CHAPTER III: WOOD SUPPLY AND CARBON SEQUESTRATION: SITUATION AND CHANGES

B) CARBON CYCLE AND BIOMASS[1]

Introduction

– ***Information in TBFRA-2000***

As a contribution to the improvement of knowledge about the role of woody biomass in the carbon cycle, it was decided to devote a special section of the TBFRA-2000 to the collection and analysis of relevant information. *Enquiry Tables 14* (Total woody biomass and the volume of growing stock), *15* (Increment) and *16* (Fellings and removals) called for statistics which would, in addition to other purposes, form the basis of calculations of the importance of woody biomass in carbon stores and balances. Countries' replies to these tables are contained in Main Tables 33 to 52 of this report. The statistics in these tables are not quoted directly in this section but are used in converted form, employing conversion factors as described below.

– ***Global carbon cycle***

The increasing concentration of carbon dioxide in the atmosphere has increased interest in the research on cycling of carbon at the global level. The atmospheric CO_2 concentration has increased 30 per cent from the preindustrial level of about 280 parts per million (ppm) to the present concentration of nearly 370 ppm. During recent years the concentration has been increasing by some 1.5 ppm per year. The increase in the concentration of CO_2 in the atmosphere is predicted to reinforce the greenhouse effect of the atmosphere and consequently lead to worldwide changes in climate. This increase is caused by human activities, mainly by the combustion of fossil fuels and deforestation. Insight into the cycling of carbon is needed in order to predict the development of the concentration of CO_2 in the atmosphere and the potential climatic changes, and to combat the increase in the atmospheric CO_2 concentration by removing CO_2 from the atmosphere and binding it in other stores.

Terrestrial ecosystems play an important role in the global carbon cycle (Figure 3B.1). Terrestrial vegetation contains an amount of carbon that is comparable with the amount of carbon in the whole of the atmosphere and equal to about 40 per cent of the amount of carbon in the surface layers of oceans. The carbon store in soils is more than twice as large. The carbon store in the deep layers of oceans is an order of magnitude larger but it is in contact with the atmosphere and the other carbon stores only through the surface layers. The carbon in the terrestrial ecosystems originates from the atmosphere. Plants take up atmospheric carbon dioxide in their photosynthesis and bind it in their structures. This carbon is released back to the atmosphere with plant respiration and microbial decomposition of detritus, and in fires. These fluxes of carbon between the terrestrial ecosystems and the atmosphere are very large. Annually they are equivalent to about 8 per cent of the amount of carbon in the atmosphere, and exceed the flux released in the combustion of fossil fuels by more than tenfold. Forests have the potential to contribute significantly to the carbon cycling in the terrestrial ecosystems. They contain about 60 per cent of the vegetation carbon and about 50 per cent of the soil carbon worldwide.

– ***Forest statistics in studying carbon cycling in forests***

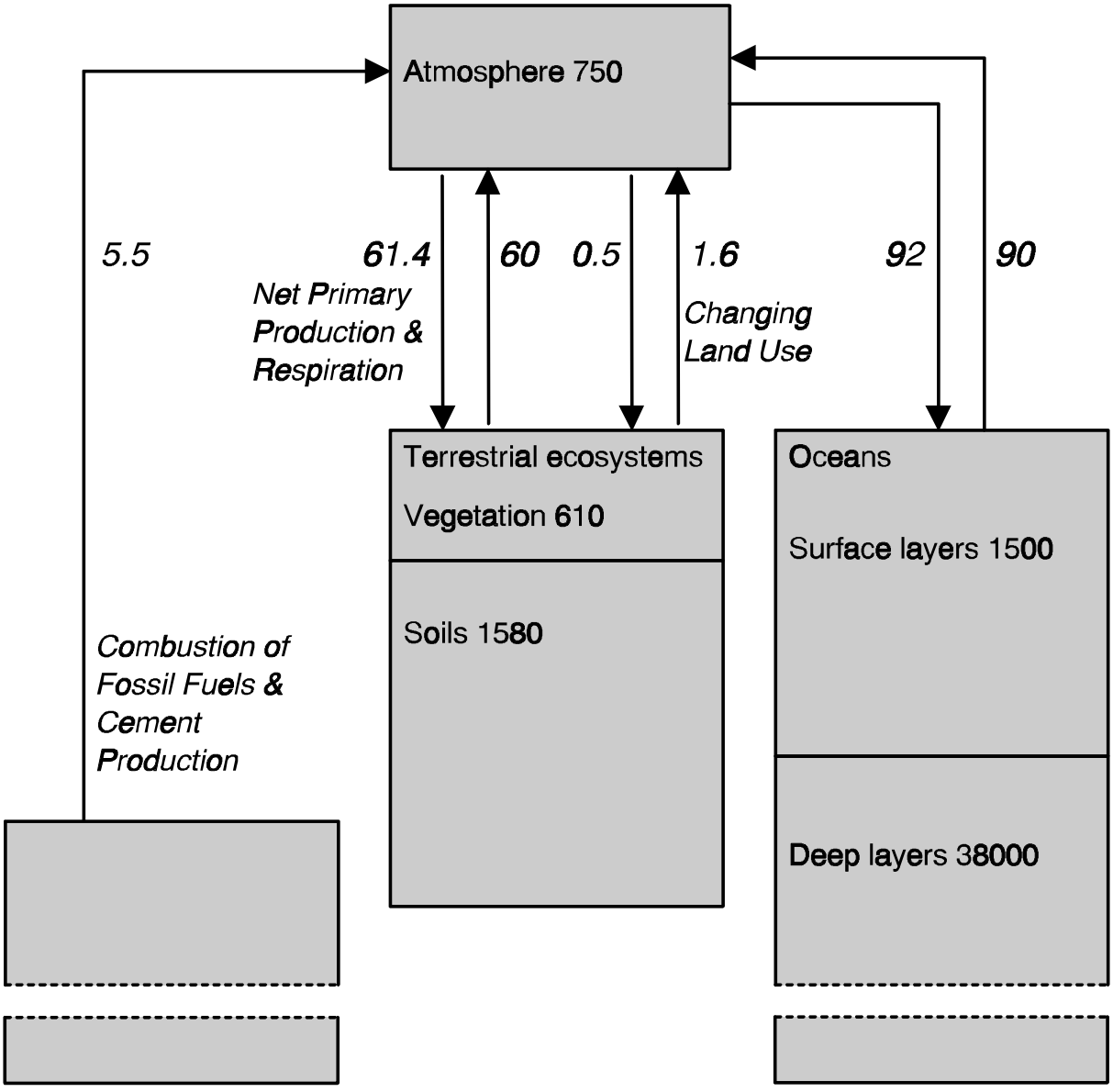
Studies of carbon cycling in a system usually involve quantifying the carbon stores of the system and their carbon balance. The carbon store means the amount of carbon in a component of the system. The carbon balance means the rate of change of a carbon store. The carbon balance can be calculated in two ways: as the difference between the fluxes of carbon into and out of a carbon store during the period in question; and as the difference in carbon stores at two points of time. If the carbon flux into a store exceeds the flux out from the store, the carbon store increases and the carbon balance of the store is positive. In the opposite case the carbon store decreases and the carbon balance of the

[1] This part of the chapter was prepared by Mr. Jari Liski and Mr. Pekka Kauppi (see Appendix V).

store is negative. Forested areas act as a carbon sink when the carbon balance is positive and as a carbon source when the balance is negative. In general, increasing biomass implies a net flux of carbon from the atmosphere to the forest and thereby a sink of atmospheric carbon. Decreasing biomass, in contrast, implies a net flux from the forest to the atmosphere and thereby a source of carbon to the atmosphere.

FIGURE 3B.1

The global carbon cycle showing the carbon stores (in Pg C, Pg = 10^{15}g) and the carbon fluxes (in Pg C/year)[2]. The sizes of the boxes demonstrate the relative sizes of the stores, except those of the deep layers of oceans and the fossil fuels and cement raw material.



Forest statistics provide a useful means to quantify the carbon stores and the carbon balances of the tree component of forest ecosystems. Some conversion of the figures in the statistics is, however, needed since the basic measure of forest statistics is the volume of stemwood of trees. To quantify the carbon store and the carbon balance of all tree biomass, stemwood volumes need first to be converted to the biomass of all tree parts and then to the carbon in this biomass. Most recent statistics also report some data on all woody biomass of trees including branches, stumps and roots in addition to stems. These data need only to be converted to carbon.

Converting stemwood volumes to biomass and carbon is one of the most critical steps in using forest statistics to quantify carbon cycling in trees. Despite this, the use of forest statistics data in studying carbon cycling in forests has

[2] Simplified from D. S. Schimel, 1995. "Terrestrial ecosystems and the carbon cycle", Global Change Biology 1: pp. 77-91.

advantages compared with other approaches, such as studies including measurements at a rather small number of sites and studies using remote sensing. Forest statistics have an extensive and comprehensive spatial and temporal coverage, and it is possible to deal with the impacts of forestry actions such as harvesting and the impacts of catastrophic landscape-scale natural events such as forest fires.

Calculating carbon cycling in forests from TBFRA-2000 data

– ***Carbon store of woody biomass***

For TBFRA-2000, countries were requested to report the dry mass of the woody parts, i.e. wood, bark, branches, twigs, stumps and roots, of all trees alive and dead as well as the dry mass of all shrubs and bushes on their forest and other wooded land. To obtain the carbon store of this woody biomass, it was assumed that 50 per cent of it was carbon and consequently the reported values were multiplied by 0.5. This conversion was considered appropriate, since the carbon concentration of biomass varies only slightly between different trees and tree parts and such conversion of biomass to carbon is common practice in carbon studies. The carbon store of above stump biomass on forest was analyzed separately from that of all biomass on forest and other wooded land so as to be able to compare the present results with the results of TBFRA-1990 where the former data were reported. However, the different definitions of forest in these two successive assessments (see Chapter I) made this comparison difficult.

Complete biomass data were available for 45 countries but missing for 10 countries. The missing biomass figures were calculated from the volume of growing stock with the help of special conversion factors also calculated from the TBFRA-2000 data. For the above stump biomass, these conversion factors were calculated separately for conifers, c_as_conif, and broadleaved trees, c_as_brleaves, on forest. For the biomass of stump and roots, c_sr, they were calculated jointly for all tree species on forest and other wooded land:

c_as_conif = above stump biomass of conifers on forest / growing stock of conifers on forest,

c_as_brleaves = above stump biomass of broad leaves on forest / growing stock of broad leaves on forest, and

c_sr = the biomass of stump and roots of all trees on forest and other wooded land / growing stock of all trees on forest and other wooded land.

The conversion factors for the above stump biomass were calculated using data on forest because on forest the data on biomass and growing stock were given by the species groups. The conversion factors for the biomass of stump and roots were calculated using data on forest and other wooded land and jointly for all trees because only such data on stump and root biomass were available in TBFRA-2000. The conversion factors were calculated for each country, except for the countries for which the needed information was missing and for those where it was incorrect and consequently resulted in conversion factors which were clearly wrong. In compiling this report, c_as values lower than 0.4 and a c_sr value as low as 0.02 were not accepted. The arithmetic means of the conversion factors of all the other countries were used for these countries. These exceptions are explained in Annex 3B.1. The missing biomass figures were calculated from the volume of growing stock by multiplying them by the conversion factors.

The conversion factors for the above stump biomass of conifers averaged 0.52 m.t./m^3, for the above stump biomass of broadleaved trees 0.66 m.t./m^3 and for the biomass of stump and roots 0.12 m.t./m^3. These values mean that for each m^3 of stem wood of conifers there was 0.52 m.t. above stump biomass, for each m^3 of stem wood of broadleaved trees there was 0.66 m.t. above stump biomass, and for each m^3 of stem wood of all trees there was 0.12 m.t. stump and root biomass.

– ***Carbon balance of woody biomass***

The carbon balance of woody biomass, i.e. the rate of change in the carbon store of woody biomass, was calculated as

net annual increment - annual fellings + annual fellings of natural losses,

after converting these figures, initially given as the volume of stem wood, to biomass and carbon. Net annual increment was used as the increment measure instead of the difference between gross annual increment and natural losses, because it was available for most countries, namely for all but three (see Annex 3B.3). Annual fellings of natural losses must be added in the difference between net annual increment and annual fellings, since they are included in annual fellings and have been subtracted from net annual increment. If they had not been added, they would have been subtracted from the balance twice. Net annual increment and annual fellings were not always reported in the countries for the same period (see Annex 3B.3). Consequently, the balance does not refer to any single year in TBFRA-2000 region but there are differences of a few years in the reference periods between the countries. The arithmetic mean of the reference years of net annual increment was 1994 and that of annual fellings 1995.

In the calculations of the carbon balance, net annual increment, annual fellings and annual fellings of natural losses given as the volume of stemwood were converted to woody biomass by multiplying them by the conversion factors (Annex 3B.1). The biomass was converted to carbon by multiplying by 0.5. On forest, this conversion was easily done both for conifers and broadleaved trees. On other wooded land, net annual increment and annual fellings were not given separately for the species groups. It was assumed that the share of conifers was the same on other wooded land as on forest. This simple assumption was considered appropriate in these calculations although the share of broadleaved trees was actually somewhat higher on other wooded land than on forest (Chapter I).

– ***Assumptions***

As described above, a few assumptions were needed to calculate the carbon store and the carbon balance of woody biomass from the TBFRA-2000 data for this analysis. Biomass was assumed to have a fixed carbon concentration equal to 50 per cent of dry mass. The conversion factors of above stump biomass calculated for forest were also applied on other wooded land. The share of conifers and broadleaved trees of net annual increment and annual fellings was assumed similar on other wooded land as on forest. In addition, various assumptions were needed to complete the calculations of countries for which the information was incomplete (see Annexes 3B.1, 3B.2 and 3B.3).

As a matter of fact, none of the figures in this chapter, despite the areas of forest and other wooded land, are taken directly from the original country enquiries. Instead they are the results of the calculations done using the original figures and utilizing the above assumptions (see Annex 3B.4 for an example). Such calculations were done so as to be able to cover the whole TBFRA-2000 region in the analysis.

Results

– ***Carbon store of woody biomass***

The carbon store of woody biomass on the forest and other wooded land in the TBFRA region at the time of the inventory is estimated at 88 Pg (Pg = 10^{15} g) (Table 3B.1). As much as 47 per cent of this total store was found in CIS countries, 35 per cent in North America, 10 per cent in Europe and 9 per cent in the other TBFRA countries (Table 3B.1, Figure 3B.2). Considering individual countries, the largest store was in the Russian Federation, 40 Pg or 45 per cent of the total store in the TBFRA region, the second largest in the USA, 19 Pg or 21 per cent of the total store, and the third largest in Canada, 12 Pg or 14 per cent of the total store (Annex 3B.2). The store in these three countries represented 80 per cent of the total store in the TBFRA region.

The woody biomass above stump on forest and other wooded land contained 72 Pg of carbon which was 82 per cent of the total store (Table 3B.1). Between the regions, this proportion varied from 77 per cent in CIS countries to 87 per cent in North America.

On forest, excluding other wooded land, the carbon store of the woody biomass above stump was 59 Pg (Table 3B.1). This is 18 per cent less than the carbon store above stump on forest and other wooded land. The area of forest was 32 per cent smaller than the area of forest and other wooded land.

Per unit land area, the carbon store of woody biomass on the forest and other wooded land averaged 35 m.t./ha (Table 3B.1). It was fairly similar in Europe, CIS countries and North America varying only from 39 to 44 m.t./ha between these regions (Table 3B.1, Figure 3.B.2). In the “Other TBFRA” countries, it was much smaller, 13 m.t./ha,

TABLE 3B.1

The carbon store of woody biomass in the TBFRA-2000 region

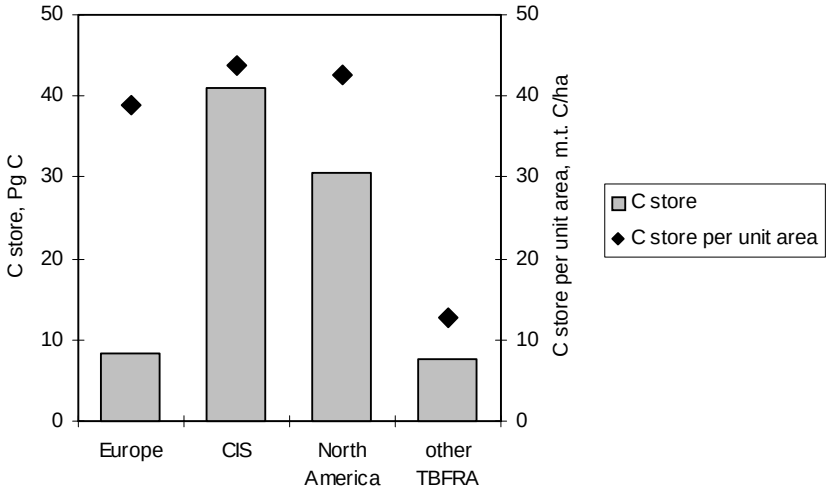
	Forest and other wooded land						Forest		
	Woody biomass	Woody biomass	Woody biomass	Above stump biomass	Stump and root biomass	Above stump biomass	Above stump biomass	Above stump biomass	Above stump biomass
	(Pg C)	(per cent of total in TBFRA region)	(m.t. C/ha)	(Pg C)	(Pg C)	(per cent of all woody biomass)	(Pg C)	(per cent of total in TBFRA region)	(m.t. C/ha)
Europe	8.4	10	39	7.0	1.3	84	6.8	12	39
of which: EU 15	5.0	6	37	4.2	0.78	84	4.1	7	36
CIS	41	47	44	32	9.5	77	24	40	28
North America	31	35	43	27	3.9	87	22	37	47
Other TBFRA	7.7	9	13	6.4	1.3	83	6.4	11	34
Total	88	100	35	72	16	82	59	100	35

which is about one third of the value in the other regions. Considering individual countries, the carbon store per unit area was highest, more than 100 m.t./ha, in four European countries, in Austria, Malta, Slovenia and Switzerland (Annex 3B.2). In the three countries containing the largest total store, the carbon store per unit area was largest in the USA, 63 m.t./ha In Russia it was 45 m.t./ha and in Canada 29 m.t./ha.

FIGURE 3B.2

The carbon store of woody biomass on forest and other wooded land in the TBFRA-2000 region

The columns show the store in Pg carbon (left axis). The dots show the store per area of forest and other wooded land in m.t. carbon/ha (right axis).



– ***Carbon balance of woody biomass***

In all 52 TBFRA countries for which data were available, net annual increment was larger than annual fellings and, consequently, the carbon store of woody biomass on the forest and other wooded land increased; the data were missing for Malta, Kyrgyzstan and Uzbekistan (Annex 3B.3). In the whole TBFRA region it increased by 0.88 Pg/year (Table 3B.2). Forests in CIS countries represented 51 per cent, North America 30 per cent, Europe 13 per cent and other TBFRA countries 7 per cent of this increase (Table 3B.2, Figure 3B.3). In individual countries, the increase rate of the carbon store was largest in the Russian Federation, 0.43 Pg/year, second largest in the USA, 0.17 Pg/year, third largest in Canada, 0.09 Pg/year, and fourth largest in Australia 0.04 Pg/year (Annex 3B.3). These four countries represented 83 per cent of the total increase, of which the Russian Federation 49 per cent, the USA 19 per cent, Canada 11 per cent, and Australia 5 per cent.

TABLE 3B.2

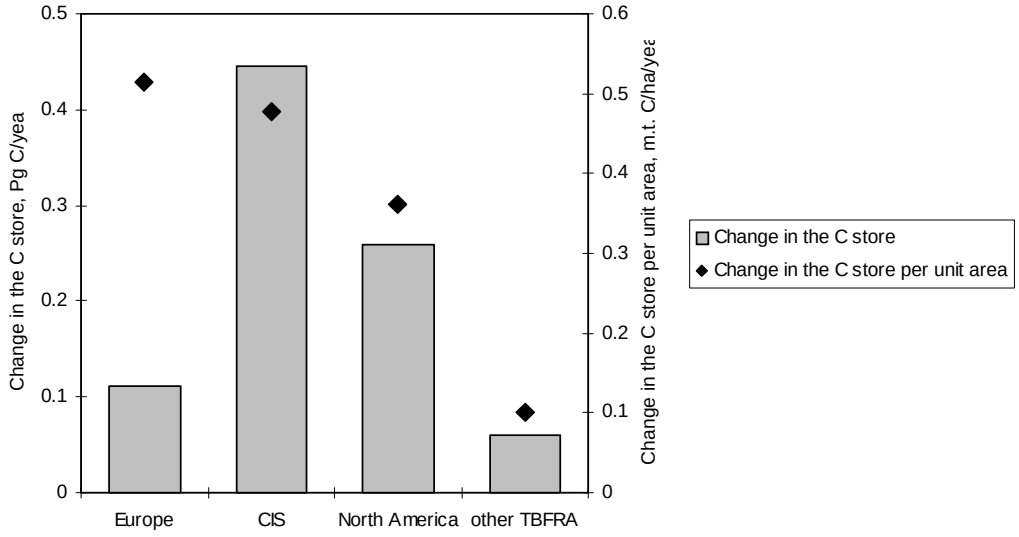
The carbon balance of woody biomass on forest and other wooded land in the TBFRA-2000 region

	Rate of increase in the carbon store of woody biomass	Rate of increase in the carbon store of woody biomass	Rate of increase in the carbon store of woody biomass	Rate of increase in the carbon store of woody biomass
	(Pg C/year)	(per cent of the total in TBFRA region)	(per cent of the present store/year)	(m.t. C/ha)
Europe	0.11	13	1.3	0.52
of which: EU 15	0.063	7	1.3	0.46
CIS	0.45	51	1.1	0.48
North America	0.26	30	0.85	0.36
Other TBFRA	0.061	7	0.79	0.10
Total	0.88	100	1.0	0.35

Figure 3B.3

The carbon balance of woody biomass on forest and other wooded land in the TBFRA-2000 region

The columns show the rate of increase in the carbon store of woody biomass in Pg carbon/year (left axis). The dots show the rate of increase per area of forest and other wooded land in m.t. carbon/ha/year (right axis).



The annual increase in the carbon store of the woody biomass on forest and other wooded land, 0.88 Pg/year, was 1.0 per cent of the present carbon store of 88 Pg (Table 3B.2). This annual increase percentage varied between the regions from 0.79 per cent in the 'other TBFRA' countries to 1.3 per cent in Europe. Among individual countries, the annual increase percentage was highest in European countries, 5.6 per cent/year in Iceland, 4.8 per cent/year in Israel, 4.0 per cent/year in Ireland and 2.4 per cent/year in Spain and Yugoslavia (Annex 3B.3). In the four countries where the increase rate was largest in absolute terms, the increase percentage was highest in the Russian Federation with 1.1 per cent/year. In the USA it was 0.89 per cent/year, in Australia 0.79 per cent/year and in Canada 0.78 per cent/year.

The rate of increase in the carbon store per unit area on forest and other wooded land averaged 0.35 m.t. carbon/ha/year (Table 3B.2). It varied between the regions from 0.10 m.t. carbon/ha/year in the "other TBFRA" countries to 0.52 m.t. carbon/ha/year in Europe (Table 3B.2, Figure 3B.3). The increase rate was larger than 1 m.t. carbon/ha/year in seven European countries, in Austria, Germany, Hungary, the Netherlands, Romania, Slovakia and Slovenia (Annex 3B.3).

Discussion

– *Carbon store of woody biomass*

The above stump biomass on forest was also analyzed in TBFRA-1990. Assuming 50 per cent carbon concentration in the biomass, the carbon store of this biomass totalled 56 Pg (Table 3B.3). The corresponding store in the present analysis was 5 per cent larger, 59 Pg. Apart from a possible increase in the store per unit area, this difference is caused by there being 17 per cent larger area of forest in the present assessment. One reason for the larger area is the difference in the definitions of forest in these assessments (see Chapter I). Earlier, forest was defined as an area with 20 per cent or more crown cover. Now the threshold of crown cover is only 10 per cent. Even though this difference makes it difficult to compare the carbon stores in these successive assessments accurately, it can be concluded that the estimates of the carbon store of the woody biomass above stump are of comparable order of magnitude.

Carbon stores in temperate and boreal forests have also been estimated before by analyzing and integrating several individual regional and national studies. Dixon et al.[3] included all above and below ground tree biomass and the biomass of non-tree vegetation in their estimate. For Europe, Canada and the USA their results are quite comparable with the present analysis, despite the differences in the analyzed areas (Table 3B.3). For Australia, however, their estimate is more than three times as large as that of the present analysis. The difference in the analyzed areas does not explain this difference in the stores since the area for which their estimate applies is even smaller than the area covered

[3] R. K. Dixon, S. Brown, R. A. Houghton, A. M. Solomon, M. C. Trexler and J. Wisniewski, 1994. "Carbon pools and flux of global forest ecosystems", Science 263: pp. 185-190.

TABLE 3B.3

The comparison of the TBFRA-2000 results on area, the carbon store of woody biomass and the carbon store per unit area with the results of TBFRA-1990 and the results of a study reviewing individual regional and national studies[4]

	Area (million ha)				Carbon store (Pg C)				Carbon store per unit area (m.t. C/ha)			
	TBFRA-2000		TBFRA-1990	Dixon et al.	TBFRA-2000		TBFRA-1990	Dixon et al.	TBFRA-2000		TBFRA-1990	Dixon et al.
	Forest and other wooded land	Forest	Forest		Woody biomass on forest and other wooded land	Above stump woody biomass on forest	Above stump woody biomass on forest		Woody biomass on forest and other wooded land	Above stump woody biomass on forest	Above stump woody biomass on forest	
Europe	215	176	149	283	8.4	6.8	5.9	9	39	32	40	32
of which: EU 15	136	113			5.0	4.1			37	30		
CIS	934	856	755	884[1]	41	24	26	74[1]	44	26	34	83[1]
North America	716	462	457	729	31	22	23	29	43	31	49	40
of which: Canada	418	245	247	436	12	11	13	12	29	24	52	28
of which: USA	298	217	210	293	19	12	9.7	17	63	39	46	58
Other TBFRA	613	189	71		7.7	6.4	2.1		13	11	29	
of which: Australia	578	157	40	396	5.4	4.5	1.2	18	9.3	7.8	30	45
Total	2478	1682	1432	2292	88	59	56	130	35	24	39	57

[1] Refers to the Russian Federation, which covers 95 per cent of the forest area in CIS countries according to TBFRA-2000.

in the present analysis. Consequently, their estimate for the carbon store per unit area in Australia is nearly five times as large as that in the present analysis. For the carbon store in the Russian Federation their estimate is also different. It is about 1.8 times as large as the store in the CIS countries in aggregate in the present analysis. The difference in the analyzed areas does not explain this difference either, since their area is again slightly smaller than the area in the present analysis. Their estimate for the carbon store in the forest vegetation per unit area in the Russian Federation, 83 m.t./ha, remains 1.9 times as high as in the present analysis, in which it was 44 m.t./ha. Dixon et al.[4] explained the high carbon store per unit area in the Russian Federation compared with the other regions by the large amount of dead standing trees in Russian forests. This difference in the results for the Russian Federation is very important considering the carbon store of woody biomass in the temperate and boreal forests as a whole since, even according to the present analysis, the forests in the CIS countries contained as much as 47 per cent of the carbon store in the forests of the TBFRA region (Table 3B.1).

In conclusion, bearing in mind the differences in the analyzed areas and what was included in the carbon stores, the present results of the carbon store of the woody biomass in temperate and boreal forests are comparable with the results by Dixon et al. for Europe and North America but considerably smaller for Australia and the CIS countries.

The size of the carbon store of the woody biomass on the forest and other wooded land in TBFRA-2000 region, 88 Pg, can be illustrated by comparing it with some other carbon stores (Figure 3B.4). It is 14 per cent of the carbon store of global vegetation and 6 per cent compared with the store in soils worldwide. It is equivalent to 12 per cent of the amount of carbon in the atmosphere at present. The soils of temperate and boreal forests have been estimated to contain more than two times as much carbon, 182 Pg, as the woody biomass in the present analysis. The estimates for these soils, however, vary considerably, with values as high as 555 Pg depending particularly on how peatlands are dealt with.

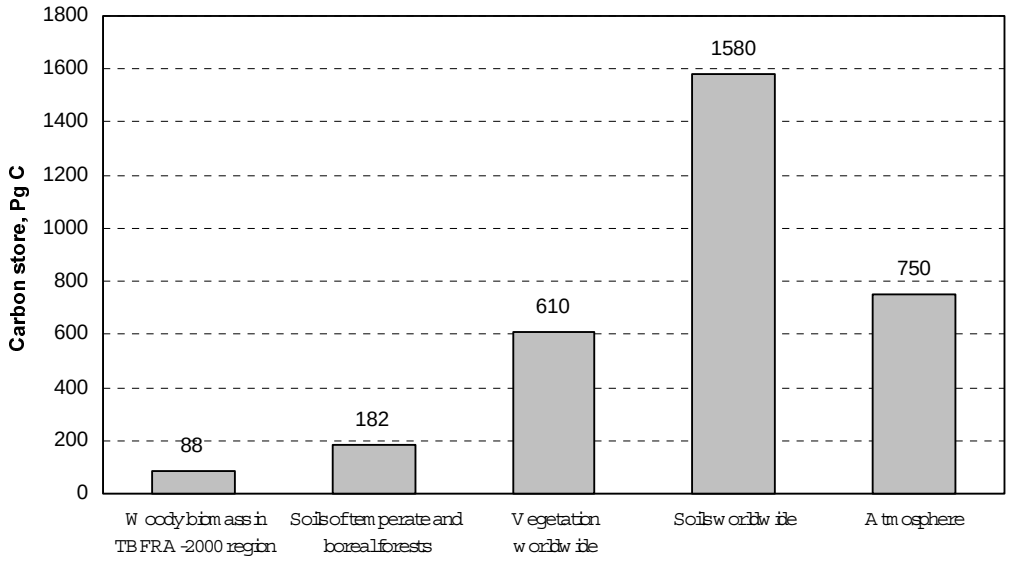
– ***Carbon balance of woody biomass***

The carbon store of the woody biomass on the forest and other wooded land in TBFRA-2000 region was calculated to increase by 0.88 Pg/year in the present analysis. This includes the biomass of woody vegetation only. Dixon et al. included also other vegetation, soils, litter and wood products in their analysis of the carbon balance of the mid and high latitude forests between 25 and 75 degree latitudes. Their mean estimate for the rate of increase was 0.74 Pg/year with a range of uncertainty from 0.57 to 0.95 Pg/year. The rate of increase in the present analysis is 19 per cent larger

[4] R. K. Dixon, S. Brown, R. A. Houghton, A. M. Solomon, M. C. Trexler and J. Wisniewski, 1994. "Carbon pools and flux of global forest ecosystems", Science 263: pp. 185-190.

FIGURE 3B.4

The carbon store of woody biomass in the TBFRA-2000 region compared with some other carbon stores[5]



than their mean estimate. In the individual regions and countries, the increase rates of the carbon store of the present analysis generally fit within the ranges Dixon et al. gave for their estimates (Table 3B.4). The larger overall mean estimate in the present analysis was a result of the estimates generally being closer to the upper than the lower limit of their range.

TABLE 3B.4

The comparison of the TBFRA-2000 results on the carbon balance of woody biomass with the results of a study reviewing individual regional and national studies[6]

	Rate of increase in the carbon store	
	TBFRA-2000	Dixon et al.
	(Pg C/year)	(Pg C/year)
Europe	0.11	0.09 to 0.12
Russia	0.43	0.30 to 0.50
North America	0.26	0.18 to 0.33
of which: Canada	0.09	0.08
of which: USA	0.17	0.10 to 0.25
Australia	0.04	trace
Total	0.84[1]	0.57 to 0.95

[1] The rate of increase does not total 0.88 Pg C/year, because Japan, New Zealand and CIS countries other than the Russian Federation are excluded from this comparison.

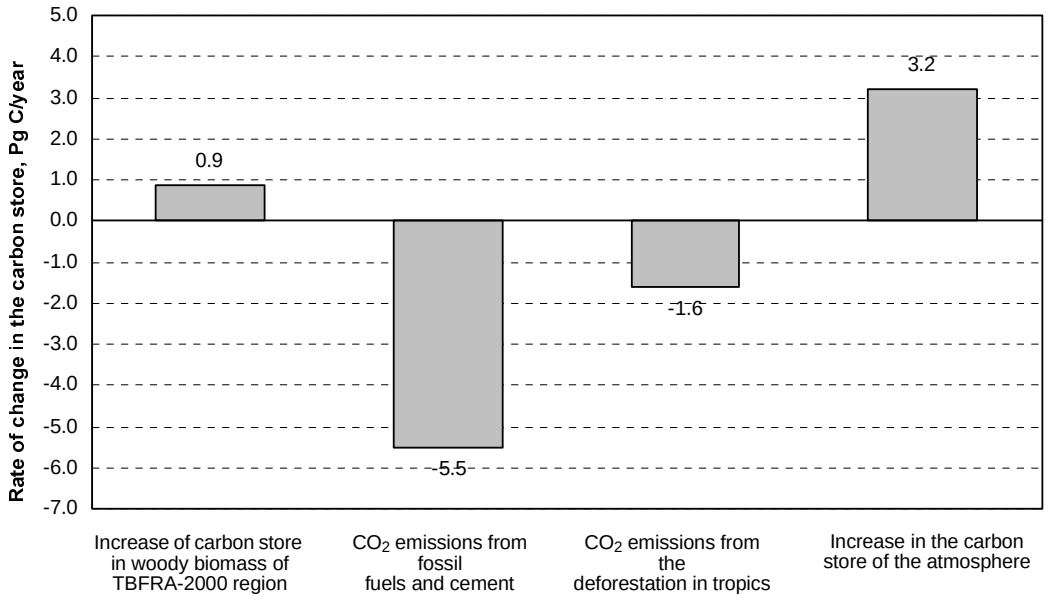
The importance of the increase in the carbon store of woody biomass in the TBFRA-2000 region can be illustrated by comparing the increase rate with changes in some other carbon stores and carbon fluxes (Figure 3B.5). The rate of total increase, 0.88 Pg/year, is about 16 per cent compared with the global anthropogenic CO_2 emissions originating from the combustion of fossil fuels and cement production, 55 per cent compared with the CO_2 emissions result-

[5] W. M. Post, W. R. Emanuel, P. J. Zinke and A. G. Stangenberger, 1982. "Soil carbon pools and world life zones", Nature 334: pp. 55-58. D. S. Schimel, 1995. "Terrestrial ecosystems and the carbon cycle", Global Change Biology 1: pp. 77-91.

[6] R. K. Dixon, S. Brown, R. A. Houghton, A. M. Solomon, M. C. Trexler and J. Wisniewski, 1994. "Carbon pools and flux of global forest ecosystems", Science 263: pp. 185-190.

FIGURE 3B.5

The rate of increase in the carbon store of woody biomass in the TBFRA-2000 region compared with CO_2 emissions worldwide and the rate of increase in the carbon store of the atmosphere[7]



ing from deforestation in the tropics and 28 per cent compared with the present rate of increase in the amount of CO_2 in the atmosphere. In other words, without this increase in the carbon store of the woody biomass of the temperate and boreal forests the amount and concentration of CO_2 in the atmosphere would be increasing 28 per cent more than they are.

The comparison between the rate of increase in the carbon store of the woody biomass and the anthropogenic CO_2 emissions can also be done specifically for the TBFRA-2000 region. CO_2 emissions from this region were about 4.0 Pg carbon/year (Table 3B.5). The increase in the carbon store of the woody biomass was the equivalent of 22 per cent of these emissions. This percentage varied by the analyzed region from 7 per cent in the EU countries and 10 per cent in the whole of Europe to a percentage as high as 48 per cent in the CIS countries.

TABLE 3B.5

The comparison of the carbon balance of woody biomass with anthropogenic CO_2 emissions in the TBFRA-2000 region[8]

	Anthropogenic CO_2 emissions	Increase in the carbon store of woody biomass	Increase in the carbon store of woody biomass
	(Pg C/year)	(Pg C/year)	(per cent of the CO_2 emissions)
Europe	1.09 [1]	0.11	10
Of which: EU	0.88	0.063	7
CIS	0.92	0.45	48
North America	1.55	0.26	17
Other TBFRA	0.42	0.061	15
Total	3.98	0.88	22

[1] 28 countries, 10 missing.

[7] D. S. Schimel, 1995. "Terrestrial ecosystems and the carbon cycle", Global Change Biology 1: pp. 77-91.

[8] United Nations Framework Convention on Climate Change, 1997. "Tables of inventories of anthropogenic emissions and removals for 1990-1995 and projections up to 2020", FCCC/SBI/1997/19/Add.1.

Intergovernmental Panel on Climate Change, 1995. "Climate Change 1995: Impacts, Adaptations, and Mitigation, Summary for Policymakers", Contribution of Working Group II to the Second Assessment Report.

In calculating these results of the carbon balance of woody biomass in TBFRA-2000 region, the original values of stemwood volume in the data needed to be converted to biomass and carbon. Particularly the conversion to biomass is considered as a serious source of uncertainty. To approximate this uncertainty, we recalculated the carbon balance using the arithmetic means of the conversion factors for all countries instead of the country-specific factors. The recalculated rate of increase in the carbon store was 11 per cent slower, 0.78 Pg/year, than the rate calculated using the country-specific factors, 0.88 Pg/year.

Summary

The carbon budget of woody biomass in the TBFRA-2000 region is summarized in Figure 3B.6 which shows that:

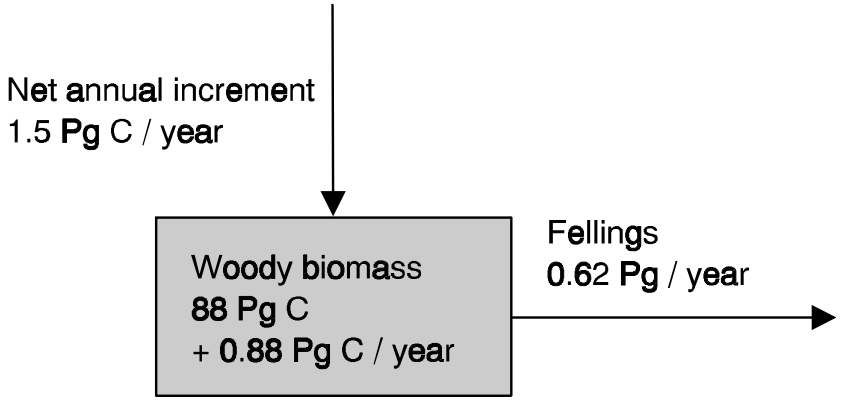
– The carbon store of woody biomass in the TBFRA-2000 region totalled 88 Pg. This is 14 per cent of the estimated amount of carbon stored in vegetation worldwide;

– The annual increment of trees exceeded fellings and natural losses. Consequently, the carbon store of woody biomass increased in all of the countries analyzed. In the whole of the TBFRA-2000 region the rate of this increase was 0.88 Pg per year. The carbon sink of these forests is the equivalent of 16 per cent of the global CO_2 emissions from the combustion of fossil fuels and cement production.

FIGURE 3B.6

The carbon budget of woody biomass in the TBFRA-2000 region.

The box illustrates the carbon store of woody biomass and the arrows the carbon fluxes into and out of the store. Fellings represent the difference between annual fellings (0.64 Pg carbon) and annual fellings of natural losses (0.025 Pg carbon).



ANNEX 3B.1

Conversion factors

Country	Above stump woody biomass (c_as) of conifers	Above stump woody biomass (c_as) of br leaves	Stump and root biomass (c_sr) of all tree species	Notes
	(m.t. biomass/ m^3 stem wood)	(m.t. biomass/m^3 stem wood)	(m.t. biomass/ m^3 stem wood)	
Albania	0.60	0.75	0.11	
Austria	0.85	1.01	0.17	
Belgium	0.39	0.52	0.09	
Bosnia and Herzegovina	0.52	0.66	0.12	means of other values
Bulgaria	0.45	0.67	0.12	
Croatia	0.40	0.55	0.10	
Cyprus	0.50	0.50	0.12	c_sr mean of other values
Czech Republic	0.45	0.64	0.12	
Denmark	0.40	0.55	0.17	
Estonia	0.51	0.60	0.08	
Finland	0.53	0.64	0.10	
France	0.40	0.53	0.07	
Germany	0.50	0.50	0.14	
Greece	0.46	0.68	0.11	
Hungary	0.50	0.67	0.13	
Iceland	0.54	0.65	0.13	
Ireland	0.52	0.66	0.07	c_as mean of other values, 0.33 and 0.33 reported
Israel	0.52	0.66	0.12	means of other values
Italy	0.42	0.56	0.12	c_sr mean of other values, 0.02 reported
Latvia	0.48	0.62	0.12	
Liechtenstein	0.40	0.67	0.11	
Lithuania	0.48	0.63	0.09	
Luxembourg	0.52	0.66	0.12	means of other values
Malta	0.52	0.66	0.19	c_as mean of other values
Netherlands	0.61	0.74	0.23	
Norway	0.51	0.69	0.09	
Poland	0.41	0.58	0.07	
Portugal	0.52	0.55	0.24	c_as of conifers mean of other values, 0.27 reported
Romania	0.47	0.65	0.12	c_sr mean of other values
Slovakia	0.46	0.65	0.08	
Slovenia	0.51	0.74	0.09	
Spain	0.51	0.61	0.08	
Sweden	0.58	0.67	0.11	
Switzerland	0.41	0.68	0.17	
The FYR of Macedonia	0.52	0.66	0.12	means of other values
Turkey	0.50	0.64	0.09	
United Kingdom	0.43	0.83	0.12	
Yugoslavia	0.52	0.66	0.12	means of other values, 0.05 and 0.24 reported for c_as
Mean of Europe	0.50	0.65	0.12	
Mean of EU 15	0.51	0.65	0.13	
Armenia	0.52	0.51	0.09	
Azerbaijan	0.75	0.77	0.14	
Belarus	0.49	0.62	0.11	
Georgia	0.60	0.70	0.10	

ANNEX 3B.1 *(continued)*

Country	Above stump woody biomass (c_as) of conifers (m.t. biomass/ m^3 stem wood)	Above stump woody biomass (c_as) of br leaves (m.t. biomass/m^3 stem wood)	Stump and root biomass (c_sr) of all tree species (m.t. biomass/ m^3 stem wood)	Notes
Kazakhstan	0.47	0.55	0.08	
Kyrgyzstan	0.52	0.66	0.12	means of other values
Republic of Moldova	0.50	0.50	0.08	
Russian Federation	0.54	0.51	0.21	
Tajikistan	0.54	0.89	0.14	
Turkmenistan	0.60	0.70	0.15	
Ukraine	0.52	0.66	0.12	means of other values
Uzbekistan	0.52	0.66	0.12	means of other values
Mean of CIS	0.55	0.64	0.12	
Canada	0.68	0.71	0.12	
United States of America	0.68	0.93	0.10	
Mean of North America	0.68	0.82	0.11	
Australia	0.60	1.05	0.21	
Japan	0.52	0.78	0.12	
New Zealand	0.66	0.68	0.17	
Mean of Other TBFRA	0.69	0.78	0.16	
Grand mean	0.52	0.66	0.12	

ANNEX 3B.2

The carbon store of woody biomass (Tg = 10^{12} g)

Country	Forest and other wooded land							Forest		
	Ref. period for biomass	Woody biomass	Above stump biomass	Stump and root biomass	Ref. period for area	Area	Woody biomass	Above stump biomass	Area	Above stump biomass
		(Tg C)	(Tg C)	(Tg C)		(1000 ha)	(m.t. C/ha)	(Tg C)	(1000 ha)	(m.t. C/ha)
Albania	1995	34.37	29.88	4.49	1995	1030	33.4	29.88	1030	29.0
Austria	1992-96	580.36	483.63	96.73	1992-96	3924	147.9	479.05	3840	124.8
Belgium	1997	39.17	32.76	6.41	1997	672	58.3	32.76	646	50.7
Bosnia and Herzegovina	1995	89.26	73.93	15.33	1995	2710	32.9	73.93	2276	32.5
Bulgaria	1995	162.75	135.63	27.13	1995	3903	41.7	135.62	3590	37.8
Croatia	1996	115.28	97.38	17.89	1996	2105	54.8	94.66	1775	53.3
Cyprus	1980-90	1.71	1.38	0.34	1996	280	6.1	1.25	117	10.7
Czech Republic	1995	209.11	166.41	42.70	1995	2630	79.5	164.30	2630	62.5
Denmark	1990	19.58	14.58	5.00	1990	538	36.4	12.83	445	28.8
Estonia	1996	101.25	88.18	13.07	1996	2162	46.8	85.75	2016	42.5
Finland	1991-96	647.02	552.25	94.77	1991-96	22768	28.4	543.40	21883	24.8
France	1997	838.55	733.50	105.05	1997	16989	49.4	700.55	15156	46.2
Germany	1987	920.00	720.00	200.00	1987	10740	85.7	720.00	10740	67.0
Greece	1992	52.04	43.36	8.67	1992	6513	8.0	42.23	3359	12.6
Hungary	1996	128.19	106.83	21.37	1996	1811	70.8	101.68	1811	56.1
Iceland	1998	0.42	0.35	0.07	1998	130	3.2	0.25	30	8.3
Ireland	1996	8.70	7.25	1.45	1996	591	14.7	7.25	591	12.3
Israel	1997	2.10	1.74	0.37	1997	170	12.4	1.74	122	14.2
Italy	1995	409.28	390.91	18.37	1995	10842	37.7	365.75	9857	37.1
Latvia	1997	177.60	145.64	31.95	1997	2995	59.3	134.34	2884	46.6
Liechtenstein	1995	0.51	0.41	0.10	1995	7	68.9	0.41	7	59.4
Lithuania	1996	118.31	101.12	17.19	1996	2050	57.7	97.70	1978	49.4
Luxembourg	1985-97	6.53	5.28	1.25	1994-97	89	73.7	5.28	86	61.6
Malta	1996	0.06	0.05	0.01	1996	0.3	162.8	0.02	0	61.7
Netherlands	1991-95	29.29	22.00	7.29	1992-96	339	86.4	18.18	339	53.6
Norway	1994-96	265.61	227.18	38.43	1994-96	12000	22.1	212.34	8710	24.4
Poland	1992-96	506.47	439.36	67.11	1992-96	8942	56.6	420.69	8942	47.0
Portugal	1995	96.04	61.41	34.63	1995	3467	27.7	55.17	3383	16.3
Romania	1984	470.78	388.66	82.12	1995-97	6680	70.5	391.49	6301	62.1
Slovakia	1996	167.02	145.60	21.41	1996	2031	82.2	142.75	2016	70.8
Slovenia	1996	117.46	103.48	13.98	1996	1166	100.7	97.67	1099	88.9
Spain	1990	186.69	163.33	23.36	1990	25984	7.2	163.27	13509	12.1
Sweden	1992-96	1045.96	888.34	157.63	1992-96	30259	34.6	864.97	27264	31.7
Switzerland	1993-95	140.14	103.98	36.16	1993-95	1234	113.6	96.88	1173	82.6
The FYR of Macedonia	1995	20.32	16.44	3.88	1995	988	20.6	16.44	906	18.1
Turkey	1996	471.58	403.39	68.18	1996	20713	22.8	367.01	9954	36.9
United Kingdom	1995	132.00	110.00	22.00	1995	2489	53.0	94.00	2469	38.1
Yugoslavia	1995	54.63	34.51	20.13	1995	3480	15.7	33.39	2894	11.5
Total: Europe		**8366.11**	**7040.12**	**1325.99**	**0.00**	**215422**	**38.8**	**6804.86**	**175829**	**38.7**
of which: EU 15		**5011.20**	**4228.61**	**782.59**	**0.00**	**136204**	**36.8**	**4104.69**	**113567**	**36.1**
Armenia	1996	13.32	11.32	2.00	1996	392	34.0	10.95	334	32.8
Azerbaijan	1988	57.92	49.29	8.63	1988	990	58.5	49.29	936	52.7
Belarus	1994	380.01	316.47	63.54	1994-97	8936	42.5	315.86	7865	40.2

ANNEX 3B.2 *(continued)*

Country	Forest and other wooded land							Forest		
	Ref. period for biomass	Woody biomass	Above stump biomass	Stump and root biomass	Ref. period for area	Area	Woody biomass	Above stump biomass	Area	Above stump biomass
		(Tg C)	(Tg C)	(Tg C)		(1000 ha)	(m.t. C/ha)	(Tg C)	(1000 ha)	(m.t. C/ha)
Georgia	1995	167.20	145.39	21.81	1995	2988	55.9	145.39	2988	48.7
Kazakhstan	1993	106.32	92.45	13.87	1993	16673	6.4	92.45	10504	8.8
Kyrgyzstan	1988	7.88	6.47	1.41	1995	797	9.9	6.47	729	8.9
Republic of Moldova	1997	12.42	10.80	1.62	1997	355	35.0	10.40	324	32.1
Russian Federation	1993	39631.38	30385.50	9245.88	1993	886538	44.7	22741.00	816538	27.9
Tajikistan	1995	2.34	1.95	0.39	1995	730	3.2	1.95	400	4.9
Turkmenistan	1995	6.06	5.00	1.06	1995	3754	1.6	4.79	3754	1.3
Ukraine	1996	545.87	439.59	106.28	1996	9494	57.5	439.59	9458	46.5
Uzbekistan	1988	4.20	3.52	0.68	1988	2170	1.9	3.49	1909	1.8
Total: CIS		**40934.90**	**31467.75**	**9467.15**	**0.00**	**933817**	**43.8**	**23821.63**	**855739**	**27.8**
Canada	1994	11891.06	10120.05	1771.01	1994	417584	28.5	10120.05	244571	41.4
United States of America	1992	18627.00	16524.00	2103.00	1992	298135	62.5	11746.00	217333	54.0
Total: North America		**30518.06**	**26644.05**	**3874.01**	**0.00**	**715719**	**42.6**	**21866.05**	**461904**	**47.3**
Australia	1994	5384.01	4486.68	897.34	1990-94	578467	9.3	4486.68	156877	28.6
Japan	1995	1276.58	1063.82	212.76	1995	25146	50.8	1063.44	24064	44.2
New Zealand	1996	1088.13	871.13	217.00	1996	9040	120.4	862.50	7940	108.6
Total: Other TBFRA		**7748.72**	**6421.62**	**1327.10**	**0.00**	**612653**	**12.6**	**6412.61**	**188881**	**34.0**
Grand Total		**87567.79**	**71573.54**	**15994.25**	**0.00**	**2477611**	**35.3**	**58905.16**	**1682353**	**35.0**

Notes for Annex 3B.2

Country	Notes
Bosnia and Herzegovina	Growing stock on forest converted to carbon by species groups
Cyprus	Growing stock of forest and other wooded land converted to carbon by species groups
Israel	Growing stock on forest converted to carbon by species groups
Luxembourg	Total growing stock on forest converted to carbon using the conversion factors of conifers
Malta	Total growing stock on forest converted to carbon using the conversion factors of conifers
Romania	Growing stock on forest converted to carbon by species groups
The FYR of Macedonia	Total growing stock on forest converted to carbon using the conversion factors of conifers
Yugoslavia	Biomass of stump and roots calculated from growing stock
Kyrgyzstan	Growing stock on forest converted to carbon by species groups
Ukraine	Total growing stock on forest converted to carbon using the conversion factors of conifers
Uzbekistan	Growing stock on forest and other wooded land converted to carbon by species groups

ANNEX 3B.3

The carbon balance of woody biomass on forest and other wooded land

Country	Ref. period for net annual increment	Net annual increment	Net annual increment	Ref. period for annual fellings	Annual fellings	Annual fellings	Annual fellings of natural losses	Rate of change in the C store of woody biomass	Rate of change in the C store of woody biomass	Rate of change in the C store of woody biomass
		(Tg C/year)	(m.t. C/ha/ year		(Tg C/ year)	(m.t. C/ha/ year)	(Tg C/yr)	(Tg C/yr)	(per cent of the present store/yr)	(m.t. C/ha/ yr)
Albania	1995	0.41	0.40	1995	0.31	0.30	0.02	0.12	0.36	0.12
Austria	1992-96	14.85	3.79	1992-96	10.54	2.69	0.84	5.15	0.89	1.31
Belgium	1982 -97	1.36	2.03	1986-95	1.14	1.70	0.00	0.22	0.57	0.33
Bosnia and Herzegovina	1995	1.76	0.65	1995	0.38	0.14	0.00	1.37	1.54	0.51
Bulgaria	1995	4.05	1.04	1995	1.71	0.44	0.32	2.65	1.63	0.68
Croatia	1986-96	2.40	1.14	1986-96	1.44	0.69	0.16	1.12	0.97	0.53
Cyprus	1980-90	0.03	0.11	1986-95	0.02	0.07	0.00	0.01	0.73	0.04
Czech Republic	1995	6.30	2.40	1995	4.83	1.84	0.65	2.13	1.02	0.81
Denmark	1990	1.06	1.96	1996	0.75	1.40	0.00	0.30	1.56	0.57
Estonia	1996	2.42	1.12	1996	1.19	0.55	0.00	1.23	1.21	0.57
Finland	1991-96	24.24	1.06	1991-96	17.60	0.77	0.00	6.64	1.03	0.29
France	1997	25.43	1.50	1996	16.04	0.94	0.54	9.92	1.18	0.58
Germany	1995	29.54	2.75	1996	15.52	1.45	0.00	14.02	1.52	1.31
Greece	1992	1.32	0.20	1992	0.89	0.14	0.15	0.59	1.12	0.09
Hungary	1996	4.20	2.32	1996	2.50	1.38	0.21	1.91	1.49	1.06
Iceland	1998	0.02	0.18	1996	0.00	0.00	0.00	0.02	5.64	0.18
Ireland	1996	1.03	1.74	1996	0.68	1.16	0.00	0.35	3.97	0.58
Israel	1997	0.14	0.84	1997	0.04	0.24	0.00	0.10	4.83	0.60
Italy	1995	10.25	0.95	1995	3.30	0.30	0.00	6.95	1.70	0.64
Latvia	1996	4.73	1.58	1996	2.69	0.90	0.48	2.52	1.42	0.84
Liechtenstein	1995	0.01	1.03	1995	0.00	0.63	0.00	0.00	0.59	0.40
Lithuania	1996	3.24	1.58	1992-96	1.80	0.88	0.53	1.96	1.66	0.96
Luxembourg	1985-97	0.21	2.41	1992-94	0.13	1.45	0.00	0.09	1.31	0.96
Malta										
Netherlands	1991-95	1.31	3.87	1991-95	0.95	2.79	0.04	0.40	1.38	1.19
Norway	1994-96	8.13	0.68	1994-96	3.63	0.30	0.06	4.56	1.72	0.38
Poland	1992 -96	11.37	1.27	1992-96	8.35	0.93	2.47	5.49	1.08	0.61
Portugal	1995	5.84	1.68	1995	4.43	1.28	0.04	1.45	1.51	0.42
Romania	1984	11.30	1.69	1993-97	4.80	0.72	0.85	7.35	1.56	1.10
Slovakia	1996	4.45	2.19	1996	2.29	1.13	1.27	3.43	2.06	1.69
Slovenia	1996	2.30	1.97	1996	0.78	0.67	0.37	1.89	1.61	1.62
Spain	1990	9.49	0.37	1994	5.00	0.19	0.00	4.49	2.40	0.17
Sweden	1992-96	33.57	1.11	1992-96	23.63	0.78	0.91	10.85	1.04	0.36
Switzerland	1985-95	3.06	2.48	1985-95	2.44	1.97	0.08	0.71	0.50	0.57
The FYR of Macedonia	1995	0.32	0.33	1995	0.32	0.32	0.00	0.00	0.02	0.00
Turkey	1996	14.54	0.70	1996	7.23	0.35	0.61	7.93	1.68	0.38
United Kingdom	1995	4.64	1.86	1995	2.87	1.15	0.03	1.79	1.36	0.72
Yugoslavia	1995	2.61	0.75	1991-95	1.32	0.38	0.03	1.32	2.41	0.38
Total: Europe		**251.96**	**1.17**		**151.56**	**0.70**	**10.64**	**111.03**	**1.33**	**0.52**
of which: EU 15		**164.15**	**1.21**		**103.47**	**0.76**	**2.54**	**63.21**	**1.26**	**0.46**
Armenia	1996	0.13	0.32	1996	0.06	0.16	0.00	0.07	0.50	0.17
Azerbaijan	1988	0.65	0.66	1988	0.03	0.03	0.02	0.64	1.11	0.65

ANNEX 3B.3 *(continued)*

Country	Ref. period for net annual increment	Net annual increment	Net annual increment	Ref. period for annual fellings	Annual fellings	Annual fellings	Annual fellings of natural losses	Rate of change in the C store of woody biomass	Rate of change in the C store of woody biomass	Rate of change in the C store of woody biomass
		(Tg C/year)	(m.t. C/ha/ year		(Tg C/ year)	(m.t. C/ha/ year)	(Tg C/yr)	(Tg C/yr)	(percent of the present store/yr)	(m.t. C/ha/yr)
Belarus	1994	7.87	0.88	1996	3.04	0.34	0.82	5.65	1.49	0.63
Georgia	1995	1.54	0.52	1995	0.18	0.06	0.00	1.37	0.82	0.46
Kazakhstan	1993	1.81	0.11	1993	0.41	0.02	0.15	1.54	1.45	0.09
Kyrgyzstan										
Republic of Moldova	1997	0.31	0.89	1997	0.14	0.39	0.06	0.23	1.87	0.65
Russian Federation	1993	477.49	0.54	1995	55.84	0.06	7.14	428.79	1.08	0.48
Tajikistan	1995	0.04	0.05	1995	0.01	0.01	0.00	0.03	1.42	0.05
Turkmenistan	1995	0.05	0.01	1995	0.00	0.00	0.00	0.05	0.79	0.01
Ukraine	1996	10.44	1.10	1996	3.72	0.39	0.64	7.36	1.35	0.78
Uzbekistan										
Total: CIS		**500.33**	**0.54**		**63.43**	**0.07**	**8.83**	**445.74**	**1.09**	**0.48**
Canada	1994	178.97	0.43	1995	86.23	0.21	0.00	92.74	0.78	0.22
United States of America	1987 - 92	466.89	1.57	1992	306.09	1.03	5.65	166.46	0.89	0.56
Total: North America		**645.86**	**0.90**		**392.32**	**0.55**	**5.65**	**259.19**	**0.85**	**0.36**
Australia	1994	52.97	0.09	1994	10.34	0.02	0.00	42.62	0.79	0.07
Japan	1990 - 95	23.77	0.95	1995	10.09	0.40	0.00	13.67	1.07	0.54
New Zealand	1996	14.17	1.57	1996	9.42	1.04	0.00	4.75	0.44	0.53
Total: Other TBFRA		**90.90**	**0.15**		**29.85**	**0.05**	**0.00**	**61.05**	**0.79**	**0.10**
Grand Total		**1489.05**	**0.60**		**637.16**	**0.26**	**25.12**	**877.01**	**1.00**	**0.35**

Notes for Annex 3B.3

Country	Notes for net annual increment	Notes for annual fellings
Bosnia and Herzegovina	Total net annual increment on forest converted to carbon using the conversion factors of conifers	Total annual fellings on forest converted to carbon using the conversion factors of conifers
Estonia		Total annual fellings on forest converted to carbon using the conversion factors of conifers
Greece		Annual fellings not reported, annual removals used
Luxembourg	Total net annual increment on forest converted to carbon using the conversion factors of conifers	Annual fellings not reported, annual removals used
The FYR of Macedonia	Total net annual increment on forest converted to carbon using the conversion factors of conifers	Total annual fellings on forest converted to carbon using the conversion factors of conifers
Georgia		Total annual fellings on forest converted to carbon using the conversion factors of conifers
Turkmenistan		Total annual fellings on forest converted to carbon using the conversion factors of conifers
Ukraine	Total net annual increment on fowl converted to carbon using the conversion factors of conifers	Total annual fellings on forest converted to carbon using the conversion factors of conifers
Canada		Annual fellings not reported, annual removals used
Australia		Annual fellings on forest available for wood supply

ANNEX 3B.4

Example showing how the figures in Annexes 3B.1, 3B.2 and 3B.3 for Austria were calculated from the data reported by the country

– Data reported by the country

Main Table 40: Total woody biomass, column Total woody biomass, 1160710 (1000 m.t.)
Main Table 40: Total woody biomass, column Total above-stump biomass, 967258 (1000 m.t.)
Main Table 40: Total woody biomass, column Above-stump biomass of trees on forest, 958093 (1000 m.t.)
Main Table 40: Total woody biomass, column Stumps and roots, 193452 (1000 m.t.)
Main Table 34: Growing stock, column Total, 1107307 (1000 m^3)

Main Table 45: Net annual increment on forest by species groups, column Forest coniferous, 22426 (1000 m^3)
Main Table 45: Net annual increment of forest by species groups, column Forest broadleaved, 5411 (1000 m^3)
Main Table 42: Gross and net annual increment, General data, column Net annual increment Other wooded land, 200 (1000 m^3)
Main Table 42: Gross and net annual increment, General data, column Net annual increment Trees outside forest, 100 (1000 m^3)

Main Table 48: Annual fellings overbark on forest by species groups, Total forest, Coniferous total, 16432 (1000 m^3)
Main Table 48: Annual fellings overbark on forest by species groups, Total forest, Broadleaved total, 3389 (1000 m^3)
Main Table 47: Annual fellings overbark, Other wooded land, 150 (1000 m^3)
Main Table 47: Annual fellings overbark, Trees outside forest, 70 (1000 m^3)
Main Table 48: Annual fellings overbark on forest by species groups, Fellings of natural losses on forest available for wood supply, 1596 (1000 m^3)

– Calculated figures

Annex 3B.1. Conversion factors

Stump and root biomass (c_sr) of all tree species, m.t. biomass/m^3 stemwood
= 0.17 = 193452 / 1107307

Annex 3B.2. The carbon store of woody biomass

Forest and other wooded land
Woody biomass, Tg C
= 580.36 = 0.5 x 1160710 / 1000
Above stump biomass, Tg C
= 483.63 = 0.5 x 967258 / 1000
Stump and root biomass, Tg C
= 96.73 = 0.5 x 193452 / 1000
Forest
Above stump biomass, Tg C
= 479.05 = 0.5 x 958093 / 1000

Annex 3B.3. The carbon balance of woody biomass on forest and other wooded land

Net annual increment, Tg C / year
= 14.85 = 0.5 x {0.85 x [22426 + 22426 / (22426 + 5411) x (200 + 100)] + 1.01 x [5411 + 5411 / (22426 + 5411) x (200 + 100)] + 0.17 x [22426 + 5411 + 200 + 100]} / 1000
Annual fellings, Tg C / year
= 10.54 = 0.5 x {0.85 x [16432 + 16432 / (16432 + 3389) x (150 + 70)] + 1.01 x [3389 + 3389 / (16432 + 3389) x (150 + 70)] + 0.17 x [16432 + 3389 + 150 + 70]} / 1000
Annual fellings of natural losses, Tg C / year
= 0.84 = 0.5 x {0.85 x 16432 / (16432 + 3389) x 1596 + 1.01 x 3389 / (16432 + 3389) x 1596 + 0.17 x 1596)}

TABLE 25

Uneven-aged and even-aged high forest available for wood supply: total of all species

Country	Reference period	Total	Uneven-aged	Even-aged				Unknown age
				Total	40 years or less	41 - 80 years	over 80 years	
		(1000 ha)						
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
Albania ©	1991	403	0	403	128 ①	88	187	0
Austria ©	1992-96	3,354	78	3,276	1,550	798	928	0
Belgium ©	1997	556	31	351	220	115	17	174
Bosnia and Herzegovina								
Bulgaria	1995	1,868	0	1,868	1,079	412	378	0
Croatia	1996	1,198	317	881	329	357	195	0
Cyprus	1996	43	43	0	0	0	0	0
Czech Republic	1995	2,555	0	2,555	832	898	825	0
Denmark ©	1990	438	30	408	188	110	50	0
Estonia	1996	1,932	16	1,916	810	896	211	0
Finland ©	1991-96	20,675	77	18,789	7171	6,215	5,404	1,808
France ©	1997	7,648	676	6,487	2586 ①	1,839	2,062	485
Germany ©	1987	10,142	1,500	8,642	3168 ②	2,871	2,603	0
Greece ©	1992							
Hungary ©	1996	1,201	37	1,164	778	274	112	0
Iceland	1998	14	1	13	10 ①	3	0	
Ireland	1996	580	0	580	475	44	11	50
Israel	1997	40	0	67	59	8	0	1
Italy	1995	2,616	1,099	1,517	972 ②	291	254 ④	
Latvia	1997	2,413	142	2,271	742	1,085	444	0
Liechtenstein ©	1995	4	2	2				
Lithuania ©	1996	1,686	36	1,650	624	852	174	0
Luxembourg	1994	73		73	19 ②	15	39	
Malta ©	1996							
Netherlands ©	1992-96	308	0	257	104	118	35	51
Norway ©	1994-96	6,609	1,621	4,850	2,222	975	1,653	138
Poland ©	1992-96	8,300		8,300	3,710	3,212	1,378	
Portugal ©	1995	1,201	547	654	485	169	0 ④	0
Romania ©	1984	1,590						
Slovakia ©	1996	1,647	239	1,408	477	680	251	0
Slovenia ©	1996	925	530	395	49	133	213	0
Spain								
Sweden ©	1992-96	21,236	3,794	17,442	9,219	4,155	4,068	0
Switzerland	1993-95	980	157	823	156	162	506	0
The FYR of Macedonia								
Turkey ©	1996	6,911	233	6,524				154
United Kingdom ©	1995	2,088	0	2,088	1,405	463	220	0
Yugoslavia ©	1995	1,172	622	549	201	218	127	0
Total: Europe								
of which: EU 15								
Armenia	1996	21	21	0				
Azerbaijan	1988	153	132	20	30	55	77	1
Belarus ©	1994	5,071	439	4,632	2,739	2,075	257	0
Georgia								
Kazakhstan	1993	10,504	0	10,504	4,490	5,196	818	0
Kyrgyzstan								
Republic of Moldova	1997	55	0	55	28	22	5	
Russian Federation ©	1993	516,391	0	516,391	127,003	109,748	279,640	0
Tajikistan								
Turkmenistan	1995							
Ukraine	1996	4,608	0	4,608	1,778	2,288	542	0
Uzbekistan	1995							
Total: CIS					**136,068**	**119,384**	**281,339**	
Canada ©	1994	125,863	662	102,033	18,739	41,682	41,611	23,168
United States of America ©	1992	198,123	44,509	153,614	72,265	49,514	31,835	0
Total: North America		**323,986**	**45,171**	**255,647**	**91,004**	**91,196**	**73,446**	**23,168**
Australia ©	1994	16,397	3,665	4,343	1,340 ①	528 ④	2,475 ④	8,389
Japan ©	1995	24,062	57	23,649	12,694	7,088	3,867	356
New Zealand ©	1996	1,851	291	1,560	1,544	16	0	0
Total: Other TBFRA		**42,310**	**4,013**	**29,552**	**15,578**	**7,632**	**6,342**	**8,745**
Grand total								

© See notes and comments in Chapter III.
① Without "Under regeneration".
② Without "Under regeneration" and "10 years or less".
④ Data are not available for all age-classes within this group.

TABLE 26

Uneven-aged and even-aged high forest available for wood supply: predominantly coniferous

Country	Reference period	Total	Uneven-aged	Even-aged				Unknown age
				Total	40 years or less	41 - 80 years	over 80 years	
		(1000 ha)						
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
Albania ©	1991	157	0	157	88	29	40 ④	0
Austria ©	1992-96	2,519	0	2,519	1,128	616	775	0
Belgium ©	1997	269	0	266	160	95	10	4
Bosnia and Herzegovina								
Bulgaria	1995	677	0	677	464	120	93	0
Croatia	1996	149	72	77	53	18	6	0
Cyprus	1996	43	43	0	0	0	0	0
Czech Republic	1995	786	0	786	286	250	250	0
Denmark ©	1990	168	6	162	87	52	16	0
Estonia	1996	746	9	737	253	351	133	0
Finland ©	1991-96	16,810	63	14,958	5,297	4,869	4,792	1,789
France ©	1997	3,985	259	3,480	1,978 ①	930	572	246
Germany ©	1987	5,852						
Greece ©	1992							
Hungary ©	1996	209	5	204	178	25	1	0
Iceland	1998	8	0	8	8 ①	0	0	
Ireland	1996	491	0	491	452	33	1	5
Israel	1997	40	0	39	34	5	0	1
Italy	1995	1,277	520	757	417 ②	170	170 ④	
Latvia	1997	907	43	864	313	313	238	0
Liechtenstein ©	1995	2	1	1				
Lithuania ©	1996	752	12	740	247	362	131	0
Luxembourg	1994			24	12 ②	10	2	
Malta ©	1996							
Netherlands ©	1992-96	134	0	129	46	70	13	5
Norway ©	1994-96	4,103	906	3,105	1,231	521	1,353	92
Poland ©	1992-96	5,528		5,528	2,471	2,139	918	
Portugal ©	1995	849	195	654	485	169	0 ④	0
Romania ©	1984	3,657						
Slovakia ©	1996	443	98	345	114	172	59	0
Slovenia ©	1996	277	134	143	13	39	91	0
Spain								
Sweden ©	1992-96	17,439	2,831	14,608	7,642	3,164	3,802	0
Switzerland	1993-95	580	106	473	75	67	331	0
The FYR of Macedonia								
Turkey ©	1996	5,588	233	5,232				123
United Kingdom ©	1995	1,454	0	1,454	1,173	255	26	0
Yugoslavia ©	1995	187	152	135	115	2	19	0
Total: Europe								
of which: EU 15								
Armenia	1996	0	0	0				
Azerbaijan	1988	0	0	0	0	0	0	0
Belarus ©	1994	2,309	277	2,032	956	1,262	91	0
Georgia								
Kazakhstan	1993	1,742	0	1,742	432	492	818	0
Kyrgyzstan								
Republic of Moldova	1997	4	0	4	4	0	0	0
Russian Federation ©	1993	263,360	0	263,360	46,472	41,972	176,916	0
Tajikistan								
Turkmenistan	1995							
Ukraine	1996	1,875	0	1,875	710	992	173	0
Uzbekistan	1995							
Total: CIS								
Canada ©	1994	70,220	300	56,541	8,846	17,744	29,951	13,379
United States of America ©	1992	84,323	8,928	75,395	36,279	17,745	21,371	0
Total: North America		**154,543**	**9,228**	**131,936**	**45,125**	**35,489**	**51,322**	**13,379**
Australia ©	1994	1,108	225	865	770 ①	95 ④		18
Japan ©	1995	11,963	54	11,809	8,767	2,515	527	100
New Zealand ©	1996	1,517	0	1,517	1,503	14	0	0
Total: Other TBFRA		**14,588**	**279**	**14,191**	**11,040**	**2,624**		**118**
Grand total								

© See notes and comments in Chapter III.
① Without "Under regeneration".
② Without "Under regeneration" and "10 years or less".
④ Data are not available for all age-classes within this group.

TABLE 27

Uneven-aged and even-aged high forest available for wood supply: predominantly broadleaved

Country	Reference period	Total	Uneven-aged	Even-aged				Unknown age
				Total	40 years or less	41 - 80 years	over 80 years	
		(1000 ha)						
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
Albania ©	1991	246	0	246	40 ①	59	147	0
Austria ©	1992-96	835	78	757	422	182	153	0
Belgium ©	1997	233	12	72	54	12	6	149
Bosnia and Herzegovina								
Bulgaria	1995	862	0	862	389	234	239	0
Croatia	1996	907	103	804	276	339	189	0
Cyprus	1996	0	0	0	0	0	0	0
Czech Republic	1995	336	0	336	92	143	101	0
Denmark ©	1990	111	12	99	55	35	16	0
Estonia	1996	401	3	398	218	175	6	0
Finland ©	1991-96	1,324	0	1,093	614	404	74	231
France ©	1997	2,982	263	2,522	477 ①	743	1,302	197
Germany ©	1987	2,515						
Greece ©	1992							
Hungary ©	1996	900	27	873	547	221	105	0
Iceland	1998	5	1	4	1 ①	3	0	
Ireland	1996	79	0	79	23	11	10	35
Israel	1997	0	0	0	0	0	0	0
Italy	1995	1,028	544	484	316 ②	100	68 ④	
Latvia	1997	458	17	441	195	223	23	0
Liechtenstein ©	1995	1	0	1				
Lithuania ©	1996	594	12	582	256	312	14	0
Luxembourg	1994			49	7 ②	5	37	
Malta ©	1996							
Netherlands ©	1992-96	128	0	90	49	28	13	38
Norway ©	1994-96	1,085	312	749	334	285	130	24
Poland ©	1992-96	1,278		1,278	570	495	212	
Portugal ©	1995	85	85	0	0	0	0	0
Romania ©	1984	0	0	0	0	0	0	0
Slovakia ©	1996	828	97	731	180	401	150	0
Slovenia ©	1996	348	184	164	24	63	77	0
Spain								
Sweden ©	1992-96	880	121	759	426	288	45	0
Switzerland	1993-95	192	20	172	50	47	75	0
The FYR of Macedonia								
Turkey ©	1996	1,323		1,292				31
United Kingdom ©	1995	498	0	498	151	174	173	0
Yugoslavia ©	1995	831	416	414	86	217	111	0
Total: Europe								
of which: EU 15								
Armenia	1996	21	21	0				
Azerbaijan	1988	153	132	20	30	55	77	1
Belarus ©	1994	1,330	39	1,292	975	268	87	0
Georgia								
Kazakhstan	1993	1,320	0	1,320	887	433	0	0
Kyrgyzstan								
Republic of Moldova	1997	51	0	51	24	22	5	0
Russian Federation ©	1993	41,311	0	41,311	19,295	14,667	7,349	0
Tajikistan								
Turkmenistan	1995							
Ukraine	1996	2,111	0	2,111	743	1,058	310	0
Uzbekistan	1995							
Total: CIS								
Canada ©	1994	27,273	142	21,667	4,422	12,364	4,881	5,464
United States of America ©	1992	89,463	25,015	64,448	28,265	26,549	9,634	0
Total: North America		**116,736**	**25,157**	**86,115**	**32,687**	**38,913**	**14,515**	**5,464**
Australia ©	1994	6,918	3,440	3,478	570 ①	433 ④	2,475 ④	13
Japan ©	1995	10,158	2	10,052	3,756	3,944	2,352	104
New Zealand ©	1996	128	85	43	41	2	0	0
Total: Other TBFRA		**17,204**	**3,527**	**13,573**	**4,367**	**4,379**	**4,827**	**117**
Grand total								

© See notes and comments in Chapter III.
① Without "Under regeneration".
② Without "Under regeneration" and "10 years or less".
④ Data are not available for all age-classes within this group.

TABLE 28

Uneven-aged and even-aged high forest available for wood supply: mixed

Country	Reference period	Total	Uneven-aged	Even-aged				Unknown age
				Total	40 years or less	41 - 80 years	over 80 years	
		(1000 ha)						
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
Albania ©	1991	0	0	0	0	0	0	0
Austria ©	1992-96	0	0	0	0	0	0	0
Belgium ©	1997	54	20	13	6	8	0	21
Bosnia and Herzegovina								
Bulgaria	1995	329	0	329	226	58	46	0
Croatia	1996	142	142	0	0	0	0	0
Cyprus	1996	0	0	0	0	0	0	0
Czech Republic	1995	1,433	0	1,433	454	505	474	0
Denmark ©	1990	159	12	147	55	24	15	0
Estonia	1996	785	4	781	339	370	72	0
Finland ©	1991-96	2,541	14	2,434	956	939	538	94
France ©	1997	681	154	485	131 ①	166	188	42
Germany ©	1987	1,775						
Greece ©	1992							
Hungary ©	1996	92	5	87	53	28	6	0
Iceland	1998	1	0	1	1 ①	0	0	
Ireland	1996	10	0	10	0	0	0	10
Israel	1997	0	0	0	0	0	0	0
Italy	1995	311	35	276	239	21	16	
Latvia	1997	1,048	82	966	234	549	183	0
Liechtenstein ©	1995	2	1	1				
Lithuania ©	1996	340	12	328	121	178	29	0
Luxembourg	1994							
Malta ©	1996							
Netherlands ©	1992-96	46	0	38	9	20	9	8
Norway ©	1994-96	1,421	403	996	657	169	170	22
Poland ©	1992-96	1,494	0	1,494	667	578	247	
Portugal ©	1995	267	267	0	0	0	0	0
Romania ©	1984	5,247		5,676	2,243	1,895	1,539	
Slovakia ©	1996	376	44	332	183	107	42	0
Slovenia ©	1996	300	212	88	15	29	44	0
Spain								
Sweden ©	1992-96	2,917	842	2,075	1,151	703	221	0
Switzerland	1993-95	208	31	178	31	47	100	0
The FYR of Macedonia								
Turkey ©	1996	0	0	0	0	0	0	0
United Kingdom ©	1995	136	0	136	81	34	21	0
Yugoslavia ©	1995	154	154	0	0	0	0	0
Total: Europe								
of which: EU 15								
Armenia	1996	0	0	0				
Azerbaijan	1988	0	0	0	0	0	0	0
Belarus ©	1994	1,432	124	1,308	748	546	79	0
Georgia								
Kazakhstan	1993	7,442	0	7,442	3,171	4,271	0	0
Kyrgyzstan								
Republic of Moldova	1997	0	0	0	0	0	0	0
Russian Federation ©	1993	211,720	0	211,720	61,236	55,109	95,375	0
Tajikistan								
Turkmenistan	1995							
Ukraine	1996	622	0	622	325	238	59	0
Uzbekistan	1995							
Total: CIS								
Canada ©	1994	28,370	220	23,825	5,472	11,574	6,779	4,325
United States of America ©	1992	24,337	10,566	13,771	7,721	5,220	830	0
Total: North America		**52,707**	**10,786**	**37,596**	**13,193**	**16,794**	**7,609**	**4,325**
Australia ©	1994							
Japan ©	1995	1,788	0	1,788	171	630	987	0
New Zealand ©	1996	206	206	0	0	0	0	0
Total: Other TBFRA								
Grand total								

© See notes and comments in Chapter III.

① Without "Under regeneration".

TABLE 29

Age-class distribution of even-aged high forest available for wood supply: total of all species groups

Country	Age classes (years)								
	Under regeneration and < 10	11 - 20	21 - 40	41 - 60	61 - 80	81 - 100	101 - 120	121 - 140	> 140
	(1000 ha)								
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
Albania ©	43 ①	51	34	34	54	57	45	85	0
Austria ©	555	271	724	419	379	328	226	153	221
Belgium ©	48	44	127	77	37	13	2	1	0
Bosnia and Herzegovina									
Bulgaria	289	287	504	225	187	161	108	65	44
Croatia	112	68	149	188	169	125	55	13	2
Cyprus	0	0	0	0	0	0	0	0	0
Czech Republic	265	175	392	426	472	455	249	87	34
Denmark ©	64	44	80	78	32	26	12	5	7
Estonia	155	162	493	560	336	136	44	22	9
Finland ©	1,954	1,676	3,541	3,226	2,989	2,238	1,323	718	1,125
France ©	537 ①	668	1,381	979	860	696	460	386	520
Germany ©		1,239	1,929	1,452	1,419	1,181	705	412	305
Greece ©									
Hungary ©	193	221	364	169	105	81	26	4	1
Iceland	7 ①	2	2	3	0	0	0	0	0
Ireland	198	102	175	36	8	5	2	2	2
Israel	17	13	29	7	1	0	0	0	0
Italy		640	332	162	129	102	67		85
Latvia	187	134	421	594	491	295	103	33	13
Liechtenstein ©									
Lithuania ©	102	119	403	504	348	142	25	5	2
Luxembourg		14	5	9	6	7	9	13	10
Malta ©									
Netherlands ©	26	19	59	72	46	23	7	2	3
Norway ©	798	591	833	528	447	565	541	421	126
Poland ©	913	639	2,158	1,776	1,436	913	314	151	0
Portugal ©	134	64	287	144	25	0			
Romania ©									
Slovakia ©	148	118	211	349	331	202	39	7	3
Slovenia ©	19	12	18	43	90	100	61	33	19
Spain									
Sweden ©	3,000	2,468	3,751	2,057	2,098	1,593	1,362	778	335
Switzerland	23	39	93	63	99	146	122	88	150
The FYR of Macedonia									
Turkey ©									
United Kingdom ©	368	341	696	331	132	79	53	41	47
Yugoslavia ©	77	64	60	170	48	35	89	4	0
Total: Europe									
of which: EU 15									
Armenia									
Azerbaijan	13	5	12	30	25	25	22	20	10
Belarus ©	347	532	1,861	1,534	541	178	19	23	36
Georgia									
Kazakhstan	1,260	978	2,252	3,684	1,512	311	364	48	95
Kyrgyzstan									
Republic of Moldova	4	8	16	14	8	2	1	1	1
Russian Federation ©	31,051	32,688	63,264	56,696	53,052	48,745	37,755	55,324	137,816
Tajikistan									
Turkmenistan									
Ukraine	380	294	1,104	1,371	917	369	117	27	29
Uzbekistan									
Total: CIS									
Canada ©	4,327	3,239	11,173	22,559	19,123	14,637	10,239	6,116	10,619
United States of America ©	23,145	20,687	28,433	28,427	21,087	14,583	8,958	4,959	3,335
Total: North America	**27,472**	**23,926**	**39,606**	**50,986**	**40,210**	**29,220**	**19,197**	**11,075**	**13,954**
Australia ©	419 ①	921		528			1,219		1,256
Japan ©	1,066	2,036	9,592	4,789	2,299	3,867	0	0	0
New Zealand ©	677	554	313	7	9	0	0	0	0
Total: Other TBFRA	**2,162**	**3,511**		**5,324**			**1,219**		**1,256**
Grand total									

© See notes and comments in Chapter III.
① Without "Under regeneration".

TABLE 30

Age-class distribution of even-aged high forest available for wood supply: predominantly coniferous

Country	Age classes (years)								
	Under regeneration and < 10	11 - 20	21 - 40	41 - 60	61 - 80	81 - 100	101 - 120	121 - 140	> 140
	(1000 ha)								
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
Albania ©	31	43	14	13	15		40		
Austria ©	385	185	558	321	295	264	186	129	196
Belgium ©	40	24	97	65	30	9	1	0	0
Bosnia and Herzegovina									
Bulgaria	141	139	184	52	68	53	26	8	6
Croatia	13	11	29	12	6	5	1	0	0
Cyprus	0	0	0	0	0	0	0	0	0
Czech Republic	103	66	117	118	132	138	78	26	8
Denmark ©	25	32	30	37	15	10	4	1	2
Estonia	54	61	138	180	172	83	29	15	6
Finland ©	1,370	1,289	2,638	2,396	2,473	1,923	1,187	649	1,033
France ©	383 ①	530	1,065	597	333	221	123	85	143
Germany ©									
Greece ©									
Hungary ©	25	56	97	19	6	1	0	0	0
Iceland	6 ①	1	1	0	0	0	0	0	0
Ireland	180	100	172	29	4	1	0	0	0
Israel	11	7	17	4	1	0	0	0	0
Italy		245	172	97	73	56	48		66
Latvia	110	65	138	140	173	140	63	25	10
Liechtenstein ©									
Lithuania ©	59	43	145	180	181	105	21	4	2
Luxembourg		10	3	7	3	2	1	0	0
Malta ©									
Netherlands ©	8	8	30	43	27	11	2	0	0
Norway ©	466	239	526	307	214	389	457	392	115
Poland ©	608	426	1,437	1,183	956	608	209	101	0
Portugal ©	134	64	287	144	25	0			
Romania ©									
Slovakia ©	34	26	54	82	90	49	8	1	1
Slovenia ©	2	2	9	17	22	44	26	13	8
Spain									
Sweden ©	2,727	2,085	2,830	1,461	1,703	1,450	1,287	743	322
Switzerland	11	20	44	26	41	71	72	58	130
The FYR of Macedonia									
Turkey ©									
United Kingdom ©	278	302	593	206	49	11	6	5	4
Yugoslavia ©	49	37	29	2	0	9	10	0	0
Total: Europe									
of which: EU 15									
Armenia									
Azerbaijan	0	0	0	0	0	0	0	0	0
Belarus ©	101	161	694	916	346	83	4	4	0
Georgia									
Kazakhstan	0	162	270	183	309	311	364	48	95
Kyrgyzstan									
Republic of Moldova	0	3	0	0	0	0	0	0	0
Russian Federation ©	12,836	13,671	19,965	19,915	22,057	20,860	23,255	30,755	102,046
Tajikistan									
Turkmenistan									
Ukraine	165	80	465	567	425	140	28	4	1
Uzbekistan									
Total: CIS									
Canada ©	2,392	1,646	4,808	9,219	8,525	7,860	7,547	4,636	9,908
United States of America ©	13,573	11,944	10,762	9,034	8,711	7,230	6,888	3,932	3,321
Total: North America	**15,965**	**13,590**	**15,570**	**18,253**	**17,236**	**15,090**	**14,435**	**8,568**	**13,229**
Australia ©	235 ①	535		95					
Japan ©	797	1,608	6,363	1,764	751	527	0	0	0
New Zealand ©	651	542	310	6	8	0	0	0	0
Total: Other TBFRA	**1,683**	**2,685**		**1,865**					
Grand total									

© See notes and comments in Chapter III.

① Without "Under regeneration".

TABLE 31

Age-class distribution of even-aged high forest available for wood supply: predominantly broadleaved

Country	Age classes (years)								
	Under regeneration and < 10	11 - 20	21 - 40	41 - 60	61 - 80	81 - 100	101 - 120	121 - 140	> 140
	(1000 ha)								
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
Albania ©	11 ①	8	21	21	39	43	33	71	0
Austria ©	170	86	166	98	84	64	40	24	25
Belgium ©	8	19	27	8	4	4	1	1	0
Bosnia and Herzegovina									
Bulgaria	80	80	230	147	86	82	70	53	35
Croatia	99	57	120	176	163	120	54	13	2
Cyprus	0	0	0	0	0	0	0	0	0
Czech Republic	20	16	56	84	59	40	30	17	14
Denmark ©	23	12	21	28	7	8	4	3	3
Estonia	31	31	156	140	34	4	1	0	0
Finland ©	124	99	391	285	119	58	11	3	2
France ©	139 ①	109	229	298	445	408	290	267	337
Germany ©									
Greece ©									
Hungary ©	162	153	232	132	89	75	25	4	1
Iceland	0 ①	0	1	3	0	0	0	0	0
Ireland	18	2	3	7	4	4	2	2	2
Israel	0	0	0	0	0	0	0	0	0
Italy		196	120	55	45	40	15		13
Latvia	48	30	117	148	75	20	1	1	1
Liechtenstein ©									
Lithuania ©	21	38	198	235	77.2	11.8	1.5	0.4	0.4
Luxembourg		5	3	2	3	5	9	13	10
Malta ©									
Netherlands ©	13	10	26	18	10	7	3	1	2
Norway ©	134	101	99	123	162	110	15	3	2
Poland ©	140	98	332	274	221	141	48	23	0
Portugal ©	0	0	0	0	0	0	0	0	0
Romania ©	0	0	0	0	0	0	0	0	0
Slovakia ©	39	39	102	212	189	119	25	5	1
Slovenia ©	9	9	6	16	47	43	17	12	5
Spain									
Sweden ©	92	85	249	202	86	27	13	4	1
Switzerland	7	12	31	22	25	34	21	12	8
The FYR of Macedonia									
Turkey ©									
United Kingdom ©	68	20	63	102	72	60	42	32	39
Yugoslavia ©	28	27	31	169	48	26	79	4	3
Total: Europe									
of which: EU 15									
Armenia									
Azerbaijan	13	5	12	30	25	25	22	20	10
Belarus ©	130	195	650	150	118	36	9	13	30
Georgia									
Kazakhstan	221	264	402	361	72	0	0	0	0
Kyrgyzstan									
Republic of Moldova	4	5	16	14	8	2	1	1	1
Russian Federation ©	5410	6,295	7,590	7,412	7,255	5,949	600	500	300
Tajikistan									
Turkmenistan									
Ukraine	160	133	450	647	411	189	77	19	25
Uzbekistan									
Total: CIS									
Canada ©	675	631	3,116	7,145	5,219	3,073	1,020	544	244
United States of America ©	7275	6,701	14,289	15,825	10,724	6,553	2,050	1,017	14
Total: North America	**7,950**	**7,332**	**17,405**	**22,970**	**15,943**	**9,626**	**3,070**	**1,561**	**258**
Australia ©	184 ①	386		433			1,219		1,256
Japan ©	264	413	3,079	2,850	1,094	2,352	0	0	0
New Zealand ©	26	12	3	1	1	0	0	0	0
Total: Other TBFRA	**474**	**811**		**3,284**			**1,219**		**1,256**
Grand total									

© See notes and comments in Chapter III.

① Without "Under regeneration".

TABLE 32

Age-class distribution of even-aged high forest available for wood supply: mixed

Country	Age classes (years)								
	Under regeneration and < 10	11 - 20	21 - 40	41 - 60	61 - 80	81 - 100	101 - 120	121 - 140	> 140
		(1000 ha)							
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
Albania ©	0	0	0	0	0	0	0	0	0
Austria ©	0	0	0	0	0	0	0	0	0
Belgium ©	1	2	3	4	4	0	0	0	0
Bosnia and Herzegovina									
Bulgaria	68	67	90	25	33	26	13	4	3
Croatia	0	0	0	0	0	0	0	0	0
Cyprus	0	0	0	0	0	0	0	0	0
Czech Republic	142	93	219	224	281	277	141	44	12
Denmark ©	16	19	21	14	10	8	4	1	2
Estonia	69	70	200	241	130	49	14	7	3
Finland ©	156	289	511	542	397	257	125	66	90
France ©	15 ①	29	87	84	82	67	47	34	40
Germany ©									
Greece ©									
Hungary ©	6	12	35	18	10	5	1	0	0
Iceland	1 ①	1	0	0	0	0	0	0	0
Ireland	0	0	0	0	0	0	0	0	0
Israel	0	0	0	0	0	0	0	0	0
Italy		199	40	10	11	6	4		6
Latvia	29	39	166	306	243	135	39	7	2
Liechtenstein ©									
Lithuania ©	22	39	60	89	90	26	3	1	0
Luxembourg									
Malta ©									
Netherlands ©	5	1	3	11	9	5	2	1	1
Norway ©	198	251	208	98	71	66	69	26	9
Poland ©	164	115	388	320	258	164	56	27	0
Portugal ©	0	0	0	0	0	0	0	0	0
Romania ©		1,196	1,047	1,035	860	604	935		
Slovakia ©	75	53	55	55	52	34	6	1	1
Slovenia ©	5	4	6	9	20	11	18	8	7
Spain									
Sweden ©	181	298	672	394	309	116	62	31	12
Switzerland	5	7	19	15	32	41	30	17	12
The FYR of Macedonia									
Turkey ©	0	0	0	0	0	0	0	0	0
United Kingdom ©	22	19	40	23	11	8	5	4	4
Yugoslavia ©	0	0	0	0	0	0	0	0	0
Total: Europe									
of which: EU 15									
Armenia									
Azerbaijan	0	0	0	0	0	0	0	0	0
Belarus ©	115	116	517	468	77	59	7	7	7
Georgia									
Kazakhstan	1,039	552	1,580	3,140	1,131	0	0	0	0
Kyrgyzstan									
Republic of Moldova	0	0	0	0	0	0	0	0	0
Russian Federation ©	12,805	12,722	35,709	29,369	25,740	21,936	13,900	24,069	35,470
Tajikistan									
Turkmenistan									
Ukraine	55	81	189	157	81	40	12	4	3
Uzbekistan									
Total: CIS									
Canada ©	1,261	962	3,249	6,195	5,379	3,704	1,672	936	467
United States of America ©	2,297	2,042	3,382	3,568	1,652	800	20	10	0
Total: North America	**3,558**	**3,004**	**6,631**	**9,763**	**7,031**	**4,504**	**1,692**	**946**	**467**
Australia ©									
Japan ©	6	15	150	175	455	987	0	0	0
New Zealand ©	0	0	0	0	0	0	0	0	0
Total: Other TBFRA									
Grand total									

© See notes and comments in chapter III.
① Without "under regeneration".

TABLE 33

Standing volume of trees (growing stock and dead trees)

Country	Reference period	Total	On forest			On other wooded land and trees outside forest
			Total	Available for wood supply	Not available for wood supply	
		(1000 m3 o.b.)				
(1)	(2)	(3)	(4)	(5)	(6)	(7)
Albania ©	1995	83,945	83,945	74,101	9,882	0 ①
Austria ©	1992 - 96	1,130,307	1,120,307	1,055,307	65,000	10,000 ①
Belgium	1997	141,033 ①	141,033 ①	139,835 ①	1,198 ①	
Bosnia and Herzegovina	1995		250,360 ①	125,180 ①	125,180 ①	
Bulgaria ©	1995	467,389 ①	468,583	402,199	66,384	44 ①
Croatia ©	1996	359,769	358,269	339,388	18,881	1,500 ①
Cyprus	1980 - 90	5,500 ①	5,000 ①	3,075		500 ①
Czech Republic ©	1995	705,571	700,891	684,942	15,956	4,680 ①
Denmark ©	1990	61,500	55,850	54,500	1,350	5,000 ①
Estonia	1996	326,812	318,972	311,390	7,582	7,840 ①
Finland	1991 - 96	2,002,000	1,978,000	1,898,000	79,000	23,000 ①
France ©	1997	2,994,920	2,909,649	2,853,176	56,473	85,271 ①
Germany	1987	2,880,000 ①	2,880,000 ①	2,820,000 ①	60,000 ①	0 ①
Greece ©	1992	156,924	154,168	141,990	12,178	0 ①
Hungary ©	1996	339,792	323,792	303,864	19,928	16,000 ①
Iceland ©	1998	1,100	800	370	430	300 ①
Ireland	1996	44,000 ①	44,000 ①	43,000 ①	1,000 ①	
Israel	1997	6,000 ①	6,000 ①	4,200 ①	1,800 ①	0 ①
Italy	1995	1,518,592 ①	1,428,742 ①	876,744 ①	551,998 ①	89,850 ①
Latvia	1997	542,000 ①	514,048	419,082	94,966	40,000 ①
Liechtenstein	1995	1,757	1,757	1,406	351	
Lithuania	1996	382,837	371,537	321,885	49,652	11,300 ①
Luxembourg	1985-97		20,517	20,517	0	
Malta	1996	80 ①	80 ①	0	80 ①	
Netherlands ©	1991-95	66,015	55,515	53,352	2,163	10,500 ①
Norway ©	1994-96	859,433	809,464	701,793	107,671	45,840 ①
Poland ©	1992-96	1,998,335	1,932,823	1,794,066	138,758	65,512 ①
Portugal ©	1995	306,364	289,370	189,192	100,178	16,246 ①
Romania	1984		1,341,465 ①			
Slovakia ©	1996	511,586	511,586	445,925	65,661	
Slovenia ©	1996	324,412	316,970	298,341	11,395	7,035 ①
Spain ©	1990	606,290	605,993	496,551	109,441	297 ①
Sweden ©	1992-96	3,071,172	3,001,457	2,621,601	379,857	69,715
Switzerland ©	1993-95	435,516	407,916	363,836	44,080	27,600 ①
The FYR of Macedonia	1995	63,420 ①	63,420 ①			
Turkey ©	1996	1,483,863 ①	1,362,141	1,187,309 ①	162,014 ①	134,540 ①
United Kingdom ©	1995	354,000	318,000	293,500	24,500	36,000 ①
Yugoslavia ©	1995	328,759 ①	419,859	375,730	42,321	8,702
Total: Europe			**25,572,279**			
of which: EU 15			**15,002,601**	**13,557,265**	**1,444,336**	
Armenia	1996	44,990	44,290	4,060	40,230	700 ①
Azerbaijan	1988	130,499	130,499	26,624	103,803	0
Belarus	1994	1,220,620	1,219,510	983,859	235,651	1,110 ①
Georgia	1995	434,000 ①	434,000 ①	86,800 ①	347,200 ①	0 ①
Kazakhstan	1993	369,810 ①	369,810 ①	369,810 ①	21,890 ①	0 ①
Kyrgyzstan	1988		23,000 ①	0	23,000 ①	
Republic of Moldova	1997	43,410	41,810	26,040	15,770	1,600 ①
Russian Federation ©	1993	91,650,252	88,650,252	63,115,156	25,535,096	1,650,000
Tajikistan	1995	5,620 ①	5,620 ①	0	5,620 ①	0 ①
Turkmenistan	1995	14,100 ①	14,100 ①	13,705 ①	395 ①	0 ①
Ukraine	1996	1,744,360	1,704,212	1,114,570	589,642	40,108 ①
Uzbekistan	1988	11,100 ①	11,000 ①	0	11,000 ①	100 ①
Total: CIS			**92,648,103**	**65,740,624**	**26,929,297**	
Canada	1994	29,364,059 ①	29,364,059 ①	17,354,560 ①	12,009,499 ①	0 ①
United States of America ©	1992	41,469,000	30,230,000	27,558,000	2,672,000	11,026,000 ①
Total: North America		**70,833,059**	**59,594,059**	**44,912,560**	**14,681,499**	**11,026,000**
Australia	1994	8,635,115 ①	8,635,115 ①	644,683 ①	7,990,432 ①	
Japan	1995	3,483,234 ①	3,482,138 ①	3,368,076 ①	114,062 ①	1,096 ①
New Zealand	1996	2,578,530 ①	2,553,000 ①	369,659 ①	2,183,341 ①	25,530 ①
Total: Other TBFRA		**14,696,879**	**14,670,253**	**4,382,418**	**10,287,835**	
Grand total			**192,484,694**			

© See notes and comments in Chapter III.
① Only growing stock.

TABLE 34

Growing stock

Country	Reference period	Total	On forest			On other wooded land and trees outside forest
			Total	Available for wood supply	Not available for wood supply	
			($1000\ m^3$ o.b.)			
(1)	(2)	(3)	(4)	(5)	(6)	(7)
Albania ©	1995	83,455	83,455	73,634	9,821	0
Austria ©	1992-96	1,107,307	1,097,307 ①	1,037,307 ①	60,000	10,000
Belgium ©	1997	141,033	141,033	139,835	1,198	
Bosnia and Herzegovina ©	1995		250,360	125,180	125,180	
Bulgaria ©	1995	467,389	467,345	401,141	66,204	44
Croatia ©	1996	357,802	356,302 ①	337,700 ①	18,602	1,500
Cyprus ©	1980-90	5,500	5,000	3,055		500
Czech Republic ©	1995	688,486	683,806 ①	668,242 ①	15,571	4,680
Denmark ©	1990	60,200	55,200	53,950	1,250	5,000
Estonia	1996	322,377	314,537	307,120	7,417	7,840
Finland	1991-96	1,963,000	1,940,000	1,867,000	72,000	23,000
France ©	1997	2,977,048	2,891,777 ①	2,835,655 ①	56,122	85,271
Germany ©	1987	2,880,000	2,880,000	2,820,000	60,000	0
Greece ©	1992	154,544	151,788	139,800	11,988	0
Hungary ©	1996	330,667	314,667	295,301 ①	19,366	16,000
Iceland ©	1998	1,100	800	370	430	300
Ireland ©	1996	44,000	44,000	43,000	1,000	
Israel	1997	6,000	6,000	4,200	1,800	0
Italy	1995	1,518,592	1,428,742 ①	876,744 ①	551,998	89,850
Latvia	1997	542,000	502,000	409,260	92,740	40,000
Liechtenstein	1995	1,750	1,750	1,400	350	
Lithuania	1996	373,937	362,637	314,355	48,282	11,300
Luxembourg	1985-97		20,377	20,377	0	
Malta	1996	80	80	0	80	
Netherlands ©	1991-95	64,709	54,209 ①	52,088 ①	2,121	10,500
Norway ©	1994-96	817,288	771,448 ①	671,412 ①	100,036	45,840
Poland ©	1992-96	1,973,531	1,908,019 ①	1,771,042 ①	136,977	65,512
Portugal ©	1995	292,006	275,760 ①	188,020 ①	87,740	16,246
Romania ©	1984		1,341,465			
Slovakia ©	1996	510,948	510,948 ①	445,547 ①	65,401	
Slovenia ©	1996	317,612	310,577 ①	292,491 ①	10,852	7,035
Spain ©	1990	594,408	594,111	486,815	107,296	297
Sweden ©	1992-96	2,993,640	2,928,117 ①	2,566,532 ①	361,586	65,523
Switzerland ©	1993 95	422,453	394,853	353,212	41,641	27,600
The FYR of Macedonia ©	1995	63,420	63,420			
Turkey ©	1996	1,483,863	1,349,323	1,187,309	162,014	134,540
United Kingdom ©	1995	353,000	317,000 ①	293,000 ①	24,000	36,000
Yugoslavia ©	1995	328,759	322,313	288,456	33,857	6,446
Total: Europe			**25,140,446**			
of which: EU 15			**14,819,421**	**13,420,123**	**1,398,299**	
Armenia	1996	43,440	42,740 ①	3,900 ①	38,840	700
Azerbaijan	1988	127,440	127,440	26,000	101,440	0
Belarus	1994	1,202,420	1,201,310 ①	969,459 ①	231,851	1,110
Georgia ©	1995	434,000	434,000	86,800	347,200	0
Kazakhstan	1993	369,810	369,810	369,810	21,890	0
Kyrgyzstan	1988		23,000	0	23,000	
Republic of Moldova	1997	43,200	41,600	25,900	15,700	1,600
Russian Federation ©	1993	86,986,752	85,486,752 ①	60,922,156 ①	24,564,596	1,500,000
Tajikistan ©	1995	5,620	5,620	0	5,620	0
Turkmenistan ©	1995	14,100	14,100	13,705	395	0
Ukraine	1996	1,736,020	1,695,912 ①	1,110,470	585,442	40,108
Uzbekistan ©	1988	11,100	11,000	0	11,000	100
Total: CIS			**89,453,284**	**63,528,200**	**25,946,974**	
Canada ©	1994	29,364,059	29,364,059	17,354,560	12,009,499	0
United States of America ©	1992	40,682,000	29,656,000	27,035,000	2,621,000	11,026,000
Total: North America		**70,046,059**	**59,020,059**	**44,389,560**	**14,630,499**	**11,026,000**
Australia ©	1994	8,635,115	8,635,115 ①	644,683 ①	7,990,432	
Japan ©	1995	3,483,234	3,482,138	3,368,076	114,062	1,096
New Zealand ©	1996	2,578,530	2,553,000	369,659 ①	2,183,341	25,530
Total: Other TBFRA		**14,696,879**	**14,670,253**	**4,382,418**	**10,287,835**	
Grand total			**188,284,042**			

© See notes and comments in Chapter III.

① Adjustment to achieve conformity with TBFRA definitions arrived at by the National Correspondent.

TABLE 35

Growing stock on forest by species groups

Country	On forest		On forest available for wood supply		On forest not available for wood supply	
	Coniferous	Broadleaved	Coniferous	Broadleaved	Coniferous	Broadleaved
	(1000 m^3 o.b.)					
(1)	(2)	(3)	(4)	(5)	(6)	(7)
Albania ©	18,897	64,558	16,155	57,479	2,742	7,079
Austria ©	909,309	187,998	849,309	187,998	60,000	0
Belgium ©	64,515	76,518	64,335	75,500	180	1,018
Bosnia and Herzegovina ©	126,000	124,360	70,000	55,180	56,000	69,180
Bulgaria ©	193,531	273,814	162,617	238,524	30,914	35,290
Croatia ©	51,044	305,258	46,416	291,284	4,628	13,974
Cyprus ©	4,800	200	3,055	0	1,745	200
Czech Republic ©	573,886	109,920	560,729	107,513	13,157	2,407
Denmark ©	31,300	23,900	31,300	22,650	0	1,250
Estonia	199,102	115,435	194,413	112,707	4,689	2,728
Finland	1,589,000	351,000	1,529,000	338,000	60,000	13,000
France ©	1,035,385	1,856,392	1,015,083	1,820,572	20,302	35,820
Germany ©	1,970,000	910,000	1,940,000	880,000	30,000	30,000
Greece ©	85,022	66,766	78,300	61,500	6,722	5,266
Hungary ©	46,937	267,730	44,916	250,385	2,021	17,345
Iceland ©	230	570	210	160	20	410
Ireland ©	40,000	4,000	39,500	3,500	500	500
Israel	3,500	2,500	2,400	1,800	1,100	700
Italy	469,206	959,536	287,927	588,817	181,279	370,719
Latvia	303,964	198,036	242,205	167,055	61,759	30,981
Liechtenstein	1,300	450	1,000	400	300	50
Lithuania	220,355	142,282	186,470	127,885	33,885	14,397
Luxembourg						
Malta	72	8	0	0	72	8
Netherlands ©	29,654	24,555	28,594	23,494	1,060	1,061
Norway ©	595,688	175,760	533,923	137,489	61,765	38,271
Poland ©	1,511,729	396,290	1,403,202	367,841	108,527	28,449
Portugal ©	147,782	127,978	140,871	47,149	6,911	80,829
Romania ©	525,735	815,730				
Slovakia ©	240,798	270,150	213,576	231,971	27,222	38,179
Slovenia ©	154,667	155,910	145,660	146,831	9,007	9,079
Spain ©	363,323	230,788	284,882	201,933	78,441	28,855
Sweden ©	2,466,262	461,855	2,188,639	377,893	277,623	83,962
Switzerland ©	281,584	113,269	246,331	106,881	35,253	6,388
The FYR of Macedonia ©		0				
Turkey ©	890,773	458,550	776,132	411,177	114,641	47,373
United Kingdom ©	190,000	127,000	188,000	105,000	2,000	22,000
Yugoslavia ©	61,053	261,260	54,742	233,714	6,311	27,546
Total: Europe						
of which: EU 15						
Armenia	790	41,950	0	3,900	790	38,050
Azerbaijan	350	127,090	310	25,690	40	101,400
Belarus	844,624	356,686	681,615	287,844	163,009	68,842
Georgia ©	130,200	303,800	26,000	60,800	104,200	243,000
Kazakhstan	241,930	127,880	230,040	117,880	11,890	10,000
Kyrgyzstan	16,000	7,000	0	0	16,000	7,000
Republic of Moldova	300	41,300	150	25,750	150	15,550
Russian Federation ©	68,389,402	17,097,350	44,641,235	16,280,920	23,748,167	816,429
Tajikistan ©	3,140	2,480	0	0	3,140	2,480
Turkmenistan ©	840	13,260	817	12,888	23	372
Ukraine						
Uzbekistan ©	2,200	8,800	0	0	2,200	8,800
Total: CIS						
Canada ©	22,695,058	6,669,001	12,772,573	4,581,987	9,922,485	2,087,014
United States of America ©	16,316,000	13,340,000	14,874,000	12,161,000	1,442,000	1,179,000
Total: North America	**39,011,058**	**20,009,001**	**27,646,573**	**16,742,987**	**11,364,485**	**3,266,014**
Australia ©	207,807	8,427,308	129,676	515,007	78,131	7,912,301
Japan ©	2,310,230	1,171,908				
New Zealand ©	653,000	1,900,000	363,310	6,349	289,690	1,893,651
Total: Other TBFRA	**3,171,037**	**11,499,216**				
Grand total						

© See notes and comments in Chapter III.

TABLE 36

Growing stock on forest available for wood supply: comparative data

Country	Growing stock per hectare on FAWS	Share of species groups in total growing stock on FAWS		Share of growing stock on FAWS in total growing stock on forest, by species groups		
		Coniferous	Broadleaved	Total	Coniferous	Broadleaved
	(m^3 overbark/ha)			(per cent)		
(1)	(2)	(3)	(4)	(5)	(6)	(7)
Albania	81.6	21.9	78.1	88.2	85.5	89.0
Austria	309.5	81.9	18.1	94.5	93.4	100.0
Belgium	218.8	46.0	54.0	99.2	99.7	98.7
Bosnia and Herzegovina	95.9	55.9	44.1	50.0	55.6	44.4
Bulgaria	128.4	40.5	59.5	85.8	84.0	87.1
Croatia	199.8	13.7	86.3	94.8	90.9	95.4
Cyprus	70.7	100.0	0.0	61.1	63.6	0.0
Czech Republic	261.1	83.9	16.1	97.7	97.7	97.8
Denmark	122.5	58.0	42.0	97.7	100.0	94.8
Estonia	159.0	63.3	36.7	97.6	97.6	97.6
Finland	90.3	81.9	18.1	96.2	96.2	96.3
France	196.0	35.8	64.2	98.1	98.0	98.1
Germany	278.1	68.8	31.2	97.9	98.5	96.7
Greece	45.2	56.0	44.0	92.1	92.1	92.1
Hungary	173.5	15.2	84.8	93.8	95.7	93.5
Iceland	26.4	56.8	43.2	46.3	91.3	28.1
Ireland	74.1	91.9	8.1	97.7	98.8	87.5
Israel	60.0	57.1	42.9	70.0	68.6	72.0
Italy	145.8	32.8	67.2	61.4	61.4	61.4
Latvia	169.6	59.2	40.8	81.5	79.7	84.4
Liechtenstein	350.0	71.4	28.6	80.0	76.9	88.9
Lithuania	186.5	59.3	40.7	86.7	84.6	89.9
Luxembourg	237.5			100.0		
Malta				0.0	0.0	0.0
Netherlands	165.9	54.9	45.1	96.1	96.4	95.7
Norway	101.6	79.5	20.5	87.0	89.6	78.2
Poland	213.4	79.2	20.8	92.8	92.8	92.8
Portugal	99.1	74.9	25.1	68.2	95.3	36.8
Romania						
Slovakia	261.2	47.9	52.1	87.2	88.7	85.9
Slovenia	282.6	49.8	50.2	94.2	94.2	94.2
Spain	46.5	58.5	41.5	81.9	78.4	87.5
Sweden	120.9	85.3	14.7	87.7	88.7	81.8
Switzerland	333.2	69.7	30.3	89.5	87.5	94.4
The FYR of Macedonia						
Turkey	137.5	65.4	34.6	88.0	87.1	89.7
United Kingdom	139.0	64.2	35.8	92.4	98.9	82.7
Yugoslavia	121.3	19.0	81.0	89.5	89.7	89.5
Total: Europe						
of which: EU 15	**140.5**			**90.6**		
Armenia	185.7	0.0	100.0	9.1	0.0	9.3
Azerbaijan	170.0	1.2	98.8	20.4	88.6	20.2
Belarus	162.5	70.3	29.7	80.7	80.7	80.7
Georgia	147.0	30.0	70.0	20.0	20.0	20.0
Kazakhstan	75.0	62.2	31.9	100.0	95.1	92.2
Kyrgyzstan				0.0	0.0	0.0
Republic of Moldova	122.8	0.6	99.4	62.3	50.0	62.3
Russian Federation	116.0	73.3	26.7	71.3	65.3	95.2
Tajikistan				0.0	0.0	0.0
Turkmenistan	3.8	6.0	94.0	97.2	97.3	97.2
Ukraine	185.1			65.5		
Uzbekistan				0.0	0.0	0.0
Total: CIS				**71.0**		
Canada	137.9	73.6	26.4	59.1	56.3	68.7
United States of America	136.5	55.0	45.0	91.2	91.2	91.2
Total: North America	**137.0**	**62.3**	**37.7**	**75.2**	**70.9**	**83.7**
Australia	39.2	20.1	79.9	7.5	62.4	6.1
Japan	144.7			96.7		
New Zealand	199.7	98.3	1.7	14.5	55.6	0.3
Total: Other TBFRA	**105.4**			**29.9**		
Grand total						

TABLE 37

Changes over time in growing stock on forest and forest available for wood supply

Country	Reference period 1	Reference period 2	On forest			On forest available for wood supply		
			Reference period 1	Reference period 2	Average annual change	Reference period 1	Reference period 2	Average annual change
			(1000 m^3 overbark)		(±1000 m^3 o.b./year)	(1000 m^3 overbark)		(±1000 m^3 o.b./year)
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
Albania	1957	1995	80,467	83,455	77	80,467	73,634	-175
Austria ©	1986-90	1992-96	1,080,121	1,097,307	2,864	1,020,121	1,037,307	2,864
Belgium ©	1982	1997	122,047	141,033	1,266	121,245	139,835	1,239
Bosnia and Herzegovina	1990	1995						
Bulgaria	1985	1995	404,800	467,345	6,255	349,747	401,141	5,139
Croatia	1986	1996	328,207	356,302	2,809	310,683	337,700	2,702
Cyprus	1981	1991			40	3,123	3,055 ②	-7
Czech Republic ©	1986	1995	639,873	683,806	4,393	622,717	668,242	4,552
Denmark ©	1980	1990	43,200	55,200	1,200	43,200	55,200 ②	1,200
Estonia	1988	1996	259,680	314,537	6,857	249,230	307,120	7,236
Finland	1980-89	1991-96	1,753,000	1,940,000	19,700	1,713,000	1,867,000	16,200
France ©	1987	1997	2,538,961	2,891,777	35,282	2,489,756	2,835,655	34,590
Germany ©	1961	1987		2,880,000	35,000		2,820,000	35,000
Greece		1992		151,788			139,800	
Hungary ©	1990	1996	288,004	314,667	4,443	274,189	295,301	3,519
Iceland	1990-1990	1998-1998	760	800	5	338	370	4
Ireland	1987	1996	25,000	42,000 ②	1,700	24,000	41,000 ②	1,700
Israel								
Italy	1985	1995	712,447	1,428,742	71,630	557,000	876,744	31,974
Latvia	1988	1997	432,000	502,000	7,000	354,240	409,260	5,502
Liechtenstein	1975	1995	1,570	1,750	9	1,260	1,400	7
Lithuania	1987	1996	326,820	362,637	3,582	271,260	314,355	4,309
Luxembourg	1985	1997	20,377	20,217 ②	160	20,377	20,217 ②	160
Malta		1996		80			0	
Netherlands ©	1988-92	1991-95	52,191	54,209	672	50,070	52,088	672
Norway	1980-86	1994-96	621,332	771,448	11,547	534,717	671,412	10,515
Poland	1987-91	1992-96	1,797,258	1,908,019	22,152	1,690,298	1,771,042	16,149
Portugal ©	1985	1995	201,021	275,760	7,474	144,153	188,020	4,386
Romania								
Slovakia ©	1988	1996	413,945	510,948	12,125	368,204	445,547	9,668
Slovenia ©	1986	1996	208,500	310,577	10,208	202,200	292,491	9,029
Spain	1970	1990	456,721	594,111	6,870	411,049	486,815	3,788
Sweden ©	1985-89	1992-96	2,715,115	2,928,117	30,429	2,389,748	2,566,532	25,255
Switzerland ©	1983-85	1993-95	361,286	395,450 ②	3,383	320,605	354,050 ②	3,311
The FYR of Macedonia ©	1990	1995		63,420			44,000	
Turkey	196-72	1973-96	1,044,602	1,349,323	12,697	1,032,352	1,187,309	6,457
United Kingdom ©	1980	1995	241,000	317,000	5,067	217,000	293,000	5,067
Yugoslavia ©	1979	1995	304,434	306,887 ②	-144	284,050	274,720 ②	-549
Total: Europe								
of which: EU 15				**14,817,261**			**13,419,213**	
Armenia	1988	1996	39,900	42,740	355	2,600	3,900	160
Azerbaijan ©	1983	1988	119,000	127,440	1,688	25,010	26,000	198
Belarus	1988	1994	891,230	1,092,550 ②	33,553	720,130	909,250 ②	31,520
Georgia ©	1990	1995	421,190	434,000	2,562	84,200	86,800	520
Kazakhstan	1988	1993	354,030	369,810	3,156	354,030	369,810	3,156
Kyrgyzstan								
Republic of Moldova	1988	1997	35,290	41,600	631	20,690	25,900	521
Russian Federation ©	1988	1993	86,053,552	85,486,752	-113,360	61,768,856	60,922,156	-169,340
Tajikistan ©	1988	1995	5,200	5,620	60	0	0	0
Turkmenistan ©	1990	1995	14,100	14,100	0	13,705	13,705	0
Ukraine	1988	1996	1,319,700	1,695,912	47,026	894,630	1,110,470	26,980
Uzbekistan ©	1988	1995	11,000	19,624 ②	1,078			
Total: CIS								
Canada ©	1980	1994	28,294,000	29,364,059	76,400	16,722,000	17,354,560	45,200
United States of America ©	1987	1992	28,754,000	29,656,000	180,400	26,225,000	27,035,000	162,000
Total: North America								
Australia ©		1994		8,635,115			644,683	
Japan	1986	1995	2,862,330	3,483,234 ②	68,989	2,862,330	3,483,234 ②	68,989
New Zealand ©	1986	1996	2,428,016	2,553,000	12,498	244,675	369,659	12,498
Total: Other TBFRA								
Grand total								

© See notes and comments in Chapter III.

② The data for "Reference period 2" in this table might be different than in ***Enquiry Table 14*** "Total woody biomass and volume of growing stock", on comparing with "Trees on Forest, total (item 14.1) and "Trees on forest available for wood supply (item 14.5A)".

TABLE 38

Changes over time in growing stock on forest available for wood supply by species groups

Country	Reference period 1	Reference period 2	Coniferous			Broadleaved		
			Reference period 1	Reference period 2	Average annual change	Reference period 1	Reference period 2	Average annual change
			(1000 m^3 overbark)		(1000 m^3 o.b./year)	(1000 m^3 overbark)		(1000 m^3 o.b./year)
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
Albania	1957	1995	10,783	16,155	138	69,684	57,479	-313
Austria	1986-90	1992-96	840,597	849,309	1,452	179,524	187,998	1,412
Belgium	1982	1997	56,335	64,335	533	64,910	75,500	706
Bosnia and Herzegovina	1990	1995						
Bulgaria	1985	1995	143,661	162,617	1,896	206,086	238,524	3,244
Croatia	1986	1996	46,910	46,416	-49	263,773	291,284	2,751
Cyprus	1981	1991	3,123	3,055	-7	0	0	0
Czech Republic	1986	1995	536,808	560,729	2,392	85,909	107,513	2,160
Denmark	1980	1990	22,800	31,400	860	20,400	23,800	340
Estonia	1988	1996	175,030	194,413	2,423	74,200	112,707	4,813
Finland	1980-89	1991-96	1,406,000	1,529,000	12,950	307,000	338,000	3,250
France	1987	1997	870,733	1,015,083	14,435	1,619,023	1,820,572	20,155
Germany	1961	1987		1,940,000	24,000		880,000	11,000
Greece		1992		78,300			61,500	
Hungary	1990	1996	39,337	44,916	930	234,852	250,385	2,589
Iceland	1990-1990	1998-1998	182	210	4	156	160	1
Ireland	1987	1996	23,500	39,500	1,600	500	1,500	100
Israel								
Italy	1985	1995	201,401	287,927	8,653	355,599	588,817	23,322
Latvia	1988	1997	209,000	242,205	3,320	145,240	167,055	2,182
Liechtenstein	1975	1995	900	1,000	5	360	400	2
Lithuania	1987	1996	156,920	186,470	2,954	114,340	127,885	1,355
Luxembourg	1985	1997						
Malta		1996			0			
Netherlands	1988-92	1991-95	28,011	28,594	195	22,059	23,494	477
Norway	1980-86	1994-96	440,470	533,923	7,189	94,247	137,489	3,326
Poland	1987-91	1992-96	1,339,487	1,403,202	12,743	350,811	367,841	3,406
Portugal	1985	1995	116,188	140,871	2,468	27,965	47,149	1,918
Romania								
Slovakia	1988	1996	183,522	213,576	3,757	184,682	231,971	5,911
Slovenia	1986	1996	105,100	145,660	4,056	97,100	146,831	4,973
Spain	1970	1990	244,490	284,882	2,020	166,559	201,933	1,768
Sweden	1985-89	1992-96	2,038,090	2,188,639	21,507	351,658	377,893	3,748
Switzerland	1983-85	1993-95	228,490	246,284	1,762	92,115	107,766	1,550
The FYR of Macedonia	1990	1995						
Turkey	1963-72	1973-96	649,726	776,132	5,267	382,626	411,177	1,190
United Kingdom	1980	1995	116,000	188,000	4,800	101,000	105,000	267
Yugoslavia	1979	1995	72,737	52,135	-1,212	211,313	222,585	663
Total: Europe								
of which: EU 15								
Armenia	1988	1996	0	0	0	2,600	3,900	160
Azerbaijan	1983	1988	340	350	2	24,670	25,990	264
Belarus	1988	1994	505,830	641,380	22,591	214,300	267,870	8,928
Georgia	1990	1995	25,300	26,100	160	58,900	60,700	360
Kazakhstan	1988	1993	221,180	230,040	1,772	115,570	117,880	462
Kyrgyzstan								
Republic of Moldova	1988	1997	120	150	3	20,570	25,750	518
Russian Federation	1988	1993	45,674,209	44,641,235	-206,595	16,094,650	16,280,920	37,255
Tajikistan	1988	1995	0	0	0	0	0	0
Turkmenistan	1990	1995	817	817	0	12,888	12,888	0
Ukraine	1988	1996						
Uzbekistan	1988	1995						
Total: CIS								
Canada	1980	1994	12,310,000	12,772,573	33,000	4,412,000	4,581,987	12,200
United States of America	1987	1992	14,966,000	14,874,000	-18,400	11,259,000	12,161,000	180,400
Total: North America								
Australia		1994		129,676			515,007	
Japan	1986	1995	1,785,839	2,310,521	58,298	1,076,491	1,172,713	10,691
New Zealand	1986	1996	240,399	363,310	12,291	4,276	6,349	207
Total: Other TBFRA								
Grand total								

TABLE 39

Volume of dead trees in standing volume

Country	Total	On forest			On other wooded land and trees outside the forest
		Total	Available for wood supply	Not available for wood supply	
			(1000 m^3 o.b.)		
(1)	(2)	(3)	(4)	(5)	(6)
Albania ©	490	490	467	61	
Austria ©	23,000	23,000	18,000	5,000	
Belgium					
Bosnia and Herzegovina					
Bulgaria ©		1,238	1,058	180	
Croatia ©	1,967	1,967	1,688	279	
Cyprus			20		
Czech Republic ©	17,085	17,085	16,700	385	
Denmark ©	1,300	650	550	100	
Estonia	4,435	4,435	4,270	165	
Finland	39,000	38,000	31,000	7,000	
France ©	17,872	17,872	17,521	351	
Germany					
Greece ©	2,380	2,380	2,190	190	
Hungary ©	9,125	9,125	8,563	562	
Iceland ©	0	0	0	0	
Ireland					
Israel					
Italy					
Latvia		12,048	9,822	2,226	
Liechtenstein	7	7	6	1	
Lithuania	8,900	8,900	7,530	1,370	
Luxembourg		140	140	0	
Malta			0		
Netherlands ©	1,306	1,306	1,264	42	
Norway ©	42,145	38,016	30,381	7,635	
Poland ©	24,804	24,804	23,024	1,781	
Portugal ©	14,358	13,610	1,172	12,438	
Romania					
Slovakia ©	638	638	378	260	
Slovenia ©	6,800	6,393	5,850	543	
Spain ©	11,882	11,882	9,736	2,145	
Sweden ©	77,532	73,340	55,069	18,271	4,192
Switzerland ©	13,063	13,063	10,624	2,439	
The FYR of Macedonia					
Turkey ©		12,818			
United Kingdom ©	1,000	1,000	500	500	
Yugoslavia ©		97,546	87,274	8,464	2,256
Total: Europe					
of which: EU 15					
Armenia	1,550	1,550	160	1,390	
Azerbaijan	3,059	3,059	624	2,363	0
Belarus	18,200	18,200	14,400	3,800	
Georgia					
Kazakhstan					
Kyrgyzstan			0		
Republic of Moldova	210	210	140	70	
Russian Federation ©	4,663,500	3,163,500	2,193,000	970,500	150,000
Tajikistan			0		
Turkmenistan					
Ukraine	8,340	8,300	4,100	4,200	
Uzbekistan			0		
Total: CIS					
Canada					
United States of America ©	787,000	574,000	523,000	51,000	
Total: North America					
Australia					
Japan					
New Zealand					
Total: Other TBFRA					
Grand total					

© See notes and comments in Chapter III.

TABLE 40

Total woody biomass

Country	Total woody biomass	Above-stump biomass					Stumps and roots
		Total		Trees on forest	Other trees	Other woody biomass	
		biomass	Share of total woody biomass				
	(1000 m.t. oven-dry)		(per cent)	(1000 m.t. oven-dry)			
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Albania ©	68,741	59,757	86.9	59,757	0	0	8,984
Austria ©	1,160,710	967,258 ①	83.3	958,093	8,250	915	193,452
Belgium ©	78,332	65,519	83.6	65,519			12,813
Bosnia and Herzegovina							
Bulgaria ©	325,505	271,255	83.3	271,230	25		54,250
Croatia ©	230,554	194,767 ①	84.5	189,322		5,445	35,787
Cyprus				2,500			
Czech Republic ©	418,213	332,813	79.6	328,598	1,715	2,500	85,400
Denmark ©	39,165	29,165	74.5	25,665	1,500	2,000	10,000
Estonia	202,505	176,365 ①	87.1	171,500	4,260	605	26,140
Finland	1,294,031	1,104,499	85.4	1,086,797	12,207	5,495	189,532
France ©	1,677,095	1,466,998 ①	87.5	1,401,100	31,920	33,978	210,097
Germany ©	1,840,000	1,440,000	78.3	1,440,000	0	0	400,000
Greece ©	104,072	86,727	83.3	84,455	2,272		17,345
Hungary ©	256,382	213,652	83.3	203,352	10,300		42,730
Iceland ©	830	690	83.1	495	195		140
Ireland ©	17,400	14,500	83.3	14,500			2,900
Israel							
Italy	818,566	781,819 ①	95.5	731,507	45,983	4,329	36,747
Latvia	355,193	291,285	82.0	268,685	21,400	1,200	63,908
Liechtenstein	1,020	820	80.4	820			200
Lithuania	236,610	202,230	85.5	195,400	6,050	780	34,380
Luxembourg							
Malta	113	98	87.0				15
Netherlands ©	58,573	43,997 ①	75.1	36,360	7,637	0	14,576
Norway ©	531,219	454,363 ①	85.5	424,678	29,685		76,856
Poland ©	1,012,931	878,717 ①	86.7	841,375	37,342	0	134,214
Portugal ©	192,079	122,822 ①	63.9	110,331	7,984	4,507	69,257
Romania				782,975			
Slovakia ©	334,032	291,207 ①	87.2	285,497		5,710	42,825
Slovenia ©	234,920	206,956 ①	88.1	195,342	5,234	6,380	27,964
Spain ©	373,383	326,669	87.5	326,536	163		46,714
Sweden ©	2,091,927	1,776,676	84.9	1,729,948	45,728	1,000	315,251
Switzerland ©	280,282	207,963	74.2	193,763	11,000	3,200	72,319
The FYR of Macedonia							
Turkey ©	943,152	806,786	85.5	734,018	72,768		136,366
United Kingdom ©	264,000	220,000 ①	83.3	188,000	27,000	5,000	44,000
Yugoslavia ©		69,012		66,774	1,545	693	
Total: Europe							
of which: EU 15							
Armenia	26,630	22,630 ①	85.0	21,900	330	400	4,000
Azerbaijan	115,830	98,580	85.1	98,580	0	0	17,250
Belarus	760,021	632,941 ①	83.3	631,715	566	660	127,080
Georgia ©	334,397	290,780	87.0	290,780	0		43,617
Kazakhstan	212,641	184,905	87.0	184,905			27,736
Kyrgyzstan							
Republic of Moldova	24,840	21,600	87.0	20,800	800	650	3,240
Russian Federation ©	79,262,750	60,771,000 ①	76.7	45,482,000	8,539,000	6,750,000	18,491,750
Tajikistan ©	4,680	3,900	83.3	3,900			780
Turkmenistan ©	12,115	10,000	82.5	9,588	0		2,115
Ukraine							
Uzbekistan							
Total: CIS							
Canada ©	23,782,119	20,240,101	85.1	20,240,101			3,542,018
United States of America ©	37,254,000	33,048,000	88.7	23,492,000	8,734,000	822,000	4,206,000
Total: North America	**61,036,119**	**53,288,101**	**87**	**43,732,101**			**7,748,018**
Australia ©	10,768,028	8,973,357 ①	83.3	8,973,357			1,794,671
Japan ©	2,553,167	2,127,639 ①	83.3	2,126,872	767		425,528
New Zealand ©	2,176,250	1,742,250	80.1	1,725,000	17,250		434,000
Total: Other TBFRA	**15,497,445**	**12,843,246**	**82.9**	**12,825,229**			**2,654,199**
Grand total							

© See notes and comments in Chapter III.

① Adjustment to achieve conformity with TBFRA definitions arrived at by the National Correspondent.

TABLE 41

Above-stump woody biomass of trees on forest

Country	Forest						Forest available for wood supply	Forest not available for wood supply
	Coniferous			Broadleaved				
	Biomass	Share of total	Ratio: Biomass/ Growing stock	Biomass	Share of total	Ratio: Biomass/ Growing stock		
	(1000 m.t. oven-dry)	(per cent)	(m.t. oven-dry/ m^3 o.b.)	(1000 m.t. oven-dry)	(per cent)	(m.t. oven-dry/ m^3 o.b.)	(1000 m.t. oven-dry)	
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
Albania ©	11,338	19.0	0.60	48,419	81.0	0.75	52,280	7,477
Austria ©	769,155	80.3	0.85	188,938	19.7	1.01	904,468	53,625
Belgium ©	25,377	38.7	0.39	40,142	61.3	0.52	64,913	606
Bosnia and Herzegovina								
Bulgaria ©	87,382	32.2	0.45	183,848	67.8	0.67	233,577	37,653
Croatia ©	20,601	10.9	0.40	168,721	89.1	0.55	179,638	9,684
Cyprus ©	2,400	96.0	0.50	100	4.0	0.50	1,457	
Czech Republic ©	258,249	78.6	0.45	70,349	21.4	0.64	321,136	7,462
Denmark ©	12,520	48.8	0.40	13,145	51.2	0.55	25,260	405
Estonia	102,100	59.5	0.51	69,400	40.5	0.60	167,400	4,100
Finland	842,761	77.5	0.53	223,882	20.6	0.64	1,042,970	43,827
France ©	411,438	29.4	0.40	989,662	70.6	0.53	1,377,809	23,291
Germany ©	985,000	68.4	0.50	455,000	31.6	0.50	1,410,000	30,000
Greece ©	38,825	46.0	0.46	45,630	54.0	0.68	77,810	6,645
Hungary ©	23,304	11.5	0.50	180,048	88.5	0.67	190,824	12,528
Iceland ©	125	25.3	0.54	370	74.7	0.65	215	280
Ireland ©	13,200	91.0	0.33	1,300	9.0	0.33	14,200	300
Israel								
Italy	198,005	27.1	0.42	533,502	72.9	0.56	448,887	282,620
Latvia	145,903	54.3	0.48	122,782	45.7	0.62	218,954	49,731
Liechtenstein	520	63.4	0.40	300	36.6	0.67	665	155
Lithuania	105,800	54.1	0.48	89,600	45.9	0.63	169,200	26,200
Luxembourg								
Malta							0	
Netherlands ©	18,215	50.1	0.61	18,145	49.9	0.74	34,933	1,427
Norway ©	302,952	71.3	0.51	121,726	28.7	0.69	365,579	59,099
Poland ©	612,553	72.8	0.41	228,822	27.2	0.58	780,972	60,402
Portugal ©	40,264	36.5	0.27	70,067	63.5	0.55	63,755	46,133
Romania ©	248,672	31.8	0.47	534,303	68.2	0.65		
Slovakia ©	109,845	38.5	0.46	175,652	61.5	0.65	248,953	36,544
Slovenia ©	79,345	40.6	0.51	115,997	59.4	0.74	183,965	11,377
Spain ©	185,294	56.7	0.51	141,242	43.3	0.61	268,881	57,664
Sweden ©	1,422,082	82.2	0.58	307,866	17.8	0.67	1,490,982	238,966
Switzerland ©	116,246	60.0	0.41	77,517	40.0	0.68	174,046	19,717
The FYR of Macedonia								
Turkey ©	442,411	60.3	0.50	291,607	39.7	0.64	646,870	87,148
United Kingdom ©	82,000	43.6	0.43	106,000	56.4	0.83	168,000	20,000
Yugoslavia ©	3,132	4.7	0.05	63,642	95.3	0.24	59,740	5,078
Total: Europe								
of which: EU 15								
Armenia	410	1.9	0.52	21,490	98.1	0.51	1,960	19,940
Azerbaijan	262	0.3	0.75	98,318	99.7	0.77	9,750	36,915
Belarus	411,555	65.1	0.49	220,160	34.9	0.62	505,770	125,945
Georgia ©	78,120	26.9	0.60	212,660	73.1	0.70	59,000	231,780
Kazakhstan	114,052	61.7	0.47	70,853	38.3	0.55	173,960	
Kyrgyzstan								
Republic of Moldova	150	0.7	0.50	20,650	99.3	0.50	12,950	7,850
Russian Federation ©	36,807,000	80.9	0.54	8,675,000	19.1	0.51	32,286,000	13,196,000
Tajikistan ©	1,700	43.6	0.54	2,200	56.4	0.89	0	3,900
Turkmenistan ©	504	5.3	0.60	9,282	96.8	0.70	9,320	268
Ukraine								
Uzbekistan							0	
Total: CIS								
Canada ©	15,490,711	76.5	0.68	4,749,390	23.5	0.71	11,969,513	8,270,588
United States of America ©	11,144,000	47.4	0.68	12,348,000	52.6	0.93	21,416,000	2,077,000
Total: North America	**26,634,711**	**50.0**	**0.68**	**17,097,390**	**32.1**	**0.85**	**33,385,513**	**10,347,588**
Australia ©	124,684	1.4	0.60	8,848,673	98.6	1.05	618,563	8,354,794
Japan ©	1,208,096	56.8	0.52	918,776	43.2	0.78	2,039,843	87,029
New Zealand ©	429,000	24.9	0.66	1,296,000	75.1	0.68	232,000	1,493,000
Total: Other TBFRA	**1,761,780**	**13.7**	**0.56**	**11,063,449**	**86.1**	**0.96**	**2,890,406**	**9,934,823**
Grand total								

© See notes and comments in Chapter III.

TABLE 42

Gross and net annual increment: general data

Country	Reference period	Gross annual increment				Net annual increment			
		Total	Forest	Other wooded land	Trees outside the forest	Total	Forest	Other wooded land	Trees outside the forest
		(1000 m^3 o.b.)							
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
Albania ©	1995	1,363	1,363	0	0	1,004	1,004	0	0
Austria	1992-96	29,733	29,433	200	100	28,137	27,837	200	100
Belgium ©	1982-97	5,176	5,176	0		5,176	5,176	0	
Bosnia and Herzegovina ©	1995					5,480	5,480		
Bulgaria	1995	12,311	12,310		1	11,973	11,972		1
Croatia ©	1986-96	9,651	9,651		0	7,543	7,423	120	0
Cyprus ©	1980-90					100	90	10	
Czech Republic ©	1995	23,056	22,915	0	141	20,856	20,715	0	141
Denmark ©	1990	3,770	3,520	250	0	3,450	3,200	250	0
Estonia	1996	10,110	9,830	160	120	7,677	7,452	130	95
Finland ©	1991-96	75,974	74,970	282	722	74,516	73,666	150	700
France ©	1997	102,215	102,096	0	119	93,330	93,211	0	119
Germany ©	1995-2020	102,736	100,722	0	2,014	92,462	90,649	0	1,813
Greece ©	1992	4,193	4,118	75		3,882	3,813	69	
Hungary ©	1996	12,093	11,493	0	600	10,884	10,344	0	540
Iceland ©	1998	67	58	9	0	67	58	9	0
Ireland ©	1996	3,500	3,500			3,500	3,500		
Israel ©	1997	404	380	24		404	380	24	
Italy	1995	32,526	30,822	0	1,704	32,211	30,507	0	1,704
Latvia	1996	17,800	16,500	500	800	14,410	13,200	450	760
Liechtenstein	1995	28	28			25	25		
Lithuania	1996	12,844	12,260	324	260	10,263	9,808	252	203
Luxembourg	1985-97					667	667		
Malta	1996							0	
Netherlands ©	1991-95	3,158	2,538	0	620	2,917	2,328	0	589
Norway ©	1994-96	27,370	26,209	1,161	0	25,223	24,391	832	0
Poland ©	1992-96	57,984	55,879	0	2,105	44,976	42,871	0	2,105
Portugal	1995	15,926	15,005	218	703	15,195	14,312	213	670
Romania ©	1984		34,650				31,878		
Slovakia ©	1996	15,929	15,929			13,858	13,858		
Slovenia ©	1996	7,120	7,064	46	10	6,395	6,339	46	10
Spain ©	1990	30,135	30,120	15		30,108	30,092	15	
Sweden ©	1992-96	103,415	101,458	991	966	95,822	94,122	760	940
Switzerland ©	1985-95	10,107	9,831	276		9,124	8,848	276	
The FYR of Macedonia ©	1995	1,010	1,010			1,010	1,010		
Turkey	1996	46,886	38,485	3,854	4,547	45,002	36,601	3,854	4,547
United Kingdom ©	1995	15,390	14,810	5	575	15,270	14,690	5	575
Yugoslavia ©	1995	7,619	7,619	0	0	6,858	6,858	0	0
Total: Europe									
of which: EU 15						**496,643**	**487,770**		
Armenia	1996	464	400	44	20	416	360	39	17
Azerbaijan	1988	1,682	1,682	6	0	1,440	1,440	5	0
Belarus	1994	36,866	36,866	0	0	24,960	24,960	0	0
Georgia	1995					4,000	4,000	0	
Kazakhstan	1993	6,379	6,140	239	0	6,379	6,140	239	0
Kyrgyzstan									
Republic of Moldova	1997	1,206	1,140	66	0	1,095	1,035	60	0
Russian Federation ©	1993	1,803,100	1,328,100	225,000	250,000	1,284,000	969,000	150,000	165,000
Tajikistan ©	1995	90	82	8	0	90	82	8	0
Turkmenistan ©	1995					130	122	0	
Ukraine	1996	34,960	33,757	10	1,193	31,470	30,357	10	1,103
Uzbekistan	1988								
Total: CIS									
Canada ©	1994					442,030	442,030	0	
United States of America ©	1987-92	1,309,000	954,000	355,000	0	1,044,000	761,000	283,000	0
Total: North America						**1,486,030**	**1,203,030**	**283,000**	
Australia ©	1994	88,110	88,110			88,110	88,110		
Japan ©	1990-95	69,205	69,205	3		69,205	69,205	3	
New Zealand ©	1996					34,200	33,700	500	0
Total: Other TBFRA						**191,515**	**191,015**		
Grand total									

© See notes and comments in Chapter III.

TABLE 43

Gross annual increment on forest by species groups

Country	Forest		Forest available for wood supply			Forest not available for wood supply		
	Coniferous	Broadleaved	Total	Coniferous	Broadleaved	Total	Coniferous	Broadleaved
				(1000 m^3 o.b.)				
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
Albania ©	296	1,067	1,205	255	950	158	41	117
Austria	23,703	5,730	28,933	23,203	5,730	500	500	0
Belgium ©	3,369	1,807	5,137	3,359	1,778	39	10	29
Bosnia and Herzegovina								
Bulgaria	6,232	6,078	10,523	5,235	5,288	1,787	997	790
Croatia ©	1,148	8,503	9,171	1,062	8,109	480	86	394
Cyprus ©			47	47	0			
Czech Republic ©	19,231	3,684	22,555	18,929	3,626	360	302	58
Denmark ©	2,420	1,100	3,520	2,420	1,100	0	0	0
Estonia	5,790	4,040	9,440	5,520	3,920	390	270	120
Finland ©	58,573	16,397	73,753	57,654	16,099	1,217	919	298
France ©	44,306	57,790	100,454	43,595	56,859	1,642	711	931
Germany ©	71,889	28,833	98,887	70,579	28,308	1,835	1,310	525
Greece ©	2,178	1,940	3,800	2,000	1,800	318	178	140
Hungary ©	2,019	9,474	11,028	1,960	9,068	465	59	406
Iceland ©	40	18	37	32	5	21	8	13
Ireland ©	3,420	80	3,450	3,400	50	50	20	30
Israel ©	214	166	280	160	120	100	54	46
Italy	10,074	20,748	19,028	6,213	12,815	11,794	3,861	7,933
Latvia	9,590	6,910	13,811	8,027	5,784	2,689	1,563	1,126
Liechtenstein	18	10	20	13	7	8	5	3
Lithuania	7,540	4,720	10,629	6,665	3,964	1,631	875	756
Luxembourg								
Malta								
Netherlands ©	1,304	1,234	2,409	1,240	1,169	129	64	65
Norway ©	20,067	6,142	23,662	18,630	5,032	2,547	1,437	1,110
Poland ©	45,973	9,906	51,867	42,672	9,195	4,012	3,301	711
Portugal	8,719	6,286	13,523	8,265	5,258	1,482	454	1,028
Romania ©	12,190	22,460						
Slovakia ©	7,648	8,281	14,180	6,715	7,465	1,749	933	816
Slovenia ©	3,335	3,729	6,852	3,244	3,608	212	91	121
Spain ©	17,580	12,540	28,614	16,701	11,913	1,506	879	627
Sweden ©	83,682	17,776	91,670	76,516	15,154	9,788	7,166	2,622
Switzerland ©	6,558	3,273	9,062	5,935	3,127	769	623	146
The FYR of Macedonia								
Turkey	23,639	14,846	34,177	20,752	13,425	4,308	2,887	1,421
United Kingdom ©	12,860	1,950	14,710	12,850	1,860	100	10	90
Yugoslavia ©	1,329	6,290	6,827	1,037	5,789	792	292	501
Total: Europe								
of which: EU 15								
Armenia	80	320	40	0	40	360	80	280
Azerbaijan	24	1,658	273	40	234	1,403	-16	1,425
Belarus	23,703	12,713	36,416	23,703	12,713	450	0	0
Georgia								
Kazakhstan	2,520	3,360	3,519	2,281	978	2,621	239	2,382
Kyrgyzstan								
Republic of Moldova	7	1,133	638	3	635	502	4	498
Russian Federation ©	957,600	370,500	1,002,000	642,600	359,400	326,100	315,000	11,100
Tajikistan ©	41	41	0	0	0	82	41	41
Turkmenistan								
Ukraine			23,380			10,377		
Uzbekistan								
Total: CIS								
Canada								
United States of America ©	529,000	425,000	870,000	483,000	387,000	84,000	46,000	38,000
Total: North America								
Australia ©	10,881	77,229	34,615	10,789	23,826	53,495	92	53,403
Japan ©	57,327	11,878	69,205	57,327	11,878		0	0
New Zealand								
Total: Other TBFRA								
Grand total								

© See notes and comments in Chapter III.

TABLE 44

Natural losses (annual) on forest

Country	Forest			Forest available for wood supply			Forest not available for wood supply		
	Total	Coniferous	Broadleaved	Total	Coniferous	Broadleaved	Total	Coniferous	Broadleaved
	(1000 m^3 o.b.)								
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
Albania ©	359	63	296	310	59	251	49	4	45
Austria	1,596	1,277	319	1,596	1,277	319	0	0	0
Belgium									
Bosnia and Herzegovina									
Bulgaria	338	247	91	287 ①	207	79	51	39	12
Croatia ©	2,228	494	1,734	2,038	461	1,577	190	33	157
Cyprus ©				2	2	0			
Czech Republic ©	2,200	1,846	354	2,200	1,846	354	0	0	0
Denmark ©	320	220	100	320	220	100	0	0	0
Estonia	2,378	1,511	867	2,303 ①	1,455	848	75	56	19
Finland ©	1,304	1,024	280	1,283	1,008	275	21	16	5
France ©	8,885	4,373	4,512	8,155 ①	4,057	4,098	730	316	414
Germany ©	10,073	7,189	2,884	9,889	7,058	2,831	184	131	53
Greece ©	305	260	45	280	240	40	25	20	5
Hungary ©	1,149	404	745	1,103 ①	392	711	46	12	34
Iceland ©	0	0	0	0	0	0	0	0	0
Ireland									
Israel									
Italy	315	101	214	315 ①	101	214	0	0	0
Latvia	3,300	1,918	1,382	2,761	1,607	1,154	539	311	228
Liechtenstein	3	2	1	2	1	1	1	1	0
Lithuania	2,452	1,583	869	2,125	1,399	726	327	184	143
Luxembourg									
Malta									
Netherlands ©	210	115	95	204 ①	112	92	6	3	3
Norway ©	1,818	1,204	614	1,621 ①	1,118	503	197	86	111
Poland ©	13,008	10,056	2,952	12,431 ①	9,606	2,825	577	450	127
Portugal	693	396	297	623	375	248	70	21	49
Romania ©	2,772	975	1,797						
Slovakia ©	2,071	994	1,077	1,843 ①	873	970	228	121	107
Slovenia ©	725	345	380	720 ①	343	377	5	2	3
Spain ©	28	16	12	25 ①	15	10	3	1	2
Sweden ©	7,336	5,704	1,632	6,239	5,002	1,237	1,097	702	395
Switzerland ©	983	656	327	907	594	313	76	62	14
The FYR of Macedonia									
Turkey	1,884	1,243	641	1,658	1,094	564	226	149	77
United Kingdom ©	120	110	10	120 ①	110	10	0	0	0
Yugoslavia ©	762	133	629	682	103	579	80	30	50
Total: Europe									
of which: EU 15									
Armenia	40	10	30	4	0	4	36	10	26
Azerbaijan	242	6	236	36	3	33	206	3	203
Belarus	11,906	7,673	4,183	11,856	7,673	4,183	50	0	0
Georgia									
Kazakhstan	0	0	0	0	0	0	0	0	0
Kyrgyzstan									
Republic of Moldova	105	0	105	58	0	58	47	0	47
Russian Federation ©	359,100	273,600	85,500	260,000 ①	178,600	81,400	99,100	95,000	4,100
Tajikistan ©	0	0	0	0	0	0	0	0	0
Turkmenistan									
Ukraine	3,400			2,110 ①			1,290		
Uzbekistan									
Total: CIS									
Canada									
United States of America ©	193,000	106,000	87,000	176,000	97,000	79,000	17,000	9,000	8,000
Total: North America									
Australia									
Japan									
New Zealand									
Total: Other TBFRA									
Grand total									

© See notes and comments in Chapter III.

① Adjustment to achieve conformity with TBFRA definitions arrived at by the National Correspondent.

TABLE 45

Net annual increment on forest by species groups

Country	Forest		Forest available for wood supply			Forest not available for wood supply		
	Coniferous	Broadleaved	Total	Coniferous	Broadleaved	Total	Coniferous	Broadleaved
				(1000 m^3 o.b.)				
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
Albania ©	233	771	895	196	699	109	37	72
Austria	22,426	5,411	27,337	21,926	5,411	500	500	0
Belgium ©	3,369	1,807	5,137	3,359	1,778	39	10	29
Bosnia and Herzegovina ©								
Bulgaria	5,985	5,987	10,236	5,028	5,209	1,736	958	778
Croatia ©	654	6,769	7,133	601	6,532	290	53	237
Cyprus ©	85	5	44	44	0		41	5
Czech Republic ©	17,385	3,330	20,355	17,083	3,272	360	302	58
Denmark ©	2,200	1,000	3,200	2,200	1,000	0	0	0
Estonia	4,279	3,173	7,137 ①	4,065	3,072	315	214	101
Finland ©	57,549	16,117	72,470	56,646	15,824	1,196	903	293
France ©	39,933	53,278	92,299 ①	39,538	52,761	912	395	517
Germany ©	64,700	25,949	88,998	63,521	25,477	1,651	1,179	472
Greece ©	1,918	1,895	3,520	1,760	1,760	293	158	135
Hungary ©	1,615	8,729	9,925 ①	1,568	8,357	419	47	372
Iceland ©	40	18	37	32	5	21	8	13
Ireland ©	3,420	80	3,450	3,400	50	50	20	30
Israel ©	214	166	280	160	120	100	54	46
Italy	9,973	20,534	18,713 ①	6,112	12,601	11,794	3,861	7,933
Latvia	7,672	5,528	11,050	6,420	4,630	2,150	1,252	898
Liechtenstein	16	9	18	12	6	7	4	3
Lithuania	5,957	3,851	8,504	5,266	3,238	1,304	691	613
Luxembourg			667					
Malta			0	0	0			
Netherlands ©	1,189	1,139	2,205 ①	1,128	1,077	123	61	62
Norway ©	18,863	5,528	22,041 ①	17,512	4,529	2,350	1,351	999
Poland ©	35,917	6,954	39,436 ①	33,066	6,370	3,435	2,851	584
Portugal	8,323	5,989	12,900	7,890	5,010	1,412	433	979
Romania ©	11,215	20,663						
Slovakia ©	6,654	7,204	12,337 ①	5,842	6,495	1,521	812	709
Slovenia ©	2,990	3,349	6,132 ①	2,901	3,231	207	89	118
Spain ©	17,564	12,528	28,589 ①	16,686	11,903	1,503	878	625
Sweden ©	77,978	16,144	85,431 ①	71,514	13,917	8,691	6,464	2,227
Switzerland ©	5,902	2,946	8,155	5,341	2,814	693	561	132
The FYR of Macedonia ©								
Turkey	22,395	14,206	32,519	19,658	12,861	4,082	2,737	1,345
United Kingdom ©	12,750	1,940	14,590 ①	12,740	1,850	100	10	90
Yugoslavia ©	1,196	5,662	6,145	934	5,210	713	262	452
Total: Europe								
of which: EU 15			**459,506**					
Armenia	70	290	36	0	36	324	70	254
Azerbaijan	21	1,420	234	34	200	1,201	-14	1,220
Belarus	16,030	8,530	24,560	16,030	8,530	400	0	0
Georgia	1,200	2,800	800	240	560	3,200	960	2,240
Kazakhstan	2,520	3,360	3,519	2,281	978	2,621	239	2,382
Kyrgyzstan								
Republic of Moldova	7	1,028	580	3	577	455	4	451
Russian Federation ©	684,000	285,000	742,000 ①	464,000	278,000	227,000	220,000	7,000
Tajikistan ©	41	41	0	0	0	82	41	41
Turkmenistan ©	7	115	119	7	112	3	0	3
Ukraine			21,270 ①			9,087		
Uzbekistan								
Total: CIS								
Canada ©	307,570	134,460	227,480 ①	158,280	69,200	214,550	149,290	65,260
United States of America ©	423,000	338,000	694,000	386,000	308,000	67,000	37,000	30,000
Total: North America	**730,570**	**472,460**	**921,480**	**544,280**	**377,200**	**281,550**	**186,290**	**95,260**
Australia ©	10,881	77,229	34,615	10,789	23,826	53,495	92	53,403
Japan ©	57,327	11,878	69,205 ①	57,327	11,878		0	0
New Zealand ©	33,100	600	33,700	33,100	600	0	0	0
Total: Other TBFRA	**101,308**	**89,707**	**137,520**	**101,216**	**36,304**		**92**	**53,403**
Grand total								

© See notes and comments in Chapter III.
① Adjustment to achieve conformity with TBFRA definitions arrived at by the National Correspondent.

TABLE 46

Net annual increment on forest available for wood supply: comparative data

Country	Net annual increment per hectare	Net annual increment as percent of growing stock			Species groups' share of total net annual increment	
		Total	Coniferous	Broadleaved	Coniferous	Broadleaved
	(m^3 o.b./ha)		(per cent)			
(1)	(2)	(3)	(4)	(5)	(6)	(7)
Albania	0.99	1.2	1.2	1.2	21.9	78.1
Austria	8.16	2.6	2.6	2.9	80.2	19.8
Belgium	8.04	3.7	5.2	2.4	65.4	34.6
Bosnia and Herzegovina						
Bulgaria	3.28	2.6	3.1	2.2	49.1	50.9
Croatia	4.22	2.1	1.3	2.2	8.4	91.6
Cyprus	1.03	1.5	1.5		100.0	0.0
Czech Republic	7.95	3.0	3.0	3.0	83.9	16.1
Denmark	7.27	5.9	7.0	4.4	68.8	31.3
Estonia	3.69	2.3	2.1	2.7	57.0	43.0
Finland	3.51	3.9	3.7	4.7	78.2	21.8
France	6.38	3.3	3.9	2.9	42.8	57.2
Germany	8.78	3.2	3.3	2.9	71.4	28.6
Greece	1.14	2.5	2.2	2.9	50.0	50.0
Hungary	5.83	3.4	3.5	3.3	15.8	84.2
Iceland	2.64	10.0	15.2	3.1	86.5	13.5
Ireland	5.95	8.0	8.6	1.4	98.6	1.4
Israel	4.00	6.7	6.7	6.7	57.1	42.9
Italy	3.11	2.1	2.1	2.1	32.7	67.3
Latvia	4.58	2.7	2.7	2.8	58.1	41.9
Liechtenstein	4.50	1.3	1.2	1.5	66.7	33.3
Lithuania	5.04	2.7	2.8	2.5	61.9	38.1
Luxembourg	7.78	3.3				
Malta						
Netherlands	7.02	4.2	3.9	4.6	51.2	48.8
Norway	3.33	3.3	3.3	3.3	79.5	20.5
Poland	4.75	2.2	2.4	1.7	83.8	16.2
Portugal	6.80	6.9	5.6	10.6	61.2	38.8
Romania						
Slovakia	7.23	2.8	2.7	2.8	47.4	52.6
Slovenia	5.92	2.1	2.0	2.2	47.3	52.7
Spain	2.73	5.9	5.9	5.9	58.4	41.6
Sweden	4.02	3.3	3.3	3.7	83.7	16.3
Switzerland	7.69	2.3	2.2	2.6	65.5	34.5
The FYR of Macedonia						
Turkey	3.77	2.7	2.5	3.1	60.5	39.5
United Kingdom	6.92	5.0	6.8	1.8	87.3	12.7
Yugoslavia	2.58	2.1	1.7	2.2	15.2	84.8
Total: Europe						
of which: EU 15	**4.81**	**3.4**				
Armenia	1.71	0.9		0.9	0.0	100.0
Azerbaijan	1.53	0.9	11.0	0.8	14.5	85.5
Belarus	4.12	2.5	2.4	3.0	65.3	34.7
Georgia	1.35	0.9	0.9	0.9	30.0	70.0
Kazakhstan	0.71	1.0	1.0	0.8	64.8	27.8
Kyrgyzstan						
Republic of Moldova	2.75	2.2	2.0	2.2	0.5	99.5
Russian Federation	1.41	1.2	1.0	1.7	62.5	37.5
Tajikistan						
Turkmenistan	0.03	0.9	0.9	0.9	6.0	94.0
Ukraine	3.55	1.9				
Uzbekistan						
Total: CIS						
Canada	1.81	1.3	1.2	1.5	69.6	30.4
United States of America	3.50	2.6	2.6	2.5	55.6	44.4
Total: North America	**2.84**	**2.1**	**2.0**	**2.3**	**59.1**	**40.9**
Australia	2.11	5.4	8.3	4.6	31.2	68.8
Japan	2.97	2.1			82.8	17.2
New Zealand	18.21	9.1	9.1	9.5	98.2	1.8
Total: Other TBFRA	**3.31**	**3.1**			**73.6**	**26.4**
Grand total						

TABLE 47

Annual fellings overbark

Country	Reference period	Total fellings	Forest				Other wooded land	Trees outside forest
			Total	Forest available for wood supply		Forest not available for wood supply	Total	Total
				Total	For commercial use			
		(1000 m3 o.b.)						
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
Albania ©	1995	740	740	677	432	63	0	0
Austria	1992-96	20,041	19,821	19,521	16,511	300	150	70
Belgium ©	1986-95	4,400	4,400	4,400	4,400	0	0	
Bosnia and Herzegovina ©	1995		1,200	1,200				
Bulgaria	1995	4,852	4,852	4,852	3,327	0	0	0
Croatia	1986-96	4,600	4,600	4,600	4,400	0	0	0
Cyprus ©	1986-95	60	50	50	50		10	
Czech Republic ©	1995	16,355 ①	16,345	16,200	16,200	145	0	10
Denmark ©	1996	2,444	2,194	2,194		0	250	0
Estonia	1996		4,028	4,028				
Finland ©	1991-96	54,300	54,300	54,300	47,700	0	0	0
France ©	1996	60,174 ①	60,174	60,174	47,403	0		
Germany ©	1996	48,584 ①	48,584	48,584			0	
Greece	1992							
Hungary ©	1996	6,449	6,049	5,880	5,406	170	0	400
Iceland	1996	0	0	0		0	0	0
Ireland ©	1996	2,330	2,330	2,330	2,330	0	0	
Israel	1997	120	120	120	120	0	0	0
Italy	1995	10,101 ①	8,746	8,746	8,746	0	0	1,355
Latvia ©	1996	8,150	8,010	6,570	5,070	1,440	60	80
Liechtenstein	1995	16	16	16	15	0	0	0
Lithuania	1992-96	5,750	5,570	5,240	3,380	330	130	50
Luxembourg	1992-94					0		
Malta	1996		0	0				
Netherlands ©	1991-95	2,150 ①	1,561	1,438	1,394	123	0	589
Norway ©	1994-96	11,632 ①	11,632	11,632	10,625	0	0	0
Poland ©	1992-96	32,212 ①	31,617	30,532	29,282	1,085		595
Portugal ©	1995	11,500	11,500	11,200	11,000	300		
Romania ©	1993-97		13,600					
Slovakia ©	1996	7,400 ①	7,400	7,100	6,900	300		
Slovenia ©	1996	2,300 ①	2,300	2,300		0	0	0
Spain ©	1994	15,863	12,639	11,028		1,611		3,224
Sweden ©	1992-96	67,766 ①	66,510	66,115	61,488	395	528	728
Switzerland ©	1985-95	7,451	7,451	7,076	6,085	375	0	
The FYR of Macedonia ©	1995	999	999	999				
Turkey	1996	22,150	17,606	17,380	17,380	226	0	4,544
United Kingdom ©	1995	9,500 ①	9,500	9,500	9,400	0	0	0
Yugoslavia ©	1991-95	3,476	3,454	3,082	3,082	372	0	22
Total: Europe								
of which: EU 15								
Armenia	1996	210	200	150	90	50	5	5
Azerbaijan ©	1988	60	60	0	0	0	0	0
Belarus	1996	9,550	9,550	9,450	1,490	100	0	0
Georgia ©	1995	500	500	500		0	0	0
Kazakhstan	1993	1,400	1,400	1,400		0	0	0
Kyrgyzstan								
Republic of Moldova ©	1997	483	483	483		0	0	0
Russian Federation ©	1995	150,200	150,200	125,500	90,500	24,700	0	0
Tajikistan ©	1995	10	10	0	0	10	0	0
Turkmenistan ©	1995	10	10	10		0	0	0
Ukraine	1996	11,600	11,300	8,500		2,800	0	300
Uzbekistan	1995							
Total: CIS								
Canada	1995							
United States of America ©	1992	708,000	523,000	523,000	452,000	0	185,000	0
Total: North America								
Australia	1994			19,560	19,560			
Japan	1995	29,000	29,000	29,000	29,000	0		
New Zealand ©	1996	22,730	22,730	22,730	22,730	0	0	0
Total: Other TBFRA				**71,290**	**71,290**			
Grand total								

© See notes and comments in Chapter III.

① Adjustment to achieve conformity with TBFRA definitions arrived at by the National Correspondent.

TABLE 48

Annual fellings overbark on forest by species groups

Country	Total forest			Forest available for wood supply				
				Coniferous		Broadleaved		Fellings of natural losses on forest available for wood supply
	Coniferous Total	Broadleaved Total	Fellings of natural losses	Total	For commercial use	Total	For commercial use	
	(1000 m^3 o.b.)							
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
Albania ©	84	656	52	80	80	597	352	51
Austria	16,432	3,389	1,596	16,132	14,265	3,389	2,246	1,596
Belgium ©	3,150	1,250		3,150	3,150	1,250	1,250	
Bosnia and Herzegovina								
Bulgaria	1,772	3,080	900	1,772	1,373	3,080	1,953	900
Croatia	700	3,900	500	700	700	3,900	3,700	500
Cyprus ©	50	0		50	50	0	0	
Czech Republic ©	14,940	1,405	2,200	14,810	14,810	1,390	1,390	2,200
Denmark ©	1,468	726	0	1,468		726		0
Estonia								
Finland ©	43,500	10,800	0	43,500	40,500	10,800	7,200	0
France ©	31,180	28,994	2,013	31,180	28,013	28,994	19,390	2,013
Germany ©	37,179	11,405		37,179		11,405		
Greece			401					
Hungary ©	799	5,250	552	777	633	5,103	4,773	537
Iceland	0	0	0	0		0		0
Ireland ©	2,295	35		2,295	2,295	35	35	
Israel	90	30		90	90	30	30	
Italy	1,824	6,922		1,824	1,824	6,922	6,922	
Latvia ©	4,470	3,540	1,440	3,610	2,970	2,960	2,100	1,100
Liechtenstein	12	4		12	11	4	4	
Lithuania	3,510	2,060	1,680	3,410	2,390	1,830	990	1,280
Luxembourg								
Malta	0			0				0
Netherlands ©	1,012	549	91	950	929	488	465	100
Norway ©	10,291	1,341	183	10,291	9,880	1,341	745	183
Poland ©	24,061	7,556	9,521	23,235	22,302	7,297	6,980	9,194
Portugal ©	6,200	5,300	100	6,200	6,000	5,000	5,000	200
Romania ©	5,000	8,600	2,400					
Slovakia ©	4,500	2,900	4,100	4,200	4,100	2,900	2,800	3,900
Slovenia ©	1,500	800	1,100	1,500		800		1,100
Spain ©	7,385	5,254		6,577		4,451		
Sweden ©	57,628	8,882	2,600	57,277	53,268	8,838	8,220	2,588
Switzerland ©	5,442	2,009	246	5,121	4,404	1,955	1,681	226
The FYR of Macedonia								
Turkey	9,992	7,614	1,884	9,843	9,843	7,537	7,537	1,658
United Kingdom ©	8,300	1,200	100	8,300	8,300	1,200	1,100	100
Yugoslavia ©	605	2,849	76	508	508	2,574	2,574	5
Total: Europe								
of which: EU 15								
Armenia	20	180	15	10	10	140	80	15
Azerbaijan ©	0	60	40	0	0	0	0	0
Belarus	6,500	3,050	2,580	6,500	650	3,050	840	2,510
Georgia								
Kazakhstan	600	800	500	600		800		500
Kyrgyzstan								
Republic of Moldova ©	3	480	196	3		480		196
Russian Federation ©	105,000	45,200	19,200	89,300	68,800	36,200	21,700	8,400
Tajikistan ©	0	10		0	0	0	0	
Turkmenistan								
Ukraine			2,000					1,200
Uzbekistan								
Total: CIS								
Canada								
United States of America ©	353,000	170,000	13,075	353,000	318,000	170,000	134,000	13,075
Total: North America								
Australia ©				8,703	8,703	10,857	10,857	
Japan	23,000	6,000		23,000	23,000	6,000	6,000	
New Zealand ©	22,320	410		22,320	22,320	410	410	
Total: Other TBFRA				**54,023**	**54,023**	**17,267**	**17,267**	
Grand total								

© See notes and comments in Chapter III.

TABLE 49

Annual removals overbark on forest

Country	Forest, total			Forest available for wood supply		
	Total	Coniferous	Broadleaved	Total	Coniferous	Broadleaved
	(1000 m^3 o.b.)					
(1)	(2)	(3)	(4)	(5)	(6)	(7)
Albania ©	692	82	610	629	78	551
Austria	17,171	14,558	2,613	16,921	14,308	2,613
Belgium ©	4,400	3,150	1,250	4,400	3,150	1,250
Bosnia and Herzegovina						
Bulgaria	3,887	1,263	2,627	3,887	1,263	2,024
Croatia	4,300	700	3,600	4,300	700	3,600
Cyprus ©	48	48	0	48	48	0
Czech Republic ©	13,140	12,033	1,107	13,022	11,926	1,096
Denmark ©	2,194	1,468	726	2,194	1,468	726
Estonia						
Finland ©	49,500	40,800	8,700	49,500	40,800	8,700
France ©	47,611	22,910	24,701	47,611	22,910	24,701
Germany ©	38,867	29,743	9,124	38,867	29,743	9,124
Greece	2,408	625	1,783	2,408	625	1,783
Hungary ©	5,375	615	4,760	5,174	597	4,577
Iceland	0	0	0	0	0	0
Ireland ©	2,330	2,295	35	2,330	2,295	35
Israel						
Italy	8,381	1,682	6,699	8,381	1,682	6,699
Latvia ©	6,710	4,030	2,680	5,480	3,250	2,230
Liechtenstein	14	10	4	14	10	4
Lithuania	4,740	2,970	1,770	4,450	2,900	1,550
Luxembourg	360	180	180	360	180	180
Malta				0	0	
Netherlands ©	1,219	836	383	1,219	836	383
Norway ©	10,880	9,673	1,207	10,880	9,673	1,207
Poland ©	26,212	19,566	6,646	25,313	18,895	6,418
Portugal ©	11,400	6,100	5,300	11,000	6,100	4,900
Romania ©	13,600	5,000	8,600			
Slovakia ©	5,600	3,500	2,100	5,400	3,300	2,100
Slovenia ©	2,300	1,500	800	2,300	1,500	800
Spain						
Sweden ©	61,593	53,824	7,769	61,266	53,526	7,740
Switzerland ©	6,408	4,680	1,728	6,086	4,405	1,681
The FYR of Macedonia						
Turkey	16,436	9,606	6,830	16,210	9,457	6,753
United Kingdom ©	8,200	7,300	900	8,200	7,300	900
Yugoslavia ©	3,058	513	2,545	2,755	455	2,300
Total: Europe						
of which: EU 15						
Armenia	150	15	135	113	8	105
Azerbaijan ©	60	0	60	0	0	0
Belarus	9,550	6,500	3,050	9,450	6,400	3,050
Georgia						
Kazakhstan	1,400	600	800	1,400	600	800
Kyrgyzstan						
Republic of Moldova ©	353	3	350	353	3	350
Russian Federation ©	116,200					
Tajikistan						
Turkmenistan						
Ukraine						
Uzbekistan						
Total: CIS						
Canada ©	214,128	179,900	34,228	214,128	179,900	34,228
United States of America ©	452,000	318,000	134,000	452,000	318,000	134,000
Total: North America	**666,128**	**497,900**	**168,228**	**666,128**	**497,900**	**168,228**
Australia ©				19,560	8,703	10,857
Japan						
New Zealand ©	19,770	19,410	360	19,410	19,050	360
Total: Other TBFRA						
Grand total						

©See notes and comments in Chapter III.

TABLE 50

Annual removals underbark, total

Country	Total removals	Forest				Other wooded land	Trees outside forest
		Total	Forest available for wood supply		Forest not available for wood supply		
			Total	For commercial use			
		($1000\ m^3$ o.b.)					
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Albania ©	623	623	566	387	57	0	0
Austria	13,886	13,736	13,536	11,506	200	100	50
Belgium ©	3,800	3,800	3,800	3,800	0	0	
Bosnia and Herzegovina							
Bulgaria	3,338	3,338	3,338		0	0	0
Croatia	3,700	3,700	3,700		0	0	0
Cyprus ©	51	41	41	41		10	
Czech Republic ©	12,375	12,365	12,255	12,255	110	0	10
Denmark ©	2,394	2,154	2,154		0	240	0
Estonia							
Finland ©	42,500	42,500	42,500	37,600	0	0	0
France ©	40,639 ①	40,639	40,639	29,461	0		
Germany ©	37,016	37,016	37,016			0	
Greece	2,007	2,007	2,007				
Hungary ©	5,159	4,839	4,704	4,335	135	0	320
Iceland	0	0	0		0	0	0
Ireland ©	2,097	2,097	2,097	2,097	0	0	
Israel					0	0	0
Italy	9,258 ①	7,973	7,973	7,973	0	0	1,285
Latvia ©	6,000	5,910	4,780	3,760	1,130	20	70
Liechtenstein	12	12	12		0	0	0
Lithuania	4,370	4,220	3,960	2,570	260	100	50
Luxembourg	330	330	330		0		
Malta		0	0				
Netherlands ©	1,407	1,064	994	964	70	0	343
Norway ©	9,340 ①	9,340	9,340	8,562	0	0	0
Poland ©	22,430 ①	22,027	21,271	20,272	756		403
Portugal ©	9,400	9,400	9,100	8,900	300		
Romania ©		12,104					
Slovakia ©	5,100 ①	5,100	4,900	4,900	200		
Slovenia ©	2,000 ①	2,000	2,000		0	0	0
Spain ©	14,185	12,631	11,022		1,609	1,554	
Sweden ©	55,420 ①	54,507	54,217	50,422	290	336	577
Switzerland ©	5,446	5,446	5,172	5,172	274	0	
The FYR of Macedonia ©	1,100	1,100	1,100				
Turkey	17,823	14,239	14,044	14,044	195	0	3,584
United Kingdom ©	7,300	7,300	7,300	7,200	0	0	0
Yugoslavia ©	2,758	2,741	2,470	2,466	270	0	18
Total: Europe							
of which: EU 15	**241,639**	**237,154**	**234,685**				
Armenia	143	135	102	61	33	4	4
Azerbaijan ©	60	60	0	0	0	0	0
Belarus							
Georgia ©	60	60	60		0	0	0
Kazakhstan	1,400	1,400	1,400	0	0	0	0
Kyrgyzstan							
Republic of Moldova ©	275	275	275		0	0	0
Russian Federation ©	103,800	103,800	86,600			0	
Tajikistan ©	1	1	0	0	0	0	0
Turkmenistan					0	0	0
Ukraine						0	
Uzbekistan							
Total: CIS							
Canada ©	188,433	188,433	188,433		0	0	
United States of America ©	507,000	398,000	398,000	349,000	0	109,000	0
Total: North America	**695,433**	**586,433**	**586,433**		**0**	**109,000**	
Australia ©			16,626				
Japan	23,000	23,000	23,000	23,000	0		
New Zealand ©	16,930	16,930	16,930	16,930	0	0	0
Total: Other TBFRA			**56,556**				
Grand total							

© See notes and comments in Chapter III.
① Adjustment to achieve conformity with TBFRA definitions arrived at by the National Correspondent.

TABLE 51

Annual removals underbark on forest by species groups

Country	Total forest		Forest available for wood supply			
	Coniferous	Broadleaved	Coniferous		Broadleaved	
	Total	Total	Total	For commercial use	Total	For commercial use
	(1000 m^3 o.b.)					
(1)	(2)	(3)	(4)	(5)	(6)	(7)
Albania ©	74	549	70	70	496	317
Austria	11,646	2,090	11,446	10,121	2,090	1,385
Belgium ©	2,710	1,090	2,710	2,710	1,090	1,090
Bosnia and Herzegovina						
Bulgaria	1,063	2,275	1,063		2,275	
Croatia	600	3,100	600		3,100	
Cyprus ©	41	0	41	41	0	0
Czech Republic ©	11,308	1,057	11,209	11,209	1,046	1,046
Denmark ©	1,438	716	1,438		716	
Estonia						
Finland ©	35,100	7,400	35,100	32,600	7,400	5,000
France ©	18,637	22,002	18,637	16,103	22,002	13,358
Germany ©	28,327	8,689	28,327		8,689	
Greece	521	1,486	521		1,486	
Hungary ©	559	4,280	543	443	4,161	3,892
Iceland	0	0	0		0	
Ireland ©	2,065	32	2,065	2,065	32	32
Israel						
Italy	1,505	6,468	1,505	1,505	6,468	6,468
Latvia ©	3,530	2,380	2,850	2,380	1,930	1,380
Liechtenstein	9	3	9		3	
Lithuania	2,660	1,560	2,610	1,830	1,350	740
Luxembourg	170	160	170		160	
Malta	0		0			
Netherlands ©	705	359	669	654	325	310
Norway ©	8,339	1,001	8,339	8,006	1,001	556
Poland ©	16,442	5,585	15,878	15,132	5,393	5,140
Portugal ©	4,900	4,500	4,900	4,700	4,200	4,200
Romania ©	4,450	7,654				
Slovakia ©	3,200	1,900	3,000	3,000	1,900	1,900
Slovenia ©	1,300	700	1,300		700	
Spain ©	7,381	5,250	6,573		4,449	
Sweden ©	47,903	6,604	47,639	44,304	6,579	6,118
Switzerland ©	3,978	1,468	3,743	3,743	1,429	1,429
The FYR of Macedonia ©						
Turkey	8,141	6,098	8,014	8,014	6,030	6,030
United Kingdom ©	6,500	800	6,500	6,500	800	700
Yugoslavia ©	451	2,290	400	397	2,070	2,069
Total: Europe						
of which: EU 15	**169,508**	**67,646**	**168,200**		**66,486**	
Armenia	13	122	7	7	95	54
Azerbaijan ©	0	60	0	0	0	0
Belarus						
Georgia ©						
Kazakhstan	600	800	600	0	800	0
Kyrgyzstan						
Republic of Moldova ©	3	272	3		272	
Russian Federation ©	72,500	31,300	61,600		25,000	
Tajikistan ©	0	1	0	0	0	0
Turkmenistan						
Ukraine						
Uzbekistan						
Total: CIS						
Canada ©	158,311	30,122	158,311		30,122	
United States of America ©	279,000	119,000	279,000	265,000	119,000	84,000
Total: North America	**437,311**	**149,122**	**437,311**		**149,122**	
Australia ©			7,397		9,228	
Japan	18,000	5,000	18,000	18,000	5,000	5,000
New Zealand ©	16,590	340	16,590	16,590	340	340
Total: Other TBFRA			**41,987**		**14,568**	
Grand total						

© See notes and comments in Chapter III.

TABLE 52

Fellings and removals on forest available for wood supply: comparative data

Country	Fellings per hectare	Fellings as percent of net annual increment			Removals as percent of fellings	Bark percentage on removals	
		Total	Coniferous	Broadleaved		Coniferous	Broadleaved
	(m^3 o.b./ha)	(per cent)			(per cent)		
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Albania ©	0.75	75.6	40.8	85.4	92.9	10.3	10
Austria	5.82	71.4	73.6	62.6	86.7	20.0	20
Belgium ©	6.88	85.7	93.8	70.3	100.0	14.0	12.8
Bosnia and Herzegovina	0.92						
Bulgaria	1.55	47.4	35.2	59.1	80.1	15.8	
Croatia	2.72	64.5	116.5	59.7	93.5	14.3	13.9
Cyprus ©	1.16	112.6	112.6		96.0	14.2	
Czech Republic ©	6.33	79.6	86.7	42.5	80.4	6.0	4.6
Denmark ©	4.98	68.6	66.7	72.6	100.0	2.0	1.4
Estonia	2.08	56.4					
Finland ©	2.63	74.9	76.8	68.3	91.2	14.0	14.9
France ©	4.16	65.2	78.9	55.0	79.1	18.7	10.9
Germany ©	4.79	54.6	58.5	44.8	80.0	4.8	4.8
Greece						16.6	16.7
Hungary ©	3.45	59.2	49.6	61.1	88.0	9.0	9.1
Iceland	0.01	0.5	0.1	3.4	95.0	33.3	12.5
Ireland ©	4.02	67.5	67.5	70.0	100.0	10.0	8.6
Israel	1.71	42.9	56.3	25.0			
Italy	1.45	46.7	29.8	54.9	95.8	10.5	3.4
Latvia ©	2.72	59.5	56.2	63.9	83.4	12.3	13.5
Liechtenstein	4.00	88.9	100.0	66.7	87.5	10.0	25
Lithuania	3.11	61.6	64.8	56.5	84.9	10.0	12.9
Luxembourg						5.6	11.1
Malta							
Netherlands ©	4.58	65.2	84.2	45.3	84.8	20.0	15.1
Norway ©	1.76	52.8	58.8	29.6	93.5	13.8	17.1
Poland ©	3.68	77.4	70.3	114.6	82.9	16.0	16
Portugal ©	5.90	86.8	78.6	99.8	98.2	19.7	14.3
Romania ©							
Slovakia ©	4.16	57.6	71.9	44.6	76.1	9.1	9.5
Slovenia ©	2.22	37.5	51.7	24.8	100.0	13.3	12.5
Spain ©	1.05	38.6	39.4	37.4			
Sweden ©	3.11	77.4	80.1	63.5	92.7	11.0	15
Switzerland ©	6.68	86.8	95.9	69.5	86.0	15.0	15
The FYR of Macedonia ©	1.34						
Turkey	2.01	53.4	50.1	58.6	93.3	15.3	10.7
United Kingdom ©	4.51	65.1	65.1	64.9	86.3	11.0	11.1
Yugoslavia ©	1.30	50.2	54.4	49.4	89.4	12.1	10
Total: Europe							
of which: EU 15							
Armenia	7.14	416.7		388.9	75.3	12.5	9.5
Azerbaijan ©	0.00	0.0	0.0	0.0			
Belarus	1.58	38.5	40.5	35.8	100.0		
Georgia ©	0.85	62.5					
Kazakhstan	0.28	39.8	26.3	81.8	100.0	0.0	0
Kyrgyzstan							
Republic of Moldova ©	2.29	83.3	100.0	83.2	73.1	0.0	22.3
Russian Federation ©	0.24	16.9	19.2	13.0			
Tajikistan ©							
Turkmenistan	0.00	8.4					
Ukraine	1.42	40.0					
Uzbekistan							
Total: CIS							
Canada ©						12.0	12
United States of America ©	2.64	75.4	91.5	55.2	86.4	12.3	11.2
Total: North America							
Australia ©	1.19	56.5	80.7	45.6	100.0	15.0	15
Japan	1.25	41.9	40.1	50.5			
New Zealand ©	12.28	67.4	67.4	68.3	85.4	12.9	5.6
Total: Other TBFRA	**1.72**	**51.8**	**53.4**	**47.6**			
Grand total							

© See notes and comments in Chapter III.

NOTES AND COMMENTS RELATING TO CHAPTER III

Main Tables	Comments

Albania

25-32

Enquiry Table 13: The data of 40, 000 ha for coniferous for even-age class "101 to 120 years" represent data for all even-age classes over 80 years. The high forests are going on to normalization of age classes; this is clear from the figures for coniferous, broadleaved groups and for total too.

33-36, 39-41

Enquiry Table 14: In comparison with figures for 1957 the trends for total and coniferous (respectively 80,467,000 m^3 in 1957 to 83,455,000 m^3 in 1995 and 10,783,000 m^3 in 1957 to 18,897,000 m^3 in 1995) and, for broadleaved (69,684,000 m^3 in 1957 to 64,558,000 m^3 in 1995) while for the years 1990 for total and broadleaved, respectively, decreased to 1992 and thereafter, increased to 1995 or 82,138,000 m^3 in 1990 to 81,142,000 m^3 in 1992 and to 83,455,000 m^3 in 1995; decreased to year 1992 and thereafter increased to year 1995 or 64,297,000 m^3 at year 1990 to 62,971,000 m^3 at year 1992 and to 64,558,000 m^3 in 1995); they increased for coniferous (17,841,000 m^3 in 1990 to 18,997,000 m^3 in 1995).

The volume of dead trees is approximately 0.6 per cent (or 489,700 m^3) of the total growing stock and mainly on forest available for wood supply (National Correspondent's estimation based on the figures of *Enquiry Table 20*).

Woody biomass is not estimated in Albania, but the National Correspondent has calculated the average specific gravity of wood oven-dry in temperature 105°C considering the part of each species in total growing stock (The specific gravity for each species the National Correspondent has received by a Italian Study-Fogii, Q-II peso del legnami-Arboricoltura da legno Pioppicoltura N.8. Agosto, 1973, p.192. Wood specific gravity-Arboricoltura de legno, Pioppicoltura N.8. Agosto, 1973, p.192).

The stump and the root biomass was calculated considering two Italian studies, one on "Net primary productivity of poplar stands" (A. Rossi Marcelli, G. Duranti & G. Giulimondi—"Net primary productivity of poplar stands"—Pubb. del Centr. di Sperim. Agr. e Forest, Vol. XIII-Fasc.3, Roma 1960); according to that, the stump and root biomass compose about 12.9 per cent of the total woody biomass, and another one, on "Dry matter production and nutrient contents of a 4-year Pinus radiata plantations" (Giulimondi, G & Dutanti, G. "Dry matter production and nutrient contents of 4-year *Pinus radiata* plantations"—Pubb. del Centr. di Sperim Agr. e. Forest Vol. XII-Fasc 1, Roma 1975); according to the dry matter of stump compose about 11.3 per cent (excluding the roots). The National Correspondent has used the rounded average figure of about 15 per cent.

42-46

Enquiry Table 15: Total natural losses compose about 26.3 per cent (or 359,000 m^3 of the gross annual increment, and the net annual increment about 73.7 per cent (or 1,004,000 m^3). The most natural losses and net annual increment are in the broadleaved forests, respectively about 82.5 per cent and 76.8 per cent. Also the most natural losses and the net annual increment are on forests available for wood supply respectively, about 86.4 per cent and 89.1 per cent.

In natural losses the National Correspondent has included also the removals by harvests and thinnings. In this way the net annual increment would be the increment remain in forests.

47-52

Enquiry Table 16: The most quantities of wood felled and removed have been in broadleaved forests (respectively 88.6 per cent and 88.2 per cent).

The figures of annual removals (u.b.) are National Correspondent's estimation, reducing annual overbark removals with 10 per cent. The fellings of natural losses compose about 7 per cent of total annual fellings; annual removals comprise about 93.5 per cent (o.b.) and 84.2 per cent (u.b.) of the annual fellings (the fellings of natural losses are for coniferous 32.1 per cent and broadleaved 3.8 per cent and annual removals 97.6 per cent and 93 per cent (o.b.) and 88 per cent and 83.7 per cent respectively).

In the annual fellings and removals, the National Correspondent has included the volume of wood felled and removed by illegal cuttings.

In the fellings of natural losses the National Correspondent has included the volume of wood removed by illegal cuttings which over the years 1991-1995 have been very high; from 1993 year to now they are falling. The following are the figures for wood volume for some years of this period that belong to the wood volume removed by illegal cuttings: 1991= 746,000 m^3, 1992=846,000 m^3; 1993=382,000 m^3; 1994=379,000 m^3 and so on.

Australia

25-32

Enquiry Table 13: Data in this table are based on the Montreal Report (table 1.1b), and NPI Report (page 10). More details can be found in these sources.

For Australia, the age-class classification for "Even-aged" is as follows and is different from the TBFRA-2000 classification:

Data presented under "11 to 20 years" represent for "11 to 30 years".
Data presented under "41 to 60 years" represent for "31 to 100 years".
Data presented under "101 to 120 years" represent for "100 to 200 years".
Data for "over 140 years" represent the age-class category of "over 200 years".
Uneven-aged--Predominantly broadleaved: Based on SOFR 1998, page 33, except cypress pine and other forests.

The figure of 16,397 for "Total" is from *Enquiry Table 4* "High forest and coppice", first row "Forest available for wood supply". We do not have disaggregated data by age class to fully tally to it. Where these data exist, they have been included in the table, hence the age classes do not total the total figure for forest available for wood supply.

Age classes have been modified to be the same as those used by SOFR, 1998

Uneven-age is a sum of the two (mixed) age and the three or more age categories used by the Montreal Report. Other forests have been categorised as "Mixed" for the purposes of this report (as they are a mix of *Callitris* and other eucalypts).

Data Source: SOFR 1998, page 33. National Plantation Inventory, 1997, page 10.

33-36, 39-41

Enquiry Table 14: "Growing stock of Trees on forest, total"— "Coniferous": based on volume stock 139 m^3/ha and area of 883,980 ha—softwood plantations NPI report, page 10. Includes callitris forests volume based on weighted stocking volume of 98 m^3/ha and area of 866,667 ha.

Growing stock of Trees on forest, total—Broadleaved: Based on back calculation from biomass to standing volume by dividing by 1.05.

Woody biomass—Coniferous: Based on product of conversion factor of 0.6 and values in column A.

Woody biomass—Broadleaved: Based on NGGI conversion factors (using forest structure) from area (ha SOFR, p. 32) to biomass. Callitris not included.

Closed forest area x 226; Open forest area x 80; Woodland area x 42

Growing stock of Trees on forest available for wood supply—Coniferous: Based on softwood plantations and callitris. The Callitris is from table 2.1.b Montreal. Using NGGI conversion to biomass (structure) from area only.

Growing stock of Trees on forest available for wood supply—Broadleaved: Based on hardwood plantations and native forest volumes from Montreal table 2.1.b.

Wood biomass of trees on forest available for wood supply—Coniferous: Based on product of conversion factor of 0.6 and values in column A.

Wood biomass of trees on forest available for wood supply—Broadleaved: Based on product of conversion factor of 1.05 and values in column A.

Growing stock of Trees on forest not available for wood supply": Difference between the figure for "Growing Stock" of "Trees on forest, total" and "Growing stock" of "Other trees (on other wooded land and trees outside the forest".

Total woody biomass:

Average conversion factor of area to biomass = 57

Average conversion factor of area to volume = 54

Woody biomass of stumps and roots: = 0.2 (pine and eucalypt)

The volume stocking levels were derived from the biomass figures. This was done with the following assumptions:

Green density of wood = 1000 kg/m^3

Expansion factor to take account of leaves and branches = 1.75

Mass = density x volume x expansion factor (i.e. volume = mass/(density x expansion factor)

To convert the volume to biomass, the constant 0.6 for coniferous and 1.05 for broadleaved was multiplied by the volume (ref. IPCC Guidelines for National Greenhouse Gas Inventories, Workbook 5.6, 1996)

Data Source: Australia's First Approximation Report for the Montreal Process, 1997. National Plantation Inventory, 1997

Stumps and Roots biomass: Greenhouse Challenge Vegetation Sinks Workbook July 1998.

root-to-shoot ration = 0.2 (pine and eucalypt).

37, 38

Enquiry Table 17: Data only available for reference period 1994.

42-46

Enquiry Table 15:

Gross annual increment, on forest, total -- Coniferous: Uses FAWS coniferous + FNAWS coniferous. Based on softwood plantations (NPI 97) and callitris (SOFR). MAIs area 12 and 2.1 respectively. Within native forests, revised using MAI figure of 2.1 for growing component of Forests (70 per cent of forest) and MAI of 0.25 for growing woodlands (40 per cent of woodlands) Source: Mellissa Wood & Rod Keenan Sept 1999.

Gross annual increment, on forest, total—Broadleaved: Uses FAWS broadleaved + FNAWS broadleaved based on hardwood plantations (NPI 97) and native forest area (SOFR). MAIs area 12 and 2.1 respectively. Within native forests, revised using MAI figure of 2.1 for growing component of Forests (70 per cent of forest) and MAI of 0.25 for growing woodlands (40 per cent of woodlands) Source: Mellissa Wood & Rod Keenan Sept 1999.

Gross annual increment on forest available for wood supply—coniferous: Based on callitris and softwood plantations and MAI of 2.1 and 12 respectively. Callitris area is based on SOFR p 32. Within native forests, revised using MAI figure of 2.1 for growing component of Forests (70 per cent of forest) and MAI of 0.25 for growing woodlands (40 per cent of woodlands) Source: Mellissa Wood & Rod Keenan Sept 1999.

Gross annual increment on forest available for wood supply—Broadleaved: Based on hardwood plantations and native forests available for harvest and MAI of 12 and 2.1 respectively. Native forest area is based on SOFR p 32. Within native forests, revised using MAI figure of 2.1 for growing component of Forests (70 per cent of forest) and MAI of 0.25 for growing woodlands (40 per cent of woodlands) Source: Mellissa Wood & Rod Keenan Sept 1999.

Gross annual increment on forest not available for wood supply: Revised using MAI figure of 2.1 for growing Forests (70 per cent of forest) and MAI of 0.25 for growing woodlands (40 per cent of woodlands) Source: Mellissa Wood & Rod Keenan Sept 1999.

Total gross annual increment: Revised using MAI figure of 2.1 for growing Forests (70 per cent of forest) and MAI of 0.25 for growing woodlands (40 per cent of woodlands) Source: Mellissa Wood & Rod Keenan Sept 1999.

There are no data on natural losses. The Net (harvestable) Annual Increment assume there are no losses.

The MAIs used were sources from the last FAO report and are as follows:

Forest Type	***MAI m3/ha/year***		
Plantations	12		
Native forest for wood supply	2.1	for growing portion	assumes 70 per cent growing in forest and 40 per cent growing in woodland
	0.25	for non-growing portion	Assumes 70 per cent growing in forest and 40 per cent growing in woodland

Data Source: Australia's First Approximation Report for the Montreal Process, 1997. National Plantation Inventory, 1997.

Total increment in item15.12 is the sum of increment for wood available for wood supply and wood not available for wood supply. This does not sum to the value in item 15.1 as values items 15.1 to 15.8 were derived from different sources.

47-52

Enquiry Table 16: There are no data available on natural losses, therefore figures assume no loss through natural losses. Assumption that bark volume approximates 15 per cent of over bark wood volume. Based on Hamilton & Chikumbo (1997). Modelling upper stem bark thickness for Eucalypts. In: International Congress on Modelling and Simulation. Edited by McDonald, A.D. and McAleer, M. Hobart, Tasmania. Vol. (4): 1611-1616.

Removals from areas outside the forest available for wood supply are unknown. However, a National project is under way to quantify the biomass being cleared.

Austria

25-32

Enquiry Table 13:

The definitions of the Austrian Forest Inventory are as follows:

Forest area "under regeneration" (285,000 ha) is an area where regeneration (reforestation) is being practised at the time of the field assessment. "Under regeneration" areas include felling areas as well as areas where (natural) regeneration was started by silvicultural measurements, e.g. femel system, strip system, etc.

The age-class "10 years or less" (270,000 ha) covers already afforested areas. The afforestation (regeneration) was done by means of seeding (see also *Enquiry Tables 11 and 12),* planting (see also *Enquiry Tables 11* and *12*), natural regeneration enhanced by planting (see also *Enquiry Table 11*) and natural regeneration.

33-36, 39-41

Enquiry Table 14: Standing volume of trees on forest available for wood supply evaluated by the Austrian Forest Inventory x 1.05 = standing volume of trees on forest available for wood supply.

37, 38

Enquiry Table 17: Reference period "1" is adapted to "0 cm" d.b.h.

Azerbaijan

37, 38

Enquiry Table 17: As no primary felling takes place in Azerbaijan's forests for economic and environmental reasons, the timber stock rose between the two base periods because of the small volume harvested.

47-52

Enquiry Table 16: Total fellings per year are small: not more than 60,000 m^3 annually.

Belarus

25-32

Enquiry Table 13: The areas "under regeneration" are included in the "10 years or less" group.

Belgium

25-32

Enquiry Table 13: For Norway spruce (*Picea abies*) in the Walloon Region (80 per cent of coniferous in this region), the distribution is as follows:

Items 13.1 to 13.14: (in ha 1000) 170.839; 0; 169.184; 11.167; 21.783; 15.114; 52.282; 41.770; 21.605; 4.970; 0.493; 0; 0; 1.655.

33-36, 39-41

Enquiry Table 14: Volume measured to minimum diameter at breast height and top diameter of 7 cm (22 cm circumference).

Growing stock on other trees and other wooded land could be estimated as zero on the assumption that the definition for this value excludes poplar linear plantations.

37, 38

Enquiry Table 17: Measured to minimum diameter at breast height and top diameter of 7 cm (22 cm circumference).

Concerning the reference period, data related to the Walloon Region have been extrapolated to the whole country.

42-46

Enquiry Table 15: Volume measured to minimum diameter at breast height and top diameter of 7 cm (22 cm circumference).

Increments calculated in Walloon Region on the basis of tables of production for broadleaved and by difference in inventories for coniferous and extrapolated to the country as a whole.

47-52

Enquiry Table 16: Volume measured to minimum diameter at breast height and top diameter of 7 cm (22 cm circumference).

Volumes annually cut in public forests have been extrapolated to the total forests proportionately to the respective coniferous and broadleaved areas.

Bosnia and Herzegovina

33-36, 39-41

Enquiry Table 14: All data are secretariat estimates based on information from different literature sources.

42-46

Enquiry Table 15: The data are secretariat estimates based on information from different literature sources.

47-52

Enquiry Table 16: The data are secretariat estimates based on information from different literature sources.

Bulgaria

33-36, 39-41

Enquiry Table 14: not "oven-dry"

Canada

25-32

Enquiry Table 13: Data are not available from Canada's Forest Inventory (CanFI) for lines "10 years or less" and "11 to 20 years" separately, only for age class 20 years or less. The breakdown is as follows:

Predominantly coniferous:3908 (x 1000 ha)

Predominantly broadleaved: 1179 (x 1000 ha)

Mixed: 1929 (x 1000 ha)

These values were divided by two to derive the values entered in "10 years or less" and "11 to 20 years".

There exists supportive information on the details on sources of data in the reply to the enquiry, which is available at the secretariat.

In CanFI, age class is the total age of the forest to the year of information (not updated to 1991). Twenty-year age classes are used. When there was an offset in the starting year of the age class, best fit was used. For example, 6 to 25 years would be treated as age class 1 (1 to 20 years).

Even-aged	
0	0 years
1	1 to 20 years
3	21 to 40 years
5	41 to 60 years
7	61 to 80 years
9	81 to 100; or 81 and greater years
11	101 to 120; or 101 and greater years
13	121 to 140; or 121 and greater years
15	141 to 160; 141 to 250; or 141 and greater years
20	161 years and greater; or 251 and greater years
- 5	Uneven-aged
- 8	Missing value
- 9	Not applicable (record is not stocked forest land)

All values have been adjusted to "forest available for wood supply" values in *Enquiry Table 3*. The information on the area distribution in CanFI that is unclassified as to forest types exists in the reply to the TBFRA enquiry which is available at the secretariat.

33-36, 39-41

Enquiry Table 14: Ref. Source for Growing Stock (*a*); and Source for Woody Biomass (b)

"Trees on forest, total": (*a*) Total volume of all species + 12.25 per cent of same (to get overbark volume); (*b*) Total biomass of all species.

"Coniferous" on forest, total: (*a*) Total volume of coniferous species + 12.25 per cent of same (to get overbark); (*b*) Total biomass of coniferous species.

"Broadleaved" on forest: (*a*) Total volume of broadleaved species + 12.25 per cent of same (to get overbark); (*b*) Total biomass of broadleaved species.

"Other (bamboos, palms, etc.)": (*a*) Not applicable; (b) Not applicable.

"Trees on forest available for wood supply": (*a*) The total volume of all species on accessed nonreserved timber productive forest + 12.25 per cent of same (to get overbark volume) was adjusted to conform to *Enquiry Table 3* "Forest available for wood supply"; (*b*) Calculated as 14.1 (total biomass) * 14.5 (volume on forest available for wood supply)/14.1 (total volume).

"Coniferous" on Trees on forest available for wood supply: (*a*) The total volume of coniferous species on accessed nonreserved timber productive forest + 12.25 per cent of same (to get overbark volume) was adjusted to conform to *Enquiry Table 3* "Forest available for wood supply".

"Broadleaved" on Trees on forest available for wood supply: (*a*) The total volume of broadleaved species on accessed non-reserved timber productive forest + 12.25 per cent of same (to get overbark volume) was adjusted to conform to *Enquiry Table 3* "Forest available for wood supply".

"Other bamboos, palms etc.": (*a*) Not applicable.

"Trees on forest not available for wood supply": (*a*) Trees on forest, total—trees on forest available for wood supply; (*b*) Calculated as 14.1 (biomass)—14.5 (biomass).

"Other trees (on other wooded land and trees outside the forest": (*a*) Not available; (*b*) Not available.

"Other woody biomass": (*a*) Not available; (*b*) Not available.

"Total above-stump volume and woody biomass": Same as "Trees on forest, total", since there is no volume data in CanFI for other wooded land; (*b*) Same as 14.1 since it is not possible to compute biomass for other wooded land.

"Stumps and roots" of other woody biomass; (*b*) Not available.

37, 38

Enquiry Table 17: The 1997 edition of the annual report to Parliament on the state of Canada's forests included the index items shown in the "Commercial Forest Volume (1980-1994)" . This supportive information exists in tabular form in the reply to the enquiry, which is available at the secretariat.

42-46

Enquiry Table 15: Estimated Mean Annual Increment to Rotation Age on Productive and Available Forest Land in Canada*

(Cubic metres per hectare)

Region and Sub-region	*Average growth*
Atlantic Provinces	1.7
Quebec/Ontario	1.7
CANADA EAST	1.7
Prairie Provinces	1.8
British Columbia	1.9
Northern Territories	0.6
CANADA WEST	1.8
CANADA	1.8

* Mean annual growth attainable on natural stands of average stocking.

Source: UN-ECE/FAO. 1996. North American Timber Trends Study. Geneva Timber and Forest Study Papers, No.9. United Nations. New York and Geneva.

It should be noted that there are substantial regional variations within Canada. The average for western Canada as a whole is 1.8 m^3/(ha/yr) and it is 1.9 m^3/(ha/yr) in British Columbia. There are many sites on the west coast on which the mean annual increment can be several times this value under intensive management regimes.

The figures presented should be considered as net mean annual increment.

Timber growth is an often used measure of productivity and performance of timber resources. Net annual growth is annual growth, less the volume lost through mortality. In other words, it is the net effect of natural gains and losses to timber volumes. Although net growth is sometimes used as an indication of timber available for harvest, in the specific context of North American resources, this can often be misleading. In instances where there is a heavy preponderance of old growth timber, growth rates may be low although there are significant volumes of timber available for harvest. As the old growth inventory is depleted, growth rates can be expected to increase as younger, more vigorous forest stands replace the present mature and over-mature stands.

According to recent estimates for the period 1980 to 1994 (The State of Canada's Forests 1996-1997), gross volume accruals to the growing stock are approximately 382 million cubic metres per annum. Estimated losses due to fire, insects and disease over the same period are 151 million cubic metres per annum. This implies a net long run potential sustainable harvest level of 231 million cubic metres per annum. While this is a useful first approximation, a number of qualifications should be borne in mind. This estimate is based on both the current age class distribution of the forest and the current level of forest management in Canada. As harvesting proceeds and the older forest is replaced by younger and more vigorous stands, non-harvest losses can be expected to decline. Increased protection and silviculture expenditures may reduce non-harvest losses while increasing growth rates. However, policy constraints are changing both the availability of land for timber harvesting as well as the obtainable yields from those lands.

47-52

Enquiry Table 16: The underbark volume of removals may include some volumes of measured overbark. Consequently, the figures for underbark and overbark measure shown in the table may be overstated.

Croatia

33-36, 39-41

Enquiry Table 14: The data on growing stock on other wooded land are rough estimates by the National Correspondent.

42-46

Enquiry Table 15: Natural losses category includes also the damages caused by war operations and illegal cuttings during the war.

The data on net annual increment on other wooded land are rough estimates by the National Correspondent.

Cyprus

33-36, 39-41

Enquiry Table 14: The given growing stock includes only stem wood of living trees having d.b.h. >12 cm.

Woody biomass of trees on forest available for wood supply: estimate made by the secretariat.

42-46

Enquiry Table 15: Increment of measurable trees (d.b.h. >12 cm).

47-52

Enquiry Table 16: Annual removals are estimated by the secretariat.

Czech Republic

33-36, 39-41

Enquiry Table 14: Growing stock is registered in m^3 under bark, minimum diameter 7 cm.

Underbark to overbark coefficients used: conifers average = 1.064; broadleaved average = 1.048; Dead trees assessment: Survey 1991—total 14,854 thousand m^3 u.b. Average u.b. to o.b. coefficient = 1.0616.

d.b.h. "0" coefficients are based on tables by Parez, Lesnictvi 36, 1990. Medium coefficients: N. spruce—1.0674; pine—1.0800; conifers—1.0699; beech—1.1690; oak—1.1404; broadleaved—1.1604; all species—1.08348.

Biomass coefficients: conifers—0.45 ton per m^3; broadleaved—0.64 ton per m^3; average—0.4785 ton per m^3; other woody biomass [bushes in forest]—1 ton per 1,000 ha of forest.

Other trees: Trees on river banks [survey 1976]—2,096 thousands of m^3 o.b. Other land without arable land = 1,940 thousands of ha. 1 m^3 per ha.

Stumps and roots: According to the research made by Vyskot, the above ground biomass and underground biomass ratio is 1,227 : 314 = 0.2559.

Growing stock range: assessment methods accuracy is ± 5 per cent.

Woody biomass range: average of coefficients from other sources [consultation] = 0.7235.

37, 38

Enquiry Table 17: Source: FMP 1986, 1995.

42-46

Enquiry Table 15: Natural losses are the annual average of 1987-1996.

47-52

Enquiry Table 16: Fellings of natural losses are annual average of 1987-1996.

Denmark

25-32

Enquiry Table 13: Though no statistics exist on age-class distributions in the three groups of forests: broadleaved, conifers and mixed forests, this table has been compiled based on the Danish forest statistics: Danmarks Statistik og Skov- og Naturstyrelsen: Skove og Plantager 1990.

Background is *Enquiry Table 3* of the TBFRA.

The age-class distribution of conifer forests more or less follows the age-class distribution of *Picea abies*, of broadleaved more or less *Fagus silvatica*, and the mixed group an interpolation of these.

The accuracy is probably not less than +- 25 per cent.

The line 'under regeneration' is as an estimate chosen as one tenth of the age-class 10 years or less.

The 5,086 ha not available for wood-supply are distributed on an equal level at the 3 oldest age classes.

33-36, 39-41

Enquiry Table 14: The following conversions factors are used in accordance with the ECE study: "Forest Resources of the ECE Region (Europe, the USSR, North America", July 1985:

Coniferous wood to biomass	1 m^3 = 0.4 ton
Broadleaved wood to biomass	1 m^3=0.55 ton
Wood not available for wood supply	1 m^3 =0.3 ton

The Forestry Institute, The Royal Veterinarian and Agriculture University, have been helpful in discussing this table.

37, 38

Enquiry Table 17: The forest statistics for 1976 and 1990 are very difficult to compare due to very different methods used in those two statistics. Therefore the average annual increment in the period 1980 to 1990 minus the average annual cut in the same period has been used to calculate 'back' from 1990 to 1980 which figures then are compared with the (not very good) 1976-figures.

In 1981, a most severe storm occurred in Denmark. The losses was 6—8 million cubic metres.

These losses should be included in the above figures. It will raise the average annual change to about 1,800,000 m^3 in total, to 1,260,000 m^3 in conifers and to 540,000 m^3 in broadleaved.

42-46

Enquiry Table 15: Natural losses is an adjustment on not used branches, stumps, dead trees, etc. of about 10 per cent of the measured increment. No scientific knowledge is available on this item, and the percentage is probably too high.

47-52

Enquiry Table 16: Fellings of natural losses are very rare in Denmark, see below:

Conversion from o.b. to u.b. is done by calculating with standard-figures on 4 per cent for conifers and 2 per cent for broadleaved in accordance with information from the Royal veterinarian and Agricultural University, Department of Forestry, Copenhagen.

By forest law it is not permitted to leave cut wood on the forest ground—all cuttings shall be removed within a short time.

Finland

25-32

Enquiry Table 13: The totals "18789 for "Even-aged" and "545" for "Under regeneration" differ from the actual total because the totals include temporarily open areas as it is impossible to define species groups of regeneration.

42-46

Enquiry Table 15: Estimates of natural losses are based on 20-year old studies, not on recent inventories.

47-52

Enquiry Table 16: For fellings and removals, data can not be divided into the forest and other wooded land volumes. A small part for both comes from other wooded land.

France

25-32

Enquiry Table 13: There exists supportive information on "Age-class distribution of high forest (broadleaved) available for wood supply" and "Age-class distribution of high forest (conifers) available for wood supply" in tabular form in the reply to the enquiry, which is available at the secretariat.

33-36, 39-41

Enquiry Table 14: The base data used (national forest inventory volumes) are stem volumes, 7 cm cut, with a sampling diameter of 7.5 cm at stem height 1.30 m. A coefficient of 40 per cent* for the volume of large branches has been added for broadleaved trees, and one of 30 per cent* for conifers. The volume for stems from 0 cm diameter upwards has been estimated by extrapolation (see chart "Standing volume by diameter class").

The volume and biomass of trees in forest not available for wood supply have been estimated at 2 per cent of the volume and biomass of trees in forest available for wood supply, poplar plantations excluded.

Volume was converted into biomass using the coefficients below*:

	Volume	***Biomass***
Wood (from NFI volume)		
Conifers	0.86	0.4
Broadleaved	0.87	0.55
Bark (from NFI volume)		
Conifers	0.14	0.35
Broadleaved	0.13	0.35
Large branches and stems < 7.5 cm in diameter		
Conifers	0.3	0.4
Broadleaved	0.4	0.55
Stumps and roots		
Conifers	0.2	0.4
Broadleaved	0.2	0.5

No account has been taken of the volume of large branches, roots, stems less than 7.5 cm in diameter and bark on dead trees.

The volume of trees outside forests has been estimated from inventories of poplar lines, hedgerow trees and scattered trees. These data are sometimes old and incomplete.

Data for "Other woody biomass": woody biomass (shrubs and bushes) in forests and on other wooded land is estimated by the National Correspondent at 2 tons per hectare.

Likely range: 95 per cent confidence-level estimate of standing material. No account has been taken of the wide margin of uncertainty associated with the adjustments.

* Coefficients taken from the document "Forest resources in the ECE region (Europe, USSR, North America), United Nations, 1986.

There exists supportive information on "Standing volume by diameter class" in graphic form in the reply to the enquiry, which is available at the secretariat.

37, 38

Enquiry Table 17: Source: national forest inventory, data available as at 31 December 1987 (period 1973-1986) and 31 December 1997 (period 1980-1996).

The adjustment method used for the 1987 data is the same as indicated in *Enquiry Table 14*. As the inventory methods have not changed, comparability between the two periods may be regarded as good.

42-46

Enquiry Table 15: The base data are running net annual increases in stem volume, 7 cm cut for woodland and running average annual increments in stem volume, 7 cm cut for poplar plantations and avenues. These increments are measured on stems over 7.5 cm in diameter. The volume for stems from 0 cm diameter upwards has been estimated by extrapolation (see chart "Standing volume by diameter class"). On the other hand, the increment on pollarded trees has not been added for want of reliable bases for an estimate.

Natural losses in forests available for wood supply have been estimated from observations for the national forest inventory of volumes of dead wood and windblow less than five years old. Natural losses in forests not available for wood supply have been estimated at 80 per cent of increment there. The volume of natural losses has been adjusted in the same way as the volumes of felled timber shown in *Enquiry Table 16.* The increment on poplar lines is the only information available for estimating the increment outside forests. Increment on scattered trees and hedgerows containing trees is not measured in the national forest inventory.

Likely range: 95 per cent confidence-level estimate of increment.

There exists supportive information on "Net annual increment by diameter-class" in graphic form in the reply to the enquiry, which is available at the secretariat.

47-52

Enquiry Table 16: The annual sector survey of forestry operators and sawmills gives volumes after extraction, underbark in the case of conifers, overbark for broadleaved trees and Maritime pine. Estimates of underbark and overbark volume have been made with the bark coefficients suggested by SCEES. It has been assumed that annual removals correspond to stem volumes, 7 cm cut, for conifers. For broadleaved species, annual removals have been estimated at stem volumes, 7 cm. cut, plus half the volume of the branches. To arrive at annual fellings, operating losses have been estimated at 10 per cent of the volume declared in the annual sector survey. To that has been added the volume of the branches, estimated at 30 per cent* of the volume of felled stems for conifers and 40 per cent*/2, or 20 per cent, for broadleaved species.

For the data on "Annual fellings, Total" for "other" and "other" for broadleaved on forest available for wood supply: corresponding to non-commercial firewood, it has been assumed that the volumes concerned come from both stems and branches.

Lastly, it has been assumed that the volume of stems ranging between 0 and 7.5 cm in diameter felled in the course of forestry operations or firewood collection is negligible.

Data for Fellings of natural losses for Coniferous and Broadleaved on forest available for wood supply: these are probably underestimates, as exceptional windblow has not been taken into account.

A very small proportion of the fellings and removals shown in *Enquiry Table 16* as coming from forests come, in fact, from other wooded land and from trees outside the forest. It is not possible to indicate what proportion.

*/Coefficients taken from the document "Forest resources in the ECE region (Europe, USSR, North America), United Nations, 1986.

Georgia

33-36, 39-41

Enquiry Table 14: Secretariat estimates; conversion factors (coefficients) for woody biomass, as derived from GS, are assumed: above-stump, total 0.68; coniferous 0.60; broadleaved 0.70; below-stump 0.15

37, 38

Enquiry Table 17: The share of coniferous growing stock is assumed to be 30 per cent of total growing stock.

47-52

Enquiry Table 16: Data are provided by the State Department of Forest Management of Georgia in its reply to the concise enquiry for SOFO-97 (23.08.1996).

Germany

25-32

Enquiry Table 13: Data for "11-20 years, (total)" also includes data for the age-class "1-20 years".

"Uneven-aged": Estimate, includes selection forests, composite forests, advanced growth areas, underplanting, bilayer stands and femel stands.

33-36, 39-41

Enquiry Table 14: "Coniferous" and "Broadleaved" on forest, total: Total estimated on the basis that half of growing stock on forest not available for wood supply is coniferous and half broadleaved.

Woody biomass column: Conversion factor to biomass 0.5

37, 38

Enquiry Table 17: Reference period 1: Unavailable due to the different data situation in the Federal Republic of Germany and the former GDR.

"Average annual change" in growing stock on forest available for wood supply: rough estimate.

42-46

Enquiry Table 15: Conversion factor between wood with a upper diameter of 7 centimetres and the whole tree wood is 1.15 (+15 per cent).

Data for "Natural losses" are estimates on a level of 10 per cent by the National Correspondent.

47-52

Enquiry Table 16:

1) Conversion factor of annual removals under bark to annual fellings.
2) Conversion factor under bark to over bark 5 per cent.

total = 1.25 (+15 per cent solid volume to lumber stands + 10 per cent X-wood)

total annual fellings = annual removals overbark * 1.25

Greece

25-32

Enquiry Table 13: No data exist on age-class distribution. The principal reason is that all fellings are on a selective cutting system, and many of the forests are uneven-aged.

33-36, 39-41

Enquiry Table 14: The figures for trees on forest available and not available for wood supply are estimated on the basis of the proportional areas of total forest. Volume is measured to a minimum diameter breast height (d.b.h) of 5 cms.

Annual fellings and removals on other wooded land are included in those on forest. Information regarding the quantity of wood production is this case is not available.

42-46

Enquiry Table 15: Net annual increment is measured to a minimum diameter breast height (d.b.h.) of 5 cms.

Hungary

25-32

Enquiry Table 13: Please refer to comments in *Enquiry Table 1* "Total area by main classes" for the definition of "Forest" and "Other wooded land" and Enquiry Table 3 "Forest and OWL according to availability of wood supply" for the definition of "Forest not available for wood supply".

33-36, 39-41

Enquiry Table 14: Data on dead trees were calculated with the help of forest health monitoring results. Biomass values, as well as data on "Other trees (on OWL and trees outside the forest)" and "Other woody biomass--stumps and roots" are estimates. National growing stock definition matches with that of TBFRA 2000.

"Standing volume": Includes small branches and twigs, in case of conifers even foliage.

Please refer to comments in *Enquiry Table 1* "Total area by main classes" for the definition of "Forest" and Other Wooded land".

37, 38

Enquiry Table 17: Data were re-computed for 1990 from inventory raw data. Data for "Growing stock on forest, total" include small branches and twigs and in case of conifers even foliage.

42-46

Enquiry Table 15: Data on "On trees outside the forest" are estimates.

Please refer to comments in *Enquiry Table 1* "Total area by main classes" for the definition of "Forest" and "Other wooded land" and *Enquiry Table 3* Forest and OWL according to availability of wood supply" for the definition of "Forest not available for wood supply".

47-52

Enquiry Table 16: Fellings of natural losses = sanitary fellings in the national statistics. Underbark values were calculated with the help of conversion factors. Adjustment was not needed in the requested fields. The likely range is an estimate, not calculated.

Please refer to comments in *Enquiry Table 1* "Total area by main classes" for the definition of "Forest" and "Other wooded land" and *Enquiry Table 3* "Forest and OWL according to availability of wood supply" for the definition of "Forest not available for wood supply".

Iceland

33-36, 39-41

Enquiry Table 14: It is important to note that all data on standing volume and biomass in this table are provisional estimates, pending a new assessment in connection with work to improve information on carbon sequestration. This information is expected within two years, i.e. during 2000.

42-46

Enquiry Table 15: All data on increment are provisional estimates, pending a new assessment in connection with work to improve information on carbon sequestration. This information is expected within two years, i.e. during 2000.

Ireland

33-36, 39-41

Enquiry Table 14: Volume measurement to a top diameter of 7 cm.

Ratio used for calculating the volume of "Stump and roots biomass" is 0.20.

42-46

Enquiry Table 15: Measurement to top diameter of 7 cm.

47-52

Enquiry Table 16: Measurement to top diamater of 7 cm.

Israel

42-46

Enquiry Table 15: The data on increment are estimated.

Japan

25-32

Enquiry Table 13: The data for "81 to 100 years" include forest over 80 years.

This table is composed of "Forest available for wood supply" and "Forest not available for wood supply" because we don't have separate age-class statistics for forest available or not available for wood supply.

33-36, 39-41

Enquiry Table 14: Growing stock does not include trees for which the diameter is less than 4 cm.

42-46

Enquiry Table 15: The data for "On forest not available for wood supply, coniferous and broadleaved" is not known, although in TBFRA summary table 42, the data shown is "0" for both coniferous and broadleaved. This "0" is shown because of the automatic calculation of the data which is "Forest—Forest available for wood supply = forest not available for wood supply".

Latvia

47-52

Enquiry Table 16: Volume for "On forest not available for wood supply" comes from sanitary cuttings and thinnings.

Liechtenstein

25-32

Enquiry Table 13: Where wood production is predominant, we apply a rotation period of 140 years for low mountain forests and more than 180 years for high mountain forests.

Lithuania

25-32

Enquiry Table 13: In Lithuania, even-aged stands predominate (uneven-aged forests represent only 2 per cent of the total forest area), resulting in prevailing clear-cut areas.

Malta

25-32

Enquiry Table 13: Not applicable as all woodland is for amenity purposes and watershed management.

Netherlands

25-32

Enquiry Table 13: Source: HOSP-database.

As mentioned before for *Enquiry Table 3* "Forest and other wooded land according to availability for wood supply": a difference in definition on mixed forest exists between the HOSP-definition and the TBFRA-2000 definition: the threshold 75 per cent is in HOSP 80 per cent. No adjustments are made since the differences are considered as negligible.

There exists supportive information on "age-class distribution within species group on high forest" in tabular form in the reply to the enquiry, which is available at the secretariat.

There exists supportive information on "age-class distribution of *Pinus sylvestris*, Other coniferous, and Broadleaved" in tabular form in the reply to the enquiry, which is available at the secretariat.

33-36, 39-41

Enquiry Table 14: Sources:

1. Daamen, W.P. 1996. Velling en oogst HOSP-cyclus 2: periode 1992-1996. Daamen Schoonderwoerd & de Klein, Rapport 70.
2. HOSP-database.
3. CBS Landbouwtelling 1996.
4. Stichting Bosdata, 1996 Projekt Hout voor schone energie,
5. Daamen , W.P.,1997 Energiehout.
6. Nabuurs G.J. & G.M.J.Mohren, 1993 Carbon stocks and fluxes in Dutch forest ecosystems IBN research report 93/1. IBN-DLO Wageningen.

Deviations from TBFRA-2000 definition:

Growing stock is given for trees with minimum diameter breast height (d.b.h.) of 5.0 cm. By calculating the distribution of total standing volume over the diameter classes (cm), the standing volume of trees < 5.0 cm is extrapolated between 0-5 cm d.b.h. Broadleaved species have 60,000 m^3 (which is 0.2503 per cent of the standing volume > 5 cm d.b.h.) and coniferous species have 15,000 m^3 (which is 0.0506 per cent of the standing volume) with a d.b.h. 0-5 cm. The calculated volumes with d.b.h. >5 are corrected with these percentages.

Specifications on *Enquiry Table 14*:

Growing stock of "Trees on forest available for wood supply--Coniferous and Broadleaved": The growing stock is corrected according to the above stated percentages.

Growing stock of "Trees on forest not available for wood supply": No classification of growing stock in coniferous or broadleaved species is available on 'forest not available for wood supply'. A mean percentage ((0.2503+0.0506)/2) is used to estimate the growing stock < 5 cm d.b.h.

Growing stock of "Other trees (on OWL and trees outside the forest)": No correction for d.b.h. < 5 cm is made. Row plantations are considered to have negligible amount of growing stock < 5 cm.

"Dead trees" of "Trees on forest, total" to "Dead trees" of "Other woody biomass--Stumps and roots": No corrections are made for the volume < 5 cm d.b.h. They are considered as negligible.

The volume of standing dead trees is estimated by HOSP. The volume of lying dead trees is derived from other inventories on forest holdings (SYHI- and WOODSTOCK-inventories). About 1 per cent of the volume of standing trees is additional lying on the ground. So for example: the volume of 1,306,000 m^3 in "Dead trees" of "Trees on forest, total" comprises 764,000 m^3 derived from HOSP and 542,000 m^3 calculated as 1 per cent of the standing volume.

There exists supportive information on the estimation of "the growing stock on areas not covered by HOSP" in tabular form in the reply to the enquiry, which is available at the secretariat.

Conversion factors for stem volume to woody biomass above-stump and woody biomass of stumps and roots the above stated conversion factors are used, which are derived from several sources. For example 1 m^3 coniferous stem volume gives 0,595125 ton dry weight above stump and 0,20104875 ton dry weight stumps and roots.

General comments:

The growing stock, growth and removals survey (Houtoogststatistiek en prognose oogstbaar hout, HOSP) is a monitoring system of about 3000 permanent plots which cover about 310,000 ha of the 340,000 ha forest in the Netherlands. No monitoring plots are established on about 30,000 ha of forest land that meets the FAO/ECE definition of forest but has an other type of land use, e.g. campings, built up areas, parking places, zoological gardens. Changes in this area of 30,000 ha can not be estimated: in this enquiry the data on this area obtained in 1980-1983 are used.

In HOSP all trees with a diameter at breast height (d.b.h.) of 5.0 cm and more are monitored individually on the plots in a 5-year cycle. This gives the possibility of calculating standing volume, growth and removal. Since the threshold on diameter in this enquiry is set to 0 cm d.b.h. an estimate has been made of volume, growth and removal of trees with diameter < 5.0 cm d.b.h.

In this enquiry standing volume is defined as all standing and lying trees in the forest. HOSP only monitors the standing dead- or alive- trees, so a gap exists in the data of HOSP and the required data for this enquiry.

From other inventories (SYHI and WOODSTOCK) on forest holdings where lying trees are measured, it is estimated that about 1 per cent extra volume is from lying dead trees. In this enquiry a correction is made for this gap and the possibilities of collecting data according to the definition of standing volume of FAO/ECE are studied and possibly implemented as well in the HOSP-inventory system.

37, 38

Enquiry Table 17: Source: HOSP database 1988-1992 and 1991-1995.

42-46

Enquiry Table 15: Source: HOSP database 1991-1995

Adjustments:

The distribution of total annual increment for coniferous and broadleaved species over the diameter classes > 5 cm (cm classes) is calculated. The annual increment for trees < 5 cm d.b.h. is extrapolated from these distributions and expressed as a percentage of the total annual increment for trees > 5 cm d.b.h.

Coniferous species (1500 m^3/year d.b.h. < 5 cm on 1236310 m^3/year d.b.h. > 5 cm =) 0,1213 per cent

Broadleaved species (4000 m^3/year d.b.h. < 5 cm on 1155683 m^3/year d.b.h. > 5 cm =) 0,3461 per cent

Natural losses: It is assumed that half of the annual increment on trees < 5 cm can be considered as natural losses. The natural losses for trees >5 cm d.b.h. are adjusted with 50 per cent of the annual increment on trees < 5 cm d.b.h.

Specifications:

Gross annual increment on Coniferous "On forest available for wood supply" and "Gross annual increment" on Broadleaved "On forest available for wood supply": The percentages stated above are used to correct the annual increment of trees > 5 cm for the threshold 0 cm d.b.h.

Gross annual increment "On forest not available for wood supply": A mean percentage ((0,3461+0,1213)/2=) 0,23 per cent is used for correcting the annual increment < 5 cm on forest not available for wood supply.

Gross annual increment "On trees outside the forest": No corrections for d.b.h. < 5 cm are made. The increment of trees < 5 cm in row plantations is considered as negligible.

There exists supportive information on "Additional increment of areas not available for wood supply" in tabular form in the reply to the enquiry, which is available at the secretariat.

General comments: The growing stock, growth and removals survey (Houtoogststatistiek en prognose oogstbaar hout, HOSP) is a monitoring system of about 3000 permanent plots which covers about 310,000 ha of the 340,000 ha of forest in the Netherlands. No monitoring plots are established on about 30,000 ha of forest that meets the FAO/ECE definition of forest land but has another type of land use, e.g. campings, built up areas, parking places, zoological gardens. Changes in this area of 30,000 ha can not be estimated: in this enquiry the data on this area obtained in 1980-1983 are used.

In HOSP all trees with a diameter at breast height (d.b.h.) of 5.0 cm and more are monitored individually on the plots in a 5-year cycle. This gives the possibility of calculating standing volume, growth and removal. Since the threshold on diameter in this enquiry is set to 0 cm d.b.h., an estimate has been made of volume, growth and removal of trees with diameter < 5.0 cm d.b.h. In this enquiry standing volume is defined as all standing and lying trees in the forest. HOSP only monitors the standing dead or alive trees, so a gap exists in the data of HOSP and the required data for this enquiry.

From other inventories (SYHI and WOODSTOCK) on forest holdings where lying trees are measured, it is estimated that about 1 per cent extra volume is from lying dead trees. In this enquiry a correction is made for this gap and the possibilities of collecting data according to the definition of standing volume of FAO/ECE are studied and possibly implemented as well in the HOSP-inventory system.

47-52

Enquiry Table 16: Source: HOSP database 1991-1995.

The volume is estimated for trees with minimum diameter 5.0 cm. No effort is made to estimate the fellings and removals of trees with diameter < 5.0 cm. The volume of felling/removal of trees < 5.0 cm is considered as negligible.

Since no data are available on fellings and removals on 'forest not available for wood supply' and for 'trees outside the forest'; the fellings and removals are assumed equal to the net increment. It is assumed that the growing stock remains constant since 1989 for lack of data. A rough estimate of the increment can be done which is also the estimate for the fellings.

No data are available on the fellings of trees already lying on the ground. It is assumed that 50 per cent of the natural losses are removed afterwards.

The conversion of volume over bark to volume under bark is 20 per cent for coniferous and 25 per cent for broadleaved species.

General comments:

The growing stock, growth and removals survey (Houtoogststatistiek en prognose oogstbaar hout, HOSP) is a monitoring system of about 3000 permanent plots which cover about 310,000 ha of the 340,000 ha forest in the Netherlands. No monitoring plots are established on about 30,000 ha of forest that meets the FAO/ECE definition of forest but has an other type of land use, e.g. campings, built up areas, parking places, zoological gardens. Changes in this area of 30,000 ha can not be estimated: in this enquiry the data on this area obtained in 1980-1983 are used.

In HOSP all trees with a diameter at breast height (d.b.h.) of 5.0 cm and more are monitored individually on the plots in a 5-year cycle. This gives the possibility of calculating standing volume, growth and removal. Since the threshold on diameter in this enquiry is set to 0 cm d.b.h., an estimate has been made of volume, growth and removal of trees with diameter < 5.0 cm d.b.h.

In this enquiry standing volume is defined as all standing and lying trees in the forest. HOSP only monitors the standing dead or alive trees, so a gap exists in the data of HOSP and the required data for this enquiry.

From other inventories (SYHI and WOODSTOCK) on forest holdings where lying trees are measured, it is estimated that about 1 per cent extra volume is from lying dead trees. In this enquiry a correction is made for this gap and the possibilities of collecting data according to the definition of standing volume of FAO/ECE are studied and possibly implemented as well in the HOSP-inventory system.

New Zealand

25-32

Enquiry Table 13: Main source: A National Exotic Forest Description as at 1 April 1996. Ministry of Forestry 1997. The source for this table is Ministry of Forestry using historical records and NEFD data.

Typical rotation lengths currently used for the main plantation species are Pinus radiata 28-30 years; Douglas-fir 45-55 years; other softwoods 40-50 years; hardwoods 20-40 years. The rotation lengths vary depending on site conditions and intended use of the timber. More details can be found in the reference New Zealand Institute of Forestry Handbook (1995).

There is a specific table which gives the age-class distribution for the plantation forest estate species:

Native name	*Scientific name*
Radiata pine	*Pinus radiata*
Douglas-fir	*Pseudotsuga menziesii*
Other softwoods	
Hardwoods	

33-36, 39-41

Enquiry Table 14: Data on the Growing stock, and Biomass are estimates by the National Correspondent made to the Table of Essential Data, and should be regarded as preliminary pending completion of further research. The table on standing volume and biomass was the most difficult one in the Enquiry to complete in the New Zealand situation. The Comments box describes some of the problem areas. As New Zealand only undertakes forest measurement and inventory exercises on the plantation forests, the indigenous forests had a very restricted set of quantitative information which could be used for the table. Scientific research work is currently underway which will help to refine the woody biomass estimates but this was unavailable to use for the Enquiry.

As noted in the comment under "biomass" the information that New Zealand can provide is based on total biomass, which includes above and below ground components and in addition it includes forest litter. The estimates of biomass provided in *Enquiry Table 14* come from a paper-based study, which attempts to estimate terrestrial carbon stocks in New Zealand, (Tate et al, 1997). The purpose of this study was to understand the role of forests with carbon flows. The study did not attempt to model forest carbon from its constituent components. Instead it modelled total carbon (above ground, forest litter & below ground) by forest type. Following further discussions with one of the authors of this paper it was decided that it was not possible to reliably separate out the components into above and below ground from the work carried out. To do this would require a dedicated rework of this study specifically for the TBFRA and the re-engagement of the scientific staff involved. It was possible to break down the plantation forests into their above and below ground components and this has been done in table 14 "Total Woody biomass and the volume of growing stock".

The per hectare growing stock for tall indigenous forests would in all likelihood be higher than the planted forests since the planted forests are immature with an average age of approximately 13 years (for *Radiata* pine).

The multiplier used to convert from inside to outside bark is 1.17 for coniferous species. This includes all the spaces in the bark such as gaps, cracks, fissures and projections.

Comments:

Growing Stock: The growing stock estimates provided have been converted from inside bark to overbark using a multiplier of 1.17 for conifers and 1.11 for broadleaved species.

Up to date growing stock estimates for New Zealand's extensive indigenous forests are unavailable. Most of New Zealand's indigenous forests are now managed for conservation values and as such are not used for timber production.

Biomass : The more reliable biomass estimates provided in column (C) are for trees on forest available for wood supply for New Zealand's planted forests only. The paper which describes the methodology used is Wakelin et al, 1996 as listed in full under "source" above. The organic carbon estimates from this paper have been multiplied by 2 to convert them to oven dry biomass. The estimate has been separated into the above ground components and below ground components. The below ground component is composed of:

– stumps

– coarse and fine roots

– dead plant material including forest litter layers.

The below ground component excludes mineral soil carbon.

The biomass contained in New Zealand's indigenous forests is estimated as 1.5 billion oven-dry tonnes. This includes above and below ground components (which includes stumps, course & fine roots, all dead plant material including forest litter). Because of the methodology used this estimate is not able to be broken down into its constituent components nor is it able to be separated into forest types.

The research work which estimates organic carbon stocks contained in New Zealand forest ecosystems is in progress.

37, 38

Enquiry Table 17: Data for "Growing stock on forest available for wood supply" is for plantation forest growing stock only.

As with earlier tables, the more reliable estimates are only given for the plantation forest for which the data source was the Ministry of Forestry NEFD reports. Again, because the plantation forest is not in the "normal forest" equilibrium situation comparison of the average annual change with annual removals is not particularly valid as an indicator for New Zealand of how the wood potential is being used.

42-46

Enquiry Table 15: This table on increment is not particularly meaningful in the New Zealand situation.

The only reliable parameter which can be provided for this table is the net annual increment for the plantation forests. This is because New Zealand undertakes no inventory work on the remainder of the forest estate or on other wooded land or trees outside the forest. The source for the estimate which has been provided is the NEFD. As the forest undisturbed by man and most of the semi-natural forest are not available for wood supply in New Zealand it has previously been considered that the gross annual increment was balanced by natural losses leading to a net annual increment of zero for these forests. However this assumption is

being reviewed in the light of new work. This work will also allow estimates for the gross annual increment on other wooded land to be derived. As this work is on-going, no published results from it were able to be used for this table.

As the New Zealand plantation estate is expanding quite rapidly in area, it is not in an equilibrium situation. Hence the net annual increment statistic by itself is not particularly meaningful as it does not represent the "allowable cut" situation of the significant forest countries in Northern Europe where the changes are less dynamic.

The 0 cm d.b.h criterion is assumed to be included in the way in which the net annual increment has been calculated.

Further information related to the future wood supply from New Zealand's plantation estate is in NEFD National and Regional Wood Supply Forecasts 1996 (Ministry of Forestry, 1996).

At this stage the assumption has been made that the net annual increment in New Zealand's indigenous forests is zero. With the limited information currently available this is all that can realistically be assumed. Further work is underway but will not be completed by the deadline. It is very likely that future monitoring work will not be directed towards the traditional forestry measures such as growing stock and annual increment for the indigenous forests but will instead focus on measuring biomass, biodiversity and other measures of forest health.

The high NAI per hectare is one of the defining features of plantation forestry in New Zealand and is, of course, essential to the way in which New Zealand developed a plantation-based forest industry over the last one hundred years. What is not usually so well-appreciated, however, is the high level of scientific research that has been invested in plantation forest management and the intensive measures taken to protect the health of the plantation forest estate.

Data on the Net annual increment are estimates by the National Correspondent made to the Table of Essential Data.

47-52

Enquiry Table 16: The source for this table is Ministry of Forestry using roundwood removals data and NEFD data. The base data were the estimated roundwood removals which was converted to annual fellings by assuming that 15 per cent of the felled tree was retained in the forest. The 0 cm d.b.h. criterion is assumed to be included in the volumes.

Norway

25-32

Enquiry Table 13: The data for "Under regeneration" has been filled in to make the totals in correspondence with *Enquiry Table 3* "Forest and other wooded land according to availability for wood supply". Under "unknown age" are included forest roads and forest in Finnmark county (not comprised by the National Forest Inventory).

33-36, 39-41

Enquiry Table 14: Trees smaller than 5 cm d.b.h are not being assessed by the Norwegian National Forest Inventory. To make the results in accordance with the TBFRA-2000 definitions, Swedish data for volume distribution by diameter classes have been used to develop adjustment factors. These factors have been calculated separately for coniferous trees, broadleaved trees and for windthrown and dead trees.

Trees growing above the coniferous forest limit (included in "other wooded land") are also not assessed by the NFI. To obtain country totals, a rough area estimate of this land category has been combined with volume estimates based on an inventory in a limited area.

"Forest available for wood supply (for economic reasons)" is not included in the national statistics, as all forest areas which are not protected, used as military training grounds etc., are normally considered as available. To estimate "forest available for wood supply", the following areas have been excluded:

- areas with a minimum distance to road of more than 2 km
- areas with a minimum distance to road of 1-2 km and inclination of more than 50 per cent
- areas with a minimum distance to road of 1-2 km and inclination of more than 33 per cent and irregular terrain
- forest with a production capacity less than 1 m^3 o.b./ha/year
- other low-productive areas dominated by broadleaved trees
- forest with current utilisation of the land other than "forestry"

Estimates of biomass are calculated as shown in the report "The forest resources of the ECE region" (1985), page 127-128.

42-46

Enquiry Table 15: As trees smaller than 5 cm dbh are not being assessed, an adjustment has been carried out by using the same procedure as described in the comments to *Enquiry Table 14*. The same comments as mentioned above regarding "forest available for wood supply" also apply to *Enquiry Table 15*.

Natural losses are estimated at 6 per cent of gross annual increment for coniferous trees and 10 per cent for broadleaved trees on forest. On "other wooded land" the percentages are set at 20 and 30 respectively.

Trees outside the forest have not been assessed.

47-52

Enquiry Table 16: Annual removals underbark are taken from the official statistics of roundwood cut for sale and industrial production, while estimates from the Census of Agriculture and Forestry 1989 are given for non-commercial use. As the national statistics refer only to quantity underbark, removals overbark have been calculated by applying adjustment factors based on the standing volume over and under bark in mature forest.

Annual fellings are estimated by adding 6 per cent of total fellings for coniferous trees and 10 per cent for broadleaved trees.

The volume of non-decayed windthrown and dead trees in mature forest has been calculated, and the percentage of this volume in relation to the total standing volume in the same development class has been estimated. This percentage (for coniferous and broadleaved trees) has been used to estimate fellings of natural losses from the total annual fellings.

"Fellings of natural losses": e.g., trees damaged by insects, pollution, fires, storms, avalanches.

Poland

25-32

Enquiry Table 13: Stands older than 140 years are included in the class 121-140 years.

There exists supportive information in tabular form on "Area structure of Polish forests in 1996, by main species groups (without forest related areas)" in the reply to the enquiry, which is available at the secretariat.

33-36, 39-41

Enquiry Table 14: In this table information of varying reliability is inserted. The data on growing stock in the State forests are measured in a detailed way; in the private forests this feature is measured too, but with a lower accuracy. The base of adjustments was the average of 1992 and 1996 data.

The most important adjustment was connected with the change of the measurement system. The Polish system adopts 7 cm o.b. or 5 cm u.b. as a minimum diameter, and only wood above this dimension was reported. The adjustment was done in the following way:

– for the group of dominating tree species (Pine, Spruce, Beech, Alder and Birch) the mean quality class was calculated,

– with the use of official yield tables for mentioned species, the share of the volume of wood below 7 cm in diameter was assigned (for every age class),

– on the base of real volume (above 7 cm) of each age class and tree species, the real volume below 7 cm diameter was calculated,

– finally, the coefficients for coniferous and broadleaved species were derived,

– to obtain the total volume, the volume of growing stock (above 7 cm) of coniferous wood should be multiplied by 1,26, while the volume of broadleaved—by 1,17.

The volume of Dead trees was assessed on the basis of results of the forest health state inventory (conducted in 1991). Dead trees were about 1,3 per cent of growing stock volume. The volume of "Other trees" (14,10) was assessed by experts.

Woody biomass is calculated by multiplying standing volume by fixed coefficients: 0,40 m.t./ m^3 for coniferous and 0,57 m.t./ m^3 for broadleaved.

Due to the lack of information, correspondents decided not to assess other woody biomass, assuming that its volume was taken in the volume of growing stock below the 7-cm threshold.

Other woody biomass (stumps and roots) relation to the growing stock was assessed as 20 to 80.

The proportions between forest available and not available for wood supply were taken from the proportions of the areas in these categories (*Enquiry Table 3*).

42-46

Enquiry Table 15: Unfortunately, increment-related information is not measured in our inventory system (beside the volume of fellings of natural losses). For that reason the gross annual increment was calculated with the use of growing stock data and growth tables (for the volume above 7 cm diameter) and increased by relevant coefficients for growing stocks (the same as in *Enquiry Table 14*) to obtain the volume of the increment above 0 cm in diameter.

The volume of natural losses is the sum of fellings of natural losses (above 0 cm) and the volume of natural losses left in the forest (expert's assessment). Natural losses in Polish forests in the 1992-96 period, estimated to average 13.0 million m^3 o.b. a year accounted for an appreciable part (23 per cent) of gross annual increment. This was due to the unsatisfactory health condition of our forests (extremely high degree of defoliation, insect and disease epidemics, forest fires, etc.). Natural losses occurred in every age class.

The division into forest available and non-available for wood supply was done proportionally to the areas covered by these categories.

47-52

Enquiry Table 16: The source data for this table was the volume of removals, measured under bark, from the years 1992-1996. In the State Forests removals are registered in a detailed way, in division above and below 5-cm u.b. In the private forests they are recorded more roughly; removals below the 5-cm threshold are not shown and should be estimated by experts.

Removals on forest available for wood supply are the difference between removals, total and removals on forest not available for wood supply.

Removals on forest not available for wood supply consist of two parts: removals from National Parks and other removals, where intensity of cuttings (per 1 ha) was assessed two times less than on the relevant area of forest available for wood supply. It was assumed that the volume of bark amounts to 20 per cent of total volume, over bark.

Annual fellings were calculated otherwise, the entrance data were the volume of removals above 5-cm u.b. (for the years 1992-1996), enlarged by the volume of bark (*1,19) and harvesting losses (*1,05). The total volume of fellings (above 0-cm o.b. diameter) was calculated with the use of the same coefficients that were applied for the growing stock and increment.

In fact the volume of cuttings that were not predicted for commercial use consists of two parts: one of them, made by farmers, is outside official statistics. The second group is the fuelled for employees of the State Forests enterprise (this could be exchanged for money). The total volume of non-commercial cuttings is not known and was estimated by experts.

Fellings of natural losses are registered in the State Forests enterprise only, for the other forests that figure was enlarged proportionally to the volume of removals. In the 1992-96 period the salvage of natural losses from Polish forests averaged 9.5 million m^3 o.b. a year, equivalent to 73 per cent of total natural losses (the remainder being left in the forest) and to as much as 30 per cent of total fellings.

Comparing average annual fellings with net annual increment gives a distorted indication of 'forest balance' because of the high proportion of recovered natural losses in total fellings. The figures of 67 per cent for the ratio of fellings to NAI for coniferous species and 109 per cent for broadleaved are misleadingly high. By adding unrecovered natural losses to total fellings (which include fellings of natural losses = salvage fellings) and comparing that sum to gross annual increment, more realistic figures of 58 per cent for coniferous and 83 per cent for broadleaved are obtained, which are consistent with the data in *Enquiry Table 17* showing that growing stock of both coniferous and broadleaved species has been expanding."

Portugal

25-32

Enquiry Table 13: The data for "61 to 81 years" correspond to data for "61 years or more".

33-36, 39-41

Enquiry Table 14: Growing stock: National Forest Inventory data are determined by sampling. Concerning the growing stock, the practice is to calculate the stem volume including tops of trees of which d.b.h. is more than 5 cm. As we are currently in an Inventory updating phase and just collecting field data, the base for our estimate was the data of the inventory (1992) of the two main Portuguese wood supply species (*Pinus pinaster* and *Eucalyptus globulus*).

– Trees with a d.b.h. more than 5 cm: the values mentioned above, were extrapolated to the new data areas.

– Trees with a d.b.h. less than 5 cm: were collected in sub-sampling plots (1 cluster with 5 plots of 10 m^2), the tree number and height, on bases of which was assessed the mean volume concerning the observed height to a mean d.b.h. of 2.5 cm, using the formula:

$$=S1m \,.\, Ni \,.\, Vi$$

where:

m = number of age classes

S = sub-stratum area

Ni = number of trees per hectare

Vi = tree mean average volume

and

$Vi = h \times g \times f$

where:

h = tree mean height

g = basal area, considering a mean diameter of 2.5 cm

f = form factor (=0.6)

To obtain the volume (trees with a minimum diameter of 0 cm) of stems, a coefficient was applied to calculate final volume including branches, that was 1.24 to coniferous and 1.2 to broadleaved. Standing volume: dead trees =5 per cent of growing stock both to coniferous and broadleaved.

Woody biomass: To calculate these values, available factors conversion were used and applied to standing volume values.

Stem+branches+bark: k=0.26 to coniferous and k=0.522 to broadleaved;

Stumps+roots: k=0.12 to coniferous and k=0.34 to broadleaved.

Woody biomass of shrubs and bushes: estimated using as mean production in forest area, 1.3 ton/ha.

37, 38

Enquiry Table 17: Concerning the 1985 data, the values were recalculated to bring them into accordance with TBFRA2000, and used the same values as those used now to calculate the volume of all trees with diameter over 0 cm (0.7 per cent over growing stock of the trees with diameter > 5 cm to coniferous and 3.7 per cent to broadleaved).

47-52

Enquiry Table 16: Concerning removals, the data were estimated on the basis of mill consumption and roundwood exports.

The data for fellings and removals on other wooded land were estimated by the National Correspondent on the basis of mill consumption and roundwood exports, which is almost exclusively pine and eucalyptus wood; otherwise estimates point to a very small and insignificant value.

Republic of Moldova

47-52

Enquiry Table 16: Overbark removals estimated at 73 per cent of fellings. Underbark removals estimated at 78 per cent of overbark removals.

The figures for annual removals are the secretariat's estimates based on the analysis of the national data.

Romania

25-32

Enquiry Table 13: The available breakdown by age-classes is from the latest forest inventory (1984) and it refers to all forests.

Figures for "11 to 20 years" include figures for "10 years or less".

Figures for "101 to 120 years" include figures for "121 to 140 years" and "Over 140 years".

The total figure for high mixed forest is smaller than the sum of the areas in different age classes because the age classes include the mixed forest not available for wood supply. The total refers only to high mixed forest available for wood supply.

33-36, 39-41

Enquiry Table 14: Estimates for "Woody biomass" are made by the secretariat.

42-46

Enquiry Table 15: Estimates for "Natural losses" and "Net annual increment" are made by the secretariat.

47-52

Enquiry Table 16: Figures from column "Fellings of natural losses" are sanitary cuttings, calculated as average from statistical reports for 5 years reference period. The estimated volume of 8.0 million m^3 (mostly coniferous)—fellings caused by strong wind storms in 1995-1996, of which removals were 5.8 million m^3 (as of the end of 1997) is not included.

Estimates for "Annual removals, underbark" are made by the secretariat.

Russian Federation

25-32

Enquiry Table 13: The areas "Under regeneration" are the areas cut over the previous three years.

The distribution of high forest available for wood supply is given for forest available for exploitation and forest reserves managed by the forestry authorities. The areas themselves were assessed on the basis of data on stands by species and age classes, allowance being made for the lower age limit on cutting.

Cutting age varies by species group within the following limits:

conifers: 81-161 years;

high forest hardwoods: 81-161 years;

coppice hardwoods: 61-101 years;

soft hardwoods: 41-81 years.

For mixed stands, the average (conditional) cutting age is taken as 100 years.

33-36, 39-41

Enquiry Table 14:

(*a*) Volume of dead conifers has been taken as a ten-year aggregate of average annual losses; volume of dead hardwoods has been taken as a five-year aggregate of average annual losses (see *Enquiry Table 15*) based on growth tables and sources in the literature (Zagreev et al., 1992; Zagreev and Sinitsyn, 1992; Bazilevich, 1993);

(*b*) Woody biomass calculated by multiplying total (growing and dead) volume by the conventional average timber density (0.45 t/cu. m.) and adding branch mass: 10 per cent for broadleaved, 15 per cent for conifers;

(*c*) Other woody biomass (saplings, small trees, bushes) taken to be 3 per cent of the volume of woody biomass;

(*d*) Other biomass (stumps and roots) taken to be 25 per cent;

(*e*) During the evaluation process, volumes of growing stock were revised downwards by 10 to 30 per cent (Alekseev et al., 1994; Filipchuk, 1995), so the likely range has been taken to be a systematic error of +25 per cent.

37, 38

Enquiry Table 17:

1. The insignificant decline in overall growing stock is the result of a change in total forest area over the review period, some forest land having been reassigned to create nature reserves or for construction areas.

2. The decline in coniferous growing stock in forest available for wood supply is the result of primary felling and fires. It is also a consequence of the substitution (succession) of coniferous for broadleaved, which is directly confirmed by the increase in broadleaved stocks.

42-46

Enquiry Table 15:

(*a*) Net annual increment was arrived at by dividing volume of growing stock by the average age of the stand (A), multiplied by a corrective coefficient (K) to take account of the lag between average stand age and the actual age (restoration, succession) in a forest ecosystem. For calculation purposes K was taken to be 1.1 for stands less than 50 years old, 1.2 for stands aged between 50 and 100 years and 1.3 for stands more than 100 years old.. Incorporating the corrective coefficient, (A*K) roughly = 100 years for conifers; (A*K) roughly = 60 years for broadleaved stands. The average value of (A*K) for all Russian forests is 78 years.

(*b*) The proportion of annual losses was taken to be 40 per cent of net annual increment for coniferous and 30 per cent for broadleaved (from averaged data in growth tables for larch and birch).

47-52

Enquiry Table 16: "Fellings of natural losses" are trees damaged by insects, pollution, fires, storms and avalanches.

For "Annual removals, overbark" (on forest, total), 88,700 thousand m^3 is given as a substitute (alternative) figure. For "Annual removals, underbark" (on forest, total), 79,200 thousand m^3 is given as a substitute (alternative) figure.

1. Annual fellings have been taken to be the actual stumpage volume of standing timber felled in 1995. The figures are official data from the Russian Federal Forestry Service, which keeps the records on forests managed by itself, the Central Hunting and Nature Reserve Administration and the Ministry of High and Specialized Secondary Education, and on national nature parks (excluding Ministry of Defence and Ministry of Agriculture and Food Volumes). The ratio of conifers to broadleaved in the annual felling figures is defined by reference to their relative proportions in primary fellings.

2. By convention, forest available for wood supply (row 16.5 in *Enquiry Table 16*) includes forests in groups II and III, which account for the bulk of the exploitable forests and fellings. Forest not available for wood supply (row 16.15) includes forests in group I, which generally serve a conservation function and are therefore subject to special management regulations (restrictions on the species felled and felling methods and extent). Group II and III forests also contain certain quantities of timber that are difficult to exploit for a variety of reasons, but no separate figures are kept on the extent of the felling within them.

3. Commercial fellings in forests available for wood supply (rows 16.5 and 16.10) are calculated with reference to the proportion of commercial timber in primary fellings (77 per cent of conifers, 60 per cent of broadleaved).

4. Annual removals (1995) is taken to be the total volume of timber extracted (by the range of enterprises considered by the Russian Federal State Committee on Statistics). The definition "Removals for commercial use" covers removals of industrial timber (shown in brackets). There are no figures indicating removals from forests under different management systems or from different categories of land, nor on removals by species group.

Slovakia

25-32

Enquiry Table 13: All data were calculated from the database JPRL (unit of area stand arrangement of forests) of Lesoprojekt in connection to tab. 4.2. The stands predominantly coniferous, predominantly broadleaved and mixed were selected based on a defined approach as given in the text to the *Enquiry Table 3* (Predominantly coniferous, broadleaved, bamboos, palms, etc., mixed on "Forest, total"; and Predominantly coniferous, broadleaved, bamboos, palms, etc., mixed on "Forest available for wood supply"). The data in the database of Lesoprojekt were given within stand area. They were converted to forest land.

The figures for "Under regeneration" include figures for even-aged stands in regeneration, and clearings and areas of annual fellings.

33-36, 39-41

Enquiry Table 14: The growing stock of living trees (column A) was calculated from the data of Permanent Forest Inventory (PIL) 1996. A calculation of the proportion of growing stock in the forests of the Ministry of Defence was done according to forest categories and age classes as well as according to the data from Lesoprojekt Zvolen to 1 January 1996 provided for the needs of deriving prospective allowable cuts in the Slovak Republic. The category—trees in forests utilizable for growing stock 14.5—comprised also the category of commercial forests and the category of special purpose forests. Into the category—trees in forests unutilizable for growing stock—protection forests were included.

A conversion of the volume of large wood-dimension underbark to the required volume tree overbark was made by means of the coefficients derived from yield tables of main tree species (Final Report 1990). An overall categorization was made with regard to the percentage of required forest categories from the data of Lesoprojekt Zvolen and from forest management plans valid on 1 January 1996.

Standing volume of dead trees was determined from the data of Lesoprojekt Zvolen which were obtained within the monitoring of forest health condition to 31 December 1996. The data presented by Lesoprojekt were converted to the required volume unit of tree overbark.

The calculation of growing stock (living and dead trees) to woody biomass was made by means of the coefficients of wood density (dry matter) in kg. m^3 according to the percentage of the growing stock of individual tree species in total growing stock from Permanent Forest Inventory (PIL) 1996.

Woody biomass of shrubs and bushes at an amount of 2 per cent of woody biomass is given as a quantified estimate.

Under-stump woody biomass (roots and stumps) was determined as a qualified estimate after studying literary sources, at an amount of 15 per cent of above-stump woody biomass.

Specifications of known deviations from TBFRA-2000 definitions:

With determining the standing volume a pre-set minimal diameter of 0 cm (of breast-height diameter) was not fulfilled as Slovakia's current forest management practices are based, in determining growing stock, on callipering of stands from minimal registration diameter of 8 cm.

37, 38

Enquiry Table 17: (SLHP) Total growing stock for the reference period "1" was calculated from the data of Total Forest Management Plan 1998 related to 31 December 1998. The conversion of the volume of large-dimension wood underbark at stump to volume overbark was made by the coefficients of conversion of volume units derived from yield tables of main tree species Halaj et al. (1990). The data on total growing stock for the period "2" were taken from the *Enquiry Table 14*. Mean annual changes were derived from the differences of reference periods divided by the number giving the duration of reference period (8 years).

42-46

Enquiry Table 15: Total current increment of large-dimension wood underbark according to forest categories was taken from the data of Lesoprojekt Zvolen for the Report on Forestry 1997 and for the needs of calculation of prospective allowable cuts in SR and, and was finally calculated for the whole of Slovakia by means of the coefficient of the proportion of the growing stock in the forests of the Ministry of Defence of SR to total growing stock of the forests in Slovakia.

A conversion to volume unit of total current increment—tree overbark—was made through derived coefficients by means of the volume unit tree overbark and large wood underbark from the data of yield tables by Halaj et al. 1990 (Final Report). This calculation was made according to forest categories and tree species.

Natural losses on the increment were determined by means of natural decrease of trees with other incidental fellings taken from the Lesoprojekt Zvolen data, recorded within the monitoring of forest health condition to 31 December 1996. Total natural losses on the increment of 13 per cent are due to injurious agents (7 per cent) and incidental fellings (6 per cent).

47-52

Enquiry Table 16: The data on annual fellings were taken from the data of Permanent Forest Inventory (PIL) 1996 in the volume of large-dimension wood underbark. The data were converted to volume overbark by means of the coefficients of the relation of volume units, derived from yield tables of main tree species (Halaj et al. 1990). This volume of felling was increased by 3 per cent representing the volume of fellings of timber remaining in the stands after cleanings. A conversion to other required items was performed through given data on fellings in particular forest categories. The data on fellings from natural losses were calculated from the data on incidental fellings according to Permanent Forest Inventory (PIL) 1996 through their conversion to volume unit tree overbark in required classification.

Annual removals—meaning timber deliveries for the year 1996—were taken from the data of the Report on Forestry 1997. They were converted to overbark volume with 10 per cent additional charge for bark. The division into the required detail was calculated through the percentage of the proportion of forest categories in total timber felling in 1996.

Slovenia

25-32

Enquiry Table 13: Expert assessment based on the data from the forest management plans and "NFI" 1996.

33-36, 39-41

Enquiry Table 14: The volume of dead trees is estimated as:

"Dead trees" of "Trees on forest available for wood supply": 2 per cent of "Standing volume--Growing stock" of "Trees on forest available for wood supply";

"Dead trees" of "Trees on forest not available for wood supply": 5 per cent of Standing volume--Growing stock" of "Trees on forest not available for wood supply";

"Dead trees" of "Total above-stump volume and woody biomass" is an expert estimate based on "Dead trees" of "Trees on forest available for wood supply" and "Dead trees" of "Trees on forest not available for wood supply".

The methodology used for woody biomass is the methodology of secretariat estimation (1985).

The estimates 2 per cent and 5 per cent are based on the National Forest Inventory data, especially on the data of Forest Decline Survey.

The standing volume and increment do not include trees below d.b.h. < 10 cm. However the regression adjustment (least square method) performed for d.b.h. (classes 0-10; 10.1-20; ... over 110 cm) and corresponding volumes showed that the maximum of 1.5 per cent of the volume can be expected in the class of 0-10 cm, which is within the sampling error for the standing volume (± 3.8 per cent).

37, 38

Enquiry Table 17: A comparison between growing stocks of two reference periods is practically impossible due to differences in data collection method.

Methodology: 1986: non sampling method (combination of sampling and visual assessments); and 1996: sampling methodology (double stage sampling in tracts).

42-46

Enquiry Table 15: Gross annual increment is based on the data of the "NFI" 1996. Natural losses are estimated to be 10 per cent of gross annual increment (expert assessment), based on the "NFI", especially on the data of Forest Decline Survey.

47-52

Enquiry Table 16: Expert assessment is based on the data from the forest management plans.

Spain

33-36, 39-41

Enquiry Table 14: The figure for "Dead Trees" is estimated at 2 per cent of growing stock.

The figure for "Woody biomass" is estimated at: coniferous = 0.5 of standing volume; broadleaved = 0.6 of standing volume.

42-46

Enquiry Table 15: The 3rd National Forest Inventory is collecting data on natural losses.

Natural losses are estimated at 2 m^3/ha (~ 6 trees).

The data for "Gross annual increment and net annual increment on other wooded land" include figures for "Gross annual increment and net annual increment on trees outside the forest".

47-52

Enquiry Table 16: The figure for "Total annual fellings on other wooded land" includes figures for "Total annual fellings on trees outside forest".

Estimate for non-recovered felling losses is 5 m^3 per 10,000 m^3 (0.0005 per cent).

Sweden

25-32

Enquiry Table 13: See *Enquiry Table 1* "Total area by main classes" for the definition of Forest" and "Other wooded land".

Even-aged is defined as: at least 80 per cent of the stem volume within the 20 m radius plot should be within a 20 year interval.

Uneven-aged: less than 80 per cent

Source: Swedish University of Agricultural Sciences/Dep. of Forest Resource Management and Geomatics. Section of Forest Survey / BSc (For) Hans Toet.

33-36, 39-41

Enquiry Table 14:

See *Enquiry Table 1* "Total area by main classes" for the definition of "Forest" and "Other wooded land".

Volume overbark above-stump excludes branches, twigs and foliage (according to FRA-2000 definitions), includes large branches (>5cm oak and beech) for wood supply which have been calculated.

Woody biomass overbark above-stump includes branches, twigs and foliage (according to FRA-2000 definitions). It also includes dead trees lying on the ground which can still be used for fibre or fuel.

37, 38

Enquiry Table 17: See *Enquiry Table 1* "Total area by main classes" for the definition of "Forest" and "Other wooded land" and *Enquiry Table 14* "Woody biomass". Reference period 1985-1989 updated according to TBFRA-2000 definitions. Source: Swedish University of Agricultural Sciences/Dep. of Forest Resource Management and Geomatics.Section of Forest Survey/BSc (For) Hans Toet.

The "Average annual change" figures have a large random error component since it is the difference between (growing stock period 2) and (growing stock period 1). The growing stock in the respective periods is a statistical estimate with a random error component included, and the difference of the two combined might add up to a large error. Because of this (the resulting figures in *Enquiry Table 7* first indicated changes in the "wrong" direction) a correction is included in the figures. The average annual change between the two periods is therefore probably in the intervals:

Growing stock on "Forest" total:	26000—32500
on "Forest available for wood supply":	21500-27000
of which coniferous:	18300-23000
of which broadleaved:	3200-4000

42-46

Enquiry Table 15: See *Enquiry Table 1* "Total area by main classes" for the definition of "Forest" and "Other wooded land" and *Enquiry Table 14* "Woody biomass".

Increment on trees which have been felled or died during the reference period has been calculated. Annual natural losses include recovered annual natural losses which have not been recorded as standing non-growing stock for inventory year(s).

47-52

Enquiry Table 16: See *Enquiry Table 1* "Total area by main classes" for the definition of "Forest" and "Other wooded land" and *Enquiry Table 14* "Woody biomass".

Fellings for trees < 50 mm stump diameter and > 0 mm diameter at breast height have been calculated.

Natural losses include recovered natural losses which have to be used as a part of total annual natural losses in *Enquiry Table 15* "Increment".

Annual removals stem volume excludes tops left on site. Oven dry = dried 48 hours at 105 °C.

There is a long-time observed difference between the National Forest Survey's felling figures (estimated from stump inventories) and the National Board of Forestry's calculated annual gross fellings (based on a combination of retrieved industry data, the National Forest Survey stump inventory, and other sources of information). Also, according to investigations by the National Forest Survey they assume that their stump inventory data are systematically under-estimated. Therefore a calibration of the National Forest Survey data has been carried out in all cells in *Enquiry Table 16*, that is all original figures are calibrated with 1.06 (6 per cent) according to Mr. Hans Toet.

Switzerland

33-36, 39-41

Enquiry Table 14: Data on "Other trees (on other wooded land and trees outside the forest)" and "Other woody biomass (shrubs and bushes) on forest and other wooded land" are raw estimates derived from national statistics on carbon balance of Switzerland.

37, 38

Enquiry Table 17: The average annual change is related to a period of 10.1 years.

Reason: The data were measured within a 3-year period on each of the two inventory occasions. The average number of vegetation periods between the two occasions was calculated to derive an exact time period to which change figures for volume etc. are related.

42-46

Enquiry Table 15: For "on other wooded land" and "on trees outside the forest", no data are available; an expert guess would lead to arbitrary data.

47-52

Enquiry Table 16: For "on other wooded land" and "on trees outside forest", no data are available; an expert guess would lead to arbitrary data.

Tajikistan

33-36, 39-41

Enquiry Table 14: Source for Above-stump volume and biomass of trees on forest, total, and Trees on forest not available for wood supply: Information from the TBFRA-2000 National Correspondent, Mr. G. A. Avsalov, Director General of the Forest Association "Tajikles", in reply to the Table of the TBFRA Essential Data, 20.11.1998.

37, 38

Enquiry Table 17: Information from the TBFRA-2000 National Correspondent, Mr. G. A. Avsalov.

42-46

Enquiry Table 15: Gross annual increment is the secretariat estimate calculated with the assumption that it is equal to about 1.5 per cent of growing stock. Source: Information on "Net annual increment" is from the TBFRA-2000 National Correspondent, Mr. G. A. Avsalov, in reply to the Table of the TBFRA Essential Data, 20.11.1998.

47-52

Enquiry Table 16: Information from the TBFRA-2000 National Correspondent, Mr. G. A. Avsalov.

The FYR of Macedonia

33-36, 39-41

Enquiry Table 14: The data are secretariat estimates based on information from different literature sources, including ETTS-V, 1996, and other UN-ECE/FAO publications.

37, 38

Enquiry Table 17: The data for "Growing stock on forest available for wood supply" are secretariat estimates based on literature sources of information.

42-46

Enquiry Table 15: The data are secretariat estimates based on information from different literature sources, including ETTS-V, 1996, and other UN-ECE/FAO publications.

47-52

Enquiry Table 16: The data are secretariat estimates based on information from different literature sources, including ETTS-V, 1996, and other UN-ECE/FAO publications.

Turkey

25-32

Enquiry Table 13: There are national data on the distribution of forest area by age classes. But those do not conform to FRA standards: Age classes involves determination of rotation ages and rotation periods by tree species. For the rotation age lesser than 70 years, the rotation period is 10, for higher it is 20 years. In addition the last rotation period also includes very old forest stands which is symbolized as +" in plans. Therefore there are many distribution figures according to various tree species and it is impossible to refine them into a single table (at least for the time being).

There exists supportive information on "Even-aged high forest available for wood supply" in the reply to the TBFRA enquiry, which is available at the secretariat.

33-36, 39-41

Enquiry Table 14: The data in this table do not include:

– areas of high forest where d.b.h. is less than 8 cm (1,458,563 ha);

– young stands where coppice sprouting or planting has been carried out recently (54,737 ha);

– bushy areas (1,107,761 ha).

8 cm diameter is the basis for all statistical calculations. The figures of standing volume and increment in our management plans reflect the volume and increment of stem above stump. To include the root and branches we used factors of 1.2 for coniferous, 1.25 for broadleaved forests and 1.45 for coppices. Also the measurement unit for coppices is the "stère" we assumed that 1 stère equals 0.75 m^3.

For the trees outside forest, the figures are estimates based on various studies and published documents.

Total volume and biomass of dead trees on forest: estimate made by the secretariat with the permission of the National Correspondent of Turkey.

Turkmenistan

33-36, 39-41

Enquiry Table 14: Source for "Trees on forest total", "Coniferous on forest", and "Other trees": Data provided by the Ministry of Natural Resources Utilization and Environmental Protection of Turkmenistan in its reply to the concise enquiry for SOFO-97 (12.08.1996).

Source for "Broadleaved on forest total", "Coniferous and Broadleaved on forest available for wood supply": Secretariat estimates based on different literature sources. Secretariat estimates; conversion factors (coefficients) for woody biomass, as derived from GS, are assumed to be: above-stump, total 0.68; coniferous 0.60; broadleaved 0.70; below-stump 0.15 of the above-stump.

37, 38

Enquiry Table 17: Data provided by the Ministry of Natural Resources Utilization and Environmental Protection of Turkmenistan in its reply to the concise enquiry for SOFO-97 (12.08.1996).

Secretariat estimates based on different literature sources.

42-46

Enquiry Table 15: Data provided by the Ministry of Natural Resources Utilization and Environmental Protection of Turkmenistan in its reply to the concise enquiry for SOFO-97 (12.08.1996).

Secretariat estimates based on different literature sources.

Net annual increment distribution between coniferous and broadleaved is calculated on the basis of growing stock.

47-52

Enquiry Table 16: Data provided by the Ministry of Natural Resources Utilization and Environmental Protection of Turkmenistan in its reply to the concise enquiry for SOFO-97 (12.08.1996).

Secretariat estimates based on different literature sources.

United Kingdom

25-32

Enquiry Table 13: Based on data from GB production forecasts and 1980 Census, rated up to totals *in Enquiry Table 3*. Age breakdown for mixed is estimated by subtraction.

33-36, 39-41

Enquiry Table 14: Source: Production forecast programs for FC and non-FC + estimates.

Dead trees, biomass shrubs + bushes, stump and roots—all are rough estimates: no data available.

Growing stock on forest: Estimated from UK area, assume growing stock 50 m^3/ha.

Growing stock on forest available for wood supply: GB + 4 per cent NI—5 per cent less open space—3 per cent stump + 6 per cent 0-7 cm + 20 per cent (broadleaved only) large branches.

Total above-stump woody biomass: Uses factors 0.43 for conifers, 0.83 broadleaved; rounded.

37, 38

Enquiry Table 17: All figures adjusted from UK definition (7 cm) minimum to 0 cm minimum.

Figures for 1980 taken from Census publication, with similar adjustment as 1995 for "not available for wood supply".

Source of figures reported for FRA 1990 not known; they look inconsistent.

For broadleaved, annual increase in growing stock over this 15-year period is less than the difference between latest (1995) figures for increment (*Enquiry Table 15*) and fellings (*Enquiry Table 16*), because losses in 1987 storm were cleared before 1995.

42-46

Enquiry Table 15: Source: GAI based on GB Production forecast for FC + private, using factors from 1980 Census, adjusted for volume definition.

Net annual increment on forest available for wood supply: GB + 4 per cent for NI—3 per cent stump + 2 per cent 0-7cm + 5 per cent less open space.

Natural losses on forest available for wood supply: rough estimates.

47-52

Enquiry Table 16: Fellings of natural losses is rough estimate for 1995, was higher after storms.

Annual fellings, total: Factors "underbark" to "overbark" smaller than used in UK statistics, to exclude stump, then adjusted for estimated volume 0-7 cm including large branches.

Annual removals, total, u.b.: Factors "underbark" to "overbark" smaller than used in UK statistics, to exclude stump, then adjusted for estimated volume 0-7 cm including large branches.

United States of America

25-32

Enquiry Table 13: Source: RPA database summary tables, unpublished.

Estimates for "Under regeneration" through "1 to 20 years" are derived. Estimates developed and prorated to align with data in *Enquiry Table 11* "egeneration and extension of forest".

33-36, 39-41

Enquiry Table 14: Growing stock volumes in the U.S. are based on top minimum diameter 10.2 cm (4.0 inches) for coniferous and broadleaved; minimum diameter at breast height (d.b.h.) 12.7 cm (5.0 inches) for coniferous and broadleaved; branches not included. Volume data are, however, gathered for all live trees down to 2.5cm (1-inch) dbh. For TBFRA-2000, all live trees are considered as growing stock, which include commercial tree species; non-commercial tree species; and sound cull trees (trees or volume declared cull due to poor form, splits, cracks, etc.). Adjusted growing stock and other volumes reported in TBFRA for the United States will always be higher than those observed in domestic publications. This is due to the more expansive TBFRA definition of growing stock, which includes live trees less than 12.5cm d.b.h. and is reported overbark. Biomass data should be roughly equivalent without adjustment.

Dead trees include only salvageable dead trees still standing; excludes dead trees lying on the ground. In addition, information is available only for these salvageable dead trees on available forest land.

Field inventories do not completely cover reserved forest (unavailable forest) or other wooded land at present. They are in progress. Volume and mass figures on unavailable forest land and other wooded land were derived from averages per acre as estimated on available forest land, and expanded by the number of hectares.

Other tree component volume and biomass—Based on summaries of several studies, it was estimated that stump and root biomass was equivalent to 20 per cent of the bole volume of trees. Shrub volume was estimated to be equivalent to 8 per cent of average bole volume based on limited data.

Trees outside the forest—Data for "Other trees on OWL" and "Trees outside the forest" only includes estimates for "other wooded land". Information for trees outside the forest is currently unavailable.

There exists supportive information on "Supplement tables converting U.S. data to international format" (in tabular form) in the reply to the enquiry, which is available at the secretariat.

IMPORTANT NOTES on reported area and volume estimates:

The reader is cautioned that there are important differences between the numbers provided in this report and those found in domestic U.S. reports. Terms used in the TBFRA such as "forest" and "growing stock" are the same as used in the U.S.A. but the meanings have subtle differences.

Forest land area—by U.S. Forest Service definition, forest land is at least 10 per cent stocked by forest trees, and at least 0.5 hectare in size. This is similar to the FAO definition, which defines forest as land with tree crown cover of more than 10 per cent and minimum size of 0.5 ha in general, the U.S. definition is considered to be compliant with the TBFRA 2000 definition for productive forest land. However, much of the land presented in this report for the U.S. as "Other wooded land" may in fact be "Forest' by the TBFRA definition. Full inventory data collection for these lands to assure compliance with the TBFRA definition is

currently underway but will not be available for 3 to 5 years. The lands reported as "Other wooded land' in this report are generally of low productivity (less than 1.4 m^3/ha/yr) and listed as "unproductive forest" or "other forest land" in U.S.A. reports. The U.S.A. response is generally consistent with the Canadian response for this land category.

Other wooded land area—"Other wooded land" in this report is primarily unproductive forest, not capable of producing 1.4 m^3 per hectare of industrial wood annually. Most of this land will probably be re-classified as forest in future TBFRA Assessments. See discussion of forest land above.

Forest Available for Wood Supply—In the context of this report 'available for wood supply' means only that the forest land is not withdrawn from timber production by law or administrative regulation. Actual availability, at any given time, will vary by ownership objectives. For instance, on public lands in the U.S.A such as National Forest System lands, availability of forest land for timber production is further restricted in the planning process by determining if it is currently 'suitable' for timber management. Suitability varies based on factors such as available markets, accessibility, aesthetic restrictions, conservation restrictions, higher value alternative uses, and many other considerations. Private industrial forests are also subject to restrictions in the corporate planning process. And, the nearly 10 million non-industrial private forest landowners have management objectives perhaps as diverse as their numbers. Thus, in general, the values reported here as 'available for wood supply' will overstate the actual area and volume available for wood supply by the cumulative restrictions of the forest planning process. For example, current plans suggest that perhaps only 1/3 of the available National Forest lands and, according to a recent private ownership study in the U.S.A., only 1/3 of privately owned forest lands have timber management as a primary objective.

Volume: In the U.S.A, while biomass is generally reported overbark, timber volumes are generally reported underbark. Most volumes requested by the TBFRA Enquiry are overbark. Volumes have been adjusted to include estimates of bark. Volumes for currently unsurveyed 'reserved' and 'unproductive' forest lands have been estimated to provide a more complete picture of U.S.A. forests. Surveys of these lands are under way.

37, 38

Enquiry Table 17: As in *Enquiry Table 14* "Total woody biomass and the volume of growing stock"—Growing stock volumes in the U.S.A. are based on top minimum diameter 10.2 cm (4.0 inches) for coniferous and broadleaved; minimum diameter at breast height (d.b.h.) 12.7 cm (5.0 inches) for coniferous and broadleaved; branches not included. Volume data are, however, gathered for all live trees down to 2.5 cm (1-inch) d.b.h. For TBFRA-2000, all live trees are considered as growing stock, which include commercial tree species; non-commercial tree species; and sound cull trees (trees or volume declared cull due to poor form, splits, cracks, etc.). Adjusted growing stock and other volumes reported in TBFRA for the United States will always be higher than those observed in domestic publications. This is due to the more expansive TBFRA definition of growing stock, which includes live trees less than 12.5 cm d.b.h. and is reported overbark.

42-46

Enquiry Table 15: Figures are not adjusted to estimate increment on cull trees or on trees below 12.5 cm d.b.h. Estimates are adjusted for overbark and include estimates for trees on unavailable forest and other wooded land based on volume estimates in *Enquiry Table 14* "Total woody biomass and the volume of growing stock". Thus the estimates of increment presented here will understate the true value. The volume represented by the missing trees is assumed to be a small proportion of the total.

There exists supportive information on "Supplement tables converting U.S. data to international format" (in tabular form) in the reply to the enquiry, which is available at the secretariat.

47-52

Enquiry Table 16: Data on annual increment and fellings are available only for land areas that the U.S. Forest Service defines as timberland (available forest land). Information for other land classes approximated by ratios to available forest land. Proportion of removals from other wooded land not separated.

Data for "On forest not available for wood supply" primarily represent lands within legal reserves within the United States (IUCN categories I & II) where harvesting is not allowed.

Data for "On other wooded land" is not a direct measure and is derived from total fellings and removals data based on logging utilization studies.

Uzbekistan

33-36, 39-41

Enquiry Table 14: The growing stock of *Halaxilon* spp. (broadleaved) constitutes about 75 per cent of the total growing stock of forest in Uzbekistan.

37, 38

Enquiry Table 17: Source for Reference period 2: Secretariat estimates based on literature sources of information, including the article "Biological diversity and genetic resources of forests in Uzbekistan", A. K. Kayimov and E.S. Alexandrovsky, FAO, 1997.

Yugoslavia

25-32

Enquiry Table 13: The categories "10 years or less", "11 to 20 years and "21 to 40 years" of "Even-aged broadleaved forest" include the area of poplar plantations.

33-36, 39-41

Enquiry Table 14: Source: Statistical Bulletin of FRJ “Sumarstvo” 1995.

37, 38

Enquiry Table 17: Source: Statistical Annual Review 1979; Statistical Annual Review 1995.

42-46

Enquiry Table 15: Source: Statistical Bulletin of FRJ “Sumarstvo” 1995.

47-52

Enquiry Table 16: Source: Statistical Bulletin of FRJ “Sumarstvo” 1995; Statistical Annual Review 1995.