UNECE and FAO [2000] furthermore show that in 24 of the EU 27 countries (data missing for Finland, Ireland and Romania), approximately 6,264,222 holdings of forests and other wooded land are in public ownership, with a considerable variation in the average size of holdings.

(2) … the average size of public holdings of forests and other wooded land is considerably larger than the average size of holdings in private ownership. The Alterra-report *Future Wood Supply from European Forests* confirms that most of the forest holdings of private owners are very small: about 5 to 10 ha each [Nabuurs et al. 2002: 21].

Overall, the level of information on certain aspects of forest ownership structure remains low, notably on the number of small forest holdings and (private / public) ownership patterns. Despite the commonly accepted importance of the forestry sector for sustainable development, data about the overall forest ownership structure of the European Union have only recently been collected, analysed and compared. However, information on ownership structure of forest and other wooded

land in the European Union "is important as a basis for policies related to the social and economic elements of sustainable forest management as well as environmental ones. Especially for small private properties, [this information] is costly, difficult and sometimes sensitive to collect." [UNECE / FAO 2000: 106] Further improvements of the information base are essential.

Table 29: Number and Average Size of Holdings of Forests and Other Wooded Land, 1990-1997

Country	No. of Holdings (number)		Average Size of Holdings (ha)	
	in public ownership	in private ownership	in public ownership	in private ownership
Austria	7,286	227,307	206	8
Belgium	877	155,11	330	2
Bulgaria	177	0	22,053	0
Cyprus	423	-	383	-
Czech Republic	4,566	137,26	484	3
Denmark	616	20,005	248	18
Estonia	180	17	10,989	11
Finland	-	-	-	-
France	15,926	-	265	-
Germany	13,04	349,361	468	10
Greece	2,19	1,265	2,434	934
Hungary	962	74,047	1,215	9
Ireland	-	-	-	-
Italy	2,241	815,586	1,645	9
Latvia	575	117,645	2,918	11
Lithuania	134	139	12,56	3
Luxembourg	295	13,785	140	3
Malta	21	0	17	0
Netherlands	2,558	28,87	68	6
Poland	461	843,802	16,156	2
Portugal	1,14	409,524	234	8
Romania	-	-	-	-
Slovakia	573	28,659	1,977	31
Slovenia	253	290	1,372	3
Spain	8,718	661,992	643	31
Sweden	13,557	260,386	454	93
United Kingdom	646	106	1,659	13

Source: [UNECE / FAO 2000: 116]; reference period between 1990 – 1997.

Outlook and impact

Private ownership of forests is increasing (see Table 27, also chapter 3.2), although it is not possible to generalise this tendency at the regional level, while the area under public ownership decreased. However, as summarised in the *Global Forest Resources Assessment 2010*, it is "not possible to say how much of the reduction in the area of publicly owned forests is due to changes in ownership itself or to a reduction of the total forest area" [FAO 2010a: 125]. The report *State of Europe's Forests 2011* stated that for countries in Central-East Europe (Belarus, Czech Republic, Georgia, Hungary, Poland, Republic of Moldova, Romania, Slovakia, and Ukraine) and countries in North Europe (Denmark, Estonia, Finland, Iceland, Latvia, Lithuania, Norway, and Sweden), "the increase in private forest seems to be of the same order as the reduction of public forest. The area of private forest in Central-East and North Europe increased by about 7.5 million ha, largely as a result of restitution and privatization measures. For Europe, privatization efforts especially led to a substantial increase in the area of private forest for Estonia, Latvia, Lithuania, Czech Republic, Hungary, Romania, Slovakia and Bulgaria." [Forest Europe / UNECE / FAO 2011a: 110] Siry, Cubbage and Newman point out that another factor could stand behind forest decline: "While market failures are often used to justify government intervention, widespread losses in government owned forests suggest that government policy failures may be equally serious factors behind forest decline." [Siry / Cubbage / Newman 2009: 8]

How the size and ownership of forest holdings influences forest management on the EU 27 level has not yet been investigated. The study by Siry, Cubbage and Newman [2009] indicates (based on aggregate statistical analyses of forest data and research literature) that on the global level private forests provide more market-based goods such as timber, while public lands produce proportionately more fuel wood and multiple-use goods and services. Nevertheless, the environmental performance of private forests tends not to be measurably different than that of public forests.

Furthermore, the report *State of Europe's Forests 2011* concluded that forest ownership structure "is known to have implications for forest management and the production of timber and other forest products and services. However, these relationships are not very well known." [Forest Europe / UNECE / FAO 2011a: 110]

2.3 Fragmentation of Forests and "New" Forest Owners

The decrease of public forest and the increase of private forest ownership (see chapter 2.2) is often associated with the parcelization, or fragmentation, of forest and other wooded lands. The fragmentation of forest ownership, especially of private holdings, may represent a challenge to

sustainable forest management, as access to infrastructure, equipment and the transfer of know-how gets more complicated when owners are many.

Data sources and time period

An overall study covering Europe or even the member states of the European Union concerning the on-going process of parcelisation, or fragmentation, of forests and other wooded land and its – evident or presumed – impact on forest management does not exist. However, the process of fragmentation has been recognised and announced within studies prepared by European and international organisations (e.g., by the *Ministerial Conference on the Protection of Forests* in Europe, the reports *World Forest Resources* by the FAO, and the study *Forest Resources in the European Region* by the FAO).

One comparative European study about the nature and dynamics of small-scale forest landowners has been conducted by Wiersum, Elands and Hoogstra in 2005, interviewing 1,401 small-scale forest owners in 8 European countries (Denmark, Ireland, the Netherlands, Austria, Germany, Hungary, Greece and Spain). The growing importance and awareness of small-scale forest ownership in Europe can also be seen in the launch of a new forestry journal (*Small-Scale Forest Economics, Management and Policy*) in 2002, aiming to fill the gap in terms of publication outlets for research papers dealing with the management, economics and policy of small-scale or non-industrial forestry. Wherever possible, data and information from the journal have been included in this section.

This section will give a summary of the past development and recognition (trying to cover at least the last 20 years), and a short overview of the present main characteristics of the process and impact of fragmentation of forests and other wooded land. Comparative data and information about this process throughout a broader time period in the EU 27 are missing.

Definition(s)

There is no single definition of the concept of small-scale forestry in Europe [Wiersum / Elands / Hoogstra 2005], but a variety of ideas and definitions of the concept of small-scale forestry exists which differ widely among countries, as demonstrated by Harrison, Herbohn and Niskanen [2002] on the basis of a comparison of experiences in the USA, Europe, Asia and Australia. As defined within a study by BOKU and other institutions, fragmented forest ownership is understood as the presence of a high number of individuals owning small-size forest parcels [BOKU 2010: 2]. The current chapter is based on this definition.

Past development

At the Fifth Ministerial Conference on the Protection of Forests in Europe in Warsaw in 2007, the ministers responsible for forests in Europe announced that they are "aware that the fragmentation of forest ownership in Europe represents a challenge for maintaining active and sustainable management of forests and mobilizing wood" [MCPFE 2007]. This is not a new finding. In 1957, the report *World Forest Resources* by the FAO already came to the conclusion that the "multiplicity of small private forests presents a major obstacle to enlightened forest management in many countries" [FAO 1957: 9], followed by the report *Forest Resources in the European Region* by the FAO in 1976, which stated that the "scattered nature of private forest ownership is […] a severe constraint on the achievement of proper management and the mobilization of the forest resource in this area" [FAO 1976: 7].

As Harrison, Herbohn and Niskanen [2002] stated, throughout the world there appears to be a trend towards moving away from industrial forestry towards landholder-based forest management and community forestry (for the latter aspect, see also chapter 3.1). This can also be witnessed in Europe:

> Private ownership [in Europe] has roots far back in history, when royal families and aristocrats owned the land. Through government action along with democratic processes, and out of economic necessity, large landholdings were fragmented, hence more people became owners of forest land. Along with democratic processes, governments distributed or shared the land for private estates. [Harrison / Herbohn / Niskanen 2002: 2]

The change in ownership structure that took place in European countries after the 1990s was, amongst other things, part of the transition process in countries formerly under centrally planned economies and was affected by the restitution and privatization process that took place (see also chapter 3.2 / Box 4). Siry, Cubbage and Newman [2009] point out that the process of forest restitution, the return of previously nationalised private forests to their former owners, is one reason for the very fragmented ownership in Central and Eastern Europe – with limited potential for improved management.

Main characteristics

The privatization of former state-owned forests and other wooded land is often associated with the fragmentation or parcelization of forest holdings. Throughout the European Union, private forest ownership is mainly characterised by small-scale forest holdings (see Table 29; also UNECE / FAO 2000: 116). As part of a research project by Wiersum, Elands and Hoogstra [2005], a survey amongst

1,401 small-scale forest owners in 8 European countries was carried out in order to make a comparative European study about the nature and dynamics of forest landowners. The survey results illustrate that the median size of forest holdings in Europe was 3.0 ha, varying from 1.3 ha in Greece to 4.5 ha in Spain. About 65 % of the forest landowners interviewed owned less than 5 ha, 28 % between 5 and 20 ha, 5 % between 20 and 50 ha and only 2 % owned between 50 and 100 ha of forest.

The Alterra-report *Future Wood Supply from European Forests* confirms that most of the forest holdings of private owners are very small: about 5 to 10 ha each [Nabuurs et al. 2002: 21]. European forest owners are a very heterogeneous group, characterised by a huge variety of owners and goals, getting more complicated with the ongoing process of fragmentation of forest and other wooded land. Summarised by the Alterra-report [ibid.: 22f.], the group of private owners is subdivided in rather homogenous groups:

- small Non-Industrial Private Forest owners (small NIPF),
- large NIPF owners,
- non-resident NIPF owners,
- farmer-owned NIPF, and
- communally-owned NIPF.

Still, it has to be taken into account that a NIPF owner in one European land will have quite different goals than one in another land and that trends in one group of owners may be counteracted by opposite trends in other groups.

Following the recognition of the ongoing process of fragmentation of forests and other wooded land and the importance of (small-scale) private forest ownership, in recent years several private forest owner typologies have been built to address their diversity and reveal their relationships. Four examples from Germany, Austria, Sweden and Finland may illustrate this.

According to a study on behalf of the *Waldbauernverband NRW* (Forest Farmers Association NRW) in private forests in North Rhine-Westphalia / Germany, three different types of private forest owners have been identified [Mutz 2007: 288]:

- the economy-oriented forest owner (importance of economic aspects, like preservation of capital, revenue etc.);
- the ecology-oriented forest owner (important to own, shape and use a piece of nature; mostly less profitable forests);
- universally oriented forest owner (equal importance of economic and ecological aspects).

Such typologies are “developed as means of communicating understanding about complex relationships between multiple factors that affect peoples’ behavior” [Emtage / Herbohn / Harrison

2007: 482f.]. It becomes clear that the classical picture of peasant forest owners changes. Based on a representative survey and by means of a cluster analysis, in Austria seven types of forest owners have been identified, ranging from forest owners with a strong agricultural background to forest owners with no agricultural background at all [Hogl / Pregernig / Weiss 2005]:

- farmer forest owners (prototype of 'rural forest owner'; mostly full-time farmers; high professional training in agriculture or forestry; living close to their forest; forest as source of income and employment);
- part-time farmers (forest part of farm enterprise; few professional training in agriculture or forestry; living close to their forest; forest as source of income and employment, but also associated with nature conservation, leisure activities, and family tradition);
- 'small-towners' with rural background (rather close connection to agriculture; few professional training in agriculture or forestry; living close to their forest; forest often leased to someone else);
- forest owners previously employed in agriculture (pronounced rural background; high professional training in agriculture or forestry; living close to their forest);
- farm leavers (forest is not part of an agricultural enterprise; no professional connection and training in agriculture or forestry; mostly employees, civil servants and tradespersons; often living close to their forest; no income from forest; forest for leisure activities);
- urban forest owners (live in large cities, often far away from their forest; no professional or educational ties to agriculture or forestry; mostly white-collar employees, civil servants, self-employed persons; above-average level of education; forest not a source of income or employment, but for leisure activities and possibility for hunting);
- forest owners without connection to agriculture (few professional training in agriculture or forestry; living close to their forest; forest not a source of income or employment; often have purchased their forest).

In Sweden, a survey was conducted and small-scale private forest owners were classified by means of a cluster analysis. The results "confirm recent studies suggesting that a sole emphasis on economic benefits is not desirable from the forest owners' point of view" [Ingemarson / Lindhagen / Eriksson 2006]. The findings showed that clear subgroups of forest owners can be differentiated and five types were identified:

- the "economist"
- the "conservationist"
- the "traditionalist"
- the "multiobjective owner"

- the “passive owner”

Based on survey data on forest owners in southeastern Finland, the study by Karppinen [1998] created an empirical typology of non-industrial private forest owners based on forest values and long-term objectives of forest ownership. Finnish forest owners have been classified into four groups:

- multiobjective owners (valued both the monetary and amenity benefits of their forests)
- recreationists (emphasised non-timber and amenity aspects of their forest ownership)
- self-employed owners (valued regular sales and labor income as well as employment provided by their forest)
- investors (forest as an asset and a source of economic security)

The results suggest “that the sole emphasis on economic benefits of forests does not lead to the most active silvicultural and harvesting behavior. Multiobjective owners, who underlined both monetary and amenity benefits of their forest property, were the most active in their silvicultural and cutting behavior. Non-timber objectives seemed not to exclude wood production: a group called recreationists harvested slightly less than other owners. Recreationists were willing to invest in forestry but were selective with respect to management practices.” [ibid.: 43]

Within the Private Forest Ownership project, several countries of the EU 27 reported on strategies and measures for dealing with the fragmentation of forests and other wooded lands [Schmithüsen / Hirsch 2010: 102-107]:

- Austrian forest policy attempts to make forest management of small lots in some areas less difficult, by encouraging associations of small forest owners.
- In Cyprus, for better protection and adequate management of state forests, the Department of Forests purchases private forest lands that form either an enclave or a wedge into state forests.
- In Lithuania, according to the Forest Law, it is forbidden to split forest holdings into parcels smaller than 5ha.
- In Romania, legislation has been developed to deal with fragmentation, obliging forest owners to ensure forest management by their own means or through contracting management services with public or private management structures.
- In Slovakia, through a legislative act on forests, the issuance of the approval of the respective body by the state administration is required for forest lands with an area of less than 10ha.

Box 4: Demographic Information on Individual Private Forest Owners

Demographic information on individual private forest owners (gender, age) is hardly available, as well as data on their social background (knowledge, motivation, objectives). However, some data already exist, e.g. from the Private Ownership Enquiry, where 11 European countries (Belgium, Bulgaria, Czech Republic, Finland, France, Hungary, Norway, Poland, Romania, Slovakia, United Kingdom) provided data on the aggregate structure of private ownership. As a result, more than 80% of private forests in Europe are held by individuals or families, followed by private institutions and forest industries, whereas public forests are predominantly owned by the state, followed by cities, townships (communes) or municipalities [Hirsch / Korotkov / Wilnhammer 2007].

Besides, the analysis emphasis the following key aspects:

a) In the majority of countries, more than 73% of private forest holdings are smaller than 3 ha in size (however, the relative share of size classes differs significantly among European countries, notably among the countries in transition).

b) A vast majority of European countries features a large share of owners above 60 years-of-age. Consequently, many forest holdings will be inherited and new owners will arise whose attitudes and motivations toward forestry are uncertain. Harri Hänninen, director of the Forest Academy for Decision-Makers which is ran by the Finnish Forest Association, considers the aging of forest owners even "a bigger problem than the small size of forest holdings [which in turn] can only be solved by encouraging earlier handovers" [Hänninen 2012].

c) In gender terms, private forests are mainly owned by men, the proportion of women varies among countries from 20 to 40 percent. Still, it has to be taken into account that reliable statistics in many European countries concerning women's participation in forestry are virtually non-existent. Nevertheless, available data show that "improvements have been made in the number of women holding technical, professional and managerial positions over the last 10 to 15 years" [FAO 2006b: 11].

The demographic change (see chapter *II Demographic Change*) and the gradual ageing of the European population, as, e.g., mentioned in *the European Forest Sector Outlook Study* [UNECE / FAO 2005], are a critical threat for sustainable development in all economic sectors [Forest Europe / UNECE / FAO 2011a: 124].

Outlook and impact

European forest owners announced that they are aware that the scattered and small-scale forest holdings structure is a major challenge e.g. in increasing the mobilization of wood from the forests of the European Union (see also Box 5). Trømborg and Solberg [1998] analysed structural changes in European roundwood and forest products markets and indicated that fragmented ownership – besides environmental constraints, certification, unstable roundwood markets, and increased costs – may hinder the supply of roundwood in the future. As Schlueter states, large volumes of standing timber "are present in the small-scale private forests, but there are difficulties with its mobilisation" [Schlueter 2008: 3]. Reasons for this are the facts, that many "new" or urbanised forest owners no longer live close to their forests nor do they have the necessary forestry knowledge [FAO 2000: vii; Angelova / Winkel 2007]. Additionally, the technology for harvesting timber, which can often reduce harvesting costs, has changed substantially. "However, these technologies have immense economies of scale, which cannot be realised in small-scale private holdings without a combined harvesting effort from multiple owners." [ibid.]. Furthermore it has to be taken into account, that the "administrative burden placed on forest owners reduces the willingness to harvest their forest resources, which is further magnified by the fact that many forest owners are not dependent on forestry activities for their income" [UNECE / FAO 2012: 84].

Therefore, the grouping of small-scale forest owners into clusters and producer groups should be further improved [CEPF / ELO / USSE 2012; Kuusinen / Raitila 2011; Schmithüsen / Hirsch 2010: 45] by facilitating cooperation and servicing professional units such as cooperatives, as recommended during the workshop "Mobilizing Wood Resources", organised by the UNECE / FAO Timber Section and partners [UNECE / FAO 2007: 32; also BOKU et al. 2010]. As witnessed in the small-scale forestry in the Italian Alps, "[close] and well functioning co-operation among different actors is essential for the success of any kind of complementary product or service. This is true especially in the case of small-scale forests landowners which operate in rural areas." [Pettenella / Secco 2006: 404] This is also true for the Irish forestry sector: "Cooperation between owners of small-scale forestry is a key factor in the exploitation of the small-scale forestry resource." [Russell / Mortimer 2005: 1]

Box 5: Owners of Fragmented Private Forests and Their Involvement in the Wood Market

In general, there is still limited information on the behaviour of forest owners and their involvement in the wood market. However, there is some evidence that forest owners "are sensitive to price levels in their selling behaviour" [Kangas / Baudin 2003: 46; see Solberg / Moiseyev 1997 for an overview]. To identify the most appropriate measures for increasing the market supply of wood from the areas where forests are held by many individuals owning relatively small parcels of forest, Stern et al. [2012] carried out a study on the market supply of wood:

"Owners of fragmented private forests are characterised by relatively small forest properties and related small harvestable wood amounts per owner. Forest owners' involvement in the wood market solely depends on their personal objectives. In contrast to the objectives of wood buyers, which are purely economic, owners of fragmented forests have multiple objectives and attitudes. Since the share of urban forest owners has been increasing for years in most of the studied countries, the proportion of owners and wood marketing is also rising in most of the regions. In conclusion it can be stated that there will be a higher supply of wood from fragmented private forest ownership in the long term. This supply will however be limited to forest owners with economic objectives and therefore will be strongly influenced by increasing urbanity of owners, i.e. a rising share of non-traditional forest owners." [Stern et al. 2012: 119]

The privatisation of forests and other wooded land has led to an increase in small-scale forest holdings and correspondingly to a huge increase in the number of small forest owners across much of Europe in recent years. According to the *European Forest Sector Outlook Study*, the "capacity of these new forest owners to manage their forests is unknown. However, it would seem likely that a large proportion of them are probably lacking in financial and technical capability, particularly in light of the new demands being placed on the sector. The same applies to the millions of 'old' private forest owners in western [sic!] Europe who are increasingly unable to manage their forests in a rational way and to handle the complex and public dilemmas associated with forest management in the twenty-first century." [UNECE / FAO 2005: 208]

Furthermore, the fragmentation of forest ownership is an important obstacle to innovation, as analysed in the report *Innovation and Entrepreneurship in Forestry in Central Europe* by Ewald Rametsteiner and Gerhard Weiss [2004], and may represent a potential problem to sustainable forest management, especially when it comes to maintaining a certain level of production and employment [Forest Europe / UNECE / FAO 2011a: 109f.].

2.4 Forest Management and Certification

Corresponding to the diversity of European ownership structures and tenure arrangements, forest management has undergone a number of broad transformations as a whole. One indicator to assess the quality of forest management in areas used for wood production is growth in certified forest areas. Hereby, certified forest areas are to be considered as one prerequisite for sustainable forestry.

Data sources and time period

Since 2005, information about forest ownership and management rights have been included in the *Global Forest Resource Assessments* (FRA). Since 2010, FRA includes even more information about different types of forest ownership [see FAO 2010a: 234-239]. Furthermore, the report the *State of Europe's Forests* recorded the proportion of forests and other wooded lands under a management plan or equivalent since 1990 [see Forest Europe / UNECE / FAO 2011a: 305f.]. However, the empirical evidence that forests are well managed and protected is often still missing [Siry / Cubbage / Ahmed 2005].

On the European level, no overall study about the impact of certification on sustainable forest management has been found. The *Center for International Forestry Research* (CIFOR) claim to have made "the first international research effort that sought to test and compare the effectiveness of C&I [Criteria & Indicators, author's note] for sustainable forest management at the forest management unit level" [Spilsbury 2005: 1]. One purpose of the case studies was to present "a summary of general trends and experiences from published literature examining benefits and disbenefits that stem from forest certification in developing countries" [ibid.: 71]. Above all, the two main certification schemes for forest area in Europe, the Forest Stewardship Council (FSC) and the Programme for the Endorsement of Forest Certification (PEFC), have been considered within this section.

Definition(s)

Managed forests and other wooded lands are defined as land managed in accordance with a formal or an informal plan applied regularly over a sufficiently long period (i.e. 5 years or more), as commonly accepted by UN-ECE and FAO specialists on the Temperate and Boreal Forest. Management operations include the tasks to be accomplished in individual forest stands during the given period [see UNECE / FAO 2000: 390]. However, the concept and implementation of management plans vary a lot among and within European countries.

Throughout the world, several certification systems exist, each applying different forest management standards with different procedures and labelling rules. Within this study, (forest) certification is defined as "the process whereby an independent third-party (called a certifier or certification body) assesses the quality of forest management in relation to a set of predetermined requirements (the standard). The certifier gives written assurance that a product or process conforms to the requirements specified in the standard." [Rametsteiner 2003: 88]

Past development

A long history of managing forests for multiple objectives can be witnessed throughout Europe. For example, in the *Forest Resource Assessment 1990*, seven functions of forests were listed: wood production, protection, water, grazing, hunting, nature conservation, and recreation. In practice, most countries concentrated on the first two categories [see FAO 1995]. Forest certification was introduced in 1993 "as a market-based response to address public concerns related to deforestation in the tropics, the resulting loss of biodiversity and the perceived low quality of forest management in areas from where traded wood products are sourced" [Rametsteiner 2003: 88].

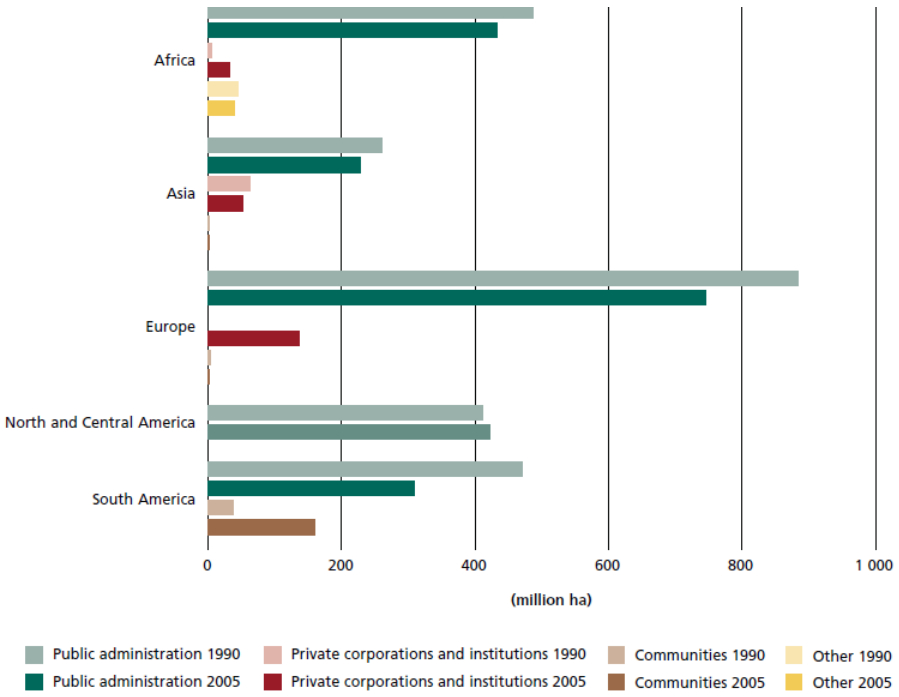
Despite the diversity of tenure arrangements and ownership structures which characterise Europe, forest management has undergone a number of broad transformations common to the region as a whole: "expanding resource pressures; the growth of scientific industrial forestry; and the more recent interest in multi-purpose, sustainable forest management" ([Jeanrenaud 2001: 2]. Traditionally, forestry has primarily been seen as an economic activity and most forests have been managed or established to supply wood and timber [Blombäck / Poschen / Lövgren 2003: 9]. Nowadays, forest management practice has changed towards greater integration of biodiversity aspects [see Forest Europe / UNECE / FAO 2011b]. Nevertheless, trends in forest management cannot be easily assessed or quantified, as measurement of the quality of forest management is not only quite subjective, but attempts to measure this have only been developed in recent years [UNECE / FAO 2005: 24].

Main characteristics

One key finding of the MCPFE report on the *State of Europe's Forests* 2007 is that 98 % of all European forests are covered by a forest management plan or equivalent, such as guidelines at various administrative levels. This means, in other words, that almost all European forest areas are covered by plans for their long-term management [Forest Europe / UNECE / FAO 2007: 30]. However, the concept and implementation of management plans vary a lot among and within European countries. Besides, it is not possible to draw general conclusions from the presence or absence of a management plan about the sustainability of the management of a public or private forest: "While management plans contain requirements for sustainable forest management, such requirements differ. Furthermore, the absence of a management plan, in particular in small-scale often privately owned forests, does not necessarily imply that the forest owners aren't trying to manage their forests sustainably." [Schmithüsen / Hirsch 2010: 9].

According to the data of the *Global Forest Resource Assessment 2010*, there have been partly significant changes in Europe regarding the management of public forests between 1990 and 2005 (see Figure 29). However, this is largely because of the Russian Federation, where private sector management increased from zero in 1990 to 137 million ha in 2005 [FAO 2010a: 125f.].

Figure 29: Management of Public Forests by Region, 1990–2005

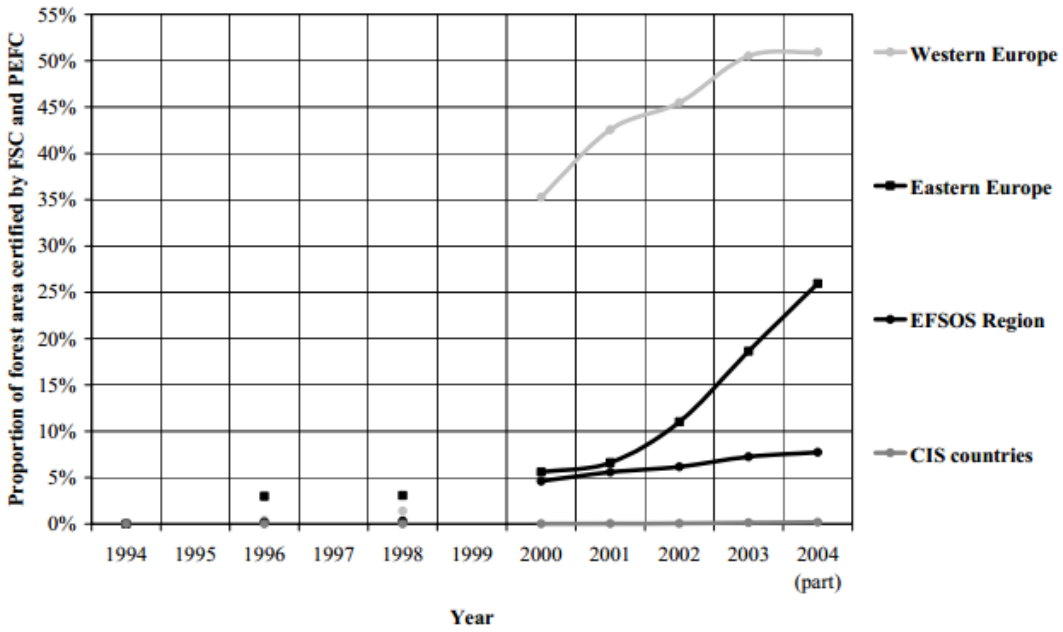


Source: [FAO 2010a: 126]; Note: Oceania is not shown due to the low level of available information.

The *Forest Sector Outlook Study* indicates the difficulty in assessing the quality of forest management in areas used for wood production [UNECE / FAO 2005 26f.]. One such indicator is growth in certified forest areas. Throughout the world, several certification systems exist, each applying different forest management standards with different procedures and labelling rules (for a comparison of the key strengths and weaknesses of eight certification schemes currently in operation, see [FERN 2004]). Generally, forest certification was created to address global forest deforestation and has grown rapidly since the early 1990s. In 2005, certified forests accounted for more than 246 million ha worldwide, or 36 % of the world's 700 million ha of forest actively managed for wood and non-wood products [CEI-Bois 2011: 29]. By 2007, about 292 million ha of forests were certified worldwide and had increased to about 323 million ha by 2008 [Siry / Cubbage / Newman 2009: 6].

The area of forests in Europe being certified by the Forest Stewardship Council (FSC) and the Programme for the Endorsement of Forest Certification (PEFC) between 1994 and 2004 has increased significantly, particularly in Western Europe, and to a lesser extent, in Eastern Europe (see Figure 30). In 2005, 35 % of the world's certified forests (almost 87 million ha) are in Europe and 92% of Europe's certified forests are in the EU 25, representing 80 million ha [CEI-Bois 2011: 29]. Still, these trends "cannot be used to suggest that the quality of forest management in Europe has increased over the last decade. However, these trends do suggest that it has been relatively easy for forest owners and managers to obtain certification over a significant part of the European forest estate. This, in turn, implies that the quality of forest management in Europe is generally quite high." [UNECE / FAO 2005: 27] Another critical aspect has been noted in a recent paper by Marx and Cuypers [2010], which stated that certification schemes such as the FSC act more as a market governance tool and hence only operate for forests and timber which are brought to the market. It appears that forest certification to date progressed mostly in forests that were already sustainably managed and where only small or no management adjustments had to be made [Siry / Cubbage / Ahmed 2005: 557]. Furthermore, the FSC certification has been seen as discriminatory by representatives of small-scale forest owners in some European countries; as for large-scale forestry operations, it would be much easier to be certified [Elliott 2000: 21]. This suggests that certification may overlap existing requirements.

Figure 30: Trends in Forest Certification, 1994 – 2004



Source: [UNECE / FAO 2005: 27] (derived from WRI (2004) and PEFC (2004 and earlier))

Outlook and impact on forest management

As stated in *the European Forest Sector Outlook Study*, it is "worth noting that the management of forests in Europe has followed a gradual and long-term trend towards management for objectives other than wood production […]. This may have led to improvements in the 'quality' of forest management, but it has also led to higher expectations of performance from the sector." [UNECE / FAO 2005: xvi]

One pan-European indicator for sustainable forest management (SFM), according to the MCPFE Expert Level Meeting in Austria in 2002, is "forests under management plans" [see MCPFE 2002: 2]. According to Rametsteiner and Simula, the "analysis of the impact of forest certification on SFM and biodiversity indicates that [forest certification] is likely to have limited but positive direct impact on SFM and biodiversity. The extent that forest certification is effective in ensuring the conservation and sustainable use of biological resources is unclear." [Rametsteiner / Simula 2003: 96] However, there are significant differences between criteria and indicators for sustainable forest management applications and certification systems, mainly concerning scale, purpose, use und user groups. This is summarised as follows [ibid.: 91]:

Criteria and Indicators for SFM	Forest Certification
Mainly national level	Sub-national level
Descriptive approach	Prescriptive (standards / requirements)
Mainly used for information sharing	Used for establishing proof of sustainable or good forest management
Used by governments and policy makers	Used by market players

According to the report *State of Europe's Forests* 2007, at present "new forms of management plans are emerging, such as extensive planning of large territories for multiple uses and integration of forest, rural and landscape planning procedures. These could replace the traditional stand-based management planning in the future, but currently they are officially recognized only by a limited number of countries." [Forest Europe / UNECE / FAO 2007: 43]

3. Tenure Arrangements for Forest Land Use

Having an understanding of different tenure arrangements is important with regard to (sustainable) forest management because the owner of the forest has also primary responsibility for its management. Throughout the European Union, it is now widely recognised that secure tenure arrangements for forest land use are one important prerequisite for achieving sustainable forest management. While land and agrarian tenure issues have been investigated for a long time, forest tenure has only recently raised the attention of the international community, such as in the context of initiatives and programmes like forest law enforcement, governance and trade (FLEGT) or efforts to reduce greenhouse gas emissions from deforestation and forest degradation (REDD). It is not possible to give a comprehensive overview of tenure arrangements in the European Union: despite the importance of forest tenure for all actors involved – governments that seek to promote sustainable use or combat illegal logging; other local communities who want legal recognition and broader political participation; environmental NGOs that seek conservation; private industries requiring reliable sources of timber and fiber etc. [see White / Martin 2002: 3] – there is still a lack of data and information.

Tenure rights are defined as the ability to acquire, use, control and dispose of a piece of property – either the land itself or the products derived therefrom – and may change periodically as governments evolve [Siry / Cubbage / Newman 2009: 2]. In recent years, the FAO carried out extensive assessments of the forest tenure situation in Africa, Southeast Asia, Latin America and Central Asia. For the European Union, no overall study or assessment exists.

Tenure arrangements that support sustainable forest management range from state-managed forests to the allocation of management rights to non-state actors, such as communities or private forest owners. The following chapter will introduce and give a broad overview of the main types and key issues of forest tenure arrangements relevant in the European Union, illustrated by selected examples.

3.1 Community Forestry

The spectrum of tenure types is wide and diverse. Community forestry is increasingly acknowledged as an opportunity for sustainable forest conservation.

Data sources and time period

Scientific research around "community forest" has considerably evolved during the last 30 years, and since then has become increasingly politicised. Options for community forest can be both limited and opened up by history, society, politics and economics [Lawrence 2011: 24]. This explains why there are such large differences in the distribution of forest ownership and likewise community forestry across the countries of the European Union, as each country faced a different historical development. In this respect, no overall study or scientific paper about the impact of community forestry on (sustainable) forest management in Europe has been identified.

Definition(s)

Community forestry was initially defined by the FAO as "any situation which intimately involves local people in a forestry activity" [FAO 1978: Introduction]. In the past decade, forest tenure arrangements have evolved as "countries have initiated efforts to reform their tenure arrangements for forests and forest land, moving towards the devolution of access and management rights to non-state stakeholders, mainly households, private companies and communities" [Martin 2011: vii].

Both publicly- and privately-owned forests can be community forests: public forests can be community forest because it is owned by a local authority or managed by a community group; private forests can also be community forests if they are owned by a group of people who define themselves as a community [see Lawrence 2011: 24].

Past development

Land ownership, forest ownership and access to resources were largely affected by the liberal ideas of progress and modernization which swept through Europe from the 17th century: "Many of the

commons were enclosed and privatised or became subject to different types of public and commercial forest management. Traditional community usufruct rights were usually liquidated by new tenure regimes, and are still threatened in some part of Europe today." [Jeanrenaud 2001: 4]

However, in many European countries, the changing land and forest tenure arrangements also produced community forests based on the experience of different social groups, such as rural groups, urban groups, indigenous groups (e.g. the Saami in Scandinavia), forest owner / producer associations, forest worker unions (particularly strong in the Nordic countries, Germany and the Netherlands), environmental NGOs as well as public forest agencies, each with a different degree of power and scale of influence [see ibid.].

Main characteristics

Generally speaking, community forestry evolves across a variety of social and environmental contexts and can undertake a very wide range of activities. Due to the different contexts, even within one state, different models and discourses of the concept "community forest" can exist. Thereby, urban forests "differ from those in rural areas in terms of their intensive use and the high level of public involvement in urban forest issues. The proximity of a forest to a large town creates special problems and opportunities for policy-makers and managers." [Konijnendijk 1997: 31]

Community management has an advantage over other tenure systems, as it most commonly builds on traditional structures, thereby meeting the unique needs of each situation. As community ownership holds potential benefits for many parts of Europe, it "should not be imposed at the expense of central regulations. An institutional-enabling framework consisting of adequate policies and legislation is required to ensure effective community forest management, including resources and structures for effective community participation in decision-making." [Verolme / Moussa 1999: 71]

The success or failure of community forestry programmes depends on many factors beyond forest tenure rights, such as the quality of the forest, its profitability and the design of detailed, complex management plans [see FAO 2011a: 33]. A meta-analysis by Pagdee, Kim and Daughterty [2006] identified several variables with significant influence on the success of community forestry [see also Ostrom 2000; Ritchie et al. 2000: 7f.]:

- tenure security,
- clear ownership,
- congruence between biophysical and socioeconomic boundaries of the resources,
- effective enforcement of rules and regulations,
- monitoring,

- sanctioning,
- strong leadership with capable local organisation,
- expectation of benefits,
- common interests among community members,
- and local authority.

As Sunderlin, Hatcher and Liddle noted, conflicts over forest lands and its resources can result "from resource competition within communities. Among the factors that propel this problem are growth of the market economy and commodification of local resources, the introduction of consumer culture, local population growth, slowed rural to urban migration, and deterioration of not just the quantity but also quality of local resources." [Sunderlin / Hatcher / Liddle 2008: 21]

Based on findings from a number of RRI (the Rights and Resources Initiative) analyses and background and position papers, particularly from the European Union, the United States and China, the study *Community-Based Forest Management* concluded that there is "ample evidence in developed and developing countries that, with the recognition of local forest tenure, forest production and processing by communities and other smallholders have, over time, become the predominant component of industry" [Molnar et al. 2011: ix]. The literature shows that in the European Union as well, the supply of industrial raw material is concentrated among small-scale forest owners who occupy multiple niches in the forest economy: "Smallholder and community-based forest enterprises are able to link to diverse industry players and markets at diverse scales." [ibid.]

The spectrum of the tenure type "community forestry" throughout the European Union is wide and diverse. Therefore, two examples of community forestry in Germany (Box 6) and in Scotland (Box 7) will illustrate how community forestry evolved in each respective country as well as its current state. Germany presents a country where the ownership of forests by villages, towns and municipalities has a long tradition, whereas community forestry in Scotland evolved more gradually.

Box 6: Community Forestry in Germany

The historical development of community forestry in Germany, concerning urban forestry, quite often goes back to the city's founding. Thus, for example, the city of Freiburg, founded by the House of Zähringer (probably in the 12th century), was given a considerable area of forest land to use [Volz 2001]. Nowadays, towns and municipalities own about a fifth of the forest area in Germany [see NABU 2012]. These community forests fulfill a variety of functions: they not only provide critical raw materials and energy, but also serve important recreational and conservation goals. Forest management and policy varies across the states in Germany, depending on the development of the

former state government, the economic and population growth in cities, the prevailing inheritance, the amount and settlement activities of churches and monasteries etc., each shaping the present situation [see Volz 2001]. However, many communities will face similar significant challenges in the next years due to demographic changes (see chapter *II Demographic Change*), climate-induced forest dieback [see e.g. *Zukünfte und Visionen Wald* 2009, NABU / DStGB 2012], the quite dramatic financial situation of municipalities, the funding cut and district enlargements as well as cost reductions and revenue increases. At the same time, social demands on forests as a place of recreation and as a habitat for animals and plants are growing.

Box 7: Community Forestry in Scotland

Community forestry in Scotland is of more recent origin. The principal legal basis for the ownership of land and forest in Scotland was (until 2004) feudal tenure. Thereby more than one person enjoyed property rights over the same area of land: "Feudal rights are normally held by three groups of people: the Crown; Superiors (having direct ownership) […]; and Vassals (having usufruct ownership) […]. Beneath them are tenants, whose rights are derived from the vassal and […] are usually governed by legislation." [Jeanrenaud / Jeanrenaud 1996/1997: 3f.] Both authors argue that therefore no incentives for community forestry existed, as any trees planted by tenants automatically became the property of the landlord [see ibid.: 4]. This feudal system of land and forest tenure ended on 28 November 2004, due to the Abolition of Feudal Tenure etc. (Scotland) Act 2000, whereby the former vassal of an estate became the sole owner of the land and the former superior's rights were extinguished [see Steven 2004]. However, Oostheok [2001] argues that already since the 1980's, more emphasis was placed on nature conservation, recreation as well as fulfilling local economic demands. By then, however, a new type of forest owner evolved: rural communities. According to a survey carried out by Reforesting Scotland in summer 2002, the number of community groups who own or manage woodlands increased to a total of 51 in the year 2002, covering an area of about 22,000 ha [Scottish Executive 2002]. Some of these initiatives, as outlined by Oostheok, "were based on the desire to manage the forests in a more holistic way, with greater emphasis on conservation and biodiversity. However, the majority of new schemes have been motivated by the aspiration of rural communities to enhance the contribution of local forests to local livelihoods." [Oostheok n.d.]

Outlook and impact

Summarised, a community forest can be looked at as "a system containing a community and a forest, linked through rules of use and decision-making, which in turn depend on community organisation, knowledge, power relations, external organisations and policies, and learning processes" [Lawrence 2011: 24]. In order to understand the implications that different tenure systems – such as community forestry – have on sustainable forest management, "related mechanisms and issues have to be analysed, and the role that these might play in enabling or prevention the effectiveness of a given tenure system have to be identified" [Romano / Reeb 2006: 5]. Within the frame of this study, just a short overview of the concept of community forestry in the European Union could be given.

The study *Community-Based Forest Management* looked upon trends and potential for the expansion of community-based forest management (CBFM):

> A modest estimate based on available evidence and comparisons of the situation in long-developed forested countries like Sweden, Finland, Mexico, the United States, Canada, and Norway is that CBFM and related smallholder and community enterprises could generate double the forest revenue and double the jobs and sustain or double the provision of ecosystem services that they generate today. Ecosystem services include investments in forest conservation, adaptation to climatic shifts and erratic climate events, and the protection of important water resources and downstream ecosystems. [Molnar et al. 2011: 12]

Where community forest management systems are threatened or undermined, the result often can be the unsustainable use of the forest landscape, leading to forest degradation or deforestation [see Ritchie et al. 2000: 8]. The study *Who Owns the World's Forests* by Andy White and Alejandra Martin concluded that "clearly identifying and recognizing private property rights held by indigenous and other qualified local community groups can lead […] to more sustainable management and conservation of forest resources" [White / Martin 2002: 18].

3.2 Privatisation

Data sources and time period

Data about the overall forest ownership structure of the European Union have only recently been collected, analysed and compared within studies of European and international organisations. A comprehensive analysis of forest ownership and forest tenure in the EU 27 has been conducted

within the *Forest Resource Assessment* by the FAO for the first time in 2005, and then upgraded in 2010 in which they incorporated even more information about different types of private ownership [FAO 2005 and 2010]. Furthermore, within the Private Forest Ownership project, data from private forest owners within 23 European countries were analysed. The corresponding publication is one of the most comprehensive surveys that demonstrated the significance of private forestry in Europe [Schmithüsen / Hirsch 2010]. Within this section, these data are complemented by scientific and other secondary literature. While, e.g., for the United States [Hodgdon et al. 2011] and Canada [Smith 2010] annotated bibliographies about certain aspects of private forest ownership exist, for Europe or the European Union no such document has been identified.

Definition(s)

The main classes of forest ownership in Europe are private ownership and public ownership, whereas private ownership of forest and other wooded land is defined as follows: Private ownership refers to land owned by individuals, families, private co-operatives, corporations and enterprises, religious and educational institutions, pension or investment funds, or other (academic, financial) private institutions [Eurostat 2009].

Past development

Although public and state ownership of forests dominate in the European Union, private forestry in Western Europe has “a long-standing tradition” [FAO 1997]. Already in 1953, the FAO stated in the *World Forest Resources* report that “private forests are most important in Europe” [FAO 1957: 8].

Significant shifts in the ownership structure of forests and other wooded lands have taken place in the former centrally planned economies of Central and Eastern Europe. In some of these countries, forests and other wooded land were 100 % publicly owned. This is slightly changing due to privatization as part of the transition process since the beginning of the 1990s (as an example, see Box 8). During this process, large parts of state forests were returned to their former owners [Balkytė / Peleckis 2010: 637]. This process of land restitution and privatization is nearing completion, but future changes in the corresponding ownership structure are still expected in countries like Romania and Slovakia [Hirsch / Korotkov / Wilnhammer 2007: 24].

Box 8: Forest Ownership in Lithuania Since 1990

In 2007, the forests of Lithuania covered approximately 33 percent of the country which constitutes an area of 2,136,000 ha. Since 1945, the forest coverage in Lithuania has grown relatively slightly but continuously. The forest sector is an important branch in the country that accounts for 4 percent of GDP.

The ownership structure of Lithuania was determined by the Communist regime until 1990, who only allowed for state-owned forests. Since Lithuania's independence in 1990, the forest ownership structure changed due to the adaption of several laws that legalised private ownership of forest lands. The latest legislature regarding forest ownership structures are the Law on Forests of the Republic of Lithuania (2001) and the Regulations on the Management and Use of Private Forests (2004). Land restitution started in 1992, and since 2005 companies are allowed to own forest lands, too.

Privatization of forest lands has been on-going since 1990, with growing shares of privately owned forests (1995: 4 percent privately owned; 2000: 23 percent; 2005: 33 percent; 2007: 36 percent). The current share of private- and state-owned forests is 35 percent private to 65 percent state-owned forests. In 2007, about 227,000 private forest owners possessed 760,000 ha of forest lands, with an average land holding size of 3,4ha. Still, restitution has not yet been completed. There is additionally an area of 250,000ha which has not been given back to its previous private owners. [Kupstaitis 2007]; [Schmithüsen / Hirsch 2010]

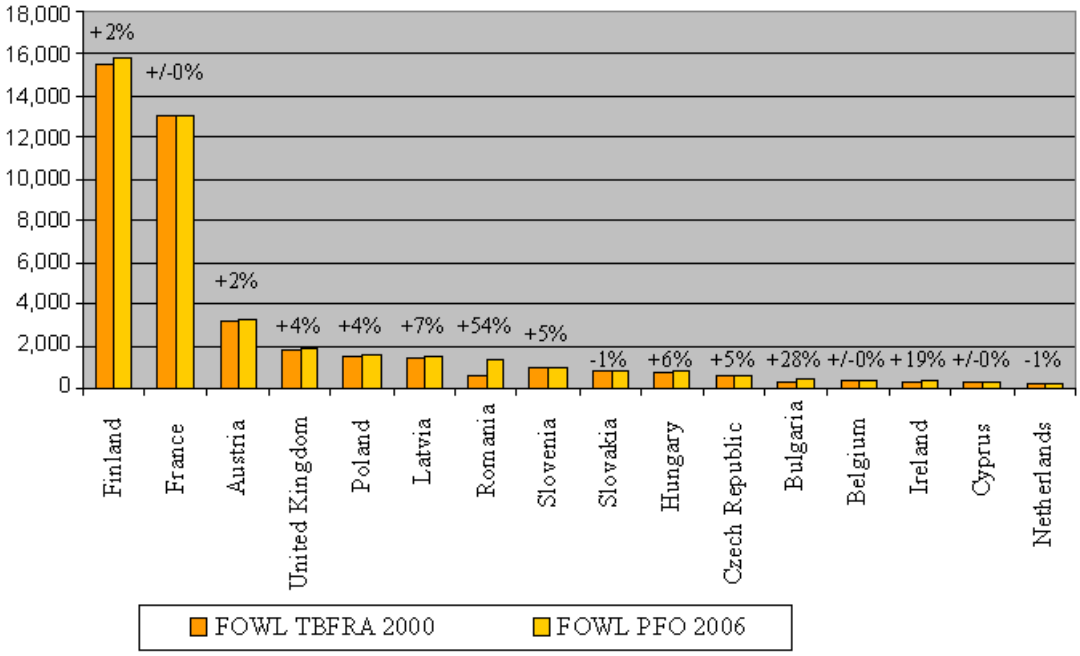
With regard to forestry policies, the *European Forest Sector Outlook Study 1960-2000-2020* came to the conclusion that the trend towards gradually more private ownership of forests in Western Europe has been driven mainly by two forces:

> In a few countries (notably Sweden and the United Kingdom) some of the public forest estate has been privatized over the last 20 years. However, the contribution of this to the total change at the sub-regional level is quite small. A much more important factor has been the significant increase in the privately owned [forests and other wooded land] area in recent years due to afforestation of bare land. This has increased in nearly all countries in Western Europe over the last two decades, at a very approximate rate of around 1 million ha per year. [UNECE/FAO 2005: 115]

Main characteristics

Comparing the data available from the Private Forest Ownership enquiry for those countries which have provided 2005 data and for which comparable data were available for the year 2000 from the *Forest Resources Assessment 2005*, an increase in private forest ownership at the country level is noticeable (see Figure 31).

Figure 31: Trends in Private Ownership at Selected Country Level Between 2000 and 2005



Source: [Schmithüsen / Hirsch 2010: 6] (based on data about forest and other wooded land (FOWL) from the Forest Resources Assessment (TBFRA) 2005 (data for 2000) and from the Private Forest Ownership (PFO) database (data for 2005)); per 1,000 ha, and percent change.

The owners of forests and other wooded land determine the objective for the use of forests and other wooded lands and their associated resources. In Europe, corresponding to the decrease of publicly- and an increase in private-owned forest areas, a reduction in state forest management and an increase in private sector management can be seen. As stated in a study by Siry, Cubbage and Newman, “public ownership often relies on government agencies in formulation and implementing policies affecting these forests. Private ownership gives management responsibility to individual owners or corporations or trusts.” [Siry / Cubbage / Newman 2009: 3]

The management of private forests is influenced by three main sets of factors [FAO 1997]:

1) the characteristics of the owner (overall financial situation, place of forestry within this situation, age, family status, residence etc.),
2) the characteristics of the forest stand itself (size, distribution, structure, productivity, composition, history etc.),
3) external constraints and opportunities (general economic situation, wood and non-wood forest product markets, existence of incentives and subsidies etc.).

Outlook and impact

According to the Private Forest Ownership project, private forest owners in Europe "have a crucial role in achieving sustainable forest management, in sustaining the productivity of forests and in satisfying the increasing demand for wood resources from wood processing manufacturers and bioenergy producers" [Hirsch / Korotkov / Wilnhammer 2007: 23]. Furthermore, the project concluded that as "privatization of forests continues to increase, urbanization and ageing of forest owners can be expected to have an impact on forest management in Europe" [ibid.: 25].

As the transfer of knowledge and the access to infrastructure can be complicated when forest owners are many [see ibid.], associations of forest owners, particularly of small holders, could improve the efficient and sustainable use of forests and other wooded lands [FAO 2000: vii]. Still, under "conditions of fragmented forest ownership, participation [of forest owners] can only be achieved where there is a mechanism that harnesses and synthesizes the various viewpoints of forest owners, such as a national level umbrella organization" [Humphreys 2004: 208]. However, Siry, Cubbage and Newman stated that "[p]olitical constraints along with concerns about protection of the environment and fulfilling important social needs make forest privatization difficult" [Siry / Cubbage / Newman 2009: 8].

3.3 Management by the State

Data sources and time period

Forest tenure and data about forest ownership and management status are very contextual, as national and local laws have unique terms and rights assigned [see RRI 2011: 3]. At European level, no overall study or comparative analysis dealing with state-managed forests in the European Union has been identified. Within this section, available information and data are complemented by

scientific and other secondary literature. To demonstrate the state's responsibilities, the example of the German Forest Sector has been chosen.

Definition(s)

The main classes of forest ownership in Europe are private ownership and public ownership. State-owned forests belong to the category public ownership, which is defined as follows: Public ownership refers to land owned by the state (or region, like in Germany), state-owned institutions, corporations or other public bodies, including cities, municipalities, villages and communes (like in France, Switzerland) [Eurostat 2009].

Past development

As already mentioned, the restitution of forests in Eastern Europe to their previous owners has created a vast number of small private forest owners. A roll-back of the state can be witnessed in many European countries, both East and West, leading to a reduced role for the public sector in national forest ownership. Besides Germany (see Box 9), in the Netherlands for example, "the state traditionally had a leading role in forest ownership for most of the twentieth century. Until the 1970s the Dutch Forest Service (SBB) would usually take over private forests being sold by their owners. Since then the SBB plays a less prominent role in this area. Forests are increasingly bought by nature conservation groups, although this is often with financial support from the government, while the SBB has been semi-privatised." [Humphreys 2004: 209]

Box 9: Responsibilities in the German Forest Sector

Germany ranks among the most densely wooded countries in the EU 27. Around 11 million ha, corresponding to one-third of the national territory, are covered with forests. Forests increased by approximately 1 million ha over the past four decades [BMELV 2011: 4]. Ownership of forests and other wooded land in Germany is highly diversified, given state, communal and private forest ownership.

Germany is a federal state. The jurisdiction of the forests rests primarily with the ministries of the 16 *Bundesländer* (federal states); the federal constitution restricts many of the legislative and most of the executive competencies to the federal states rather than to the national level. The promotion of forestry, especially of non-state-forests, is within the competence of the ministries of the federal states. They, as well as the regional forest authorities, are in charge of regional legislation, of monitoring the implementation of legal requirements, of managing the state-owned forests as well as providing consultancy and support to private forest owners. On a national level, the Federal

Department for Consumer Affairs, Food and Agriculture (BMVEL) is responsible for providing and coordinating a legal framework and international forest management policies, as well as incentive-based measures [see Häusler / Scherer-Lorenzen 2001: 16]. This vertical distribution of political power shapes, e.g., the potential scope and limits of the federal National Forest Programmes [see Humphreys 2004: 209].

While for privately owned and corporate forests the economic responsibility lies with the owner, as regards state-owned forests there is currently a change going on: "So far, the state forest authorities have been fulfilling both jurisdictional and managerial functions. However, the federal states of Saarland and Hessen have recently transferred the management function to autonomous limited liability (with the federal state as associate). The state forest authorities of those federal states now exclusively fulfil jurisdictional and advisory functions." [Häusler / Scherer-Lorenzen 2001: 16f.]

Main characteristics

State management of forests and other wooded lands is still a prominent form of tenure in the countries of the European Union. At least in principle, public forests are managed for public good, which includes a range of productive and protective uses, while private forests are managed for even a wider range of objectives [Siry / Cubbage / Ahmed 2005: 558].

Within the countries of the European Union, forestry usually comes under the minister who is also responsible for agriculture (see also Box 9). The arrangement takes advantage of "the close links between farming and forestry in land use, employment and rural development" [Hummel / Hilmi 1989: 11]. Being under direct state control, policy implementation in state-owned forests is easy – especially as these forests are usually in sufficiently large units to permit management by properly qualified staff. Besides, "since all the costs are borne and all the benefits are reaped by the whole population, conflicts of interest between forest owner and society are minimized" [ibid.: 6]. On the other hand, the bureaucracy might prevent forest managers from exercising the degree of initiative that is required for good management [ibid.].

Institutional and administrative changes influence the way that governments act within the forestry sector. For example, the continuing challenge for transition economies is to adapt their forest institutions to the new economic, political and cultural environment [World Bank 2005]. In recent years, as stated in *the European Forest Sector Outlook Study 1960-2000-2020* [UNECE / FAO 2005], many forest sector institutions and legal frameworks have adapted to changing circumstances, such as

- the separation of “authority” and “management” functions for public forests,
- a wider range of demands on forest-sector institutions,
- an increased emphasis on extension services, and
- national forest programmes etc.

Future developments will force forest institutions “to adapt to ever-changing circumstances and open decision making processes to many specialists who are not conventionally trained foresters. To some extent, it will also require a redirection of skills and capacities in the sector to deal with these new challenges.” [UNECE / FAO 2005: xxvi]

Nevertheless, state forests – through their scale, expertise and history – are very well placed to implement the ecosystem services concept within the European context. As for EUSTAFOR [2011], examples of progress can be witnessed in important service areas such as payments, carbon, water, biodiversity and protection.

> European state forests provide valuable ecosystem services with a range of characteristics – in terms of access, private and collective use […]. Markets deal most efficiently with private goods where access can be limited to those who pay for them, and productising the features of a service can achieve this […]. However, public institutions remain very important deliverers of those services that are provided as public goods. State forests can therefore seek to present the ‘product’ characteristics of these, in innovative ways, so that markets and other institutions can take them up too and contribute effectively to their overall provision. Accounting for the high value of services produced can also provide the incentive for reinvestment […]. [EUSTAFOR 2011: 15]

At present, many European states are faced with a variety of challenges arising from the global economic crisis [see chapter *III Economic Development*; also Nilsson 2009; European Commission 2009]. The crisis slowed down the demand for a wide array of wood and wood products. Future climate change arrangements may specifically face challenges as countries give priority to tackling the economic crisis. The demand for environmental services could therefore be affected by a reduced willingness to pay for them, as reported by *the State of the World’s Forests* 2009 [FAO 2009: 98-100].

Outlook and impact

According to EUSTAFOR, state forest management organisations (SFMO) have certain characteristics that support their capability to deliver ecosystem services [EUSTAFOR 2011: 29f.]:

- SFMOs generally exist to manage the state asset of forests, therefore having a strong link to the government;
- State forests are managed on sustainable and multi-functional policies which makes them very flexible public assets that are in tune with the rising awareness of sustainability within people's everyday lives;
- Large scale state forest holdings are able to span a diversity of woodlands, land types and management objectives. The sustainable balance of environmental, social and economic benefits can therefore be applied across a wider range of sites regionally or nationally, so that each site in each forest can be managed for its greatest ability to contribute to a full range ecosystem services.

4. Conclusion

Understanding the concept of forest tenure is essential for all actors concerned with forests, indicating the authority determining the function and use of forests and other wooded lands. The objective of this chapter was to achieve an understanding of selected aspects of the broad concept of forest tenure within the EU 27 and its relation to and impact on the management of forested landscapes. Therefore, the forest ownership structure as well as tenure arrangements for forest-land use in the European Union were described, considering the main characteristics, major changes in the past and (where possible) its – evident or presumed – impact on forest management.

The overview of the European forest cover unraveled the complexity and variety of European forest areas and structures. The EU's forests vary from small private to large state forests, from small family owned holdings to large estates owned by companies, many as part of industrial wood supply chains. As a generalization, the number of holdings of forest and other wooded land in private ownership is much higher than that of public holdings, and the average size of public forest holdings is considerably larger than the average size of holdings of those in private ownership. Clarity of ownership structures is essential for the sustainable management of forests in avoiding and resolving tenure-related conflicts and is important as a basis for policies related to the social and economic elements of SFM. Ownership of forests might influence forest management, environmental performance, and the production of timber and other forest products and services. How the size and ownership of forest holdings influences forest management on the EU 27 level has not yet been investigated, but on the global level private forests provide more market-based goods such as timber,

while public lands produce proportionally more fuel wood and multiple-use goods and services [see Siry / Cubbage / Newman 2009].

The privatisation of former state-owned forests and other wooded land (e.g. as part of the transition process in countries formerly under centrally planned economies) is often associated with the fragmentation of forest holdings. Nowadays, throughout the EU 27, private forest ownership is mainly characterised by small-scale forest holdings and correspondingly to a huge increase in the number of small forest owners across much of Europe in recent years. These European forest owners are a very heterogeneous group, characterised by a huge variety of owners and goals, getting more complicated with the ongoing process of fragmentation. Many “new” or urbanised forest owners no longer live close to their forests nor do they have the necessary forestry knowledge. Additionally, the technology for harvesting timber, which can often reduce harvesting costs, has changed substantially. Furthermore, fragmented forest ownership is a challenge in e.g. in increasing the mobilization of wood from the forests and might be an important obstacle to innovation.

VI. Forest Policy Regime

Sabine Storch (Chair of Forest and Environmental Policy, University of Freiburg)

1. Forest policy authorities

1.1 Pan-European Institutions

In 1947, the European Forestry Commission (EFC) was established by the FAO (Food and Agriculture Organization of the United Nations) as one of six Regional Forestry Commissions. It provides "a policy and technical forum for countries to discuss and address forest issues on a regional basis" [EFC], and meets once every two years. The EFC has a joint Bureaux with the UNECE Timber Committee, where every second session is held jointly.

The *Ministerial Conference on the Protection of Forests in Europe* (MCPFE/FOREST EUROPE) was initiated in 1990 and involves 46 European signatory states – including Russia – of so far non-legally binding commitments. Its scope of competencies is described as follows: "FOREST EUROPE enhances the cooperation on forest policies in Europe under the leadership of ministers, and secures and promotes Sustainable Forest Management (SFM) with the aim of maintaining the multiple functions of forests crucial to society" [Forest Europe]. It commits itself to:

a) developing and updating policies and tools for sustainable management,
b) monitoring, assessing and implementing commitments to forests,
c) promoting education and research and
d) raising awareness and understanding of the contributions of FOREST EUROPE to Sustainable Forest Management [ibid.].

In addition to the Ministerial Conferences that take place every 3 to 5 years, there are (a) Expert Level Meetings where decisions are taken regarding the implementation of the commitments (involving up to 46 signatory states, the EC and observers and stakeholders), (b) Round Table Meetings that function as information platforms and include stakeholders and (c) Working Groups that deal with particular topics and involve nominated experts, preparing for the Expert Level Meetings.

In June 2011, the FOREST EUROPE Ministerial Conference decided to start negotiations for a legally binding agreement on forests in Europe [Forest Europe 2011]. For that purpose, the Intergovernmental Negotiation Committee for a Legally Binding Agreement on Forests in Europe (INC) was established as an intergovernmental body. It is supposed to complete its tasks until 30 June 2013.

1.2 EU Forest Policy Authorities

In the European Union, several institutions are concerned with forest policy issues. Within the **European Commission** (EC), which has the right of initiative to propose laws, both the DG Agriculture and the DG Environment and other Commission departments have some competencies concerning forests and forestry, which poses the question of where to institutionalise a coordinated EU forest policy. In 2001, the Inter-Service Group on Forestry was established to improve internal coherence. It holds two meetings each year that involve at least six Commission departments.

The **European Parliament** (EP) is, together with the Council, a co-legislator for nearly all EU law and adopts or amends proposals from the Commission. There is the parliamentary Committee on Agriculture and Rural Development, and the Committee on Environment, Public Health and Food Safety that deal with forestry issues. Furthermore, there are Intergroups with the purpose of informal exchange of opinions and contact with civil society. The most important forest-related Intergroups are the Intergroups "Sustainable Hunting, Biodiversity, Countryside Activities and Forestry" [FACE] and "Climate change, biodiversity and sustainable development" (overview: [European Parliament]).

The **Council of Ministers** adopts legislative acts, often in co-decision with the EP, decides on the Union's Budget together with the EP and helps to coordinate the member states' (MS) policies [Consilium]. The Council related to forest issues is dealing both with international forest processes and the EU's internal debates. Since 2002, the Council Working Party on Forestry that prepares the Council of Ministers responsible for forest issues is permanent and typically meets about once every month. Austria held the presidency of the Council both in December 1998, when the Forestry Strategy was adopted and in June 2006, when the Forest Action Plan was adopted.

The **Standing Forestry Committee** (SFC) was set up in 1989. It consists of representatives of the forestry administrations of the EU member states who are nominated by their governments and representatives of the European Commission (DG Agri and other DGs) holding the chair of the Committee. The SFC has mainly three roles:

a) concerning specific forestry measures, it acts as an advisory and management Committee;

b) concerning the development of forest-related measures in the framework of various Community policies, it is also an ad-hoc consultation forum that provides forestry expertise;
c) it generally provides a venue for exchange of information among MS, and between MS and the Commission [European Commission 2010b].

Furthermore, for a better exchange of information on issues of common interest, periodic and informal **Forestry Directors-General** meetings with director-level officials from forestry authorities of the member states are organised by the presidencies of the EU [Lazdinis et al. 2009: 49].

2. Political Mediation Patterns

2.1 European Forest-Related Interest Groups

The Confederation of European Forest Owners (**CEPF**) was established in 1996 as a successor organisation to the Central Committee of Forest Owners in the European Economic Community, which was founded in 1961. It represents about 16 Mio private forest owners and just established a close alliance with Nordic Family Forestry (**NFF**), the Nordic Forest Owners' Association.

The European State Forest Association (**EUSTAFOR**), established in 2006 by Metsähallitus (Finland), Office National des Forêts (France), Latvijas Vasts Mezi (Latvia) and Österreichische Bundesforste AG (Austria), comprises 26 state forest organisations from 20 EU countries.

The European Federation of Municipal Forest Owners (**FECOF**), established in 1990 by the French and German Municipal Forest Owners' Association, makes up eight national sections today (France, Germany, Italy, the Czech Republic, Bulgaria, Spain and Andorra).

The Union of European Foresters (**UEF**), created in 1965, consolidates 23 associations from 19 countries (Albania, Austria, Belgium, Bulgaria, Croatia, Cyprus, Denmark, Finland, France, Germany, Ireland, Italy, Liechtenstein, Luxembourg, Moldavia, Poland, Spain, Sweden and Switzerland). It represents some 80.000 foresters working for different kind of forest owners (state, community, private).

The Union of Foresters of Southern Europe (**USSE**), founded 1989, integrates 13 associations of private forest owners from Spain (Galicia, Basque Country, Aquitania, Asturias, Navarre, Catalonia), France (Poitou-Charentes, SW France), Portugal and Greece.

The European Network of Forest Entrepreneurs (**ENFE**), established in 2000, represents European Forestry Contractors and comprises 13 national Forest Entrepreneur Associations (Belgium, Bulgaria, Germany, Denmark, Finland, France, Netherland, Poland, Portugal, Romania, Sweden).

Prosilva Europe, founded in 1989, is the European federation of professional foresters across 24 countries that advocates and promotes ProSilva Close to Nature Forest Management Principles as an alternative to clear felling and short rotation forestry. [Euroforest Portal]

FERN, created in 1995, is an environmental non-governmental organisation (NGO) and a Dutch Stitching concerned – among others – with European forest policy ("Tracking EU Policies, Focusing on Forests"). It holds a campaign on European Forest with the aim "to push for forestry practice and conservation in Europe which halt biodiversity loss and protect important habitats" [FERN]. It also facilitates a network of 45 NGOs from 12 European countries working on forest-related issues.

The World Wide Fund for Nature (**WWF**), one of the biggest international nature conservation organisations, holds a European Policy Office since 1989 that also deals with European forest policy. It was the most important NGO in the political processes around Natura 2000 [Weber / Christophersen 2002] and played an important role concerning the EU Timber Regulation and the FLEGT Action Plan. Furthermore it facilitates exchange between the EU institutions and local WWF groups and comments on the EU environmental and agricultural programmes (e.g. EAP, LIFE, Natura 2000).

The European Confederation of Woodworking Industries (**CEI-Bois**), founded in 1952, represents more than 380.000 companies from wood-working industries. It is an umbrella organisation, comprising both other European organisations from specific wood-working industries and national associations. Its secretariat is located in Brussels and is supported by working groups on (a) sustainability, (b) competitiveness and (c) construction [CEI-Bois].

One of CEI-Bois' most important members is the European Organisation of the Sawmill Industry (**EOS**), created in 1958, which represents the sawmill industries from 12 European countries (Austria, Belgium, Denmark, Finland, France, Germany, Italy, Latvia, Norway, Romania, Sweden and Switzerland). Together, these countries produce about 75 % of the total European sawn wood output. It shares the same offices and secretariat with CEI-Bois [EOS].

The Confederation of European Paper Industries (**CEPI**) was founded in 1992 through a merge of CEPAC (Confédération Européenne de l'Industrie des pates, papiers et cartons) and EPI (European Paper Institute). Through its 18 member countries (17 European Union members plus Norway) it represents some 520 pulp, paper and board producing companies and 1000 paper mills [CEPI].

The European Forestry Institute (**EFI**), established 1993 by 23 European states, represents 132 associate and affiliate member organisations (mainly from science) in 36 countries conducting research and providing policy advice on forestry related issues.

The Forest-based Sector Technology Platform (**FTP**), owned by CEPF, EUSTAFOR, CEI-Bois and CEPI, was created in 2005 as one of 36 EU Technology Platforms which are "industry-led stakeholder for a

charged with defining research priorities in a broad range of technological areas" [European Comission 2011]. It published the "Vision Document 2030" (FTP 2005) and the "Strategic Research Agenda" (FTP 2006). With the FTP, the forest sector has the opportunity to influence EU Framework Programmes for research and has to ensure industrial participation [Erikkson 2012].

As can be seen from the development of the organisations listed here, the wood industry was the very first to raise its European profile (1952), followed by the private forest owners (1961) and professional foresters (1965). Then, in the 1990s/2000 some new organisations were established: the Municipal Forest Owners organised themselves on the EU level in 1990, Forest Entrepreneurs in 2000 and State Forest Organisations in 2006. Together with FERN, an environmental NGO focusing especially on EU forest policies emerged 1995, WWF established its European Policy Office in 1989.

EUSTAFOR and CEPF established the "European Forestry House" on the 20th of March 2007 in order to increase and strengthen the visibility of the European forest-based sector in Brussels. The European Forestry House wants to offer a working and meeting place and serve as a communication platform in order to develop synergies and enhance external activities concerning forestry issues on the EU level. Several organisations that are politically and financially independent share this facility [EURSTAFOR].

2.2 Participation Procedures

Formal institutions

There are several specific committees for providing collaboration between the Commission and stakeholders in the field of European forest policy [European Communities 2003: 14]:

The **Advisory Group on Forestry and Cork** (AGFC) (set up 2004 to replace the Advisory Committee on Forestry and Cork) under the DG Agriculture and Rural Development includes representatives of forest owners' organisations (public and private), forest-based industry representatives, non-governmental environment organisations, forest trade unions, traders and consumer groups. It has 49 members, with the seats distributed among interests as follows [European Commission 2010d]:

- producers: 28 (mainly forest/landowners' associations)
- traders: 2
- industry: 11
- workers: 3
- consumers: 1
- environmentalists: 4

The main task of this advisory group is to contribute to areas covered by the CAP and by rural development policy and to the operation of the common organisations of the market in general.

The **Advisory Committee on Community Policy Regarding Forestry and Forest-Based Industries** (ACCFF) (set up 1983) under the DG Enterprise and Industry involves 23 representatives of different forest industry sectors, forest owners and trade unions. It advises on matters concerning the industrial aspects of Community policies affecting forest-based industries and forestry.

The **"Habitats" and "Ornis" Committee** consists of representatives of 25 members states and assists the Commission in the implementation of the Habitats and Birds Directives.

The **Sectoral Social Dialogue Committee** established for the woodworking industries (1998) involves European organisations representing employers and workers of the wood sector and developed the social dialogue on many issues linked to employment, working conditions, vocational training, industrial change, enlargement and others [Lazdinis / Angelstam / Lazdinis 2009: 50].

On 15 May 2012 the **ThinkForest** Discussion Platform was established for three years in order to „provide an active and efficient science-policy interface and foster an inspiring and dynamic science-policy dialogue on strategic forest-related issues" [Think Forest]. There are scientists, stakeholders and policy-makers involved. Tools used to facilitate dialogue are ThinkForest dinners, high-level seminars and other networking activities.

Examples of participation processes

Every five years, the Commission has to report on the implementation of the EU Forestry Strategy. For that purpose, it also conducted an online survey among forest stakeholders, while national forestry authorities had been included in the process earlier via the Standing Forestry Committee. Fifty-eight respondents commented on it, yet "the number of interest groups prepared to actively participate in Community-level forest and forestry-related policy- and decision-making is relatively low" [Lazdinis / Angelstam / Lazdinis 2009: 55]. Both low participation capacities and little participation opportunities may be reasons for that [ibid.: 54). It may also be related to the quality of the Forestry Strategy as an example for weak governance that cannot change the impact of government programmes, implying frustrations among policy actors and stakeholders [cf. Krott 2008: 24].

The following EU Forest Action Plan (see below) demanded even more stakeholder participation, which was first channelled through the SFC, the AGFC, the Inter-Service Group on Forestry and also the ACCFF, with the AGFC publishing a first progress report on the implementation of the EU FAP in July 2008 [European Commission 2008a]. However, although the aim of the FAP was to start a dynamic, multi-stakeholder process, forestry professionals criticised it as an 'empty' plan as it was

not accompanied by a financial statement [Angelidis 2011]. Additionally "the EU FAP has at its best been able to react to developments ongoing in other policy areas" [Pelli et al. 2012: 95].

Nevertheless, Lazdinis, Angelstam and Lazdinis [2009: 55] conclude that for a successful European forest policy, "a stronger and more coherent voice in the priority setting must be accompanied by more active participation and better capacities of interest groups themselves". Using Swedish forest stakeholders as an example, Bjärstig [2013: 135] showed that meanwhile, forest industry stakeholders want to become more Europe-focused and especially international companies or transnational networks have a great chance to impact forest issues in the EU. Still, there are notes of caution to not only rely on European umbrella organisations. Bjärstig concludes that forest stakeholders "truly feel they have a chance to influence the integration process [of forest policy on the EU level]", although "they are more or less forced to act and engage in the process due to the pressure from related policies (mainly environment and energy)" [ibid.: 136]. The European forest owners' movement is seen as the most important actor to influence the establishment of some form of formal forest policy followed by the European forest industry (esp. CEPI) and individual member states (Austria, Finland) [ibid.]. Moreover, forestry and forest-based industry actors use the EU's instrument of Technology Platforms to wield influence. For many forest stakeholders, the desire to maintain forestry under the national competence with a minimised Community intervention poses a problem, because still "there seems to be a consensus that coordination, coherence and actions on the Community level in the forest and forestry-related policy fields must be improved" [Lazdinis 2008: 10].

Environmental institutions and NGOs are said to be rather strong at the EU level [Winkel / Sotirov]. A prime example for that is Natura 2000, where environmental NGOs successfully used their influence [Weber / Christophersen 2002: 10]. Generally, Weber / Christophersen [ibid.] argue that "[t]he political stage in Brussels, and the architecture and structure of the European Union, opens new and more effective forms of political influence for NGOs." The development of Natura 2000 was strongly supported by Birdlife Europe, WWF, IUCN and later the European Environmental Bureau. On the other side, FACE expressed scruples against it from the beginning on, similarly ELO. The establishment of CEPF was in large part a response to the success of Natura 2000.

3. Political Ideas

There are diverse understandings of forests and forest management as well as diverse related policy paradigms amongst the European states. Winkel / Sotirov give an overview on forest policy paradigms and their regional pattern in Europe (Table 30).

Table 30: Policy Paradigms and Regional Patterns of Forest Management and Policy Across Europe (EU 27)

Policy paradigm	**„Sustained yield“: Sustainable timber production**	**„Multipurpose forestry“: Multifunctional sustainability**	**„Ecosystem management“: Ecological sustainability**
Goal	Maximum possible periodic timber yields	Maximum possible periodic yields from sales of 1) timber and 2) other forest services	Improvement and/or maintenance of the ecological state of forest ecosystems
Constraints and / or premises	- Maximum quantity of timber harvest must not exceed periodical prescribed yield - Forest maintenance, deforestation ban, reforestation obligation - Preservation of ‘health’ of forest ecosystems	- Maximum quantity of timber harvest must not exceed periodical prescribed yield - Certain amount of forest services (e. g. protection, recreation) must be maintained - Forest maintenance, deforestation ban, reforestation obligation - Preservation of ‘health’ of forest ecosystems	- Maximum of forest ecosystem services aspired - Minimum quantity of timber maintained - Advanced standards/criteria and indicators for forest management - Forest maintenance, deforestation ban

Regional patterns of sustainable forest management (on continuum from ‘sustained yield’ via ‘multipurpose forestry’ to ‘ecosystem management’’)					
Group of countries	**Northern Europe, Baltic States and Central Europe** Finland, Sweden, Estonia, (Latvia, Lithuania, Austria, Poland)	**Western, Central and Eastern Europe** France, Germany, Czech Republic, Slovakia, Slovenia, Bulgaria, Romania, (Hungary)	**Western Europe** Denmark, Ireland, United Kingdom	**Southern Europe** Greece, Italy, Portugal, Spain	**Western Europe** Belgium, The Netherlands, Luxembourg
Forest area	Large in relative terms	Relatively large, partly fragmented forests	Small, in relative and absolute terms	Parcelled forests	Small, fragmented properties
Importance of forest sector for national economy	Great	Moderate	Little	Little	Marginal

Key services of forest ecosystems for society	***Wood production*** ***Other services*** (recreation; biodiversity conservation mostly in protected areas)	***Wood production*** ***Other services*** (recreation, biodiversity conservation partly integrated in sustainable forest management, partly in designated protected areas)	***Wood production*** ***Other services*** (e.g. protective or protected forests) or products other than timber also important Semi-natural forests for recreation and biodiversity conservation	***Different forest products*** (e.g. foliage, berries, game, fuel-wood) ***other forest services*** (e.g. soil and water protection)	***Nature conservation and recreation, wood production***

Source: Adopted from [Winkel / Sotirov], based on [Winkel et al. 2011: 366-367].

In addition, there are mainly two fundamentally different perspectives on forests, forest management and forest policy, namely the environmental (conservationist) and forest-based industry or forest use (commodity) perspectives (Table 31).

Table 31: Different Perspectives on European Forests

'Commodity'-perspective	**Aspects to be considered**	**'Conservation'-perspective**
Resource base and place of wood production	**View of forests**	Naturally dynamic ecosystem
Forest owners and enterprises, forest based industry	**Groups of greatest concern**	All living species including plants and animals, pluralistic society
Forest health/stability, vitality (growth), profitability	**Important attributes of forest ecosystems**	Forest biodiversity, dynamic and disturbances
Competitiveness of the forest sector	**Main goals for forest policy**	Increase forest biodiversity
Sustainable forest management (basically timber production oriented)	**Forest management paradigms**	Protection, conservation, ecologically responsible management

Forest sciences, economy, technology	**Knowledge basis**	Ecology, biology, ethics

Source: Adopted from [Winkel / Sotirov], based on [Winkel et al. 2009: 30].

Glück [2000] describes how these two perspectives developed. After a long period, in which only "foresters were regarded as the trustees of sustainable forest management", and which stimulated the development of forest sciences (particularly forest inventory, forest growth research and forest economics), "the timber-oriented perception of forests was challenged by an ecosystem orientation focusing on the maintenance and enhancement of biological diversity" from the 1960s on [Glück 2000: 196], when the environmental movement started. After the UN Conference on Human Environment in 1972 in Stockholm, it became institutionalised and since then, "forest politics on national, European and global levels, has been characterised by two stances with different interests in the use of forests: the economic interest in timber production and the ecological interest in maintaining and enhancing environmental values such as biological diversity" [ibid.].

The globalisation of forest-based industries now adds to the policy paradigm of free markets and low standards for forest management. Krott [2008: 22ff.] generally assumes that a market driven governance strategy will find a positive response from EU institutions and policies, for which the FTP is again a prime example [ibid.]. Yet, as described above, there are also strong environmental and conservation-oriented interests represented on the EU level. After all, since the Treaty of Amsterdam (1997), it is a goal of the Community to foster a high level of protection and improvement of the quality of the environment, equally to economic goals [Gottlob 2005: 26ff.].

VII. Policy Coherence

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1. Formal Policy Goals and Instruments

1.1 Pan-European Level

Table 32 gives an overview on policy issues discussed on the Ministerial Conferences of the voluntary Forest Europe process and their resulting, so far non-binding forest policy instruments.

Table 32: Issues of the MCPFE and Resulting Forest Policy Instruments

	Short titles of resolutions	Forest policy instruments (non-binding)
Strasbourg 1990	1) Monitoring of Forest Ecosystems 2) Genetic Resources 3) Data Bank on Forest Fires 4) Adapting the Management of Mountain Forests 5) Research on Tree Physiology 6) Research into Forest Ecosystems	
Helsinki 1993	1) Sustainable Management of Forests in Europe 2) Conservation of Biodiversity of Forests 3) Co-operation with Countries with Economies in Transition 4) Adaptation of Forests to Climate Change	➢ General Guidelines for Sustainable Forest Management (SFM), ➢ General Guidelines for conservation of biological diversity of European forests
Lisbon 1998	1) Socio-Economic Aspects of SFM 2) Pan-European Criteria, Indicators and PEOLOG for SFM	➢ Pan-European Criteria and Indicators for SFM ➢ Pan-European Operational Level Guidelines for SFM
Vienna 2003	1) Cross-sectoral Co-operation and NFPs 2) Economic Viability of SFM 3) Social and Cultural Dimensions of SFM	➢ Improved Pan-European Indicators for SFM ➢ Pan-European Approach to National

	4) Forest Biological Diversity 5) Climate Change and SFM	Forest Programmes
Warsaw 2007	1) Forest, Wood and Energy 2) Forest and Water	
2008		➢ Pan-European Guidelines for Afforestation and Reforestation

Source: Adopted from [Forest Europe a].

The range of topics covered from 1990 to 2007 included more and more economic and social/cultural aspects over time. The guidelines, criteria and indicators for SFM that were established and further developed during the MCPFE processes reflect this. The National Forest Programmes that resulted from the MCPFE process were recognised by the EU, UNFF and the World Bank. Since 2003, FOREST EUROPE has published a *State of Europe's Forests Report* every four years (MCPFE 2003a, 2007, 2011), supported by the UNECE and FAO.

In Oslo 2011, the historical decision to launch negotiations on a Legally Binding Agreement (LBA) on Forests in Europe was made. The last session of the Intergovernmental Negotiation Committee for a LBA on Forests in Europe will be held in June 2013 and the ratification process is expected to take place in 2014.

1.2 EU Level

i. Overview

Forest products – with the exception of cork – were excluded from the EU primary laws on common policies. Thus, forest policy remained in the competence of the member states. Nevertheless, in coordination with the member states through the SFC, some forest related measures were adopted on the EU level under the objectives of other policies, especially of agricultural and environmental policies. In recent years, the Timber Regulation ((EU) No 995/2010) laying down the obligations of operators who place timber and timber products on the market was one of the main topics in EU forest politics. Since 1998, there have been initiatives for a coordinated EU forest policy through the EU Forestry Strategy, to be renewed in 2013. Since 2011, this process is closely interrelated to the negotiations for a LBA on forests in Europe. Still, there are several different EU forest related measures that result in a fragmented EU forest policy. Table 33 gives an overview on forest-related EU policies, as summarised by Rametsteiner / Weiss [2011].

Table 33: Areas of EU Activities Related to Forests and Respective Policy Instruments

Areas of forest related EU policy activities	EU policy instruments
EU Forestry strategy and EU Forest Action Plan	Council Resolution of 15 December 1998 on a Forestry Strategy for the European Union (non-legally binding) Communication from the Commission to the Council and the European Parliament on an EU Forest Action Plan, COM(2006) 302 final; (non-legally binding)
Forestry in rural development	Council Regulation (EC) No 1698/2005 of 20 September 2005 on support for rural development by the European Agricultural Fund for Rural Development (EAFRD) (legally binding) Commission Regulation (EC) No 1857/2006 of 15 December 2006 on the application of Articles 87 / 88 of the Treaty to State aid to small and medium-sized enterprises active in the production of agricultural products and amending Regulation No 70/2001 (legally binding)
Forest-based and related industries	Communication from the Commission to the Council and the European Parliament on innovative and sustainable forest-based industries in the EU: A contribution to the EU's Growth and Jobs Strategy; COM(2008) 113 final (non-legally binding)
EU forest monitoring and protecting measures	Regulation (EC) No 2152/2003 of the European Parliament and of the Council of 17 November 2003 concerning monitoring of forests and environmental interactions in the Community (Forest Focus) (legally binding); repealed by: Regulation (EC) No 614/2007 of the European Parliament and of the Council of 23 May 2007 concerning the Financial Instrument for the Environment (LIFE+) (legally binding)
Forests and energy	Communication from the Commission of 7 December 2005 - Biomass Action Plan [COM(2005) 628 final] (non-legally binding) Communication from the Commission - 20 20 by 2020 - Europe's climate change opportunity [COM(2008) 30 final] (non-legally binding) Directive 2009/28/EC of the European Parliament and of the Council of 23 April 2009 on the promotion of the use of energy from re newable sources and amending and subsequently repealing Directives 2001/77/EC and 2003/30/EC (legally binding) Communication from the Commission to the European Parliament, the Council, the European Economic and Social Committee and the Committee of the Regions - Energy 2020 A strategy for competitive, sustainable and secure energy [COM/2010/0639 final] (non-legally binding)
Forest fire	Regulation (EEC) No 2158/92 of 23 July 1992 on protection of the Community's forests against fire (legally binding) Regulation (EC) No 2152/2003 of 17 November 2003 on the monitoring of forests and environmental interactions in the European Union (Forest Focus) (legally binding) Commission Communication (COM(2008)130 final) on reinforcing the Union's disaster

	response capacity (non-legally binding) Regulation (EC) No. 614/2007 on the Financial Instrument for the Environment (LIFE+) (legally binding)
Forests and biodiversity	Directive 2009/147/EC of the European Parliament and of the Council of 30 November 2009 on the conservation of wild birds (legally binding) Council Directive 92/43/EEC of 21 May 1992 on the conservation of natural habitats and of wild fauna and flora (legally binding) Communication from the Commission to the Council and the European Parliament of 4 Feb-ruary 1998 on a European Community biodiversity strategy [COM(1998) 42] (non-legally b.) Commission Communication of 27 March 2001 on Biodiversity Action Plans in the areas of Conservation of Natural Resources, Agriculture, Fisheries, and Development and Economic Cooperation [COM(2001) 142 final] (non-legally binding)
Forest Plant Health and Forest Reproductive Material	Council Directive of 15 July 1991 concerning the placing of plant protection products on the market (91/414/EEC) (legally binding) Council Directive 2000/29/EC of 8 May 2000 on protective measures against the introduction into the Community of organisms harmful to plants or plant products and against their spread within the Community (legally binding) Council Directive 1999/105/EC of 22 December 1999 on the marketing of forest reproductive material (legally binding)
Forest and water policy	Directive 2000/60/EC of the European Parliament and of the Council establishing a framework for the Community action in the field of water policy (legally binding)
Forest law enforcement and trade	Regulation (EC) No 2173/2005 of 20 December 2005 on the establishment of a FLEGT licensing scheme for imports of timber into the European Community (legally binding) Regulation (EU) No 995/2010 of the European Parliament and of the Council of 20 October 2010 laying down the obligations of operators who place timber and timber products on the market (legally binding)
Forestry within the EU research policy	Regulation (EC) No 1906/2006 of the European Parliament and of the Council of 18 December 2006 laying down the rules for the participation of undertakings, research centres and universities in actions under the Seventh Framework Programme and for the dissemination of research results (2007-2013) (legally binding)
Green public procurement	Directive 2004/18/EC of the European Parliament and of the Council of 31 March 2004 on the coordination of procedures for the award of public works contracts, public supply contracts and public service contracts (legally binding)

Source: Adopted from [Rametsteiner / Weiss 2011: 158].

Winkel / Sotirov group these policies in five major policy fields and classify them according to their problem statement, objectives, knowledge, governance approach and way of implementation (Table 34).

Table 34: The Landscape of EU Forest Relevant Policies

Policies	Main problem / concept of forest	Main objectives / problem solution path	Knowledge / science referred to	Governance approach (instruments)	Implementation
Forest (management) policy	Forests for society Need to be managed sustainably in order to pro-vide multiple services	Sustainable Forest Management framed as multi-functional forest management, but only vaguely defined	Diverse, as central documents bundle different scientific perspectives on forests (economic, ecological, social); "forest sciences" are dominant	'Soft' approach (EU-FS and EU-FAP), focusing on communication and coordination Subsidiarity central	Flexible and fragmented implementation related to different member states interests
Agriculture and rural development	Forests are not prioritised Focus across Europe is on rural develop-ment and agriculture	Economic competitiveness and rural development as main concerns Social and environ-mental objectives are included to a certain degree	Diverse perspectives, as the different objectives and tools applied are derived from different concepts; "agricultural sciences" dominant	Policy is based on provision of financial means (subsidies and payments) for sustainable land use and rural development Payments linked to social and ecological standards	member states choose activities they wish to finance within the common framework Implementation is regulated and monitored Evaluations show that member states forest related spending is biased towards production measures
Environment	Forest as place of biodiversity and source of ecosystem services Needs to be conserved through	Provision of a conservation status of forest ecosystems and related ecosystem services, through protection and sustainable management, are central.	Mostly natural science-based; conservation biology (e.g. Natura 2000), also environmental innovation and sustainability transition	Regulatory framework approach with environmental directives Financial means and provision of information less	A certain conservation status or ecosystem services have to be provided by applying conservation and management concepts, such as protected areas

	ecologically sustainable management practices			central	Flexible implementation, often delayed due to conflicts
Energy and climate change	Forests primarily defined as the provider of a renewable energy source and/or carbon sink	Increase of the share of renewable energy production and increase biomass production Use of forests for carbon sequestration	Mostly "production ecology" and technology-based.	'Soft' (discursive) approach (strategies) combined with framework regulatory policy (including binding targets)	EU binding targets for renewable energy and emission reduction have to be met via member states policies; member states are free for the policies they apply
Industry and trade	Forests defined as a economic resource (commodity) Focus is on the competitivenes of the European forest sector	Creation of an innovative and competitive forest sector, supported by research and industrial development	Mostly economics and technology based.	'Soft' (mostly discursive and knowledge-based) approach (Communications and research plan)	Implementation interlinked with other forest-related policies, For instance, competitiveness is the first objective of the EU-FAP as well as agricultural policy

Source: Adopted from [Winkel / Sotirov].

In the following, three important fields of forest related policies are singled out and their goals and instruments are described in a little bit more detail.

ii. Forest Policy

The following activities are listed as EU forest policy on the official website of the European Commission, DG Environment [European Commission 2012c]:

Table 35: EU Forest Policy Activities

1995	The Thomas Report of the environmental committee of the European Parliament gave a series of recommendations for the development of a European Union (EU) Forest Policy.
1998	The European Commission presented a Communication on a Forestry Strategy for the EU. The EU Council adopted a Resolution on a Forestry Strategy for the EU. This document is considered to be the basic political charter for Community involvement in forest issues.
2005	The Commission has presented to the Council and the European Parliament a reporting on the implementation of the EU Forestry Strategy accompanied by a detailed Staff Working Document.
2006	The EU Forest Action Plan was adopted on 15 June 2006. It builds on the report on implementation of the EU Forestry Strategy and consequent conclusions by the Council.
2010	The Commission adopted the Green Paper on forest protection and information.
2011	The Arsenis Report of the environmental committee of the European Parliament gave a series of recommendations on the follow up of Commission's Green Paper on forest protection and information.

As its overall principles, the Forestry Strategy puts forward the application of Sustainable Forest Management and the multifunctional role of forests. Furthermore, the principle of subsidiarity is underlined. The FAP can be seen as the response of the Commission to transform the Strategy into a dynamic process, defining a common vision, principles, objectives and key actions in a multi-stakeholder process. It is primarily a framework for activities to be pursued jointly by EU countries and the European Commission. In order to achieve the FAP's four main objectives (see Table 36), eighteen key actions had been developed. They mostly relate to areas of coordination, communication and research. A new EU Forestry Strategy is expected to be adopted in 2013.

In 2010, the Commission published a Green Paper that is a document to stimulate discussion and initiate consultation processes "[o]n Forest Protection and Information in the EU: Preparing forests for climate change" [2010a]. It stresses climate change and protection issues, which fall under the DG Environment's competency, and highlights the need for better forest information.

Table 36: Overview on EU Forest Policies

Policy field	EU forest policy
Key policies	a) Forestry Strategy (FS) (Council, 1998) b) EU Forest Action Plan (FAP) (Commission, 2006) c) Green Paper on Forest Protection and Information (Commission, 2010)
Political decision-maker	Council, EC

Formal goals of policies	FS: To foster multifunctional forests and sustainable forest management (SFM). FAP: 55 activities, 18 key actions to achieve the following four main objectives: a) improving the long-term competitiveness of the forestry sector, b) improving and protecting the environment, c) contributing to the quality of life, d) fostering coordination and communication. Green Paper: To ensure the protection of forests so that they can continue to deliver all their functions; -> update FS on climate-related aspects!
Specific types of instruments utilised	'Soft' approach: informative instruments, e.g. • Support research, training and studies • Communication (information exchange, websites, awareness events) • Coordination (meetings, workshops, National Forest Programmes)

iii. Rural Development

The Agenda 2000 CAP reform split up funding for agriculture into the 2 pillars (a) market/income support and (b) rural development (RD). With this reform, forestry became an integral part of the CAP. One of the four priority areas of the RD Policy for the period from 2007 to 2013 was to improve the environment and countryside (axis 2). Many measures of this axis are linked to forestry, supporting [Winkel et al. 2009: 39ff.]:

- the promotion of first afforestation of agricultural and non-agricultural land to contribute to the protection of the environment, the prevention of natural hazards and fires, the enhancement of biodiversity as well as to mitigate climate change;
- forest restoration and prevention in forests damaged by natural disasters and fire;
- forest environment payments introduced for voluntary commitments to enhance biodiversity, preserve high-value forest ecosystems and reinforce the protective value of forests with respect to soil erosion, maintenance of water resources and water quality;
- the establishment of agro-forestry systems that combine extensive agriculture and forestry systems, aimed at the production of high-quality wood and other forest products;
- non-remunerative investments of forest holders where they are necessary in order to achieve the forest-environment commitments or other environmental objectives;
- Natura 2000 payments granted to forest holders to help address specific problems resulting from the implementation of the Birds and Habitats Directives.

Yet there are also many forestry measures under axis 1, which aim at improving the competitiveness of the agricultural and forest sector. It can be said that before 2007, the "bulk of rural development funding for forest management focused primarily on the promotion of timber production and supporting forest owners" [Winkel et al. 2009: 40].

Member states are able to choose, which measures to include in their national or regional rural development programmes according to their needs. However, there has been a relatively low uptake of forestry measures. Some forest stakeholders advocate an agri-environmental scheme for forestry, which poses the question of the baseline of SFM. On 12 October 2011 the Commission presented a set of legal proposals for the next period designed to make the CAP a more effective policy, including sustainable and climate-friendly forest land use. These proposals are accompanied by an impact assessment and debated in the European Parliament and the Council. It is expected to have the CAP reform in place as from 1st January 2014.

iv. Biodiversity

Natura 2000 is the core policy of the EU protecting nature and biodiversity. Thirty percent of NATURA 2000 sites are categorised under forest and other wooded-land habitat. The site selection should focus specifically on [Winkel et al. 2009: 41]:

- forests of native species, forests with a high degree of naturalness,
- forests of tall trees,
- presence of old and dead trees,
- forests with a substantial area,
- forests having benefited from continuous sustainable management over a significant period.

Concerning forest management, only a limited number of requirements can be derived from the Directives [Winkel et al. 2009: 42]. Nevertheless, forest policy actors expect forest management to be affected in these areas by the goal of maintaining favourable conservation status (Article 6, § 2 of the Habitats Directive). Still, some management activities are favourable to creating or maintaining a high natural value and the Habitats Directive does not a priori prevent any new activities. An impact assessment must be made for new plans that are likely to have a significant effect on Natura 2000 sites. There are ongoing activities to prepare EU guidelines for managing forest habitats and species under the Natura 2000 network of protected areas.

v. Bioenergy

The Renewable Energy Directive sets the targets to achieve a general 20 % renewable energy share and 10 % renewable energy share in transport by 2020. It establishes sustainability criteria for

bioenergy including where (not) to plant energy crops, e.g. no conversion of “high biodiversity” or “high carbon stock areas”. Bioenergy is assessed to still have a growth potential. The EU Biomass Action Plan identified 32 key activities for boosting the bioenergy market. The CAP and EU Regional Policy support bioenergy production, including e.g. short rotation forestry [Winkel et al. 2009: 42ff.].

vi. Water

The Water Framework Directive will be implemented in three management cycles (until 2015, 2021 and 2027). The river basin approach led to a Common Implementation Strategy, including public participation requirements. Member states have to establish Programmes of Measures for each river basin (operational in 2012). The measures are linked to axis 2 of the RD policy. Forestry related measures can be expected in headwater regions of rivers [Winkel et al. 2009: 40ff.].

2. Policy Coherence

(In)coherence of EU forest policy goals and instruments

As can be seen from the description of different policies above, the development of forest measures in different policy fields led to a layering of different goals and instruments that are partly incoherent and inconsistent. There are obvious contradictions between Natura 2000 and bioeconomy or wood mobilization policies. Energy policy with the aim to expand the use of woody biomass for renewable energies is assessed as disregarding environmental concerns and may conflict with the goal of protecting valuable forest habitats. The CAP exhibits conflicting objectives and instruments in itself, supporting economic competitiveness on the one hand and afforestation, restoration and conservation of forests and woodlands on the other. Some incentives from the RD policy can interfere with conservation policies [Winkel et al. 2009: 46ff.]. Furthermore, there is a lack of coherence within the EU Forest Policy, regarding e.g. the objectives of the FAP and the Green Paper on Forest Protection. In a process of “layering”, new goals and instruments have simply been added to old ones. A central element of the forest policy debate that facilitated this development is the concept of Sustainable Forest Management that is very flexible and not unanimously defined, opening the way to “empty eggshell policies”.

Debate on EU forest policy coherence

Both the EU institutions and the MCPFE show much concern about the coherence between forest-related policy activities at the EU level. It is generally assessed that there is a lack of coherence in EU forest policy, due to (a) different forest related policies (from other policy fields) and (b) different forest policies. Winkel / Sotirov found the following main reasons for this fragmentation of European forest policy:

- "Diverging ecological, social and economic patterns of forests and the forest sector in different regions, and resulting diverse interests of member states, combined with a general 'anti-EU mood' of some member states,
- Lack of interest of the forest sector, and more specifically its economic interest groups, in an integrated forest policy,
- Lack of interest of other sectors in an integrated forest policy,
- Institutional competition about the 'right' competency for policy integration".

Winkel / Sotirov also elaborate on the reasons behind this fragmentation, perceiving policy (dis-) integration as a highly political process and as a "strategic approach in the political struggles over interests and ideas" including institutional competition.

For example, they list the recent forest policy initiatives at EU and pan-European level and their strategic importance for policy actors from forest and environmental coalitions, based on expert interviews (Table 37):

Table 37: The Strategic Importance of Recent Forest Policy Initiatives at EU and Pan European Level, as Described by Interviewees

	Policy level	**Main supporters**	***Strategic importance…***	
			… as assigned by forest sector interviewees	**… as assigned by environmental interviewees**
EU Forestry Strategy, Forest Action plan, planned new Forest Strategy	EU	DG Agriculture, Forest coalition	Attempt to coordinate forest policy Prevent other activities by the Commission, e.g. related to environmental issues	Attempt to coordinate forest policy, has transformed into a purely symbolic process Prevent other activities by the Commission, e.g. related to environmental issues
Commissions Green Paper on Forest Protection and information	EU	DG Environment, Environmental Groups, Southern European States	Attempt to establish one-sided forest policy under environmental competency, based on information	Attempt to achieve better integration via better information in a first step
Legally Binding Agreement Negotiation Process (Forest	Pan-European	Forest coalition of nation states' authorities and interest groups,	Diverse, attempt to finally establish own institution for the forest sector in order to a) level	Attempt to block or influence EU forest related policy (forest protection, biodiversity) via the pan-

Europe)	yet to different degrees	the (legal) playing field for the forest sector and b) counteract forest relevant EU environmental policies	European level

Source: Adopted from Winkel / Sotirov.

In conclusion, Winkel / Sotirov assess that in the absence of political conditions that are inacceptable for all groups, "it is currently unlikely that any initiative at the EU or pan-European level will achieve substantial forest policy integration" [ibid].

Pelli et al. [2012: 94] evaluated the FAP and concluded that

> […] instead of being a driver of policy coordination, the EU FAP has, at its best, reacted to developments in other policy areas. In the ex-post evaluation surveys many respondents (Commission services, member states and stakeholders) acknowledge the positive aspect of exchanging information within the framework of the EU FAP. At the same time the respondents also recognise that the mere information sharing does not necessarily lead to improved policy coherence or impact on policy definitions. For stronger impact, stronger policy instruments would be needed, although there is lack of enthusiasm and political will for defining a stronger policy instrument, such as a legally binding agreement on forests. [ibid.]

However, member states still have room to manoeuvre in implementing forest related EU policies, so that they could coordinate these policies and shape their interplay or coherence at domestic level.

3. Policy Processes

Already in the 1970s, initiatives on a common or better integrated EU forest policy were being discussed. These were triggered e.g. by the forest die-back challenges (mid 1980s), the accession of forest-dominated countries, Austria, Sweden and Finland (mid 1990s) and the discussion on the European constitution [Winkel / Sotirov]. Nevertheless, no Common EU forest policy has been achieved.

The development of the patchy EU forest-related policy that can be found instead today, was described by Lazdinis [2008]: first, "[d]uring the period of 1964-1988 the EC took certain measures to develop the forestry sector, but these lacked a systematic approach and were always directly linked to the CAP, in particular the policy on improving agricultural structures. The measures concerned

harmonisation of legislation, the development of forests and forestry, the protection of forests against atmospheric pollution and fires, and forestry research (European Parliament 2004)." There were no coherent predetermined objectives for a European forest policy, rather they were established on an ad-hoc basis [ibid.: 4]. Gottlob [2005: 22ff.] further elaborates, that the Agriculture Council failed to come to an agreement on a first draft Directive on forestry measures in the 1970s, as it obviously could not agree on its scope of competences regarding forestry. The possibility for a common environmental policy, the other major policy field for forest-related measures, was opened up by the final declaration of the Paris European Summit in 1974 [ibid.]. An independent competence of the Commission for environmental policy was provided by the Single European Act (1986), which amended the Treaty on the Foundation of the European Community by the goal to strengthen the economic and social cohesion.

Lazdinis [2008] continues that, "[t]he Community adopted a more coherent approach to its forestry projects during the period of 1988-1992" by adopting a first forestry action programme with a focus on "(1) afforestation of agricultural land; (2) development and optimum use of forests in rural areas; (3) cork; (4) forest protection; (5) accompanying measures" [ibid.: 5]. From 1992 on, "[c]ommunity measures in the forest sector entered a more ambitious phase" [European Parliament 2004]. Regulation No 2080/92 (CAP) provided for (a) aid to cover afforestation costs, (b) a premium to cover maintenance costs, (c) annual premiums to cover loss of income as a result of afforestation and (d) aid for the improvement of woodlands [Lazdinis 2008: 6]. Measures to protect forests from atmospheric pollution and fires had been strengthened and an aid scheme for forestry measures in agriculture had been established. Interestingly, in 1999 the European Parliament successfully sued that the Council Regulations on the protection of forests against atmospheric pollution and on the protection of the forests against fire also fall under the environmental legislation without changing them substantially [Gottlob 2005: 22ff.]. This happened after the Treaty of Amsterdam (1999) – after it had received more competencies in the field of environmental policy – and reveals the existing institutional competition.

With regard to afforestation measures, which are "the oldest forest related measure of the CAP and still the most important one in terms of its percentage share of EAFRD (European Agricultural Fund for Rural Development) contributions to forest measures" [Winkel et al. 2009: 40] show how the objectives behind these measures changed and how contested they are:

> Afforestation measures were initially introduced as a means to mitigate overproduction in the agriculture sector and to promote alternative use of agricultural land. Since 2000 these measures are also aimed at the promotion of woodland expansion and the integration of more environmental considerations. However, until the 2007-2013

programming period the bulk of rural development funding for forest management focused primarily on the promotion of timber production and supporting forest owners instead of specifically addressing forest protection issues. In this regard, the European Court of Auditors also suggested that the CAP should place a stronger focus on environmental benefits of afforestation (European Court of Auditors, 2004).

FERN [2008] also criticised that funds of the RD policy are spent for plantations, but there is no sufficient funding for Natura 2000 [ibid.: 26]. Additionally, the European Court of Auditors pointed to the vagueness of the concept of sustainable forest management and the "insufficient clarity in the distribution of responsibilities between the Commission and the member states, for instance concerning the assessment of the effectiveness of single forestry projects with regard to initial Community goal setting" [Winkel et al. 2009: 40].

Forest monitoring can be seen as the first active forest specific policy measure implemented also on the EU level, triggered by observations of declining forest health and the "Waldsterben" discussions from the late 1970s on, but since 2007, it is not obligatory any more. First, the UNECE established the International Co-operative Programme on the Assessment and Monitoring of Air Pollution Effects on Forests (ICP Forests) in 1985. In 1986, the member states of the European Union agreed upon the Council Regulation (EEC) No 3528/86 on the protection of the Community's forests against atmospheric pollution, leading to a close co-operation between the EU and ICP Forests in implementing forest monitoring. In 1992, the Council Regulation (EEC) No 2158/92 for monitoring the impacts of fire on the Community's forests was adopted. Building on the achievement of these two regulations, the Forest Focus Regulation (EC) No 2152/2003 came into effect from 2003 to 2006. It broadened the scope of the monitoring scheme from the protection of forests to include other environmental issues such as soils and forest biodiversity [Winkel et al. 2009: 45]. Yet, after having ensured forest monitoring on the EU-level from 1987 to the end of 2006, the member states have no longer been obliged to execute forest monitoring. Some monitoring activities have been co-financed under the LIFE+ Regulation (EC) No 614/2007, especially the EU-level Forest Monitoring project called FutMon [ibid.: 46].

The EU Forestry Strategy was adopted in December 1998, following an initiative of the European Parliament [Angelidis 2011]. It was finally based on a non-legally binding Council Regulation despite the requests made by the Commission and the Parliament to adopt a legislative proposal [Winkel et al. 2009: 38]. The main driving forces behind the adoption of the EU Forestry Strategy were said to be "the growing concern about the coherence between the forest policies of the member states and forest related activities at the EU level, as well as the rising profile of forests in international policy

debates and initiatives in the area of sustainable development" [Lazdinis 2008: 6]. The consultations for the European Commission's obligatory reporting on the implementation of the Forestry Strategy revealed some emerging critical issues [Commission of the European Communities 2005a; Commission for the European Communities 2005b). Lazdinis [2008: 7] summarises that "generally, it appeared that the competitiveness and economic viability of sustainable forestry in many parts of the EU was increasingly being challenged." Demands towards forest owners and managers increased and cross-sectoral cooperation, coordination and policy coherence had to be improved. Both the Strategy and the FAP are perceived as political compromises that list activities that everyone could agree on [Winkel / Sotirov]. Lazdinis [2008: 10] concludes that "[t]he challenge is how to facilitate development of the sector without substantial regulatory and financial means and in the absence of a strong concerted interest from all the member states to enhance these means on the Community level." In contrast to the Forestry Strategy and the FAP, The Green Paper on Forest Protection was mainly supported by the DG Environment, environmental groups and mostly southern member states [Winkel / Sotirov]. Instead of giving rise to legislative documents (a White Paper), what was also demanded in the Arsenis Report, this initiative was hampered by forest policy actors who suspected environmental legislation intentions and rejected monitoring and reporting obligations or even better information flow on forests towards the European Commission in general, as more information implies more power [ibid.].

Other currently important policy developments not further elaborated here take place e.g. in the field of bioenergy or climate change. For example, there are preparations going on to propose EU accounting rules and action plans on greenhouse gas emissions and removals resulting from activities related to land use, land use change and forestry.

As mentioned above, there is currently a negotiation process for a legally binding agreement (LBA) on forests in Europe on the pan-European level, based on the FOREST EUROPE Oslo Mandate from 2011. Prior to that, two separate working groups were formed, "the first between 2008 and 2009 to explore the potential added value of and possible options for a legally binding agreement on forests in the pan-European region and the second in 2010 to prepare options for a decision on a possible legally binding agreement on forests in Europe" [Edwards / Kleinschmitt 2012]. Although FOREST EUROPE is also co-operating with and supported by UNECE and FAO, the responsibility for conducting the negotiations became a conflicting issue [Edwards / Kleinschmit 2012]. Some countries wanted an independent FOREST EUROPE process (esp. UK, EC), others preferred negotiations to take place under UN rules (esp. France, Germany, Switzerland, the UNECE, Russia) [ibid.]. Pronounced substantial problems in these negotiations are the question of subsidiarity and sovereignty versus

"forest policy beyond the nation state" and nature conservation versus forest production interests [ibid.].

Formally, the negotiation process aims to create "the necessary structure for a coherent approach to the continent's forests" [Forest Europe 2011b]. However, it is noticed that a major motivation of forest policy actors to support this LBA process is to bypass the EU level and prevent the "danger" of a more stringent EU environmental policy on forests with a rather weak intergovernmental agreement [Winkel / Sotirov]. Actually, only a small minority of countries, namely Greece, Italy, Spain, Portugal and France have expressed some (formal and informal) willingness to consider an EU wide forest policy [Edwards / Kleinschmitt 2012: 4]. Yet the dynamics of the negotiation processes could also trigger other developments, for example "provide the European Commission with a new opportunity to launch its own forest policy initiative" [Winkel / Sotirov]. As mentioned before, the Intergovernmental Negotiating Committee is supposed to complete its task in June 2013 and the LBA is supposed to be ratified in 2014.

In conclusion, the following factors can be seen as relevant for the development of forest related policies in the European Union:

- Struggles about EU competences for forest issues in general and in particular between forest and environmental policy actors (within EU institutions: DGs);
- EU Internal institutional competition between Parliament, Council, Commission as well as institutional competition between member states, EU, MCPFE, UNECE/FAO;
- Different perceptions and interests of member states;
- Presidency of the Council ("forest countries" like Austria start initiatives)
- Commitment of stakeholders, esp. forestry and nature conservation stakeholders towards the EU level
- Amendments of Treaties and policy reforms (e.g. CAP reform);
- Enlargements (change of relative importance of forest sector)
- Path dependency of policies (e.g. afforestation measures, Habitats Directive)
- Pressure from other policies concerning forest issues
- Framing through overall strategies (bio-economy) or research programmes (FTP)
- Supra-regional ecological challenges (forest die-back, forest fires, climate change)
- Forest information systems (foci, intensity, information flow)
- Profile of forests in international politics
- Globalization and thus economic situation of forest-based industries.

It remains a challenge to deal with forest issues within the established EU policy frameworks. As output of a ThinkForest Dinner in September 2012, it was suggested that "existing tools and

instruments could be used in a new and innovative way […], creating a kind of tool kit regardless of who actually has legal authority for forest policy in the Union and the member states" [Think Forest 2012]. Winkel et al. [2009: 58ff.] distinguish between the regulatory approach, the framework approach and voluntarism as modes of governance for EU forest related policies and develop four forest (protection) policy concepts: (a) "Continue and Improve Current Approach", (b) "Forest Monitoring for Europe", (c) "Forest Framework Directive" and (d) "Open Method of Coordination" [ibid.]. These potential concepts provide ideas for further political debate and future policy processes may eventually implement some of them.

VIII. Public Opinion

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1. Introduction

The process of societal development within a region, country or on a broader international level is often accompanied by social research in order to consult and to consider the society at large in the decision-making process. In particular, within the topic of environment and management of natural resources, attention is devoted to participatory elements (e.g. 1992 Rio Declaration or Aarhus Convention 1998) [Applestrand 2002]. Therefore, the bottom-up approach plays a significant role with regard to the concept of sustainable forest management, including ecological, social, and economic needs of the society. In this context, conducted studies of the public's perceptions or opinions are of relevance aiming at the analysis of the public's values, preferences, and wishes. These studies of public opinion surveys can be defined as a communication process on two levels:

1) the first level accesses public knowledge (society communicating with the policy and decision makers, forest owners and managers as well as the forest industry), and
2) the second increases public support for sustainable forest management (policy and decision makers, forest owners and managers as well as the forest industry strengthening the design and implementation of communication with the citizens) [Fabra-Crespo / Mola-Yudego / Rojas-Briales 2012: 99-100] [Rametsteiner / Eichler / Berg 2009: XV].

Historically, these studies of public perception of forests and their management have been developed in the USA [e.g. Germain / Floyd / Stehmann 2001]. The application of methodologies of social sciences to the forest sector has been eventually transferred to Europe and constitutes one of the principal innovations in the last 40 years. The pioneering countries were Germany, Austria and Switzerland [Fabra-Crespo / Mola-Yudego / Rojas-Briales 2012: 99-100]. Moreover, most of the surveys were conducted with regard to management and forest conservation for outdoor and leisure purposes [Rametsteiner / Kraxner 2003]. "At the European level, public opinion has been identified as one of the key research priorities by the Technology Platform for the Forest-based Sector in Europe, which was established in 2004. The platform aims to define and implement the sector's R&D roadmap for the future, and is supported by a wide range of stakeholders in its Scientific Research Agenda. Research Area 5, entitled "The sector in a societal perspective", contains a subarea (5.3)

entitled “Citizens’ perceptions”, which has the aim of acknowledging, at the European scale, the values and perceptions of different social and economic groups that will help the sector to adapt to change (*Forest-based technology platform* 2006). Generally speaking, throughout Europe these kinds of surveys are very patchy, with Finland (Finnish Forest Association, 2010) being the only country to have carried out surveys of public opinion on forestry on a regular basis, having conducted a survey ten times between 1993 and 2009 [Fabra-Crespo / Mola-Yudego / Rojas-Briales 2012: 100].

However, crucial changes occurred in the views and demands on forests by the society at large over the last decades. Those developments include the increased environmental awareness and recreational interests of the public. Furthermore, those changes also have taken place at the citizens’ way of looking at the traditional role of forests as producers of raw material. Simultaneously, the urge to reorient European societies towards increasingly bio-based economies results in higher demands for raw material, not only in the context of increasingly sophisticated products, but also renewable energy. Those changes in public opinion have a profound effect on policy makers, forest owners and managers as well as the forest industry. Forest owners are especially increasingly becoming service providers (instead of suppliers of the material) in the need to respond to and become engaged within the expanding integrated value-added production as well as the appropriate governance of resource use. Therefore, all of these groups experience the necessity for increased and optimised communication as well as improved marketing and public relations skills in order to face the new challenges and opportunities at the level of the society (both consumers and the public at large) [Rametsteiner / Eichler / Berg 2009: XV].

The objective of the present chapter is to establish the current state of knowledge on the topic of public perception of forests and forestry in Europe. Based on a literature review, a comprehensive overview of the state-of-the-art research on public opinion about forest and forestry conducted on a broader European level is provided. The review builds upon work done in particular in the last decade. The four studies presented below are thus the cornerstones making an effort to present public perception and related societal demands on forests on a broader European level. The last chapter summarises the collected results of public perception on forests in Europe. The guiding questions for the review and synthesis are:

- How are forests perceived in the public opinion on the EU level?
- Has the perception on the EU-level changed in the last (up to) 20 years?

For the sake of completeness, it shall be mentioned that a multitude of studies analysing the forest sector in connection with other topics such as climate change [e.g. FAO 2012b], rural development [e.g. Ni Dhubhain et al. 2009], and biodiversity [European Commission 2007a] exist. However, due to the focus in the first instance on the certain topics related to forestry (e.g. climate change) or

eventually, forestry is naturally included within specific topics (e.g. biodiversity) whose studies are excluded in this paper. Albeit, the methods of social research as well as the focus on a broader European level are common, the objectives differ. Nevertheless, the four identified studies focusing on forestry do include such topics as climate change and biodiversity, and thus the perceptions of the European public in this context will be introduced.

It needs to be mentioned that all of the identified studies and respectively their results generated by public opinion (and broad consumer) were challenged by the diversity of cultures and living contexts of citizens and consumers in the member states of the European Union. Therefore, homogeneity on the broader European level is often achieved within a limited number of studies, providing data from one or a few countries only [Rametsteiner / Oberwimmer / Gschwandtl 2007: 9]. A further challenge is the geographical distribution, which differs within each study, i.e. the studies *Perception of wood-based industries* and *Europeans and Wood* do not include any detailed explanations on the countries or regions covered, while the definitions in the other two studies *Europeans and Their Forests* and *Shaping Forest Communication in the European Union: public perceptions of forests and forestry* have two different sets of definitions (e.g., in *Europeans and Their Forests*, Central Europe includes German-speaking countries, while in *Shaping Forest Communication in the European Union* the same region (Central Europe) includes Poland, Austria, Czech Republic, Slovakia, Slovenia and Hungary. Germany is considered as a part of northwest Europe).

2. Findings from the Studies

In the last decade four studies on public opinion were conducted on a broader European level. The first study aimed at analyzing and understanding existing perceptions as well as identification of how forest industries are perceived by the population [European Commission 2002]. Though, the most complete work summarizing social forest studies in the European Union was conducted by Rametsteiner and Kraxner in 2003 [Rametsteiner / Kraxner, 2003], including 47 representative surveys from a majority of all European member states. Four years later the study *Europeans and wood* [Rametsteiner / Oberwimmer / Gschwandtl 2007] followed, and at the end of 2009 a synthesis of the work *Shaping forest communication in the European Union: public perceptions of forests and forestry* [European Commission 2009b].

2.1 Perception of Wood-Based Industries. Qualitative Study of the Image of Wood-Based Industries amongst the Public in the Member States of the European Union (2002)

The first inquiry included is the qualitative study *Perception of the wood-based Industries. Qualitative study of the image of wood-based industries amongst the public in the member states of the European Union*, which was conducted in 2002 by DG Enterprise of the European Commission. The study regards the perceptions of the general public of the 15 member states of the European Union. The qualitative nature, the small number of respondents and large generalisation of the findings of the study do not allow adequate conclusions to be drawn due to its lack of representativeness. Also there was no information about the detailed geographical distribution of the countries included in this study, and therefore no precision on the geographical correlation (Western, Southern, Eastern and Northern Europe) within the findings. However, the study gives an overview on the general picture of forests [cf. European Commission 2002: 8].

2.1.1 Content and Methodology

The study has a qualitative nature. The focus group method was used, in which two group discussions – about eight people in each member state – were held in 15 member states. The target public of the study included adult men and women ages 25 to 60 (as "the 'average' general public") and young people ages 16 to 18, who are living in large cities and towns. "Middle managers, craft workers, small traders, employees and manual workers" [European Comission 2002: 7f.] are socio-occupational surroundings of the general public. The young people questioned were from households in the same average socio-occupational categories as the adults. People who are connected with the forest industry, its products as well as marketing, communication and opinion research personnel were excluded from the target public of the study. The qualitative exploration was aimed at following topics within the focus group method [ibid.]:

- Spontaneous perceptions of forests and forest-related products, industries and economic sectors […].
- The specific image of a number of the industry's main sectors: forestry, wood processing industries, paper industries, […] printing […].

- The extent to which perceptions changed during the discussions, and in response to the information provided and common, potentially unifying dimensions of the image of the industry's various sectors.

With regard to the aim of the analysis of this paper at public opinion on forests at the European level, the main topics of interest from this qualitative exploration are the spontaneous perceptions of forests, forest industries and economic sectors and the specific image of forestry. This includes also the perceptions and attitudes related to modernity in the forest sector, to the understanding of the concept of forest management, and to the environment.

2.1.2 Findings

Spontaneous perceptions of forests, forest industries and economic sectors

In Sweden and Finland, the participants of the group discussions have shown the most intense emotional reactions towards forests. The idea of the ideal forest nature is deeply rooted in the minds of people of these two countries. The forest is therefore considered as an important part of the daily environment and the country's identity. This attitude was more or less confirmed in Germany, Austria, France, Portugal, Spain, Greece, Luxembourg and Belgium [cf. 17]. Citizens of the other member states of the EU (e.g. Italy or Ireland) tended, however, to see their country as largely lacking forests [ibid.]. In cases such as Denmark, the Netherlands, Ireland, the United Kingdom and Italy, forests for people appeared to be remote. They were considered to be very large areas existing elsewhere (e.g. rainforests, Canadian Forests). In particular, the Italians from Milan forgot in this respect the Alpine forests, a substantial proportion of which lies in their own country [cf. 17]. In general, based on the conclusions of the study, it can be emphasised that forests are emotive for many European citizens who tend to see the human activities in the economic and industrial sphere as an imminent part of untouched nature [cf. 9].

Economic and environmental dimensions of forests

Only for citizens in Finland and Sweden were forests associated with their economic functions, which were at the same time determined as essential for the country. Mostly the individual products from forest-derived economic sectors like paper or the actual wood industry were identified: "In the other European States, the more products from these sectors were identified (in the subsector of paper as well as in the actual wood industry), the more people's perceptions of these sectors or industries became confused" [ibid.: 17]. Economic activities connected with forests or the products obtained from forests were also mentioned in Austria, Belgium, Luxembourg, France and Portugal. In the other

member states, the economic dimensions of forests were rarely mentioned spontaneously. In the Netherlands, this dimension of forests was mentioned related to other regions of the world, although in general, participants' views on economic dimensions of forests tended to come from thinking about forests (or their perceived absence) in their own country. There was no mention in particular of the notion of a 'European forest' [cf. 18]. Moreover, the most widespread idea was that forests are in decline or threatened. In this context, forest-related industries and economic activities are looked upon as the main exploiter of nature, since they use the raw material, fell trees and destroy this natural heritage. The notion of pollution by forest-related industries was widespread in relation to the importance of the forests in each country. It was generally accepted that forest-related industries were not the most polluting industries. In many member states, the growing importance of recycling was noted as a positive fact, especially by the young people focus groups [cf. 18].

Depending on the case, the environmental dimension in relation to forests was expressed either in a more emotive (forest as a „pure environment", as a place for relax) or in a more ideological way (ecological aspects of forests such as carbon filters, reduction of greenhouse effect esc. are accented). However, differences in perception occurred between adults and young people. The later felt less emotive about forests than adults, but expressed their perception of forests in a more ideological way [cf. 18].

Image of forestry

Solely in Sweden and Finland, and to a lesser extent in Austria, the image of the forest sector was positive. In this context, such characteristics as modern and high-tech production equipment, use of information technologies and scientific research to ensure the correct ecological balance of forests were mentioned [cf. 23]. This very positive image of forestry in Scandinavian countries is caused by the very high importance of the sector there (see the chapter 4.2.2.7). However, in general, perceptions on forestry have had a negative stereotypical character, especially with regard to innovativeness of the forestry. Forestry was seen "as traditional and not very innovative" [ibid.: 9]. The notion of innovative methods and techniques was mostly accepted as "gigantic felling machines […] blindly destroying everything in their path" [ibid.]. In general, the image of forestry was not related to economic activities.

The notion of sound and responsible forest management was widespread in Sweden, Austria and partly in Finland. In the other countries there was no consensus of opinion. The general understanding of the term forest management was incomplete. Nevertheless, if applied, it was interpreted "in terms of regulatory and supervisory action by public and local authorities" [ibid.]. "People were often suspicious about the resolve of (private) forest owners and forest workers to

promote sustainable development and respect the 'common ownership' of the forest heritage — suspicions which were particularly marked, moreover, as regards European and other enterprises working in the area of tropical wood" [ibid.]. Moreover, forestry is not very attractive for citizens as a place to work. Jobs in the industry are usually envisaged as poorly paid and unattractive. Especially for young people, this perception on forestry is applicable [cf. 6].

The environmental impact of forestry was considered under several aspects. When forestry was seen as an activity to manage the heritage by the public authorities or under their supervision, it was almost always seen in a positive light. However, participants from Spain criticised the 'inaction' of the national state, and Greeks had strong reservations about public authority action in this area. The ecological nature of wood from forests was perceived as positive in particular in the United Kingdom and Ireland. Danes and Belgians also thought positively of this topic considering their own countries – in contrast to the 'devastation' of rainforests. When forestry was seen as an economic activity, it was generally viewed unfavourably – in some cases heatedly so. This was particularly true in Germany, the Netherlands, Luxembourg, France, Italy, Spain, Portugal and Greece [cf. 23-24]. "It was only in Finland and Sweden (and to a lesser extent, Austria), that people thought both of an economic activity and of responsible practices by actors in the sector" [ibid.].

In general, the image of forest owners was ambiguously defined. The image of private forest owners was not identified positively [cf. 22]. The state and local authorities were often perceived as the main owners of forests, in some cases together with other non-profit-making institutions. "In people's minds, private owners included the following: Large landowners (rich, aristocratic, etc.) were mentioned in Denmark, Austria, the United Kingdom, Portugal and Greece. 'Investors': major enterprises exploiting forests in order to maximise their profits (mentioned in Denmark, the United Kingdom, the Netherlands and Portugal); small- and medium-sized owners in Sweden and Finland (everyone), as well as in Austria, Belgium, Luxembourg, France and Spain (adults)". [ibid.]

2.2 Europeans and Their Forests. What Do Europeans Think About Forests and Sustainable Forest Management? (2003)

The second study identified was conducted by Ewald Rametsteiner and Florian Kraxner: *Europeans and Their Forests. What Do Europeans Think About Forests and Sustainable Forest Management?* It was published in 2003 and generated an extensive overview of public opinions on forests and forestry concerning particular categories. It was the first effort to compare and analyse the available surveys on forests in Europe (16 countries), starting in the 1970s, although the main focus was on the

1990s. The MCFPE criteria for Sustainable Forest Management were the main orientation of investigation within this study.

2.2.1 Content and Methodology

The study presented for the first time collected results of European representative public opinion surveys on many subjects related to forest and forest management conducted within individual member states. The following issues were included [Rametsteiner / Kraxner 2003: 10]:

- Forests in general and their perceived roles for society
- General views on Sustainable Forest Management
- Results on individual topics structured according to the six MCPFE criteria and indicators for Sustainable Forest Management (forest resources, forest ecosystem health and vitality, productive functions of forests, biological diversity in forest ecosystems, protective functions in forest management, other socio-economic functions and conditions).

There are a number of factors influencing the high degree of generalisation and interpretation in this study. The necessary information on single questions strongly varied in the different states. “One severely impeding factor for an accurate analysis of results of the different opinion polls available from different countries is the low degree of harmonisation of questions posed to the general public. Also, differently framed questions and the type of question, e.g. open versus closed questions, can and often do lead to considerably different answers” [ibid.: 46]. The majority of studies included were undertaken in Central, Western and Northern Europe. Thus, Southern and Eastern Europe were underrepresented due to the lack of nationally representative surveys. It must be noted that in this report, Northern Europe is understood to include the Scandinavian countries and Finland. Eastern Europe comprises all EU-accession countries. Central Europe covers the German-speaking countries. “Data analysis was usually based on reports and tables available from the different studies included. That means that very little or no analysis was undertaken on the basis of primary data” [ibid.]. Moreover, statements on changes in public opinion over time were only made on the basis of a few studies that were periodically repeated [ibid.]. In particular, those are based on a few surveys from Western and Central Europe (France, Germany). Wherever possible, the differences in perceptions of different sex and age groups were presented [cf. 10].

2.2.2 Findings

General perceptions on forests and their roles in society

The aspects of attitudes towards forests in general, knowledge of forests and the perceptions on the roles of forests for society were mainly covered in surveys in Central European and some larger European countries including emotions and perceptions of the citizens. However, with regard toward feelings and associations to forests, the public is divided into two poles: positive and negative. The positive perceptions contained associations such as “happiness”, “green”, “fresh air”, whereas the negative, such as “darkness” and “danger”, are related with concrete objects like trees and machinery. In Northern and Western Europe, the association with the topic of forests is mostly related to multifunctional forest use and other economic issues. In Central Europe, in comparison, more ecological statements, like wood as a carbon sink, prevention from erosion or species variety, seemingly dominated the spectrum of associations. In general, forests seem to be a symbol of nature to Europeans [cf. 11].

Moreover, the public tends to value its knowledge on forests between ‘good‘ and ‘very good‘. A major part of the responders show, in fact, a lack of knowledge by providing simple answers to questions related to knowledge about forests. In Central Europe, most of the people were able to give a detailed answer on the question of why trees have to be felled in the forests, but only half of the public in Western Europe was able to adequate describe the notion of “multi-purpose-forestry”. In general, younger people tend to show significantly less interest in forests than older people [cf. 12-13].

Only few people mentioned forest-related terms such as forest management or “forestry” itself. In this context, the tending of forests was considered negative, and reforestation and the economic importance of forests positive [cf. 11]. Protective and ecological, recreational and leisure, as well as productive and economic forest functions were identified by the Europeans. In this context, the importance of forests as a natural habitat has grown over time. Therefore, the most well-known forest function is the production of clean and healthy air [cf. 14]. Preservation of the natural environment and biodiversity and protective functions of forests “are the most widely recognised and most highly valued roles of forests across Europe” [ibid.: 13]. In particular, in Southern Europe and in the Alpine regions, the protective functions of forests were highly valued. Furthermore, the recreational function of forests was also identified. Relating to the data available from the south to the north of Europe, recreation was identified as the main reason for visiting forests [cf. 41]. “Last but not least, the role of forest as a place to produce and harvest wood is also recognised by the public” [ibid.: 14]. Although the economic function of forests has no relevant presence in the public

opinion and has steadily declined over time, the main associated aspect is wood production in particular to a clear majority of the Central Europeans. However, the European public generally recognises the multi-functionality of forests – in particular with regard to the three functions of sustainability: ecological, social, and economic. Nevertheless, the perceived importance of the functions changed over time. In particular, it seems that forests have lost their significant economic role, at least in the minds of the European public [ibid.].

Sustainable Forest Management

In dependence to geographical factors, big differences in the data related to the term sustainable forest management exist. Especially from the south and east of Europe, very little information was available. Furthermore, only a few surveys included questions with regard to SFM, either as term or a concept. However, the public in the United Kingdom, Austria and Germany are best aware of the term sustainable forest management. In particular, in Germany the term is well recognised due to the development of the term "sustainability" as the central principle of forest management. Its awareness has increased over time among the general public [cf. 16f.].

> In a majority of countries where information is available a large part of the public does not seem to believe that the sustainability principle is really practised. Those who state not to know the principle are usually considerably more critical than those who do. A majority of those who state to have knowledge of the principle of sustainability show more confidence in the native country's forestry. Overall, however, confidence in forestry in carrying out sustainable practices seems to change for the better in some countries. […] In Germany the share believing that forestry applies the sustainability principle is slightly increasing, but still below 50%. In other countries between a third and a half of the respondents are not convinced. [cf. 18]

With regard to the public's awareness of the self and the others, the results show that in Europe, Nordic forestry was identified as a benchmark with regard to the use of principles of sustainable forest management. The Scandinavians also evaluated their forests the best. However, in Germany and Austria, the general public considers forestry in their own country to be more sustainable than in Scandinavia. Although it is a gross misperception, forestry in Eastern Europe was evaluated by the Western European public as the worst. Also, clear differences between west and east European countries for almost all indicators of sustainable forest management do not exist. On the contrary, Eastern European countries are frequently among the best, including the balance between increment and fellings [cf. 21-22]. "The bad reputation of Eastern European forest management in terms of

sustainability may have economic consequences. Surveys on the wood purchasing behaviour of Western Europeans indicate that few consumers say they are willing to buy wood of Eastern European origin. While such behaviour might be rare in practice, it is nevertheless not a desirable image" [ibid.]. In Central and Western Europe, satisfaction existed with the management of domestic forests. Differences in the perceptions of sustainable forest management evolved within different sex and age groups: among the young generation relatively few believe that sustainable forest management is really practiced in their own country [cf. 19], and women were more skeptical to the question of applying forest management than men [ibid.]. Furthermore, foresters were generally seen as the ones who are responsible for forests and who decide which measures to take if something happens. They are considered as the monitors of the state of forests and ´advocate of nature´. However, few people in Europe see foresters as modern managers or as technicians with needed technical tools. Though, the majority do not regard the forester profession in a modern context. The reasons for such perceptions were similar to those in the previous study: the understanding of the term 'sustainable forest management' was patchy (however some improvement can be stated on the example of Germany). Therefore, the role of foresters was not understood. Nevertheless, foresters as well as scientists, environmentalists, and representatives of outdoor organisations were regarded by the public from Central and Northern Europe as the most credible source of information on forests and the environment. On the contrary, such confidence is very limited among journalists, civil servants, politicians and industry in all countries [cf. 40].

Forest resources

The public relates 'forest resources' mainly to the amount of, and changes in, forest area. Surveys from almost all regions of the European Union have been identified, with the exception of Eastern Europe as well as Mediterranean countries [cf. 23]. Although, the contrary is the truth, in almost every European state people – especially young people between 15 and 25 – tend to see forest area to be decreasing. In Italy, people have the worst perceptions related this topic. The fact is that all countries in Europe record an increase in forest area [MCPFE 2003a]. "There are only a few exceptions, such as in Austria. Here, clearly more people state that they perceive the area of forests in Austria to be increasing or at least to be stable, rather than decreasing. One possible explanation for the Austrian exception might be the increased public relations campaigns conducted since the early 1990s to promote the use of wood and the fact that forest area is increasing year by year […]." [ibid.: 23]

A range of human interference was mentioned in some studies in Central Europe as a reason for the decrease: building activities and their consequences, such as too little afforestation and clear-cutting;

human-caused environmental destruction, including all the causes of forest dieback, such as acid rain and exhaust fumes from traffic; as well as natural hazards. In this context, a clear majority of the public from Western Europe and from the northern parts of continental Europe would like their countries to be covered with more forest. Only a minority of the public in Central Europe expressed the same wish. In Switzerland, where almost a third of the country is forested, people do not wish to increase the actual amount [cf. 23-25]. It can be concluded that most of the people in Europe "prefer around a third of the land area to be forested" [ibid.]. The main reason for the desire to increase the forest area is the perceived and actual CO2-sequestering role of forests in the global climate change [ibid.].

Forest Ecosystem Health and Vitality

The best known forest health problem is forest dieback. However, information on this problem is available only from Central European Alpine countries because it was a significant topic there in the 1980s. Moreover, in general the Europeans are not satisfied with the conditions of their domestic forests, including but not limited to categories such as health and vitality, biological diversity and forest area. Only about one quarter of participating Europeans stated to be satisfied with the current state of their domestic forests [cf. 26-28].

> "A majority of the general public of the European countries surveyed think that the key factors and responsibilities for the unsatisfactory condition of domestic forests lie outside the direct influence of forestry […] Environmental pollution by industry was blamed as being most responsible, followed by pollution caused by traffic exhaust fumes or general construction activity. Nevertheless, forestry is seen as a factor that is at least partly responsible for the unsatisfactory conditions, and only a few people think that forestry is not responsible at all" [ibid.: 28].

Furthermore, other forms of environmental pollution and tourism-related measures are also seen as damaging for forest health. In order to improve the perceived bad state of the forests, the public in Central Europe overwhelmingly called for less environmental pollution. However, forestry by itself is not seen by the public as able to solve problems related to the overall forest condition.

Productive Functions of Forests

With regard to wood- and non-wood goods and services, people surveyed in different European countries think that in northern countries, forest harvesting is the same or less than is regrown in the same period. People in Central Europe tend to think that more wood is used than is regrown [cf. 30].

> Generally, it seems that the Central European public has more negative associations with forestry than the public in other regions. Forest dieback, destruction of forests, clear-cutting and over-utilisation are only some examples of negative associations that are mentioned. Forestry is blamed for ignoring nature and is seen as guilty of mismanagement that causes further soil problems and the decline of species diversity, in addition to posing poses other threats to the environment […] The general public in large countries of Central and Western Europe names very few forestry measures as being positive, such as tending and afforestation. [ibid.: 34]

Views on wood as a forest industry product are, on the contrary, mostly positive. For the majority of the public in Central Europe, wood is an environmentally friendly product due to its naturalness. By such attitudes, people often forgot to make a link between wood as a product and its production, harvesting and forest loss, which often have negative associations. The term 'wood' was accompanied with terms like 'beautiful furniture', 'practical material', and 'trees and forest'. Citizens from Central Europe perceive the most widespread use of wood to be furniture production, and the timber, furniture and paper industry are seen as the sectors having the highest demand for wood. Wood as a product is in general considered to be good-looking raw material, as well as building material with excellent insulating qualities. Wood products are also favoured by people over other materials such as bricks, cement or steel; however, the high price of wood and the necessity of maintaining rather than over-utilising forests are the reasons why people don't use wood when purchasing construction material [cf. 30-31].

Moreover, the public considers recreation as one of the productive functions of forests. "In general, people strongly demand extra efforts for making forests good places to visit. Nevertheless, a great majority is already convinced that forests provide valuable leisure facilities" [ibid.]. However, when suggested for visitors of forest to pay, such financial contributions were clearly rejected by almost everybody. "While in Central Europe slightly more than half of all people say they have visited a forest during the last year, the figure is almost twice as high in the North […]. One might assume that this has to do with the country's forest coverage, but comparisons show that even in regions that are very densely covered by forest in Central Europe, the visiting behaviour of the public does not change significantly" [cf. 42].

Moreover, accepted forestry measures are regarded to "contribute to a healthy forest condition through tending, thinning and removing sick trees. Tree cutting for timber production is also accepted, especially if afforestation is guaranteed after harvesting. Nevertheless, acceptance is rapidly decreasing for tree cutting for Christmas tree production and firewood" [cf. 32]. In general

"people tend to oppose forestry measures that disregard nature. Tree felling for timber production is accepted only together with afforestation" [ibid.].

Biological Diversity

The topic of biodiversity is rarely covered within surveys on forestry. Only in Central Europe and in some other large countries are most forest-related polls included the issue. Nevertheless, the majority of the European public (from Italy, Switzerland, Germany, Austria, Great Britain, and France) thought that biodiversity in their domestic forests is declining and the number of species is decreasing. In Finland, a clear majority of surveyed citizens thought felling of timber and forest management to constitute threats to the abundance of flora and fauna, however the majority of Finnish public perceived that the treatment of forests has taken a turn for the better as regards to care of the forest environment and the actual situation of plant and animal species in their own forests [cf. 35-36]. "Overall, the situation of plant and animal species in Europe's forests is perceived to be endangered, and the number of species is generally decreasing. In Nordic countries, the public thinks that forestry takes care of biodiversity, while no such information is available from other regions" [ibid.]. Nevertheless, the majority of the public perceived the issue of biodiversity, preserving plants and animals living in the forests, to be more important than any economic notion – even sustainable forest management. In this context, forest protection is perceived to be highly necessary in all geographic parts of Europe [cf. 36-37].

Other social-economic functions and conditions

Further socio-economic functions and conditions cover such aspects as forest ownership, the contribution of the sector to income and employment, and free services to society. With regard to the first aspect – forest ownership –

> [...] only one inquiry from Austria is available in which the general public was asked about the estimated distribution of ownership between private and state-owned forests. Although the forest itself in this country is highly appreciated, it seems that the public knows rather little about who actually owns the forests. Slightly more than half of the forests are considered to be state-owned, and almost half to be privately owned. The fact is that about 80% of forests are privately owned. Concerning preferred ownership, only one survey from Southern Europe included in this report gives some information. It shows that, despite the large number of small, privately owned forests and the related difficulty in managing them, people reject the proposal that the state should take over management in these small, private forests. [cf. 39]

The second aspect was related to the importance of the forest industry for the public. For the people from Nordic countries, forest industry is the most important sector from an economic point of view, and its role has expanded over time as it is now competing directly with the pharmaceutical industry, followed by the automobile, computer and telecom industries. However, this perception and fact is not shared by the public of Central Europe. Here the fulfilment of the recreational, environmental, and protective roles of forests are more emphasised [ibid.].

2.3 Europeans and Wood. What Do Europeans Think About Wood and Its Uses? A Review of Consumer and Business Surveys in Europe (2007)

The next study conducted by Ewald Rametsteiner, Roland Oberwimmer and Ingwald Gschwandtl followed in 2007: *Europeans and Wood. What Do Europeans Think About Wood and its Uses? A Review of Consumer and Business Surveys in Europe*. The study reviewed various consumer and business surveys in Europe, which assessed the general attitude towards wood, products derived from wood as well as the forest industry.

2.3.1 Content and Methodology

The presented study is a first overview of relevant studies conducted in Europe, including 85 surveys conducted in 21 European countries since the 1990s. Most of the inquiries have been conducted in Central, Western and Northern Europe; the Eastern, Mediterranean and Southern parts of Europe are covered only by 10 studies. More than half of the studies (57) included were of national scope. Other studies were of international (13) and regional (11) scope or did not reveal their scope. Most of the studies included were carried out between 2000 and 2007 [Rametsteiner / Oberwimmer / Gschwandtl 2007: 49-50]. Almost half of the studies included were carried out by academic institutions. It was noted that the private organisations who commissioned studies "tend to report only parts of surveys and often only those aspects that are not against the interests of the organization publishing results" [ibid.].

Even though the focus of this study is on the perception of wood and its uses, it is included into the present paper as it also regards general aspects of wood and wood-based products in relation to forest. Therefore, the use of wood (also as a source of energy) and climate change, perceived by the European public, are also of relevance in order to reflect the public opinion on forest in Europe. Further, the following issues are the focus of the study:

- General attitudes towards wood,
- Living with wood (furniture, design, climate change),
- Building with wood (wood as construction material, durability, new materials, climate change),
- Paper and packaging products,
- Wood for energy (renewable energy sources, the role of wood energy, climate change),
- The image of the forest industry (knowledge about forest industry, innovativeness and attractiveness).

However, the last chapter of this study is based on the first study reviewed: *Perception of the wood-based industries*. Due to the small amount of studies on the image of forest industries identified, the former mentioned was included in order to gauge the situation. Therefore, it will not be further reviewed here.

2.3.2 Findings

General attitudes about wood

"Europeans in general have a clearly positive attitude towards wood. According to the available survey data, it is a material considered natural, warm, healthy, good-looking, easy to use and environmentally friendly by a majority of people across Europe" [cf. 12]. Nevertheless, wood as such was not directly associated by the public with the production of wood. Rather it was appreciated by citizens and consumers across Europe for its 'naturalness' [48]. Furthermore, wood was regarded as an expensive material by a large majority of the public. The opinions about the price of wood as a construction material varied in different countries between expensive, excessive and expensive, and reasonable. On the one hand, wood is regarded in Europe as a more environmentally friendly material than glass, cement, steel or plastic. On the other hand, since the late 1990's, the use of tropical wood is seen as rather harmful to the environment. All studies regarded the question of the use of different materials show that the most environmentally harmful material is plastic [cf. 12-13]. Moreover, this study reveals that "survey data show hardly any correlation between the perception of individual consumers on the status of forest area (which the majority see as decreasing), and their respective willingness to pay." [cf. 16] This includes such measures as the certification of forest products is not regarded as an effective instrument in order to improve forest management by the consumers. "However, it is more likely to be nothing more than a further indication of the (still) low level of awareness and knowledge of what 'sustainable forest management' means. Moreover, there are indications that consumers implicitly assume the raw material for wood products to come from

acceptably well-managed (European) forests [Veisten / Solberg 2004]. Thus, with current levels of knowledge among consumers, forest certification alone is unlikely to guarantee greater demand, and nor a significantly improved image of wood or significantly higher prices for wood products in general". [Rametsteiner / Oberwimmer / Gschwandtl 2007: 16]

Wood and Climate Change

The impact of the use of wood on climate change within the publics' perception is considered to be a useful component in a wider overall strategy to mitigate climate change "[…] the use of wood and consequent longer-term storage of carbon in wood products and the replacing of non-renewable materials by renewable ones are seen as a useful component in a wider overall strategy to mitigate climate change" [ibid.]. For the large majority of the European public, the problem of climate change is the most important environmental issue. Contrary to the facts, however, people think that European forest area is decreasing, and the use of more wood possibly means for citizens that forest area decreases even more [cf. 16]. Furthermore, wood as a construction material is seen as environmental friendly, but the European public was rather undecided to support the opinion that using wood helps in mitigating climate change [cf. 29]. A survey conducted in England, Scotland and Wales in 2007 revealed that a majority of respondents in all three regions had the opinion that using wood for fuel makes climate change worse, but less so than using fuels such as coal and gas [cf. 39].

Wood as Energy Source

The most important source of renewable energy in the European Union is wood biomass, but the results of the surveys at national and regional level across Europe showed that awareness of and the level of support for bioenergy and biomass by the European public is generally rather low – "lagging far behind that of other renewables like wind, solar and hydro energy" [cf. 37]. A national survey in Ireland conducted in 2003 showed that biomass as a source of power had an awareness level of about 2 percent, compared with 23 percent for wind and 12 percent for solar energy. A clear reason identified for the weak support for biomass energy is the low level of information among the public [ibid.]. However, even if awareness of environmental threats exists, it "[…] does not translate into acceptance of, or willingness to pay more for, renewable energy sources, or the acceptance of more radical changes in consumption behaviour" [cf. 41]. In general "respondents call for governmental support in accordance with both their general level of knowledge about renewable energy sources,

and their future expectations: solar, ahead of wind or water, followed by biomass, followed by small hydropower appliances" [cf. 42].

2.4 Shaping Forest Communication in the European Union: Public Perceptions of Forests and Forestry (2009)

The last study reviewed is *Shaping Forest Communication in the European Union: Public Perceptions of Forests and Forestry*, conducted in 2008. This study constitutes the synthesis of the work above and combined three methodological tools in order to provide the European Commission with information and design of a questionnaire which may be included in the Eurobarometer surveys on public opinion in the EU.

2.4.1 Content and Methodology

The study contains three methodological tools: meta-analysis of previous studies, stakeholder survey and a public survey. Therefore, it is the synthesis of the work reviewed above, with, for the first time, collected primary data on public opinion towards forest at the level of the European Union.

The meta-analysis was built upon previous work done within the context of the MCFPE process, in particular it uses the study *Europeans and their Forests* [Rametsteiner / Kraxner 2003] as a benchmark study in order to focus on and highlight the newest developments in public opinions across Europe published since this benchmark study (status quo) from 2003 onwards. The extensive literature review was conducted based on a total of 26 surveys conducted in 14 European countries, covering the public opinion of European citizens from 21 Countries (Turkey included) on forest and forestry [Rametsteiner / Eichler / Berg 2009: XV-XVI]. The literature review included 22 studies conducted on a national scale and 4 international studies. This study faced the same challenges as in 2003: most of the studies have been conducted in Central, Western and Northern Europe; little information for Southern and Eastern Europe was available. Furthermore, the meta-analysis focused on key documents such as surveys and documents on policies on the national, regional, sub-regional and European levels related to public perceptions and attitudes about forest and forestry. The sources of the documents were forest associations, research institutes, non-governmental organisations, forest industry, and governmental bodies. “Furthermore, the structure of the present review follows the structure of the study *Europeans and their Forests* [Rametsteiner / Kraxner 2003], which is based on the MCPFE criteria for sustainable forest management, the European-wide agreed operationalization of the sustainability concept” [Rametsteiner / Eichler / Berg 2009: 4]. So following aspects according to MCPFE, criteria have been analysed in the review: general opinion of Europeans on forests, forest resources (general condition of forests), biological diversity of forests, forest

ecosystem health and vitality, other socio-economic functions and conditions, sustainable forest management and protective functions in forest management.

The next tool used in the study – a survey amongst influential European forest and forestry stakeholders – based on the findings of the meta-analysis followed three steps: Stakeholder identification from various groups (Research Institutes, Environmental NGO, Forest NGO, State Forest Enterprise, Government) per member state, and on the European level, survey development (one for the national and the second for the European level) and the use of developed surveys as a basis for conducting telephone interviews for the realization of a public survey. Consequently, a representative public survey amongst the general public of EU27 member states based on the results of the expert stakeholder survey was conducted. Computer-assisted telephone interviews (CATI method) were selected as an interviewing method. A total of 11,106 citizens across 27 EU member states were contacted during the survey. There were 7 (groups of) questions plus demographic information, which provided closed-answer categories. The representative sample was based on quotas for country population size, gender and age groups. Educational background and level of urbanization were additional demographic indicators to be surveyed during the interviews [cf. Rametsteiner / Eichler / Berg 2009: 4-9].

The geographical distribution of EU regions for analysis was the following:

- North West Europe: UK, Ireland, Netherlands, Belgium, Luxembourg, Germany, France
- Nordic/Baltic: Finland, Sweden, Denmark, Lithuania, Latvia, Estonia
- Central Europe: Poland, Austria, Czech Republic, Slovakia, Slovenia, Hungary
- South East Europa: Greece, Cyprus, Romania, Malta, Bulgaria
- South West Europe: Italy; Spain, Portugal.

2.4.2 Findings

2.4.2.1 Meta-Analysis

General opinion of Europeans on Forests

The general meaning of forests to the European public varies in different countries. Generally in Sweden, Norway, Finland, Austria, Germany, and the UK, the public has good knowledge about its forests. The Austrian public holds forests even as the national symbol of identification. However, in Austria, Sweden, Norway and the UK, citizens seems to have a more sensitised, balanced and pragmatic view on the productive functions of forests, while the eastern and southern European

public tended to show a more drastic view in that respect. Changes in public opinion since 2003 and 2005 were reported from UK in a study following in 2007: “Participants stated to have observed an increased presence of forest related topics in the media. Notable, in comparison to the 2003 and 2005 surveys, was the fact that the public saw forests and forestry in close connection to climate change and forests’ capability to tackle climate change” [cf. 15]. However, changes within public perceptions on forests were also noted in Northern Europe (Finland, Norway and Sweden): 53 analysed quantitative surveys conducted between 1972 and 2006 revealed that on the one hand, one common outcome of the public’s preference was a forest stand with increasing tree size and advancing stage of stand development. On the other hand, large clear-cuts and obvious traces from forest operation were less appreciated [ibid.].

Forest resources

The topic of forest resources was addressed only within studies from Germany, Sweden, and the UK. In the UK, more forested areas were considered to be preferential with regard to climate change. At this point, the respondents indicated to want more forests to be part of the country and thus, showing a significant increase compared to previous studies in 2003 and 2005 [cf. 15]. In Germany, as well as in Sweden, a correlation between forests (size and resources) and tackling climate change was also stated by the majority of the public. Furthermore, in Sweden changes can also be stated since the knowledge of the public about the relation between forest growth and logging has continuously improved continuously since 1985. “From 1993 onwards various surveys have depicted a slightly declining trend for the share of the population that think the amount of logging is less than the growth. But also an increasing share of people has been registered who believe there is a balance between the amount of logging and forest growth” [cf. 17].

Biological diversity

Biological diversity and the issue of its preservation were mentioned in each of the studies. However, the literature review did not generate considerably new information on the issue. Nevertheless, a high degree of importance was given to biological diversity, particularly in Germany.

Forest health and vitality

The topic of forest ecosystem health and vitality is covered only by two studies – conducted in Germany and in Spain. The MCPFE Report from 2007 stated that forests in Europe are under stress due to air pollution and depositions, although pollution has decreased, and major challenges for the health and vitality of European forests are the severe damage caused by storms and fires. Only the

German public saw forest dieback as a major problem, while in the Spanish study, only 3.7 % believed that the destruction of forests ranks among the two major problems for the environment [cf. 20].

Productive functions of forests

An international public survey carried out in Norway, Sweden, Great Britain, Latvia, Poland, Slovakia, Czech Republic, France, Austria, Romania, Turkey and Greece in 2003 has showed that education and scientific studies (76 %), recreation (71 %) and sustainable tourism are among the three most favoured productive functions. Activities such as logging (23 %), hunting (24 %) and construction (28%) were rated as being the most unfavourable forest functions [cf. 21]. Recreation was mentioned as an important productive forest function also in separate European countries – in a German survey, 77 % of interviewees stated seeing forests as a place for recreation and relaxation, over 95 % of the surveyed Lithuanian public in the national survey said that they had visited forests for walks [cf. 22]. Moreover, the use of forests as a source of resources and energy was also mentioned as an important productive forest function: “Eighty-four percent of the German public seemed well aware that forests are an important source of resources and energy. Similarly, the UK survey detected an increased use of forest products as fuel sources across the UK in comparison to its 2003 and 2005 predecessor studies” [cf. 23].

Other socio-economic functions and conditions

The topic of other socio-economic functions and conditions of forests was provided only from studies in Finland, Germany, Sweden and Switzerland. Here, perception of the public is closely linked to forest ownership and forest industry. “The survey from Germany has shown that a majority of people stated that the forest industry and its machinery does a lot of harm to the forest, 58 % believed the forest industry to be negative for the overall condition of the forest” [cf. 24]. A survey from Sweden conducted in 2008 shows that 62 % of the Swedish public rated the forest industry as one of the most important industries in the country, and 37% believed its importance to increase in the future. According to the issue of forest ownership, half of the respondents in the national survey in Finland estimated the Finnish government to be the biggest forest owner in Finland, and one-third of the respondents estimated private persons and families to be the biggest forest owner group [cf. 24].

Sustainable forest management

With regard to sustainable forest management, changes in public opinion within Europe occurred. The most distinct change could be described for Sweden and Finland: “The general public’s view of

how the Swedish forests are managed has improved continuously over the years from 1985 to 2006 and remained on a constant high and stable level in the 2006 surveys. In 2006, 85% of the public thought that forests are managed very well or fairly well, whereas only 10 % thought that forests are managed fairly bad or very bad, representing the lowest level during the whole period 1985-2007" [cf. 26]. In Finland, the findings are similar to the Swedish ones: the level of satisfaction towards forest management has increased since the late 1990s. Ninety percent of the respondents thought forest management in Finland was doing a very good or a rather good job. Fifty percent of the Finnish public thought that their country has the most advanced methods of forest management (one third of the questioned public thought Canada had the most developed methods, and the rest advised to Sweden) [cf. 26]. Furthermore, changes were pointed out in the UK with regard to the topic of sustainable forest management: "In connection with wildlife, recreational and climate change issues, the public in the UK stated to have a predominantly positive opinion concerning SFM. Compared to the 2003 report, especially the public's knowledge on this topic seems to have increased, although it has to be stated that knowledge had already been the highest in the UK compared to other European countries in 2003" [cf. 25]. In Germany, the findings on this topic were similar to the review *Europeans and Their Forests* from 2003, i.e. the majority of the public supported the idea of balanced rates of cut and re-growing wood. Further, "within the most recent German survey on the principles of SFM, 42% of the questioned public claimed to know the sustainability principle within the forest industry, 12% more than the year before" [cf. 25-26]. However, the forest industry and the aspect of forest ownership have been perceived as important in Finland and Sweden, while the German public perceived the forest industries behaviour largely as negative [cf. 16-24].

2.4.2.2 Stakeholder Survey

The results of this survey showed that stakeholders on the European as well as on the national level have overall similar views about what citizens think with regard to forests and forest management. Both groups of stakeholders agreed that forest communication needs to be improved [cf. 52]. It was pointed out that the most important topics for citizens are perceived to be the threats to forests, conservation and protection of forests, climate change and biodiversity. The issue of recreation was the most frequently mentioned issue within the group of national stakeholders with regard to the public opinion in their respective country [cf. 29]. Stakeholders expect citizens to be generally interested in forests for protecting biodiversity and conserving nature. Furthermore, it was emphasised that the younger generation is more focused on recreation and seeking pleasure, and is

less driven by a concern of a decreasing natural environment. Stakeholders thought that citizens would see the main reason for forest damage in fire and storms, while a clear opinion about other reasons, such as damage by wild animals to forests' natural regeneration or invasive species will be missing. Regarding the management of forests, the majority of stakeholders were of the opinion that citizens recognise a good job has been done. While a quarter of respondents thought that citizens would see forestry doing a rather bad job, experts pointed out that European citizens continue to have a fairly bleak view of the development of major aspects of forests, such as forest area or biodiversity. Furthermore, the perception of stakeholders was that citizens also are still most critical about clear-cutting and cutting trees. The reason for such an attitude results probably out of the widely shared misperception that forest area is declining in all countries and in Europe in general (the MCPFE Report of 2007 showed on the contrary that the area of forests in Europe are rapid growing) [cf. 52-53].

2.4.2.3 Public Survey

Based on evaluation of the survey among stakeholders the following criteria for the public survey were defined:

- key concerns about forests,
- general conditions of forests,
- threat and damages,
- benefits from and use of forests,
- management of forests,
- interconnection between forest and climate change, and
- public opinion on forest communication.

Key concerns

With regard to the key concerns about forests, the most important topic perceived by the majority of the public was conservation and protection of forests – environmental issues, forest health, pollution and climate change as other protection-related topics followed. Utilization-related topics such as sustainable forest management, recreation, ecosystem services, or economic use were mentioned only by a clear minority of the responders [cf. 55].

General conditions

A significant majority of EU citizens perceived the general conditions of forests to be rather negative due to the opinion that forested areas and biodiversity of forests are decreasing in their own countries. More than 30 % of responders thought that forested areas were decreasing, and more than 22 % of citizens think that forest biodiversity is decreasing significantly. Women seem to have more negative perceptions of change in forest biodiversity than men. Only about 15 % of European citizens thought that forested areas in their country were increasing. However, in Denmark and Austria the majority of citizens consider that the forested area of their respective country is stable or increasing [cf. 61].

Threats and damages

On the topic of threats and damages to forests, almost 45 % of citizens mentioned forest fires as the most important threat followed by harvesting and management damages. In particular, in the southeast (59.6 %) and southwest (85.3 %) of Europe, a strong emphasis on forest fires was made. Harvesting and management damages were regarded in Central Europe (35.1 %) as the most important issue. Other damages and threats such as storms (11.8 %), invasive species (7.6 %), and wild animals (3.3 %) were perceived as less important issues. However, the perceived threats across and within regions of the European Union varied considerably [cf. 62].

Benefits from and use of forests

The most important benefit from forests ranked by a clear majority of European citizens (68.6 %) is the preservation of biodiversity. Moreover, the citizens of the European Union regarded

> […] the use of forests to produce furniture, paper and construction materials is rather evenly distributed (in terms of importance). As such, 32.1% assign an average importance to the provision of wood to the manufacturing sector, while 19.4% see this function as very important and 11.0% as not important. With regard to regional differences, there is a tendency towards the provision of wood to the manufacturing sectors as being ranked more highly in the Nordic/Baltic region (53.1%), in comparison to North West (34.1%), Central (41.1%), South East (40.1%) and South West (31.9%) Europe. [cf. 65]

However, the function of forests of protecting people from natural disasters and the detrimental effects of climate change was ranked by the majority of European citizens as the second important forest benefit (56.6 %). The recreational function of forests is less important than the protection and conservation of forests, but more important than the provision of wood as a source for bioenergy for

all European citizens. More than 36% of citizens mentioned the recreational function of forests as very important [cf. 64-71]. "With regards to regional patterns, the strongest emphasis on recreation is in South East Europe and the Nordic/Baltic region. In these regions 54.5 % and 42.9 % of respondents respectively marked opportunities for recreation as very important, in contrast to North West (25.4 %), Central (33.6 %) and South West (32.6 %) Europe". [ibid.]

Management of forests

Additionally, the European public (63 %) perceived forest management within all regions in Europe as in the need of being much more actively managed in order to provide recreation opportunities and in order to protect forests themselves from damages caused by fire, storms, or climate change. Beyond that, 85.5 % of the public thought "that forests should be more – much more – managed" [cf. 73]. However, with regard to sound forest management, the opinions of the public were divided: "About an equal number of EU citizens calls for less (or much less) active management to provide wood in their respective countries (34.4 %) than do those that are of the opinion that forest management can remain as is (33 %), or that forest management should be more (or much more) active to provide wood to produce furniture, paper, or construction material (32.7 %)" [cf. 75]. In order to provide wood for bioenergy, about 40.5 % of respondents are of the opinion that forest management in their respective countries should be more or much more active. Over 31 % thought that forests do not need to be managed any different than already done, and over 27 % suggested that forests should be less (or much less) managed to provide wood for bioenergy [79]. However, a clear majority of EU citizens supported more (or much more) active forest management to preserve biodiversity, to conserve nature and to protect people from disasters and climate change [cf. 77-81].

Interconnection between forest and climate change

In this context, a significant majority of European citizens (60.6 %) thought that growing trees helps reduce impact of climate change and helps against climate change (81.1% of the responders). The European public is clearly for the planting of new trees in order to influence climate change. However, the opinion of EU citizens varied greatly across Europe on the use of wood as a construction material: "On the whole, the largest group – somewhat less than half (42.8 %) – of EU citizens thinks that it cannot help at all or can rather not help to use more wood as a renewable material. Around one third (29.6 %) of respondents seem to be undecided. Only about one quarter, 27.4% of EU citizens, think that it would help somewhat or a lot" [cf. 87]. Nevertheless, a majority of EU citizens (67.5 %) were of the opinion that planting new trees will help tackling climate change through the provision of wood as a raw material for products and bioenergy [cf. 91].

Public opinion on forest communication

With regard to the communication on forests, the great majority of the European public expressed interest in biodiversity and nature conservation. Furthermore, most of the citizens stated to be interested in learning more about related topics such as the balancing of forest protection and forest use, forests and climate change, forest and recreation as well as about the general condition (health and vitality) of forests. However, the interest to learn more about the provision of wood as a raw material for products and bioenergy was not high amongst EU citizens; more than 27 % of the public stated having no or very little interest in this subject [cf. 103].

3. Conclusion

Each of the studies reviewed above has their own methodological features and criteria. The first study was of a qualitative nature using the focus group method, in which group discussions were held in 15 member states. Furthermore, the studies *Europeans and Their Forests* as well as *Europeans and Wood* conducted reviews of previous studies. The last study included a review as well as a stakeholder and a public survey on the European level, and therefore developed further earlier attempts to assess the European public's perception on forests. However, a comparison of the four studies completely, accurately and precisely in all details is not possible due to the varying methodological tools, as well as the set of questions and criteria. Therefore, more research is necessary in particular on the broader European level.

However, in order to derive conclusions and to synthesise the findings of the present chapter the most important answers to the guiding questions (How are forests perceived in the public opinion on the EU level? Has the perception on the EU-level changed in the last (up to) 20 years?) are summarised below.

The topic of forests evoked emotive reactions from many European citizens. Particularly in Finland, Sweden, Norway and Austria, forests and the forest industry are the most important sectors of the economy and overall in daily life. Albeit, in other European countries over the time the public's perception of the role of forests has been changing: the example of France reveals that forests on the one hand seem to lose more and more of its economic role, and on the other hand to gain importance in the fields of ecology and the environment. In this context, on a broader European level, the environmental functions of forest are perceived more significantly (and are also more known) by the public than the economic ones. Thus, the most important function of forest is regarded to be conservation and protection. In this context, a link to the 1980's, where forest dieback was the main key concern in Central Europe can be established. In the UK, the public is more and more sensitised

towards forests and forestry issues, which are perceived as having an increased presence in the media during the last years. However, there is an issue to be aware of: the European public rates their own knowledge about forest between good and very good, although only in Sweden, Norway, Finland, Austria, Germany and the UK the public has in fact good knowledge.

Moreover, different forest-related issues such as forest resources, biodiversity, forest use, production of wood, and sustainable forest management were mentioned within the reviewed studies in relation to the topic of climate change. Therefore, the role of forests in global climate change was considered by the general public as one of the most important ecological functions. Only the issue of conservation of biodiversity was ranked higher. This perceived (and actual) correlation and increasing significance is revealed in particular in the surveys conducted in the UK: during the period of five years, the awareness of forests and forestry being in close connection to climate change and forests' capability to tackle climate increased. Moreover, more forested areas are regarded to be preferential with regard to the impact of forests on climate change. However, in general, the European public was rather undecided to support the opinion that using wood helps in mitigating climate change. The majority of public from England, Scotland and Wales thought that using wood for fuel makes climate change worse, but less so than using fuels such as coal and natural gas.

IX. Forest (Related) Discourses

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1. Introduction

Forest policy within the European Union (or in a greater pan-European and international sense) is largely still the matter of the member states in application of the principle of subsidiarity and the concept of shared responsibility [Lazdinis 2008: 4]. Consequently, the national states are responsible for their forests and forest management. However, forest (related) discourses do not know national borders and sectorial boundaries. Pülzl [2010] argued on the example of deforestation of tropical rainforests that forests, and therefore also the management of this natural resource, has been newly defined. International processes, political declarations and discourses have had a substantial impact on the forest becoming global.

Since the 'argumentative turn' [Fischer / Forrester 1993] in social and political sciences, it is widely acknowledged that ideas and discourses are just as relevant as actors, institutions, and interests within political processes. Despite many attempts to create an international (and European) legal framework for forests, no agreement could be reached thus far. Moreover, the word "forest" is not integrated in the titles of policy plans and programmes dealing with forests. The semantic change as well as discursive shift, which also occurred on the level of European member states [Veenman et al. 2009] has gone hand-in-hand with policy changes and has put the attention on biodiversity, climate change, and sustainable development. In Europe, further sectors, their respective policies as well as discourses have had a continuous influence on forests (e.g. environmental policies like Natura 2000 and rural development policies) [Edwards / Kleinschmit 2012].

The objective of the present chapter is to establish the current state of knowledge on the topic of forest (related) discourses internationally and in Europe, in particular with regard to the most current ones. Based on a literature review and integration of existing literature on forest (related) discourses, an overview, although probably incomplete, of the scholarly research at the international as well as European levels is provided (not a discourse analysis). The guiding question is:

- What are perceived as the major discourses with regard to the forest sector/forestry on the level of the EU?

The term "discourse" does not have a uniform definition. Even within scientific literature, the term has many definitions [Brink / Metze 2006: 15]. Arts defines forest discourse "as a set of ideas (e.g.

'forest as carbon stocks'), concepts (e.g. 'sustainable forest management'-SFM), and categorizations (e.g. forest versus non-forests) that are created and changed in forest-related social practices […] and which give meaning to forests as both physical and social phenomenon" [Arts 2010: 58]. This definition is based on Hajer providing a broad orientation for discourse analysis [Hajer 1995].

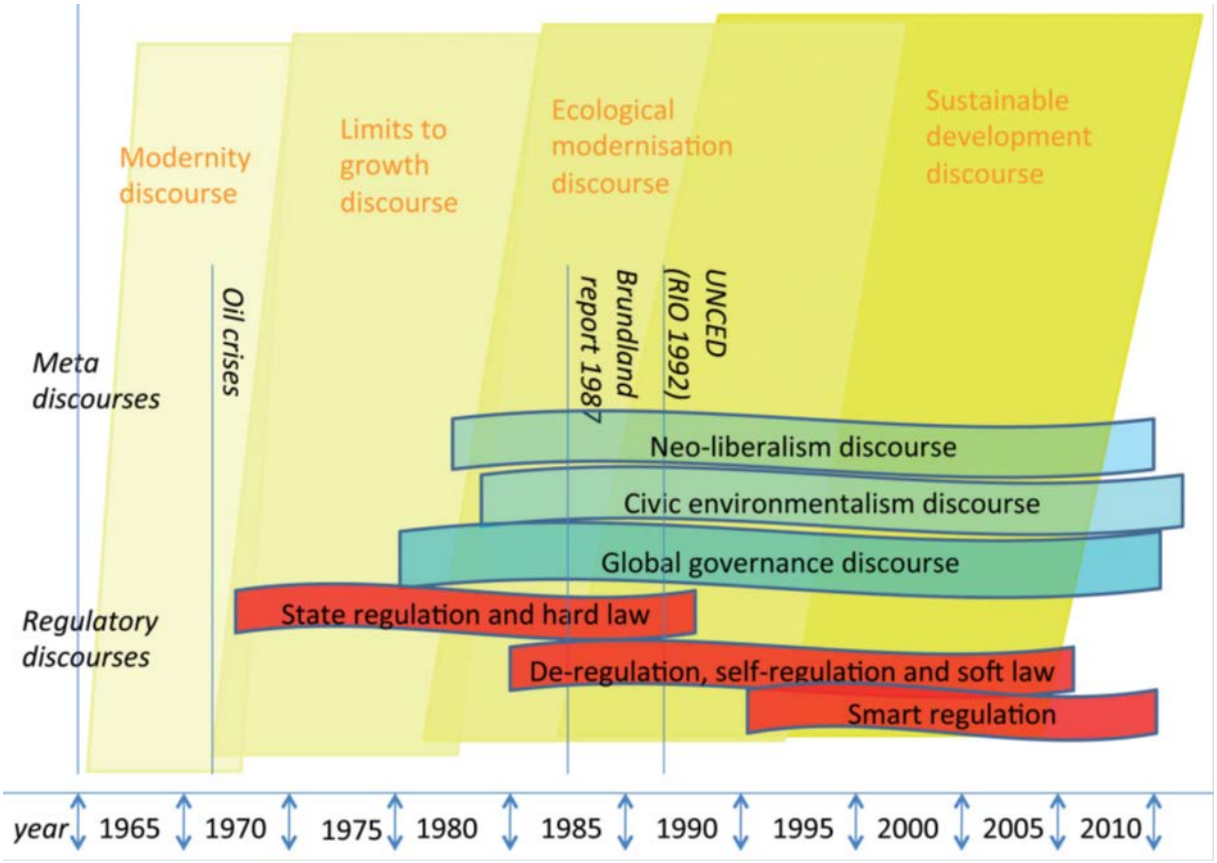
2. Discourses in International Forest Governance

On the basis of scientific literature, the present paper integrates forest (related) discourses at the European level within the international context as introduced by Arts [Arts 2010]. On the international level, three forest (related) discourse types are distinguished:

1) Meta-discourses related to environment: modernity discourse; limits to growth discourse; ecological modernization discourse; sustainable development discourse.
2) Meta-discourses related to global economics, politics, and culture: neoliberalism discourse; civic environmentalism discourse; global governance discourse.
3) Regulatory discourses dealing with regulation and instrumentation of policy issues: state regulation and hard law; de-regulation, self-regulation and soft law; smart regulation.
4) Specific forest discourses shaping forest issues and policies: industrial forestry; wood-fuel crisis; deforestation; conservation in protected forest areas (forest parks); forest decline; sustainable forest management; forest biodiversity; forest-related traditional knowledge: forests and climate change; illegal logging.

The meta- and regulatory discourses (first and second type) relate to global forest policy, although sometimes rather indirect (e.g. economic and governance meta-discourses or the regulatory discourses). On the one hand those discourses affect the initialisation and direction of forest (related) discourses, which on the other hand influence and shape the meta- and regulatory discourses. The specific discourses are directly connected to global (and European) forest policy, albeit embedded within other sectors and their sectoral policies (e.g. biodiversity or climate change). Therefore, the forest sector has had been in a rather challenging position, "attempting to deal with a variety of conflicting demands placed on it by other sectors" [Edwards / Kleinschmit 2012].

Figure 32: Meta and Regulatory Discourses, 1965-2010



Source: [Arts 2010].

2.1 Meta Discourses

2.1.1 Environmental Meta Discourses

The development and manifestation of forest (related) discourses in a broader sense has emerged at the beginning of the 1980s at the international level. However, the first type of discourses on the meta-level related to environment has developed since the 1960s. The discourses on modernity, limits of growth, and ecological modernization are eventually overlapping, but continuously have built on one another. The shift from the limits to growth discourse towards the most current and influential discourse on sustainable development has occurred in the mid-1980s. The main differences are: lack of acknowledgement of fixed limits to growth and extension of the level for implementation of solutions for global challenges to the local and regional level. [Pülzl 2010: 105f.] Further characteristics of the discourse on sustainable development are:

> […] (ii) it requires inter-generational and intra-generational satisfaction of one's needs (hence, equity among generations); (iii) the managerial notion of regulation prevails, since the dominant belief of UNCED was that global environmental problems are solvable through coordinated public and private action; (iv) the management, conservation and use of resources are not viewed as contradictory; and (v) other concerns, such as public participation, global equity and technology transfer from developed to developing countries are taken into consideration. [Arts 2010: 60f.]

The basis for the emergence of the discourse on sustainable development in the 1980's were such publications as W*orld Conservation Strategy: Living Resource Conservation for Sustainable Development* [IUNC 1980] and *Our Common Future* [WCED 1987]. Although even then, the term 'sustainable development' was not new: "Its origins go back to German forestry of the 19th century (Wiersum, 1999). At that time, the notion of 'sustained yield' was introduced to balance human needs for forest products, on the one hand, and the production capacity of the forests, on the other ('harvest equals biomass growth')". [Arts / Buizer 2009: 344] At the United Nations Conference on Environment and Development (UNCED) in 1992, a new impulse was given to the discourse with the publication of Agenda 21 [Ellison / Petterson / Kestikalo 2009: 4f.]. Even though no legally binding instruments with regard to international forests were established, a qualitative improvement was made for the forest policy dialogue in 2000 with the establishment of the United Nations Forum on Forests (UNFF). Having the same de facto status as Commission on Sustainable Development (CSD) under the United Nations [Pülzl 2010: 38-81], the UNFF has agreed on four shared Global Objectives on Forests with a strong focus on the implementation of sustainable forest management. The most recent shifts within the international sustainable development discourse, identified by Mert [2009], are towards neo-liberal globalization, the security turn, and the carbonification of environmental issues.

On the level of the European Union, the shift towards sustainable development is presented, for instance, in the Communication from the Commission, *A sustainable Europe for a Better World: A European Union Strategy for Sustainable Development* (Commission's proposal to the Gothenburg European Council) [Commission for the European Communities 2001] as well as the Treaty of Maastricht stating sustainable development as an overarching goal of the EU in 1992. On the pan-European level, a regional policy process, the *Ministerial Conference on the Protection of Forests or Forest Europe* (MCPFE), has started in the 1990's addressing forest-related issues and sustainable forest management. Over the years, the MCPFE has contributed to the national policies as well as the EU Forestry Strategy and the EU Forest Action Plan and has led to such achievements as the

guidelines, criteria and indicators for sustainable forest management [Pelli et al. 2009: 18f.]. The discourse on sustainable development is strongly interconnected with the specific discourse on sustainable forest management on both the international and European levels.

2.1.2 Economic and Governance Meta Discourses

Other discourses of the first type, related to global economics and governance, have developed since the mid-70's and are all still influencing today's global forest policy. Neoliberalism can be regarded as the most influential ideology, embedding its principles (increased role of markets, enhanced role of the private sector, and voluntary regulation) in international forest policy. Humphrey argues that this meta-discourse has become melted with the specific forest discourses, such as e.g. sustainable forest management, conservation, and illegal logging [Humphreys 2009: 320]. Discourses on civic environmentalism and global governance both emphasise the relevance of stakeholder participation in the forest policy process. The first discourse has its main focus on NGOs, and the second one on the diversity of actors and rules shaping environmental governance [Arts 2010: 61f.]. Both discourses refer to a paradigm shift in governance of current societies and organisations. New forms of multi-actor and multi-level governance as well as new types of policy instruments have developed within the forest sector: community forestry, voluntary agreements, certification programmes etc. [Arts / Buizer 2009].

2.2 Discourses on Regulation

The second type of discourses dealing with regulation and aiming at organizing policy implementation processes, are chronologically replacing (and partly overlapping) each other over time. Therefore, the discourse on smart regulation is the most current mixing the top-down regulation approach and de-regulation [Arts 2010: 62f.]. The term was developed in the context of environmental policy to describe a post-command-and-control implementation style, which shall be capable to deal with increasingly technically and politically complex policy issues. "Therefore, 'smart regulation' proposes a shift to an implementation style which recognizes that government intervention will continue to take place, albeit selectively, and in combination with a range of market and non-market solutions as well as public and private orderings" [Gossum / Arts / Verheyen 2009: 24].

2.3 Specific Forest Discourses

The third type of discourses comprises specific forest discourses. As mentioned above, those are affected by the meta- and regulatory discourses as well as vice versa (i.e. specific forest discourses shaping meta and regulatory discourses). Within the third type, discourses interact, overlap and complete each other, although their intensity might be higher or lower over time. Discourses on industrial forestry, woodfuel crisis, forest-related traditional knowledge as well as deforestation were of relevance on the international level focusing on certain countries (mainly outside of the European continent) and have lost on significance over time. Nevertheless, those discourses contributed to the recognition of forest to be not only set at the national level but at the global level. The destruction of tropical rainforests was the content of the deforestation discourse in the 1980s. Albeit, the content of this discourse changed over time from destruction to, on the one hand, perceived deforestation, also of European temperate and boreal forests, and on the other hand, shifting towards the meta-discourse on sustainable development in the 1990s. [Arts 2010; Pülzl 2010].

3. Discourses in European Forest Governance

The specific forest discourses on the European level were influenced by the discourses on the international level. The first part of discourses (forest conservation, forest decline, illegal logging, sustainable forest management, forest and climate change, and forest biodiversity) was affected by global forest (related) policy. The second part of discourses (energy from biomass, and forestry between urbanisation and rural development) developed within specific countries and later spilled over to the EU and its member states. The specific forest discourses will be presented within the framework of their emergence and development.

3.1 Discourse on Forest Conservation

The discourse on forest conservation was very important at the international level in the 1980s. It addressed the question on whether parks (legally designated protected forests) adequately protect forests' biological diversity and to what extent communities should participate in the decision-making processes as well as management [Hayes 2006; Arts 2010: 64]. By the end of 1980s, the discourse on forest conservation became strongly influenced by the discourse on sustainable forest management; the junction of both discourses resulted in the agenda of forest conservation. At the pan-European level, the ideas of the discourses were addressed, for instance, at MCPFE in 2003

[MCPFE 2003b], harmonizing forest protection to safeguard biodiversity, protection of landscape and specific natural features, and protective forest functions.

3.2 Discourse on Forest Decline

The discourse on forest decline came up at the end of the 1970s and was of great relevance during the 1980s. Emerging environmental issues in Central and Eastern Europe were the starting point in Europe. The German term 'Waldsterben' in connection to the phenomenon of acid rain [Pülzl 2010: 127ff.] and atmospheric pollution fed into this discourse [Skelly / Innes 1994]. The most likely cause of widespread forest decline was claimed to be a complex ecosystemic disease triggered by cumulative stress from increasing air pollution, e.g. acid rain [Kandler 1993]. In Great Britain, for instance, the controversy of acid-rain was caused by two different approaches and discourses: the 'traditional-pragmatist' approach and the discourse of 'ecological modernization'. The first discourse considered acid rain as primarily related to SO2 emissions of big coal-fired stations in Great Britain and thus, pollution was an 'incident'. Therefore, the damage caused to continental Europe – forest decline – was regarded as a foreign affair. The discourse of 'ecological modernization' recognised acid rain as causing domestic as well as foreign damage, and thus, the requirement of a change in policy regime (i.e. a new institutional way of conducting environmental policy-making). This meta-discourse related to the environment, i.e. ecological modernization, was linked to pollution prevention and precaution within specific forest discourses, particularly to forest decline [Hajer 2005]. At present, the term 'Waldsterben' is still in use, but is no longer restricted to acid rain [Arts 2010: 66; Kandler 1993].

3.3 Discourse on Illegal Logging

At the end of the 1990s, (tropical timber) illegal logging became a major issue in international forest governance. The G8 and World Bank were the major actors. In particular, the World Bank did the most to catalyse the development of Forest Law Enforcement and Governance (FLEG) processes on the international level [Arts 2010: 67f.]. In order to supplement and support those processes, the EU committed in 2002 to develop an action plan to combat illegal logging. The action plan of the EU, a major timber importer, went beyond FLEG with its main approach on the supply-side and included the demand-side. The measures of the first were to provide assistance to developing former communist countries, and the measures of the second were to curtail the trade of illegally-logged timber to the EU. The Forest Law Enforcement, Governance and Trade (FLEGT) action plan was introduced in 2005 [Gulbrandsen / Humphreys 2006].

3.4 Discourse on Sustainable Forest Management

The discourse on sustainable forest management is congruent with the meta-discourse on sustainable development. Over time, the discourse has experienced shifts in emphasis: on the one hand away from the focus on developing countries with tropical rainforest towards global threats to forests such as distribution of production and consumption and participation [Arts 2010: 66]; on the other hand away from timber production towards a broader role of forests and their multiple functions [Wang / Wilson 2007]. However, the basic idea has been the integration of the use of resources and the conservation of biodiversity within the approach of SFM [Arts / Buizer 2009]. On the pan-European level, Forest Europe or MCPFE has started as a voluntary policy process in the 1990s in order to achieve the sustainable management of Europe's forests [Forest Europe 2009]. In 2007, an initiative in order to develop a Legally Binding Agreement (LBA) on forest in Europe was introduced. A legal basis in forestry was considered important in order to increase the political attention on forests on the European as well as international level [Edwards / Kleinschmit 2012]. Within the framework of a legally binding agreement, another process, in order to revitalise the approach to forestry, began with the release of *The Green Paper on Forest Protection and Information in Europe by the European Commission in 2010* [European Commission 2010a].

3.5 Discourse(s) on European Forest Policy: Protection (Nature Conservation) vs. Production

Edwards and Kleinschmit [2012] indicate a further discourse about forest and environmental protection within the EU process, according to the Green Paper. This discourse includes the topics of forests being CO2 sinks, environmental protective functions of forests, preserving biodiversity and climate mitigation. A further discourse within the broad discourse on forest protection is that of improving forests' resilience and adaptive capacity. However, the existsing discourse on protective functions of forests (with regard to biodiversity, climate change, soil, storms, pests, diseases, and fires) is at odds with the discourse on the productive use of forests, including economic interests. In accordance with Humphreys's argument, that neoliberalism discourse coalesced with the specific forest discourses [Humphreys 2009: 320], the productive use of forests can be regarded as part of the economic and governance meta-discourse interconnected with the discourse on sustainable forest management – respectively sustainable development.

Although the initiated process by Forest Europe has a quite different mix of discourses around forest protection and production, the junction of both discourses (neoliberalism and sustainable forest

management) is also apparent: documents refer continuously to protection issues, sustainable development as well as to increasing economic growth and jobs and enhancing forest production. The weight however has shifted to economic growth, as one of the major discourses is the 'Green Economy', including "improved human well-being and social equity while reducing environmental risks and ecological scarcities" [UNEP 2011]. Furthermore, the 'Green Economy' "is low carbon, resource efficient, prevents biodiversity loss and preserves ecosystem services. […] The idea of a green economy appears to try and balance the need for economic growth while having the least impact on the environment, which would seem to be an offshoot of the previously popular term 'sustainable development'". [Edwards / Kleinschmit 2012: 5]

3.6 Discourse on Forests and Climate Change

The discourse on forest and climate change is also embedded within the meat discourse on sustainable development. It received international attention in the mid-1980s, after growing scientific concern for the effects of certain "greenhouse gases" into the atmosphere. Although the topic of climate change has been an issue of uncertainty, science has supported policy shaping the challenge as an immediate and pressing one on both European and global level [Otterbach 2011]. The Food and Agricultural Organization of the United Nations (FAO) has developed strategies to mitigate and adapt to climate change through sustainable forest management [FAO 2012c]. The Clean Development Mechanism (CDM) and reduced emissions from deforestation and degradation (REDD and REDD+) are attempts to tackle the problems on the international level [Arts 2010: 67]. On the level of the EU, climate policy focuses mainly on mitigation under the use of the Emission Trading Scheme (ETS). However, specific policies for land use or forestry are not existing [Winkel et al. 2009: 43].

3.7 Discourse on Forest Biodiversity

On the contrary to forests, a global legally binding instrument for biodiversity exists with the Convention on Biological Diversity (CBD) from 1992. This process was initiated by the International Union for Conservation and Nature (IUCN) as well as the United Nations Environment Program (UNEP). The discourse on biodiversity originates from the diverging interests of north and south, developed and developing countries [Forte 1999]. Forests were strongly related to this discourse because of the intrinsic link to access to resources and technology as well as benefit-sharing in the sustainable use and conservation of forests [Arts 2010: 67]. Due to the growing economic importance of biotechnology, the discourse on biodiversity has gained weight on the global agenda. The interests

of multinational corporations and new trends of globalizing economy, for instance access to financial value of genetic resources through intellectual property rights, had a strong impact on the CBD and the commercialization of biodiversity [Väliverronen 1998: 23ff.]. McAffe constitutes the supranational institutions like the World Bank or United Nations including environmental treaties like CBD, as structures of eco-economic governance. Those structures are considered to be sites for the production of environmental discourse, which is dominated by a post-neoliberal version of environmental economics [McAfee 1999; Arts 2010: 67]. Therefore, a shift within discourses is perceived from the argument of protecting biodiversity for itself towards an argument of conserving tropical forests, as carbon sinks, to address climate change by selling carbon emissions [Forte 1999; Arts 2010: 67].

3.8 Discourse(s) on Energy Form Biomass/Bio-Energy

The discourse(s) on energy from biomass has emerged in the 1970s on the international level as a response to the oil crises, being part of the wood-fuel discourse and most recently reframed into a discourse on innovative wood-based bio-fuels [Arts 2010: 64].

On the European level, Kirkels identified four discourses within the discourse on energy from biomass: biotechnology / bio-based economy; small local systems; renewable energy (solid, liquid, power); and biofuels. Those discourses are evidence for shifts in attention, involving different policies and different actors. In the early 1980s, the main attention was on forestry and wood, the traditional biomass sources for energy. As soon as the oil prices no longer provided an incentive and agricultural overproduction increasingly became a challenge, the shift towards initial application for power production and reduction of greenhouse gas emissions in the 1990s occurred (EU Commission publishes White Paper on renewable energy in 1997, with a leading role for biomass). After 2000, the interest in renewable energy remains, but wind takes over the power market. Furthermore, the biofuels market expands and the attention on a bio-based economy rises. However, the discourse on energy from biomass is surrounded by duality – for instance, energy from biomass can be on the one hand a culprit and on the other hand a savior for sustainable energy production. Furthermore, duality also exists within the time horizons: the long-term focusing on energy from biomass as a strategic option including necessary innovations, and the short-term focusing on urgent needs such as the reduction of the actual dependency on oil or greenhouse gases [Kirkels 2012].

3.9 Discourse(s) on Forestry Between Urbanisation and Rural Development

3.9.1 Urban Forestry Discourse

Two major social changes and their impact on forestry have gained relevance since the 1990s in Europe: urbanisation and rural development. The urban mandate of forestry was recognised rather hesitantly due to the consideration of forestry as a rural activity (most of the forest resources are situated in rural areas, which cover 91 % of territory in EU [European Commission 2008b]). Networking and knowledge exchange (through study visits and conferences) on the concept of urban forestry applied in North America proved crucial on the level of European member states. One of the direct spin-offs of the network for the promotion and coordination of urban forestry in Europe, COST Action E12 Urban Forests and Trees, as well as European Forest Institute's (EFI) efforts was the establishment of the European Urban Forestry Research and Information Centre (EUROFIC) in 2001. Within 'urban forest', 'forest' has developed a different meaning than the traditional forest concept, by including for instance small woods, parks and gardens with area size, the concept has been broadened [Konijnendijk 2003]. The traditional separation between 'city' (urbanisation) and 'countryside' (rural development) has also been challenged because of the influences of urbanisation on rural areas (e.g. urban people increasingly visiting the country side for leisure activities) [Hoogstra et al. 2004].

3.9.2 Forestry and Rural Development Discourses

Traditionally the role of forestry within rural development was to provide labor and income opportunities as well as raw material in remote areas) [Hoogstra et al. 2004]. "At present, the role of forestry is gradually changing, with greater emphasis being given to its role to maintain and to recreate ecological and amenity services as a means to contribute towards environmentally attractive living and leisure areas for a growing urbanised population" [Elands / Wiersum 2001].
Elands and Freerk Wiersum have identified the perceived role of forestry within five different discourses on rural development [Elands / Wiersum 2001: 5ff.]:

- agri-ruralist, farmers as stewards of the countryside;
- hedonist, countryside as the garden of the city;
- utitlitarian, production areas to be used for economic purposes;
- community stability, remote places;

- nature conservation, potential nature areas featuring intrinsic values.

The first discourse considers the focus of forestry on the one hand to be on optimization of integration between farming and forestry; on the other hand forestry shall not become too dominant. Within the hedonist discourse, rural forestry development is viewed to contribute to the strengthening of the ecological infrastructure through an increase of nature-oriented values and recreational attractiveness of the countryside [Elands / Wiersum 2001]. “In the utilitarian discourse, rural forestry development should aim at optimising the income earning capacity of the forestry sector and its contribution to the regional economy.”[Elands / Wiersum 2001: 13] The community stability discourse considers forestry aiming on the one hand positively at the prevention of economic decline and the maintenance of community stability in existing forest areas, and on the other hand negatively at afforestation of agricultural lands. Within the last discourse of nature conservation, forestry is regarded for its protective functions (see above 3. 4.1. Discourse on forest protection). However, the discourses reveal that the role of forestry is shifting from the traditional production function to a multifunction. Therefore, the role of forestry may differ depending e.g. on the country, the region, or the various stakeholders involved [Elands / Wiersum 2001].

X. Summary

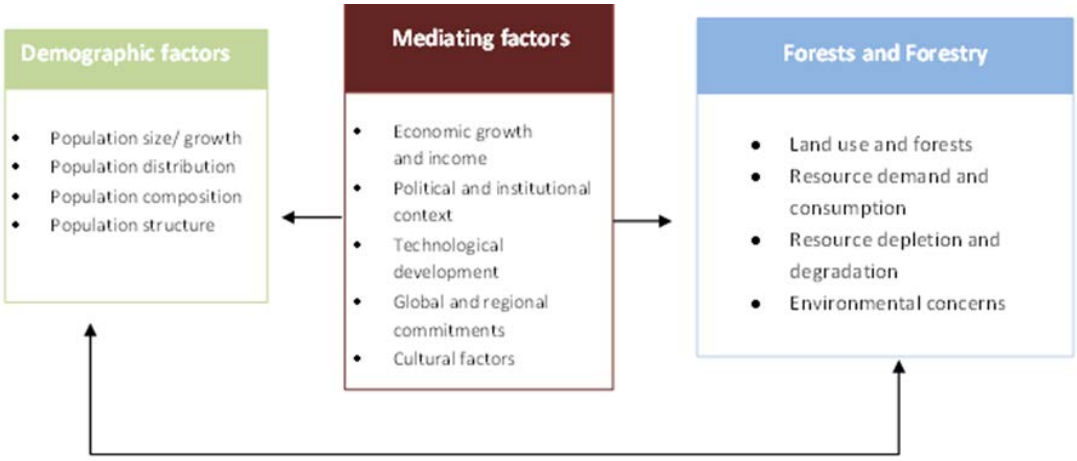
Overview of EU policy and socioeconomic factors of forest management

The study provides an overview of changes of selected structural factors at the EU 27 and (if reasonable) global levels that have affected the development of the forest-based sector in Europe over the last six decades (if reasonable). Due to the fact that the European Union has undergone several enlargements in the last 50 years, the provision of systematically collected statistical data based on standard definitions was often not possible for all EU member states. In these cases, the data are limited depending on availability. The main aim of the study is to supplement the findings of the case studies at the landscape level and to identify and describe the relevant consequences of demographic, economic, technological, and political development, forest-related discourses and changes of the ownership structure and perception of forests by the public on forestry and forest-based industries at the macro level.

Demographic developments

Demographic changes that affect forestry include primarily changes in population size, composition, structure, and distribution. More detailed, the following tangible critical factors have been identified: population growth, ageing, international migration, and rural-urban distribution (especially internal migration). Europe´s population has grown over the last 60 years, having the strongest annual population growth (over 3 million persons) in 1960. Since then, the rate of growth has slowed. The developments in EUs population composition are predominantly determined by natural population change and migration. The natural change has remained low over the past 50 years, showing a declining trend, whereas migration (especially labour and student migration and refugees and asylum seekers) has become the main driver of population increases in the past decade. The rural population share has been falling continuously in the EU 27 since 1950; in 2011 about 56 percent of the population lived in rural areas, which cover 91 percent of the overall territory [Eurostat 2011]. Demographic changes have a slow dynamic influence on forest management practices and long-term transformation of wooded landscapes [FAO 1995], and work through “mediating factors,” such as geopolitics, markets, climate change, or technology [Mather / Needle / Fairbrain 1998, Sandström at al. 2011]. Figure 1 shows a framework for the links between population change and forestry. This framework was developed by Hunter [Hunter 2000] and adapted in the second Asia-pacific forestry sector outlook study by FAO [FAO 2010b].

Figure 1: Framework Considering the Link between Population Change and Forestry



Source: Adapted from [Hunter 2000] and [FAO 2010b].

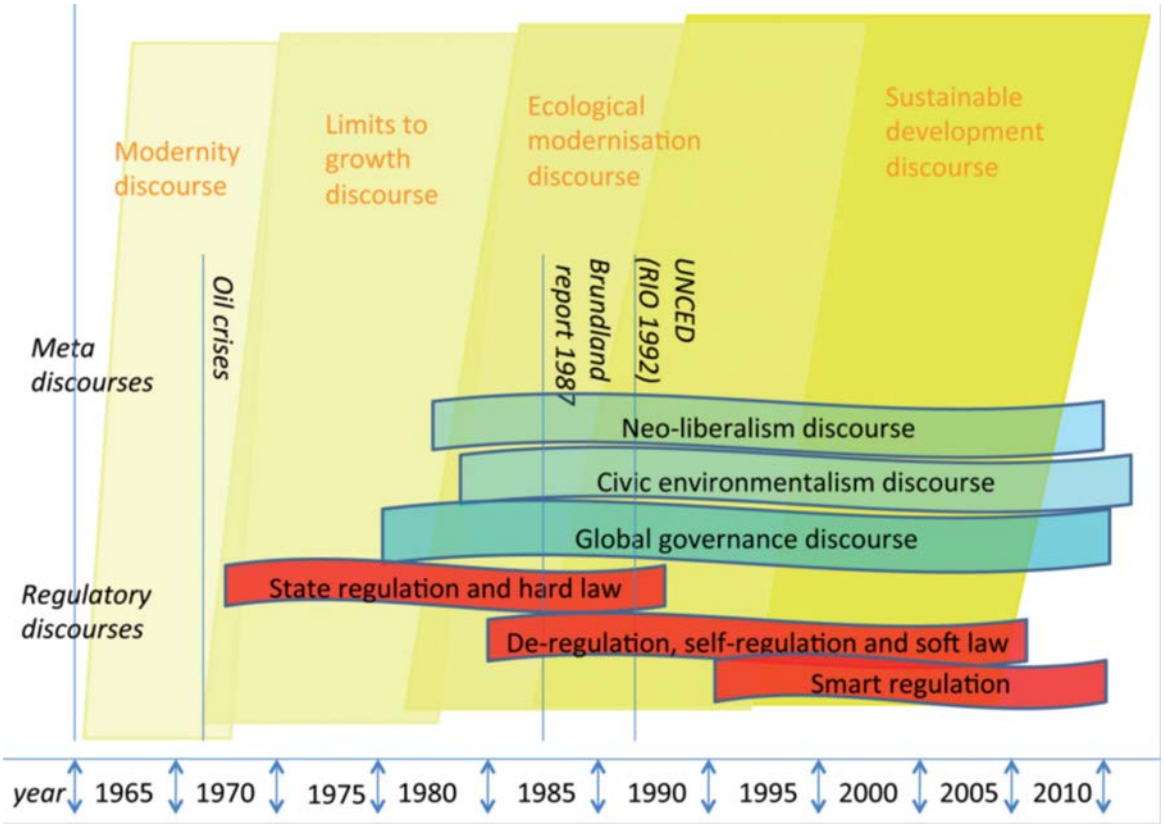
International migration reinforces existing urbanisation patterns, as most immigrants tend to settle in urban areas [European Commission 1999]. The major trends of internal migration over the past 60 years are the movement from rural to urban areas and counter-urbanisation. Migration of young working-age people from rural to urban areas has led to land abandonment followed by natural afforestation of agricultural areas in many European countries (e.g. in the Baltic States, Bulgaria, Romania, Portugal and Spain). The extensification of agriculture and industrial forestry as a consequence of the depopulation of rural areas can be found in other European countries (e.g. in Central Sweden, Eastern Finland, Eastern Germany, Italy, Hungary or Eastern France) [FAO 2005]. Increasing urbanisation has in turn accelerated the establishment of urban forestry and the subsequent development of corresponding new forest management practices. The main functions of urban forests are usually limited to protection, recreation, and nature conservation, while productive functions are mainly of secondary importance [Guduric at al. 2011]. On the other hand, in the 1970s, some urbanized regions started to experience a population turnaround and urban decline [Antrop 2004]. This so-called counter-urbanisation is defined as population flow out of urban areas and into accessible rural areas (made possible by new transport and ICT infrastructure), contributing to countryside gentrification and regeneration of rural areas. This trend, started in the 1970s, can be observed particularly in older EU-member states (e.g. France, Spain, Italy and UK). Demographic changes are also widely recognized as key drivers for wood consumption and markets for forest products and services. Both population growth and ageing affect forest product markets, as total population growth causes increased demand for timber, fuel wood, and other forest products and forest services [Angelsen / Kaimowitz 1999]. On the other hand, changes in relative affordability may lead to changes in the composition of consumption. In general, in many of the wood product

markets, market shares have been stable or increasing in the past decades. However, in recent years, the economic and fiscal crisis has worsened the competitive position of wood-based industries in Europe. Population ageing induces the emergence of the so-called "silver economy" – "when the growing share of gray-haired elderly with strong purchasing power becomes major actors in the economy" [Malmberg 2009]. FAO outlines "a historical trend towards greater public interest in forest services" that is likely to grow as the population ages, becomes wealthier, and demands more non-wood forest services (e.g. recreational services) [FAO 2005]. The increase in the number of people of older age groups clearly affects residential construction, resulting in declining demand for new housing [Thomas / Malmberg 2005]. Similarly, the growing number of households in Europe (due to changing family structures and family lifestyles enabled by an improving economic situation after 1950) cause growing demand for housing and furniture [cf. Marcin 1993].

Public opinion and discourses

Since the 'argumentative turn' [Fischer / Forrester 1993] in social and political sciences, it has been widely acknowledged that ideas and discourse are just as relevant in political processes as actors, institutions, and interests. Despite many attempts to create an international (and European) legal framework for forests, no agreement has been reached thus far. Moreover, the word "forest" is not integrated in the titles of policy plans and programmes dealing with forests. The semantic change as well as discursive shift, which also occurred on the level of European member states [Veenman et al. 2009], has gone hand-in-hand with policy changes and focused attention on biodiversity, climate change, and sustainable development. Further sectors in Europe, as well as their respective policies and discourses, have had a continuous influence on forests (e.g. environmental policies like Natura 2000 and rural development policies) [Edwards / Kleinschmit 2012]. Figure 2 provides an overview of the most relevant meta-, regulatory, and forest-specific discourses during the period 1965-2010.

Figure 33: Meta and Regulatory Discourses, 1965-2010



Source: [Arts 2010]

The process of societal development within a region, country, or on a broader international level is often accompanied by social research in order to consult and to consider the society at large in the decision-making process. In particular, within the topic of the environment and management of natural resources, attention is devoted to participatory elements (e.g. 1992 Rio Declaration or Aarhus Convention 1998) [Applestrand 2002]. The bottom-up approach therefore plays a significant role with regard to the concept of sustainable forest management, including ecological, social, and economic needs of society. In this context, studies conducted on the public's perceptions or opinions are of relevance since they analyze the public's values, preferences, and wishes. Four comprehensive studies on public opinion have been conducted on a broader European level in the past decade. The first study, "Perception of Wood-Based Industries", sought to analyze and understand existing perceptions and identify how forest industries are perceived by the population of the 15 "old Member States" of the European Union [European Commission 2002]. The most complete work summarizing social forest studies in the European Union was conducted by Rametsteiner and Kraxner in 2003 [Rametsteiner / Kraxner, 2003], and included 47 representative surveys from a majority of all European member states ("Europeans and Their Forests"). The study "Europeans and wood"

[Rametsteiner / Oberwimmer / Gschwandtl 2007] followed four years later, followed by a synthesis of the work "Shaping forest communication in the European Union: public perceptions of forests and forestry" [European Commission 2009b] at the end of 2009. Due to varying methodological tools questions, and criteria that were used in these four studies, an accurate, precise, and fully detailed summary has not been possible. Nevertheless, some of important findings of the four studies are summarized below.

The topic of forests evoked emotive reactions from many European citizens. Particularly in Finland, Sweden, Norway, and Austria, forests and the forest industry are among the most important sectors of the economy and society. The public's perception of the role of forests has been changing in other European countries: the example of France reveals that while forests seem to be losing their prominent socioeconomic role, they are growing in importance in the fields of ecology and the environment. In this context, and on a broader European level, the environmental functions of forests are perceived as being more significant (and are also more known) by the public than the economic ones. The most important function of forests is therefore thought to be conservation and protection. In this context, a link to the 1980's, when forest dieback was the main concern in Central Europe can be established. In the UK, the public is increasingly sensitized towards forests and forestry issues, which are perceived as having a growing media presence over the past years. However, there is an issue to be aware of: the European public rates its own knowledge about forests between good and very good, although only in Sweden, Norway, Finland, Austria, Germany, and the UK does the public in fact have good knowledge of these issues. Moreover, different forest-related issues such as forest resources, biodiversity, forest use, wood production, and sustainable forest management were mentioned within the reviewed studies in relation to the topic of climate change. Therefore, the role of forests in global climate change was considered by the general public to be among the most important ecological functions. Only the issue of conservation of biodiversity was ranked higher. This perceived (and actual) correlation and increasing significance is revealed in surveys conducted in the UK: over a five-year period, awareness of forests and forestry's connection to and role in tackling climate change increased. Moreover, densely forested areas are thought to be preferential with regard to the impact they have on climate change. Generally speaking, however, the European public was rather ambivalent in supporting the opinion that using wood helps to mitigate climate change. The majority of the English, Scottish, and Welsh public thought that using wood for fuel might even accelerate climate change, although with lower intensity than fuels such as coal and natural gas.

Economic and technological developments

Economic and technological developments significantly affect the provision of products which are obtained from forest ecosystems. Since wood-based industries in Europe have experienced the same increase in direct and indirect independence of economic activities as all other globally operating industries, a global view was chosen for the analysis of the main products, markets, and producers in the last 6 decades. In this period, production in forest-based industries grew fairly steadily, although considerably slower than overall production as measured by GDP. The biggest shifts in production and consumption occurred after 1990 in association with, first, the transformation in Eastern Europe and, second, the economic rise of China. Production as well as consumption declined considerably in Eastern Europe which was and still remains one of the major wood producing areas in the world. China, however, which was still an economically minor power in 1990, grew to become the second biggest economy in the world. Its forest- and wood-based industries grew accordingly, although primary wood production in China is still comparatively low due to few natural wood resources. Both of these developments caused substantial changes in global trade patterns in wood and wood-based products.

Until now, the big wood producing countries in the developed world, as well as Russia, exhibit growing forests with increasing wood densities. These countries are also the major producers of industrial roundwood and further processed wood products. In contrast, most tropical countries exhibit decreasing forest areas and densities. The main forest product in these regions is fuel wood, which is almost exclusively consumed locally. Even though total wood removal in these countries is as large as in the developed world, its respective economic value represents only a negligible fraction of the economic value of wood removal in developed countries. This might change in the future, when these countries' economies reach the level of today's middle per capita income countries – similar to the development in China.

In Europe, development of the fuel wood sector might influence forestry and wood processing industries in the future. During the 2000s, growth in fuel wood production and consumption reached heights not foreseen in previous decades, primarily because of the presumed carbon neutrality of wood as fuel compared with fossil fuels. Given the increase in price of wood residues in Europe, it is not clear if this trend towards increased usage of wood fuel will be maintained in the future. Up to now, EU 27 countries followed policies to increase the share of wood as a renewable energy source. Trade-offs between forests as sources for fuelwood and as carbon sinks are already recognised [Forest Europe / UNECE / FAO 2011a: 223], as well as the competition between material and energy uses.

In general, advances in technology such as mechanisation of harvesting operations have led to increased productivity and efficiency of wood processing and a consequent reduction of the workforce required for such tasks. The growing competition for wood as a raw material has accelerated the development of techniques that enable diversification of input materials for processing. In the pulp and paper industry, for example, the supply of virgin fibres have started to shift from northern European and northern American countries toward countries of the southern hemisphere, partly because modern techniques have allowed better utilization of hardwood fibres. The utilization of recovered wood and fibres has been significantly increased due to improved collecting and sorting systems and treatment technology. However, at the same time, there is growing competition for these materials with the bioenergy sector. Since pulp and paper production is highly energy- intensive, scientific and technological research have concentrated on increasing energy (and material) efficiency. Due to increasing awareness for environmental concerns of customers and reflected in policy regulation, the reduction of negative environmental impacts of processing has been another focus of process development. The industries in the forest-based sector have increasingly made use of enabling technologies (ICT solutions or industrial biotechnology techniques), but radical innovations usually have taken place outside the sector. The better integration of enabling technologies into the production of value-added products still remains a challenge.

Forest ownership structure and tenure arrangements

An understanding of different tenure arrangements in the EU 27 is essential for the sustainable management of forested landscapes. It is a prerequisite for avoiding and resolving tenure-related conflicts and is important as a basis for policy formulation related to the social and economic elements of sustainable forest management. Despite the relevance of forest tenure for all involved actors – governments that seek to promote sustainable forest use or combat illegal logging; local communities which want legal recognition and broader political participation; private industries requiring reliable sources of timber and fibre; or environmental NGOs that seek conservation – there is still a lack of comprehensive data and information on the past development and current state of the forest tenure situation in the European Union.

The EU's forests vary from small private to large state forests, and from small family owned holdings to large estates owned by companies, many of which are used as part of industrial wood supply chains. Generally, the number of holdings of forest and other wooded land in private ownership is much higher than that of public holdings, and the average size of public forest holdings is considerably larger than the average size of holdings of those in private ownership. Ownership of

forests might influence forest management, environmental performance, and the production of timber and other forest products and services. How the size and ownership of forest holdings influences forest management on the EU 27 level has not yet been investigated, but there is evidence on the global level that private forests provide more market-based goods such as timber, while public lands produce proportionally more fuel wood and multiple-use goods and services [see Siry / Cubbage / Newman 2009]. The privatisation of formerly state-owned forests and other wooded lands (e.g. as part of the transition process in countries formerly under centrally planned economies) is often associated with the fragmentation of forest holdings. Currently, throughout the EU 27, private forest ownership is mainly characterised by small-scale forest holdings, and the number of small forest owners has been increasing in recent years. These forest owners are a very heterogeneous group with a wide variety of goals regarding ecosystem services. There are an increasing number of "new" or urbanised forest owners in the EU 27 that no longer live close to their forests and do not have adequate knowledge of forest management. Recognition of the ongoing process of fragmentation of forests and other wooded lands has in recent years led to several private forest owner typologies, which have been built to account for diversity and reveal their relationship. For example, Mutz identifies the following types of forest owners in Germany [Mutz 2007]:

- the economy-oriented forest owner (importance of economic aspects, like preservation of capital, revenue, etc.);
- the ecology-oriented forest owner (important to own, shape, and use a piece of nature; mostly less profitable forests);
- universally oriented forest owner (equal importance of economic and ecological aspects).

An increasing number of surveys on small-scale private forest owners has been conducted in the last two decades throughout Europe. Fragmented forest ownership has been identified in the social sciences and forest policy as a challenge in increasing mobilization of wood from forests. The fragmentation of forest ownership is an important obstacle to innovation, as analysed in the report *Innovation and Entrepreneurship in Forestry in Central Europe* by Ewald Rametsteiner and Gerhard Weiss [2004], and may represent a potential problem to sustainable forest management, especially when it comes to maintaining a certain level of production and employment [Forest Europe / UNECE / FAO 2011a: 109f.].

Forest policy regime

The responsibilities for forest policy within the EU lie with the Commission (DG Agriculture, DG Environment) and its Inter-Service Group on Forestry, in the Parliament and its respective

Committees and Intergroups, in the Council of Ministers and its Council Working Party on Forestry, and in the Standing Forestry Committee representing the forestry administrations of the EU member states. There are several European forest-related interest groups, including the Confederation of European Forest Owners, European State Forest Association, the European Federation of Municipal Forest Owners, the Union of European Foresters, the European Network of Forest Entrepreneurs, Prosilva Europe, FERN and other European eNGOs, the European Confederation of Woodworking Industries, and the Confederation of European Paper Industries.

These stakeholders support and participate in EU forest policy processes through the Advisory Group on Forestry and Cork under the DG Agriculture and Rural Development, the Advisory Committee on Community Policy Regarding Forestry and Forest-Based Industries (ACCFF) under the DG Enterprise and Industry, or the "Habitats" and "Ornis" Committee. The European forest owners' movement and individual member states (Austria and Finland), as well as the European forest industry (esp. CEPI), are seen as very important actors in influencing the establishment of some form of formal forest policy. Forestry and forest-based industry actors also use the EU's instrument of Technology Platforms to wield influence. Environmental institutions and NGOs are thought to be rather strong at the EU level. A prime example is Natura 2000, where environmental NGOs successfully used their influence.

Forest policy coherence

Beside forest policy itself, there are several different forest-related measures that result in a fragmented EU forest policy, namely in the fields of agriculture and rural development (CAP), environment/biodiversity (e.g. Natura 2000, Water Framework Directive), energy/climate change (e.g. Biomass Action Plan, accounting rules on greenhouse gas emissions and removals), and industry/trade (e.g. Timber Regulation, procurement policy). The different policy measures are partly incoherent both within forest policy itself and between the different forest-related policies, resulting from regional, social, ecological, and economic differences, lack of interest, and institutional competition, among others. The first forest-related policy measures – mainly under the CAP – were developed unsystematically between 1964 and 1988, and a more coherent approach with featuring the first forestry action programme was developed between 1988 and 1992. EU forest policy entered a more ambitious phase after 1992 with the strengthening of forest protection measures, the establishment of aid schemes for forestry, and other forest-related policies.

Since 1998, there have been initiatives for a more coordinated EU forest policy through the EU Forestry Strategy that advances the application of Sustainable Forest Management, the multifunctional role of forests, and the principle of subsidiarity. The EU Forest Action Plan from 2006

aimed at transforming Forestry Strategy into a dynamic process, and building a framework for joint activities mainly in the fields of coordination, communication, and research. However, these were perceived as political compromises with rather little impact. In 2010, the Commission published a Green Paper stressing climate change and forest protection issues as well as the need for better forest information. The Ministerial Conference on the Protection of Forests in Europe that has developed different pan-European (legally non-binding) guidelines, criteria, and indicators for sustainable forest management since 1993 launched negotiations in 2011 on a Legally Binding Agreement (LBA) on Forests in Europe. The ratification process is expected to take place in 2014. In conclusion, dealing with forest issues within established EU policy frameworks is a challenge, especially when considering responses such as regulation, framework-setting or voluntarism, and policy instruments.

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