

# COUNTRY-LEVEL TRENDS AND FORECASTS USED IN THE EUROPEAN FOREST SECTOR OUTLOOK STUDY (EFSOS)

## INTRODUCTION

The European Forest Sector Outlook Study or EFSOS (UNECE/FAO, 2005) presents trends and forecasts for developments in forest resources and forest products markets for Europe as a whole and at the sub-regional level (Western Europe, Eastern Europe and selected countries of the Commonwealth of Independent States or CIS). These trends and forecasts were based on an analysis of European forestry statistics at the country level.

The following tables and charts present the trends and forecasts shown in the EFSOS at the level of individual European countries. It should be noted that many new countries have been established in Europe during the 1990s. While it was possible to include historical trends at the sub-regional level in the main EFSOS report (making estimates and assumptions about the inclusion of the new countries in different sub-regions), statistics for most of these new countries are not available for the years before their independence. Rather than trying to create historical time series for these countries from the former larger geographical areas, it has been decided to present only the information that is available since their independence. Thus, most of the historical statistics presented here for the new countries in Eastern Europe and the CIS only extend back to the early-1990s.

For each country, this document presents one table and a second page showing six charts. The tables present information at ten-year intervals and are arranged as follows:

- the left-hand columns in the tables present historical statistics from 1961 to 2000 and the average annual change in these figures (in percent) from the first year in which data was available (usually 1961);
- the right-hand columns in the tables present the EFSOS projections from 2000 to 2020 under each of the three future scenarios defined in the analysis (baseline, conservation and integration scenarios), plus the average annual change from 2000 to 2020;
- the first set of rows present information about forest resources (area, growing stock, increment and fellings);
- the following two sets of rows present information about the production and consumption of forest products (by product type); and
- the last two sets of rows present the wood raw material balance, which includes the derived demand for wood raw materials (wood and fibre from forests and other sources) used to manufacture forest products in each country and the consumption of wood raw materials from different supply sources.

The charts present some of the information shown in the tables, but for every year over the period 1961 to 2020. As noted above, the historical statistics for some countries in Eastern Europe and the CIS only extend back to the early-1990s (due to the availability of data), so some of these charts only show the trends since 1990.

The remainder of this introduction presents more information about the data sources, definitions and methodology used to create these tables and charts. Readers wishing to obtain any of the more

detailed datasets used in the EFSOS analysis can obtain this freely from the UNECE Timber Section by writing to [info.timber@unece.org](mailto:info.timber@unece.org).

## FOREST RESOURCES

In the country tables, historical trends in forest area, growing stock and increment are only shown for those countries that were included in the report by Gold (2003). This report included historical forest resource statistics for most European countries and the figures shown in the following tables are based on the statistics presented in that report.

The report by Gold presented the results of national forest inventories implemented in a number of different of years in the past. In order to present this information for a comparable set of years, linear interpolation was used to produce figures for the years 1961, 1970, 1980, 1990 and 2000. For example, Gold reported the forest area available for wood supply in Austria in 1988 and 1994, so the figure presented for Austria in 1990 in the following tables is based on interpolation of these two statistics. Furthermore, the figures presented below for the year 2000 are the most recent available figures from these national statistics (e.g. the forest area shown for Austria in 2000 is the figure reported by Gold for 1994).

It should be noted that the forest resource statistics presented in Gold were based on a variety of different definitions (e.g. total forest area, area of forest available for wood supply, area of forest and scrub land). The figures presented here are based on the definitions contained in Gold and no attempt has been made to standardise these figures. Thus, these figures are not always comparable across countries (although the majority of them refer to forest available for wood supply).

The report by Gold contained statistics for the majority of countries in Western Europe, plus some countries in Eastern Europe and the Russian Federation. Historical statistics are not shown for the countries that were not covered by Gold (and are shown as not available or "n.a." in the following tables). However, for those countries, figures for the year 2000 are shown and these have been copied from the figures shown for the year 2000 in the projections.

The historical statistics for fellings are based on historical roundwood production statistics. Roundwood production is measured in cubic metres underbark, so these figures were converted to a felling volume by multiplying them by conversion factors taken from the forest resource assessment (UNECE/FAO, 2000). These conversion factors take into account the underbark to overbark conversion, plus the differences between fellings and removals in countries (e.g. harvesting residues or losses). The same conversion factor was used for each country to convert from roundwood production to fellings over the whole of the historical time series and the conversion factors used in the analysis are shown in the document " Conversion Factors Used In The European Forest Sector Outlook Study ".

For the projections of forest area, growing stock and increment in the country tables, the figures are based on the results reported in Schelhaas *et al* (in preparation). This report presented an analysis of future developments in forest resources, based on the European Forest Information Scenario Model or EFISCEN. The projections are shown for two scenarios (the baseline and integration scenarios).

All of the projections are for forest available for wood supply. Thus, it should be noted that the figures reported for the year 2000 in the projections may not match the figures reported for the year 2000 in the historical statistics, due to differences in definitions. It should also be noted that the figures for the year 2000 in the historical statistics and the projections may not match those presented in the forest resource assessment, as all three of these reports have been based on the best

available information at the time they were written (and may, therefore, present slightly different data).

For the projections of fellings, the figures have been based on the roundwood production projections described in the EFSOS main report. Again, these projections have included a conversion from roundwood production (in cubic metres underbark) to fellings, using the same conversion factor that was used in the historical statistics. Projections are presented for all three EFSOS scenarios.

On the second page for each country, the first two charts show the historical trends in forest resources and projections for two of the EFSOS scenarios (the baseline and integration scenarios). The first chart shows the ratio of fellings to increment (in percent), which has been calculated by dividing the historical and projected increment figures by the figures for fellings. The second chart shows the trends and projections for growing stock per hectare, calculated by dividing the growing stock volume figures by the figures for forest area.

These charts need to be interpreted with some caution. First, in the fellings to increment chart, it should be noted that figures for fellings are based on total roundwood production, which includes woodfuel production. Woodfuel is often produced from tree tops and branches, trees outside forests, harvesting residues and forests outside the area of forest available for wood supply, so the true fellings to increment ratio may be somewhat lower than shown here.

A second point to note is that some of these charts show the fellings to increment ratio rising to more than 100 percent. This is not necessarily an indication of harvesting beyond the maximum sustainable yield in a country, because increment may not be at the level of maximum sustainable yield. This is particularly the case in countries that include a significant proportion of very mature forest stands (where increment is relatively low). In such cases, harvesting and replacement of these stands with younger more vigorous forests could result in an increase in increment, which would bring the fellings to increment ratio back down to less than 100 percent (but, probably, outside the period examined here to 2020).

A third point to note is that some of the historical trends show significant changes that are probably due to differences in the quality and coverage of past national forest inventories rather than true changes in the forest resource. For example, early forest inventory results for Spain show a very low level of growing stock and increment compared to the results of more recent inventories. The charts also show sudden changes in the felling to increment ratio due to the impact of events in one particular year (e.g. the impact of storm damage in Germany in 1990, which led to a sudden increase in harvesting in that year). Again, these events should not be interpreted as unsustainable harvesting by forest owners and managers.

Finally, the differences in definitions between the historical statistics and projections appear quite clearly in some of these charts. For example, the historical statistics for growing stock per hectare in Finland are based on the area of forest and scrub land, while the projections are based on the area of forest available for wood supply. This probably accounts for the significant difference between the historical and projected figures for growing stock per hectare in the year 2000 shown in the chart.

## **PRODUCTION AND CONSUMPTION OF FOREST PRODUCTS**

In the country tables, the historical statistics for the production of forest products have been taken from the FAO FAOSTAT database, which is freely available online at:

<http://faostat.fao.org/faostat/collections?version=ext&hasbulk=0&subset=forestry>. These include statistics for the three major groups of processed forest products (sawnwood, wood based panels and paper and paperboard). They also include statistics for the three main sources of raw materials for the forest industry (roundwood, wood pulp used for paper production and recovered paper). However, it should be noted that figures for roundwood are presented here (rather than industrial roundwood), so these include the production of woodfuel.

All definitions of these product groups and the definitions of the individual products within these groups can be found in the FAO Forest Products Yearbook (2004). The amounts of production of roundwood, sawnwood and wood based panels are measured in cubic metres and the amounts of production of pulp and paper are measured in metric tonnes (MT). In addition, it should be noted that “*wood pulp used for paper production*” is defined as wood pulp excluding dissolving pulp (i.e. mechanical pulp, plus semi-chemical pulp, plus chemical pulp).

The historical statistics for consumption show the “*apparent consumption*” of forest products, which is defined as the amounts of production, plus imports, less exports. Data sources and definitions are the same as those above.

As noted above, historical statistics are not presented for the new countries in Europe established since 1990. In addition, statistics for recovered paper were only available from 1970 onwards for many other countries in Eastern Europe (and, therefore, the average annual changes in production and consumption shown for these countries are for the period 1970 to 2000).

The projections of production and consumption of processed forest products are based on the results of the econometric modelling of forest product supply and demand reported in Kangas and Baudin (2003). These projections are presented for all three EFSOS scenarios. In addition, it should be noted that the figures for the year 2000 in the projections are the averages of the period 1999 to 2001 and are not, therefore, comparable to the figures for 2000 shown in the historical statistics (which present the actual figures for the year 2000). This discrepancy also appears in some of the charts.

The projections of roundwood, wood pulp used for paper production and recovered paper are based on the analysis reported in the EFSOS main report, where the procedures used to make these projections is described in more detail.

The second two charts on the second page for each country show the historical trends and one projection (the baseline scenario) for the following four product groups: sawnwood; wood based panels; paper and paperboard; and wood pulp used for paper production. These charts cover every year over the period 1961 to 2020 (or 1990 to 2020, for the new European countries).

## **WOOD RAW MATERIAL BALANCE**

The wood raw material balance shows the total amount of wood and fibre needed to produce the stated level of forest product production in each country in each year. These figures are presented in wood raw material equivalents (WRME), which have been calculated by multiplying all of the production and consumption figures by conversion factors. These conversion factors represent the amount of wood (in cubic metres underbark) that would be required to produce one cubic metre or one MT of each product. They were taken from the last enquiry on conversion factors implemented by the Timber Section (in the late-1980s), updated with more recent statistics from various reports and analyses (see the EFSOS main report for more details). A complete listing of the conversion

factors used in the EFSOS is given in the document "Conversion Factors Used In The European Forest Sector Outlook Study".

In the country tables, the derived demand for wood raw materials shows the amount of wood and fibre needed to produce each country's stated level of forest product production. This includes the wood required to produce the processed forest products that are sold to final consumers (i.e. sawnwood, wood based panels and paper and paperboard). Because of the different types of wood and fibre that can be used to manufacture these products, the figures shown in the country tables are aggregated into the following slightly different groups: sawnwood, plywood and veneer sheets; reconstituted panels (i.e. particleboard and fibreboard); and paper and paperboard. It also includes the amount of wood required to produce each country's stated level of other industrial roundwood production (where the conversion factor is 1.00).

In addition to the above, the wood raw material balance also has to take into account the production of wood pulp. Where wood pulp is used in the domestic forest processing industry to make paper and paperboard, the wood required to make this wood pulp is already included in the estimation of wood raw materials required to make that paper and paperboard. However, if a country is a net exporter of wood pulp, this is an additional use of wood and fibre that must be included in the wood raw material balance. Therefore, for countries that are net exporters of wood pulp, the wood raw material balance also includes the volume of wood required to make those net exports (converted to WRME).

The figures shown in the country tables are based on the levels of finished product production shown in the rows above the raw material balance. The wood raw material required for net pulp exports is based on the net trade in wood pulp (which is equal to the difference in wood pulp production and consumption in the previous rows). In addition to this, historical statistics on industrial roundwood production were taken from FAOSTAT and simple projections for this production were produced, based on an extrapolation of these trends.

The consumption of wood raw materials shown in the country tables are also based on the statistics shown in the previous rows, converted by the conversion factors shown in document "Conversion Factors Used In The European Forest Sector Outlook Study". In this case, three main sources of wood and fibre supply are identified, namely: industrial roundwood; recovered paper and net pulp imports. The figures for industrial roundwood and recovered paper are the consumption of these products, multiplied by the appropriate conversion factors. Net pulp imports are based on the net trade in wood pulp (i.e. consumption minus production) multiplied by the appropriate conversion factors and are only shown for those countries that are net pulp importers in each year.

By definition, the total consumption of wood raw materials must equal the derived demand for wood raw materials, so the totals in this part of the table are equal to the totals in the previous section of the table. The "other" category is calculated as the total consumption of wood raw materials minus the consumption of the three known supply sources (i.e. industrial roundwood, recovered paper and net pulp imports). This category includes the consumption of wood residues and recovered wood products (which are unknown), plus some small amounts of net trade in wood residues and chips and particles.

The final two charts shown for each country present this information for each year. The first chart presents the derived demand as a stacked bar chart, which shows the demand for wood and fibre in each product category. In many countries, this shows considerable growth in demand for lower quality of wood and fibre (i.e. for reconstituted panels and paper and paperboard) compared with growth in demand for the high quality wood required to make sawnwood, plywood and veneer sheets.

The second chart shows the total consumption of wood raw materials as a line (which is equal to the top of each bar in the previous chart). Underneath this, the chart shows the raw material consumption from the three known supply sources (i.e. industrial roundwood, recovered paper and net pulp imports). The difference between the tops of these bars and the line is the amount of “*other*” wood and fibre that would be required to satisfy the requirement that total derived demand and total consumption must, by definition, be equal. As these charts show, there are some countries where the line is actually lower than the tops of the bars and there are others where they are very wide apart. This suggests that there may be some statistical issues that should be examined in any future analysis of the European forestry sector.

## **REFERENCES**

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