



# 4 Current Fibre Supply Situation

## CLASSIFYING FIBRE SOURCES

The major sources of fibre for industrial production can be divided into the following categories:

- Forest undisturbed
- Forest disturbed by man
- Plantations
- Non-wood
- Recovered

These terms are fully described in our definitions, which are found in Annex 2. Essentially the forest undisturbed and disturbed by man is natural forest and represents the traditional major sources of fibre supply for industrial purposes. Industrial plantations, recovered fibre and non-wood fibre represent newer sources of industrial fibre and their capacity to meet future industrial needs will be important to address in the future. As mentioned in Section 2 there are also additional sources of fibre such as trees outside of forest, non-forest land and "other" land which will have to be examined in the future as these will also play a more prominent role in some regions.

## SELECTED SUMMARY OF REGIONAL STATISTICS

This section summarizes the types of statistics collected by region in the GFSM process. Annex 1 contains a more detailed analysis by country and the upcoming CD-ROM will feature information on each country by forest type.

These statistics are the core of the project. They represent FAO's latest attempts to assemble industry-relevant fibre supply information which provides an essential basis for the implementation of sustainable forest management.

Table 3 presents a global summary of natural forest area available and not available for wood supply. The area available for wood supply under current market conditions is approximately 48 percent of the total natural forest area. Of the area available for wood supply at least 44 percent is estimated to be undisturbed. The North American region did not provide statistics on the area of forest undisturbed so it is not possible to offer a better assessment. The total natural forest area varies slightly from the number reported in the FAO State of the World's Forests 1997 report (3.454 million ha) because the GFSM did not attempt to assess countries with very minor forest cover.



**Table 3**  
Natural forest area ('000 ha) by region – Global summary

Region	Total	NOT Available for Supply	Available for Wood Supply	Undisturbed	Disturbed
Africa (26)	399 618	233 157	166 461	59 469	106 992
Asia (22)	408 605	177 338	231 267	48 729	182 538
Oceania (6)	87 867	61 593	26 274	8 415	17 859
Europe (28)	140 713	20 960	119 753	0	119 753
Russia (1)	694 139	166 597	527 542	514 090	13 452
North America (2)	542 700	238 940	303 760	0	303 760
Central America (10)	78 168	49 760	28 408	0	28 408
South America (13)	869 097	709 105	159 992	34 850	125 142
<b>TOTAL</b>	<b>3 220 907</b>	<b>1 657 450</b>	<b>1 563 457</b>	<b>665 553</b>	<b>897 904</b>

\* Number of countries currently included in database

Table 4 presents the total growing stock and the commercial species growing stock expressed in m<sup>3</sup>/ha. In general the disturbed forest has a lower average volume because research reports have indicated a lower standing volume after logging. The differences are more dramatic in regions such as Africa and South America where harvesting may not have been appropriate from a silvicultural point of view thus leading to lower volumes, but this may be changing.

**Table 4**  
Average standardized forest volume by region (m<sup>3</sup>/ha)–summary

Region	Growing Stock**		Commercial Species Growing Stock	
	Undisturbed	Disturbed	Undisturbed	Disturbed
Africa (26)*	227	124	105	53
Asia (22)	151	84	62	65
Oceania (6)	139	103	87	84
Europe (28)	0	142	0	142
Russia (1)	111	133	165	195
North America (2)	n.a.	205	0	199
Central America (10)	n.a.***	100	0	96
South America (13)	158	116	70	48

\* Number of countries currently included in database.

\*\* Volumes pertain to the forest available for supply; the reference diameter is 10 cm.

\*\*\* n.a. indicates not currently available.

In the Forest Resources Assessment 1990 the total reported growing stock volume was reported to be 383 727 million m<sup>3</sup> for forest and other wooded lands. Table 5, which represents a summary of a much more detailed assessment of volume, indicates a total growing stock volume on forest area of 182 005 million m<sup>3</sup>. For all regions, with the exception of Russia, the commercial species growing stock is lower than the total growing stock. South America and Africa show the greatest difference and this is likely due to the fact that many tropical tree species in these regions are not commercialized. The total difference between the growing stock and commercial growing stock is not important because of the significant increase in volumes calculated for Russia.

**Table 5**  
**Total standardized volume by region ('000 000 m<sup>3</sup>) – Summary**

Region	Growing Stock**			Commercial Species Growing Stock**		
	TOTAL	Undisturbed Forest	Disturbed Forest	TOTAL	Undisturbed Forest	Disturbed Forest
<b>Africa (26)*</b>	26 796	13 519	13 277	11 927	6 274	5 653
<b>Asia (22)</b>	22 670	7 160	15 510	15 089	2 942	12 147
<b>Oceania (6)</b>	3 013	1 166	1 847	2 226	729	1 496
<b>Europe (28)</b>	17 029	0	17 029	17 029	0	17 029
<b>Russia (1)</b>	59 112	57 319	1 794	87 371	84 744	2 627
<b>North America (2)</b>	30 926	0	30 926	30 018	0	30 018
<b>Central America (10)</b>	2 339	0	2 339	1 845	0	1 845
<b>South America (13)</b>	20 120	5 602	14 518	7 995	2 241	5 753
<b>TOTAL</b>	<b>182 005</b>		<b>97 240</b>	<b>173 499</b>	<b>96 931</b>	<b>76 567</b>

\* Number of countries currently included in database

\*\* Volumes pertain to the forest available for supply; the reference diameter is 10 cm

Table 6 indicates that the total growth is 3.2 billion m<sup>3</sup> in the forest available for wood supply of which 2.7 billion m<sup>3</sup> is potentially commercial. This growth has not been adjusted for mortality in the forest. It is useful to draw this kind of comparison since what is referred to as the growth/drain or growth/removal ratio is an indicator of the change in forest volume one can expect in the future. Harvesting intensity is normally expressed on the basis of a cutting cycle, a periodic basis, but it could also be expressed on an annual basis in regions where the harvesting system is based on clear-felling. Based on historic management practices the Asian, South American and African regions indicate a significantly lower harvesting intensity once the forest is disturbed. In the boreal regions, such as Russia, and the northern part of North America the harvesting volumes per unit area could increase with each rotation. The critical factor is the type of silvicultural or harvesting system chosen for management purposes.



**Table 6**  
Total potential growth and harvesting intensity by region ('000 000 m<sup>3</sup>) – Summary

Region	Gross annual increment**				Harvesting intensity**		
	Total (1 000 000 m <sup>3</sup> )		Average (m <sup>3</sup> /ha)		Time periodic (m <sup>3</sup> /ha)		
	All species	Commercial species	All species	Commercial species	Undisturbed Forest	Disturbed Forest	
Africa (26)	146.3	56.9	1.4	0.5	Cutting cycle	11.5	4.4
Asia (22)*	328.3	273.7	1.8	1.5		33.9	17.3
Oceania (6)	42.1	34.7	2.4	1.9		30.5	36.8
Europe (28)	622.5	562.9	5.2	4.7	Annual	n.a.	3.3
Russia (1)	946.0	946.0	5.0	3.5	Rotation	122.3	166.4
North America (2)	659	659	6	6		n.a.	n.a.
Central America (10)	49.0	38.3	1.5	1.1	Cutting cycle	n.a.	12.8
South America (13)	473.1	147.7	3.7	1.1		18.0	11.2
<b>TOTAL</b>	<b>3 266</b>	<b>2 719</b>	<b>n.a.</b>	<b>n.a.</b>		<b>n.a.</b>	<b>n.a.</b>

\* Number of countries currently included in database

\*\* Volumes pertain to the forest available for supply. See Annex 1, Table 2 for harvesting intensity by country

The total plantation area is approximately 58 million ha in the southern regions and has a potential annual growth of approximately 84 million m<sup>3</sup>. It is generally agreed that plantations will play an ever-increasing role in meeting the needs of industrial roundwood. The growth represents about 5 percent of the growth estimate for the natural forest but with a reclassification of some of the boreal and temperate forests this would increase significantly.

**Table 7**  
Industrial plantation area and growth by region (1995) – Global summary

Region	Total Plantation Area 1995 (1000 ha)		Total Annual Growth
	Reported Industrial Plantations	Net Industrial Plantations	1 000 000 m <sup>3</sup>
Africa (20)	3 381	3 173	1.0
Asia (15)	54 665	44 068	16.61
Oceania (4)	2 709	2 709	19.46
Europe	n.a.	n.a.	n.a.
Russia	n.a.	n.a.	n.a.
North America	n.a.	n.a.	n.a.
Central America (5)	490	428	0.01
South America (9)	8 516	8 320	47.02
<b>TOTAL</b>	<b>69 761</b>	<b>58 698</b>	<b>84.09</b>

Table 8 summarizes recent estimates of wastepaper and non-wood fibre by region. Europe, North America and Asia produce over 90 percent of the wastepaper and Asia has the capacity to produce over 90 percent of the non-wood fibre. Alternative fibres complement fibres from industrial plantations and natural forests to complete the picture of total fibre availability for industrial uses.

**Table 8**  
Alternative fibres – recovered and non-wood fibres by region – Global summary

Region	Recovered fibres			Non-wood fibres		
	Paper and Paperboard Production	Wastepaper Recovery	Fibre Availability (equivalent volume)	Pulp Production	% Nonwood Used in Total Capacity	Fibre Availability (equivalent volume)
	1 000 000 MT	1 000 000 MT	1 000 000 m <sup>3</sup>	1 000 000 MT	%	1 000 000 m <sup>3</sup>
Africa (26)*	2.27	0.70	1.76	1.84	0.10	0.25
Asia (22)	72.95	27.52	68.79	36.49	18.76	46.90
Oceania (6)	3.13	1.20	2.99	2.42	0.00	0.00
Europe (28)	77.99	31.58	78.96	36.75	0.52	1.29
Russia (1)	4.07	1.09	2.73	4.89	0.00	0.00
North America (2)	107.98	34.89	87.22	91.39	0.19	0.47
Central America (10)	3.21	1.07	2.69	0.48	0.43	1.08
South America (13)	9.18	2.64	6.61	9.42	1.05	2.64
<b>TOTAL</b>	<b>280.78</b>	<b>100.69</b>	<b>251.74</b>	<b>183.67</b>	<b>21.05</b>	<b>52.62</b>

\* Number of countries included in database.

## SELECTED SUMMARY OF A COUNTRY STATISTICS

Table 9 provides an example of a series of country statistical reports that are currently available in the GFSM database. The country chosen for demonstration purposes is the Republic of Congo. The report contains a summary of information on forest area, volume, plantations and reference material examined in assessing the state of the forest resources (the sample report is titled: GFSM estimate – Table 1). There is also an optional feature in the reporting features which allows the user to examine detailed statistics by reference (sample report is titled: GFSM background information – Table 2). The primary advantage of this additional report is exposing all the data to interested analysts to cross-check and validate conflicting data. Finally, there is the possibility to produce alternative futures for each country using the modelling tool fully explained in GFSM Working Paper No. 1 (see sample report titled: Data projection).



Table 9  
Summary of major country statistics for Republic of Congo, an example

GFSS Estimates (Table 1)  
Country Summary: Congo, Republic of

Country Code: CG Total Land Area (Mg): 34,751,000 Total Population (1000): 2,025,000

**(I) Forest Area**

	Total Forest Area (1 000 ha)			Forest Available for Wood Supply (1 000 ha)			Forest Not Available for Wood Supply (1 000 ha)					
	Total Forest	Unallocated Forest	Allocated Forest	Total Forest	Unallocated Forest	Allocated Forest	Unallocated Forest	Unallocated Forest	Protected Forest	Other Forest	Other Forest	Other Forest
Non-forest (1 000 000 ha)	0	0	0	0	0	0	0	0	0	0	0	0
Forest	2,200	790	1,410	2,200	790	1,410	0	0	0	0	0	0
Net	16,810	13,040	3,770	16,810	13,040	3,770	0	0	1,670	4,120	880	660
Total (1 000 ha)	19,010	13,040	4,980	19,010	13,040	4,980	0	0	2,140	4,120	880	1,320

**(II) Forest Ownership & Species**

	Total Forest Area (1 000 ha)			Forest Available for Wood Supply (1 000 ha)			Forest Not Available for Wood Supply (1 000 ha)		
	Total Forest	Unallocated Forest	Allocated Forest	Total Forest	Unallocated Forest	Allocated Forest	Total Forest	Unallocated Forest	Allocated Forest
Non-forest (1 000 000 ha)	0	0	0	0	0	0	0	0	0
Forest	2,200	0	0	2,200	0	0	0	0	0
Net	16,810	0	0	16,810	0	0	1,670	0	0
Total (1 000 ha)	19,010	0	0	19,010	0	0	2,140	0	0

Note: Unallocated forest is forest that is physically available but not assigned to any specific use. Unallocated forest is forest that is not available for harvest or for other uses. Unallocated forest is forest that is not available for harvest or for other uses.

GFSS Estimates (Table 1)  
Country Summary: Congo, Republic of

Country Code: CG Total Land Area (Mg): 34,751,000 Total Population (1000): 2,025,000

**(I) Forest Volume (Total)**

	Commercial Species Growing Stock (1 000 000 m <sup>3</sup> )				Growing Stock (1 000 000 m <sup>3</sup> )				Biomass (1 000 000 m <sup>3</sup> )		Net Annual Growth (1 000 000 m <sup>3</sup> )		
	Total Forest	Unallocated Forest	Allocated Forest	Other Forest	Total Forest	Unallocated Forest	Allocated Forest	Other Forest	Total Biomass	Commercial Species	Other Species	Commercial Species	Other Species
Non-forest (1 000 000 m <sup>3</sup> )	0	0	0	0	0	0	0	0	0	0	0	0	0
Forest	79	21	58	80	170	240	330	10	940	2.8	1.8	2.8	1.8
Net	600	173	427	60	2,700	1,700	300	10	2,780	2.8	1.8	2.8	1.8
Total (1 000 000 m <sup>3</sup> )	585	194	485	60	3,170	2,100	310	10	3,550	3.2	2.2	3.2	2.2

**(II) Forest Volume (Commercial)**

	Commercial Species Growing Stock (1 000 000 m <sup>3</sup> )				Growing Stock (1 000 000 m <sup>3</sup> )				Biomass (1 000 000 m <sup>3</sup> )		Harvesting (1 000 000 m <sup>3</sup> )		
	Unallocated Forest	Allocated Forest	Other Forest	Other Forest	Unallocated Forest	Allocated Forest	Other Forest	Other Forest	Average Annual	Commercial Species	Other Species	Commercial Species	Other Species
Non-forest (1 000 000 m <sup>3</sup> )	0	0	0	0	0	0	0	0	0	0	0	0	0
Forest	40	14	26	80	140	124	12	10	270	0.8	0.4	0.8	0.4
Net	40	14	26	80	140	124	12	10	260	0.8	0.4	0.8	0.4
Average (m <sup>3</sup> /ha)	0.1	0.2	0.1	0.1	0.4	0.4	0.1	0.1	0.1	0.1	0.1	0.1	0.1

Note: Commercial Species are not allocated to a specific forest type. Commercial species are not allocated to a specific forest type.

GFSS Estimates (Table 1)  
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Note: Unallocated forest is forest that is physically available but not assigned to any specific use. Unallocated forest is forest that is not available for harvest or for other uses. Unallocated forest is forest that is not available for harvest or for other uses.

**References**

Reference Name	Reference #	Source Type
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GFSS Background Information (Table 2)  
Country Summary: Congo, Republic of

	Total Forest Area (1 000 ha)			Forest Available for Wood Supply (1 000 ha)			Forest Not Available for Wood Supply (1 000 ha)					
	Total Forest	Unallocated Forest	Allocated Forest	Total Forest	Unallocated Forest	Allocated Forest	Unallocated Forest	Unallocated Forest	Protected Forest	Other Forest	Other Forest	Other Forest
Non-forest (1 000 000 ha)	0	0	0	0	0	0	0	0	0	0	0	0
Forest	2,200	790	1,410	2,200	790	1,410	0	0	0	0	0	0
Net	16,810	13,040	3,770	16,810	13,040	3,770	0	0	1,670	4,120	880	660
Total (1 000 ha)	19,010	13,040	4,980	19,010	13,040	4,980	0	0	2,140	4,120	880	1,320