

DATA OF WORLD FORESTS BY COUNTRIES

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Foreword

Forests will in the future have a very decisive role in climate change. They are consuming carbon dioxide and producing oxygen, which will be needed by the mankind and animals for breathing. They will also give home for many wild animals and plants.

But the forests are in danger to be disappearing in the future. The rate of forest loss has been about 144 million hectares (Mha) after 1990. This is 3.5 % from the forest land area in 1990 (4.2 billion hectares) during the last 26 years. The rate of forest losses is particularly high in some African countries (Togo, Nigeria, Uganda), where more than 50 % of forest area has been lost in 26 years. In absolute terms the highest losses have been in Brazil (54 Mha), Indonesia (28 Mha) and Myanmar (11 Mha). All the forest loss countries have lost 250 million hectares of forests.

However, there are also 45 countries, which have managed to increase their forest land area considerably. They have managed to increase their forest area by 107 million hectares and thus the net loss of forest area is 144 Mha. The three countries, which have increased their forest area most are China (53 Mha), United States (9 Mha) and India (8 Mha).

I have been studying climate change in my latest book "*Fundamentals of Global Warming*" and I believe that forests can be utilized as an asset to fight against global warming. This requires that more countries will be increasing their forest area in the future. We have some 30-years to make the change. The first thing will be to know where we are today and where we should be going in the near future to achieve the change.

The data given here has been collected from FAOSTAT database, which is open for all. However, it must be noted that there are several countries which have been established after 1990 and thus all figures are not available from the year 1990. Also, the figures in those countries, which have been splitting, are also missing.

In Espoo

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1 FOREST AREA

1.1 Global forest area

Global forest area (Appendix 1.1) has been decreasing about 7 million hectares (Mha) annually during the 1990's and about 3 Mha/a after the year 2000. The total net loss has been 132 Mha during these 26 years or in average 5.1 Mha annually. The area is still almost 4 billion hectares (Figure 1.1.1).

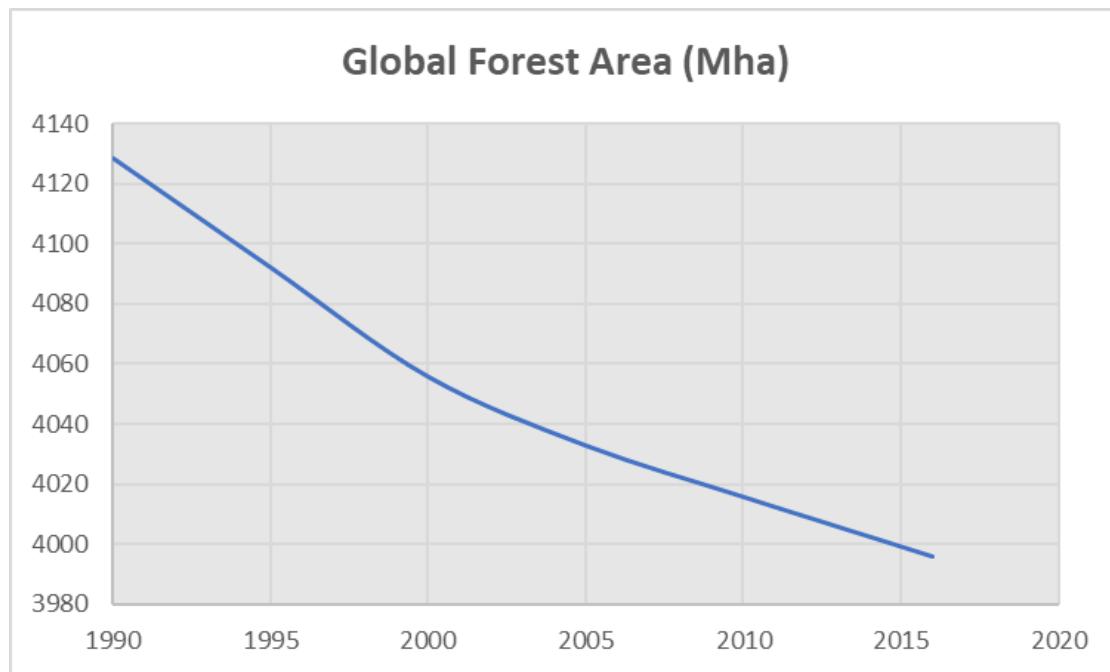


Figure 1.1.1 Global forest area (Mha).

The largest losses in forest area has been given by 40 countries (Appendix 1.2), which have caused losses of 240 Mha (9.2 Mha/a). However, there are 81 countries, which have forest losses and the total losses will rise to 245 Mha (9.5 Mha/a).

Top five countries (Brasil, Indonesia, Myanmar, Nigeria and Tanzania) have lost more than 10 Mha of forest area and all together 114 Mha. However, the rate of forest losses has been decreasing from almost 6 Mha/a to about 3 Mha/a (Figure 1.1.3).

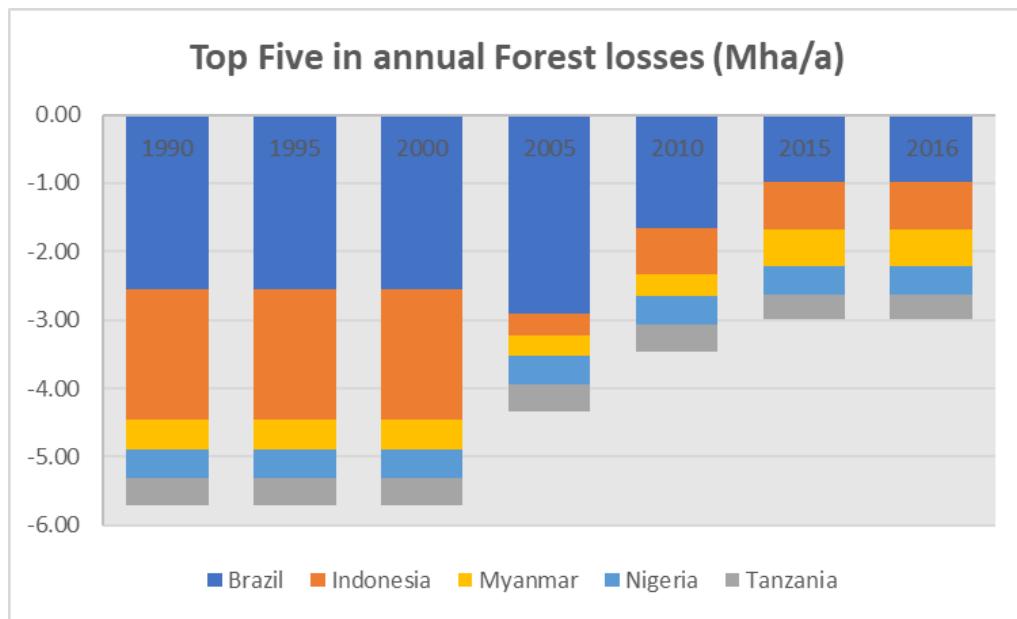


Figure 1.1.2 Top five countries in forest area losses.

The top 80 countries (Appendix 1.3), which have been increasing the forest area, have increased the forest area by 116 Mha (4.5 Mha/a). Top three (China, USA and India) countries have been increasing their forest area about two million ha annually (Figure 1.1.3)

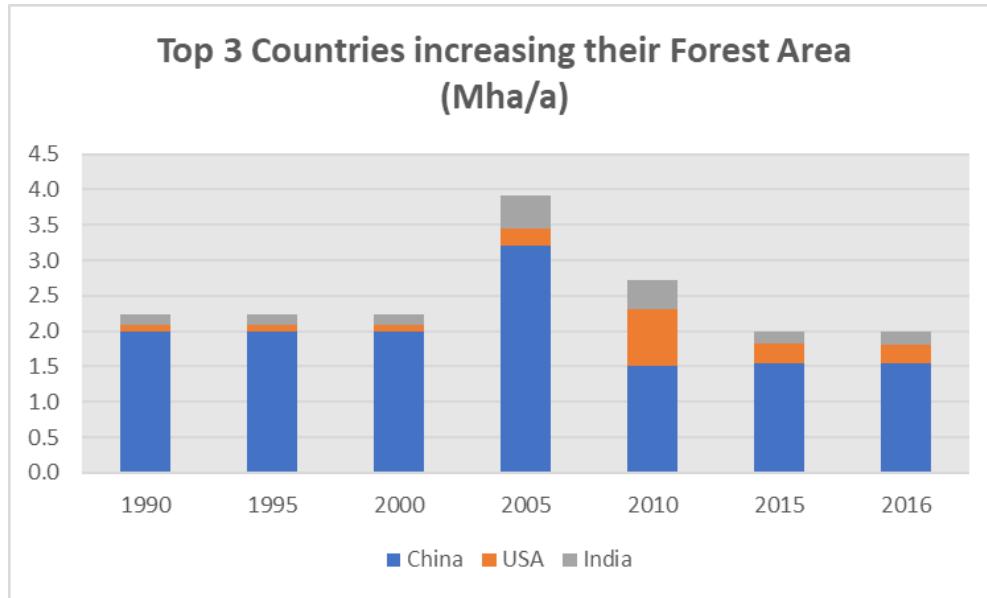


Figure 1.1.3 Top three countries increasing their forest area (Mha/a).

The total net loss can be calculated by forest area increase (116 Mha) minus the decreases (245 Mha). The result will be - 129 Mha in 26 years (in average 5.0 Mha/a). However, the net losses were about 7 Mha/a in 1995 and only 3.2 Mha in 2016 (Figure 1.1.4).

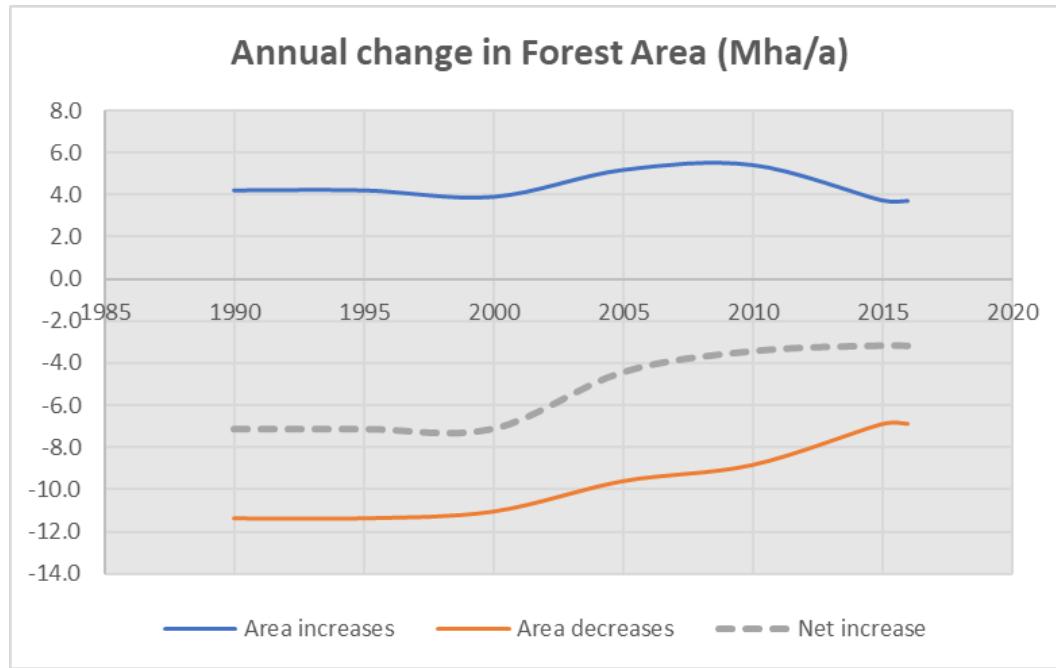


Figure 1.1.4 Net losses of forest area annually (Mha/a).

Top 40 countries, which have lost their forest area most in percent (Appendix 1.4) have lost their forest area more than 15 %. Top three (Togo, Mauritania and Uganda) have lost more than 50%.

A trend of top 40 countries in forest losses has been calculated by dividing the change in 2016 with average change during 1990 – 2016 (Appendix 1.5). If the trend has a minus mark, the losses have been declining. If the change is greater than -100 %, the losses have turned to increases. This has happened in Australia.

Annual change in forest area has been about -3.2 Mha/a between years 2010 and 2015 (Figure 1.1.5). Most of this change has been happening in Africa (-2.8 Mha/a) and South America (-2.0 Mha/a).

The change in natural forest area has been -6.4 Mha/a between 2010 and 2015 (Figure 1.1.6). It has been -3.1 Mha/a in Africa, -2.2 Mha/a in South America and -1.0 Mha/a in Asia. However, the planted forests in Asia (1.8 Mha/a) has made the change in Asia to positive (Figure 1.1.7).

We should be very worried about forests in Africa. Losses in natural forests have been -3 Mha annually during years 2010 – 2015.

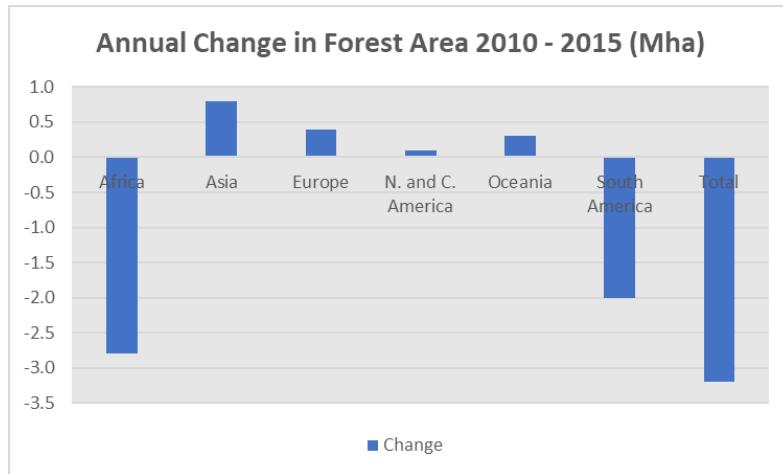


Figure 1.1.5 Annual change in Forest area (Mha/a).

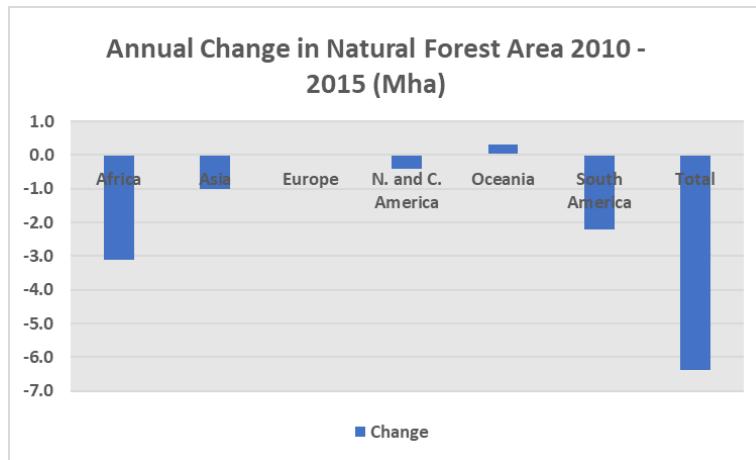


Figure 1.1.6 Annual Change in natural forest area (Mha/a).

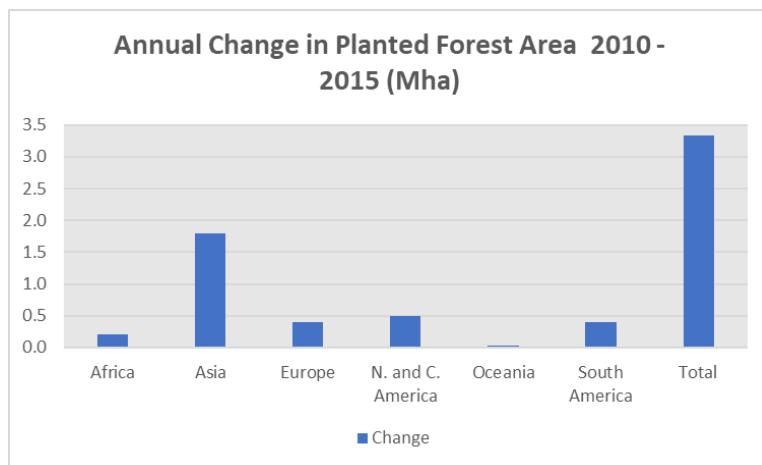


Figure 1.1.7 Annual change in planted forest area (Mha/a)

1.2 Area by continents

Africa

Losses of forest area in Africa have been 86 million ha (3.3 Mha/a) since 1990 (Table 1.2.1). Nigeria has lost more than half of its forests. Nigeria and Tanzania have lost more than 10 Mha of their forest land and Zimbabwe and Congo more than 8 million hectares.

Table 1.2.1 Largest losses in forest area in Africa (Mha)

	Area	1990	1995	2000	2005	2010	2015	2016	Change	%
1	DR of the Congo	160363	158806	157249	155692	154135	152578	152267	-8096	-5%
2	Angola	60976	60352	59728	59104	58480	57856	57731	-3245	-5%
3	Zambia	52800	51967	51134	50301	49468	48635	48468	-4332	-8%
4	Tanzania	55920	53920	51920	49920	47920	46060	45688	-10232	-18%
5	Mozambique	43378	42283	41188	40079	38972	37940	37734	-5644	-13%
6	Papua New Guinea	33627	33614	33600	33586	33573	33559	33556	-71	0%
7	Gabon	22000	22000	22000	22000	22000	23000	23200	1200	5%
8	Congo	22726	22641	22556	22471	22411	22334	22319	-407	-2%
9	Central African Repub	22560	22482	22404	22326	22248	22170	22154	-406	-2%
10	Sudan (former)	23570	22698	21826	20954	20082	19210	19036	-4535	-19%
11	Cameroon	24316	23216	22116	21016	19916	18816	18596	-5720	-24%
12	Suriname	15430	15411	15391	15371	15351	15332	15328	-102	-1%
13	Zimbabwe	22164	20529	18894	17259	15624	14062	13750	-8414	-38%
14	Ethiopia	16735	14410	13705	13000	12296	12499	12540	-4195	-25%
15	Madagascar	13692	13358	13023	12838	12553	12473	12457	-1235	-9%
16	Botswana	13718	13127	12535	11943	11351	10840	10738	-2980	-22%
17	CÃ'te d'Ivoire	10222	10275	10328	10405	10403	10401	10401	179	2%
18	Ghana	8627	8768	8909	9053	9195	9337	9365	738	9%
19	South Africa	9241	9241	9241	9241	9241	9241	9241	0	0%
20	Senegal	9348	9123	8898	8673	8473	8273	8233	-1115	-12%
21	South Sudan	7157	7157	7157	7157	7157	7157	7157	0	#DIV/0!
22	Namibia	8762	8397	8032	7661	7290	6919	6845	-1917	-22%
23	Nigeria	17234	15186	13137	11089	9041	6993	6583	-10651	-62%
24	Guinea	7264	7084	6904	6724	6544	6364	6328	-936	-13%
25	Somalia	8282	7899	7515	7131	6747	6363	6286	-1996	-24%
26	Morocco	4954	4974	4993	5401	5672	5632	5624	670	14%
27	Burkina Faso	6847	6548	6248	5949	5649	5350	5290	-1557	-23%
28	Chad	6705	6516	6326	6141	5508	4875	4748	-1957	-29%
29	Mali	6690	6295	5900	5505	5110	4715	4636	-2054	-31%
30	Kenya	4724	4141	3557	4047	4230	4413	4450	-274	-6%
	Top 1-30	720032	702413	686414	672037	656640	643397	640748	-79284	-11%
	31-57	36399	34724	33027	31681	30649	29681	29487	-6912	-19%
	Total	756431	737137	719441	703718	687289	673078	670235	-86196	-11%

Asia

Forest area has grown in Asia by 22.3 million hectares from 1990 (Table 1.2.2). The growth has been largest in China (53 Mha) and India (6.9 Mha). The losses have been the largest in Indonesia (28 Mha) and Myanmar (10.7 Mha).

Table 1.2.2 Forest area in Asia (1000 ha).

	Area	1990	1995	2000	2005	2010	2015	2016	Change	%
1	China	157141	167071	177001	193044	200610	208321	209864	52723	34%
2	Indonesia	118545	108977	99409	97857	94432	91010	90326	-28219	-24%
3	India	63939	64665	65390	67709	69790	70682	70860	6921	11%
4	Myanmar	39218	37043	34868	33321	31773	29041	28495	-10723	-27%
5	Japan	24950	24913	24876	24935	24966	24958	24956	6	0%
6	Lao People's Democratic Republic	17645	17085	16526	16870	17816	18761	18951	1306	7%
7	Thailand	14005	15508	17011	16100	16249	16399	16429	2424	17%
8	Viet Nam	9363	10545	11727	13077	14128	14773	14902	5539	59%
9	Mongolia	12536	12127	11717	11308	13039	12553	12456	-80	-1%
10	Cambodia	12944	12245	11546	10731	10094	9457	9330	-3614	-28%
11	Republic of Korea	6370	6329	6288	6255	6222	6184	6176	-193.6	-3%
12	Democratic People's Republic of Korea	8201	7567	6933	6299	5666	5031	4904	-3297	-40%
13	Turkmenistan	4127	4127	4127	4127	4127	4127	4127	0	0%
14	Nepal	4817	4359	3900	3636	3636	3636	3636	-1181	-25%
15	Kazakhstan	3394	3394	3365	3337	3309	3309	3309	-84.5	-2%
16	Uzbekistan	3129	3129	3212	3295	3276	3220	3209	80.28	3%
17	Bhutan	2507	2556	2606	2656	2705	2755	2765	258.14	10%
18	Sri Lanka	2284	2238	2192	2118	2103	2070	2063	-220.6	-10%
19	Pakistan	148	2322	2116	1902	1687	1472	1429	1281.02	866%
20	Bangladesh	1494	1481	1468	1455	1442	1429	1426	-67.6	-5%
21	Afghanistan	1350	1350	1350	1350	1350	1350	1350	0	0%
22	Timor-Leste	966	910	854	798	742	686	675	-291.2	-30%
	Kyrgyzstan	847	847	858	869	677	637	629	-218.35	-26%
	Tajikistan	409	409	410	410	410	412	412	3.4	1%
21	Brunei Darussalam	413	405	397	389	380	380	380	-33	-8%
22	Singapore	16.35	16.35	16.35	16.35	16.35	16.35	16.35	0	0%
	Total	510757	511616	510163	523864	530645	532670	533075	22318	4%

Europe

Forest area in European Union has increased 13 million hectares since 1990 (Table 1.2.3). Largest increase has been happened in Spain (4.6 Mha). Only Portugal has lost its forest area.

Table 1.2.3 Forest area in EU (1000 ha)

Area	1990	1995	2000	2005	2010	2015	2016	Change	%
1 Sweden	28063	28113	28163	28218	28073	28073	28073	10	0%
2 Finland	21875	22160	22445	22143	22218	22218	22218	343	2%
3 Spain	13809	15393	16977	17282	18247	18418	18452	4643	34%
4 France	14436	14862.5	15289	15861	16424	16989	17102	2666	18%
5 Germany	11300	11327	11354	11384	11409	11419	11421	121	1%
6 Poland	8881	8970	9059	9200	9329	9435	9456	575.2	6%
7 Italy	7590	7980	8369	8759	9028	9297	9351	1761	23%
8 Romania	6371	6368.5	6366	6391	6515	6861	6930	559.2	9%
9 Greece	3299	3450	3601	3752	3903	4054	4084	785.2	24%
10 Austria	3776	3807	3838	3851	3860	3869	3871	94.8	3%
11 Bulgaria	3327	3351	3375	3651	3737	3823	3840	513.2	15%
12 Latvia	3207	3207	3241	3297	3354	3356	3356	149	5%
13 Portugal	3436	3390	3343	3296	3239	3182	3171	-265.4	-8%
14 United Kingdom	2778	2866	2954	3021	3059	3144	3161	383	14%
15 Czechia	2633	2633	2637	2647	2657	2667	2669	36	1%
16 Estonia	2225	2225	2243	2252	2234	2232	2232	7.1	0%
17 Lithuania	1983	1983	2020	2121	2170	2180	2182	199.5	10%
18 Hungary	1801	1859	1917	1983	2046	2069	2074	272.6	15%
19 Slovakia	1922	1922	1921	1932	1939	1940	1940	19	1%
20 Slovenia	1211	1211	1233	1243	1247	1248	1248	38	3%
21 Ireland	465	550	635	695	726	754	760	295	63%
22 Belgium	763	759	667	674	681	683	684	-79.36	-10%
23 Denmark	543	564	586	558	587	612	617	74.02	14%
24 Netherlands	345	352.5	360	365	373	376	376.6	31.6	9%
25 Cyprus	161	166	172	173	173	173	173	11.56	7%
26 Luxembourg	86.7	86.7	86.7	86.7	86.7	86.7	86.7	0	0
27 Liechtenstein	6.5	6.7	6.9	6.9	6.9	6.9	6.9	0.4	6%
28 Isle of Man	3.46	3.46	3.46	3.46	3.46	3.46	3.46	0	0%
29 Malta	0.35	0.35	0.35	0.35	0.35	0.35	0.35	0	0%
30 Greenland	0.22	0.22	0.22	0.22	0.22	0.22	0.22	0	0%
31 Faroe Islands	0.08	0.08	0.08	0.08	0.08	0.08	0.08	0	0%
Total	146210	149478	152862	154846	157326	159170	159539	13242	9%

Forest in other European countries has also increased about 9.3 million ha (1 %) since 1990 (Table 1.2.4). The largest increase has happened in Russia (5.8 Mha), Turkey (2.2 Mha) and Belarus (0.6 Mha).

Table 1.2.4 Forest area in Europe outside EU (1000 ha).

	Area	1990	1995	2000	2005	2010	2015	2016	Change	%
1	Russian Federation	809109	809109	809269	808790	815136	814931	814889	5780	1%
2	Norway	12132	12123	12113	12092	12102	12112	12114	-18.0	0%
3	Turkey	9622	9903	10183	10662	11203	11715	11817	2195.4	23%
4	Ukraine	9392	9392	9510	9575	9548	9657	9679	286.8	3%
5	Belarus	8027	8027	8273	8436	8534	8634	8653	626.9	8%
6	Georgia	2756	2756	2761	2773	2822	2822	2822	66.0	2%
7	Serbia and Montenegro	3013	3013	3086	3102	2713	2720	2721	-291.1	-10%
8	Bosnia and Herzegovina	2198	2198	2185	2185	2185	2185	2185	-12.5	-1%
9	Croatia	1868	1868	1885	1903	1920	1922	1922	54.9	3%
10	Switzerland	1151	1173	1194	1217	1235	1254	1258	106.8	9%
11	Azerbaijan	862	862	872	877	1008	1139	1166	303.8	35%
12	North Macedonia	935	935	958	975	998	998	998	63.0	7%
13	Montenegro	827	827	827	827	827	827	827	0.0	0%
14	Albania	789	779	769	782	776	772	771	-18.3	-2%
15	Republic of Moldova	322	322	324	363	386	409	414	92.1	29%
16	Armenia	334	334	333	332	331	332	332.2	-1.8	-1%
17	Iceland	16.1	22.45	28.8	36.5	42.7	49.2	50.5	34.4	214%
18	Andorra	16	16	16	16	16	16	16	0.0	0%
	Channel Islands	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.0	0%
	Total	863368	863657	864587	864944	871784	872494	872636	9269	1%

North America

Forest area in North America has increased with 2.8 million ha since 1990 (Table 1.2.5). Area in USA has increased with 7.9 million ha and decreased in Mexico with 3.8 Mha.

Table 1.2.5 Forest area in North America (1000 ha)

	Area	1990	1995	2000	2005	2010	2015	2016	Change	%
1	Canada	348273	348038	347802	347576	347302	347069	347022	-1251	0%
2	United States of America	302450	302993	303536	304757	308720	310095	310370	7920	3%
3	Mexico	69760	68808	67856	67083	66498	66040	65948	-3812	-5%
	Total	720483	719839	719194	719416	722520	723204	723341	2858	0%

Central America

Forest area has been decreased in Central America since 1990 with 5.8 million hectares (Table 1.2.6). The largest losses have been in Honduras (3.6 Mha) and Ecuador (2.2 Mha). The largest increases have been in Cuba (1.2 Mha) and Dominican Republic (0.9 Mha).

Table 1.2.6 Forest area in Central America (1000 ha).

	Area	1990	1995	2000	2005	2010	2015	2016	Change	%
1	Ecuador	14631	14180	13729	13335	12942	12548	12469	-2162	-15%
2	Panama	5040	4954	4867	4782	4699	4617	4601	-439	-9%
3	Honduras	8136	7264	6392	5792	5192	4592	4472	-3664	-45%
4	Cuba	2058	2247	2435	2697	2932	3200	3254	1196	58%
5	Nicaragua	4514	4164	3814	3464	3114	3114	3114	-1400	-31%
6	Dominican Republic	1105	1296	1486	1652	1817	1983	2016	911	82%
7	Belize	1616	1538	1459	1417	1391	1366	1361	-255	-16%
8	Bahamas	515	515	515	515	515	515	515	0	0%
9	Puerto Rico	287	369	450	463	479	496	499	212	74%
10	Jamaica	345	343	341	339	337	335	335	-10	-3%
11	El Salvador	377	355	332	309	287	265	261	-116	-31%
12	Trinidad and Tobago	241	237	234	230	226	234	236	-5	-2%
13	Haiti	116	113	109	105	101	97	96	-20	-17%
14	Guadeloupe	74	74	74	74	73	73	73	-2	-2%
15	Dominica	50	49	47	46	45	43	43	-7	-14%
16	Turks and Caicos Islands	34	34	34	34	34	34	34	0	0%
17	Saint Vincent and the Grenadines	25	26	26	26	27	27	27	2	8%
18	Saint Lucia	22	22	21	21	21	20	20	-2	-7%
19	Cayman Islands	13	13	13	13	13	13	13	0	0%
20	Barbados	6	6	6	6	6	6	6	0	0%
21	British Virgin Islands	4	4	4	4	4	4	4	0	-2%
22	Saint Pierre and Miquelon	3	3	3	3	3	3	3	-1	-18%
23	Montserrat	4	3	3	3	3	3	3	-1	-29%
24	Bermuda	1	1	1	1	1	1	1	0	0%
	Total	39216	37806	36395	35330	34261	33589	33455	-5761	-15%

South America

Countries in South America have lost 90 million ha of its forest area in 26 years or 3.5 million hectares annually (Table 1.2.7). The largest losses have happened in Brazil (54 Mha) Bolivia (8 Mha) and Argentina (8 Mha). Forest area has increased only in Chile (2.8 Mha), Uruguay (1.1 Mha) and Costa Rica (0.2 Mha).

Table 1.2.7 Forest area in South America (1000 ha).

Area	1990	1995	2000	2005	2010	2015	2016	Change	%
1 Brazil	546705	533990	521274	506734	498458	493538	492554	-54151	-10%
2 Peru	77921	77034	76147	75528	74811	73973	73805	-4116	-5%
3 Colombia	64417	63108	61798	60201	58635	58502	58475	-5942	-9%
4 Bolivia (Plurin)	62795	61443	60091	58734	56209	54764	54475	-8320	-13%
5 Venezuela (Bo)	52026	50589	49151	47713	47505	46683	46519	-5507	-11%
6 Argentina	34793	33327	31860	30186	28596	27112	26815	-7978	-23%
7 Chile	15263	15549	15834	16042	16231	17735	18036	2773	18%
8 Guyana	16660	16641	16622	16602	16576	16526	16516	-144	-1%
9 Paraguay	21157	20263	19368	18475	16950	15323	14998	-6159	-29%
10 French Guiana	8218	8200	8182	8168	8138	8130	8128	-90	-1%
11 Guatemala	4748	4478	4208	3938	3722	3540	3504	-1244	-26%
12 Costa Rica	2564	2470	2376	2491	2605	2756	2786	222	9%
13 Uruguay	798	1084	1370	1522	1731	1845	1868	1070	134%
14 American Samo	18	18	18	18	18	18	18	-1	-5%
15 Grenada	17	17	17	17	17	17	17	0	0%
16 Antigua and Ba	10	10	10	10	10	10	10	-1	-5%
17 Anguilla	6	6	6	6	6	6	6	0	0%
18 Norfolk Island	0	0	0	0	0	0	0	0	0%
19 Aruba	0	0	0	0	0	0	0	0	0%
20 Falkland Islands	0	0	0	0	0	0	0	0	#DIV/0!
Total	908117	888225	868333	846385	830219	820477	818529	-89588	-10%

Oceania

Forest area in Oceania has decreased with 1.4 million hectares from 1990 (Table 1.2.8). Largest forest losses have been in Australia (3.4 Mha) and the largest increases in Philippines.

Table 1.2.8 Forest area in Oceania (1000 ha).

	Area	1990	1995	2000	2005	2010	2015	2016	Change	%
1	Australia	128541	128691	128841	127641	123211	124751	125059	-3482.0	-3%
2	Malaysia	22376	21984	21591	20890	22124	22195	22209	-166.8	-1%
3	New Zealand	9658	9899	10139	10183	10151	10152	10152	494.2	5%
4	Philippines	6555	6791	7027	7074	6840	8040	8280	1725.0	26%
5	Solomon Islands	2324	2296	2268	2241	2213	2185	2179	-144.6	-6%
6	Fiji	953	967	980	997	993	1017	1022	69.2	7%
7	Netherlands Antilles	839	839	839	839	839	839	839	0.0	0%
8	Vanuatu	440	440	440	440	440	440	440	0.0	0%
9	French Polynesia	55	80	105	130	155	155	155	100.0	182%
10	Micronesia (Federate)	63.7	63.7	63.9	64.0	64.1	64.3	64.3	0.6	1%
11	Martinique	48.5	48.5	48.5	48.5	48.5	48.5	48.5	0.0	0%
12	Seychelles	40.7	40.7	40.7	40.7	40.7	40.7	40.7	0.0	0%
13	Palau	38.9	38.9	39.6	40.3	40.3	40.3	40.3	1.4	4%
14	Mauritius	41.1	41.5	41.9	38.2	38.4	38.6	38.6	-2.5	-6%
15	Northern Mariana Islands	32.8	32.8	32.0	31.1	30.3	29.5	29.3	-3.5	-11%
16	Guam	25.0	25.0	25.0	25.0	25.0	25.0	25.0	0.0	0%
17	Niue	20.6	20.1	19.6	19.1	18.6	18.1	18.0	-2.6	-13%
18	United States Virgin Islands	23.6	22.0	20.5	18.7	18.2	17.6	17.5	-6.1	-26%
19	Cook Islands	14.4	14.8	15.1	15.1	15.1	15.1	15.1	0.7	5%
20	Marshall Islands	12.6	12.6	12.6	12.6	12.6	12.6	12.6	0.0	0%
21	Kiribati	12.2	12.2	12.2	12.2	12.2	12.2	12.2	0.0	0%
22	Saint Kitts and Nevis	11.0	11.0	11.0	11.0	11.0	11.0	11.0	0.0	0%
23	Tonga	9.0	9.0	9.0	9.0	9.0	9.0	9.0	0.0	0%
24	Wallis and Futuna Islands	5.8	5.8	5.8	5.8	5.8	5.8	5.8	0.0	1%
25	Mayotte	10.7	9.7	8.7	7.8	6.8	5.8	5.6	-5.0	-47%
26	Pitcairn Islands	3.5	3.5	3.5	3.5	3.5	3.5	3.5	0.0	0%
27	Saint Helena, Ascension and Tristan da Cunha	2	2	2	2	2	2	2	0.0	0%
28	Maldives	1	1	1	1	1	1	1	0.0	0%
29	Tuvalu	1	1	1	1	1	1	1	0.0	0%
	Total	172158.9	172401.4	172643.9	170841.9	167370	170175.8	170737	-1421.9	-1%

2 CARBON STORAGE IN LIVING FORESTS

2.1 Global carbon storage

Most important matter in point of the climate change is the storage mass of CO₂ in the living forests or carbon sink. The trees take carbon from the air and release oxygen. But if the trees are burned, this carbon will be released as CO₂ into the atmosphere.

The mass of CO₂ stored in living forests has been declining from 1127 Gt in 1990 to 1084 Gt by 2016 (Figure 2.1.1). The loss of mass has been 43 Gt, which corresponds 1.7 GtCO₂ annually. It can be found that during the last 11 years the loss has been 12.5 Gt or 1.1 GtCO₂ annually.

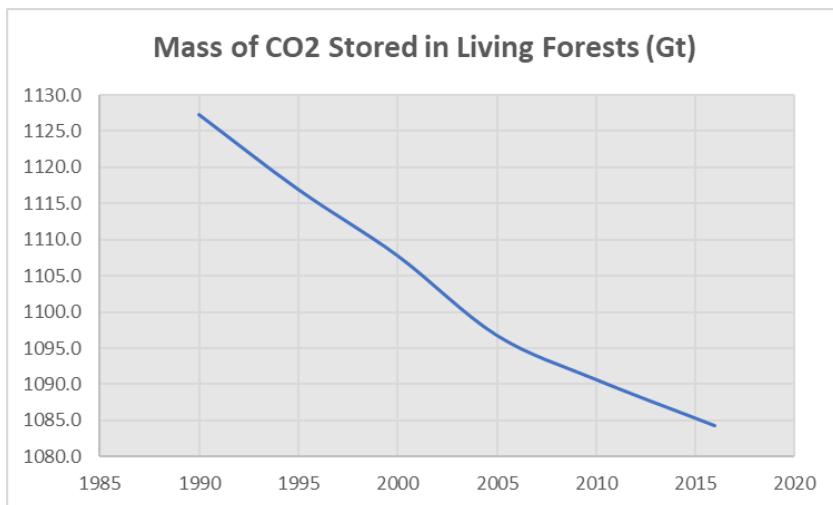


Figure 2.1.1 Mass of CO₂ stored in living forests (GtCO₂).

Top forty countries in CO₂ losses (emissions) have caused 88.6 GtCO₂ losses in 26 years (Appendix 2.2). The emissions have been in average 3.4 GtCO₂ annually.

Largest CO₂ emissions from forests have been released by five countries, which still are causing about 1.8 GtCO₂ emissions annually (Figure 2.1.2). Emissions in Indonesia have been growing considerably and are today about 1 GtCO₂ annually. Emissions in Brasilia have been decreasing, but they are together with Brasilia still the same as in 1990 or about 1.3 Gt/a.

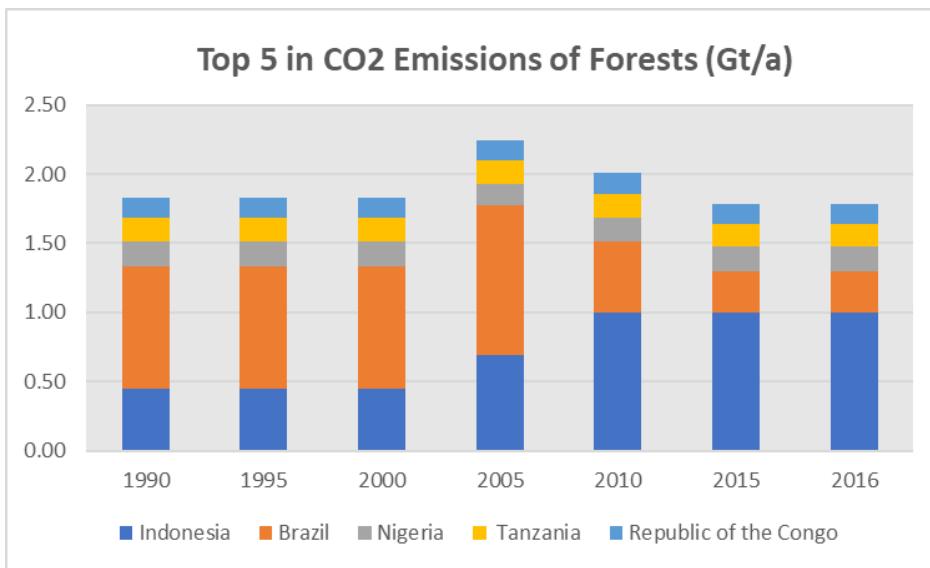


Figure 2.1.2 Five largest CO₂ emissions from forests (GtCO₂/a).

Top forty countries in CO₂ increases in carbon storages in forests have caused 45.5 GtCO₂ change in 26 years (Appendix 2.3). This causes in average 1.8 GtCO₂ carbon storage annually. The net emissions of living forests have been 43 GtCO₂ (88.6-45.5 Gt) or in average 1.8 GtCO₂ annually.

Largest increases of carbon sink in living forests has been in USA and China (Figure 2.1.3). However, carbon sink of USA has decreased to 0.2 GtCO₂/a, but carbon sink has remained in China at level of 0.4 GtCO₂/a. These five countries are increasing their carbon sink about 0.8 GtCO₂ annually.

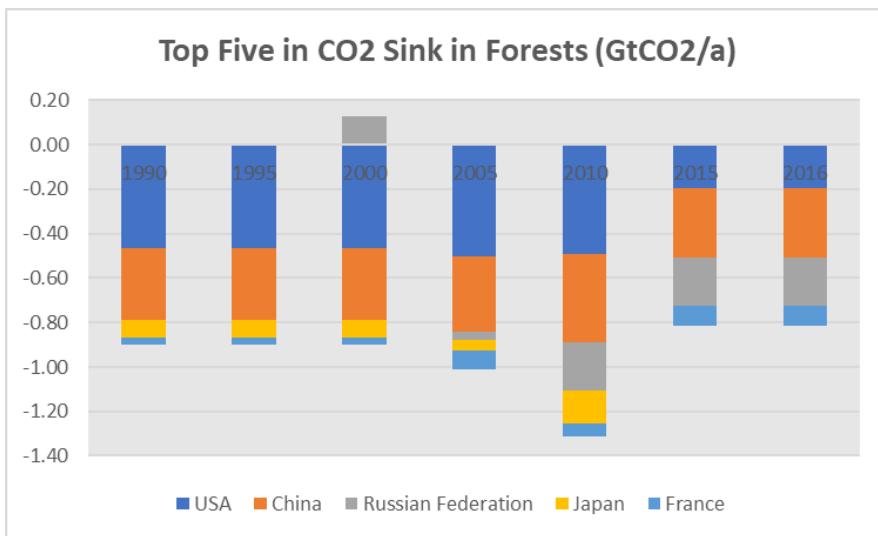


Figure 2.1.3 Increases of carbon sinks (GtCO₂/a).

The net change of CO₂ storage is indicating that the CO₂ emissions of forests have been decreasing from about 2 GtCO₂/a during years 1990 – 2005 to near 1 Gt/a in 2010 – 2016 (Figure 2.1.4).

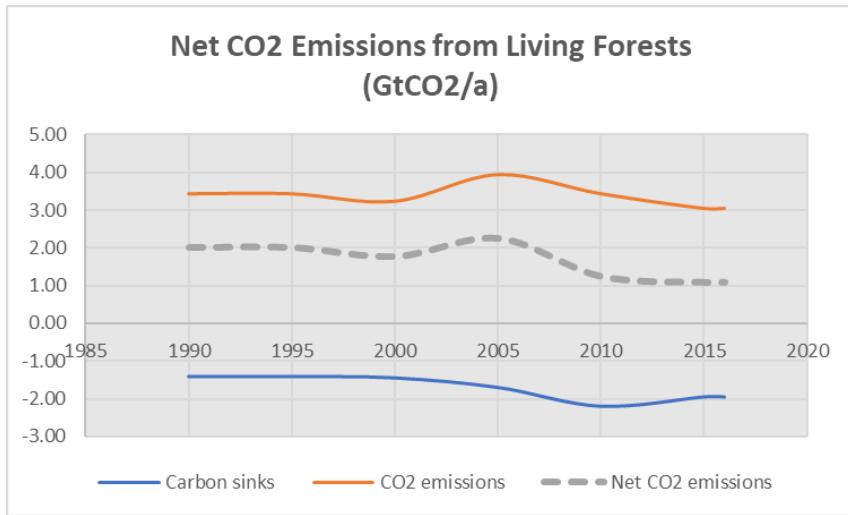


Figure 2.1.4 CO₂ emissions and sinks in living forests (Gt/a).

Carbon dioxide above and below ground in forests by continents have been decreasing about 1.3 GtCO₂ annually during years 2010 – 2015 (FAO, Figure 2.1.5). The largest losses have been in South America (1.2 GtCO₂/a) and Africa (0.9 GtCO₂/a).

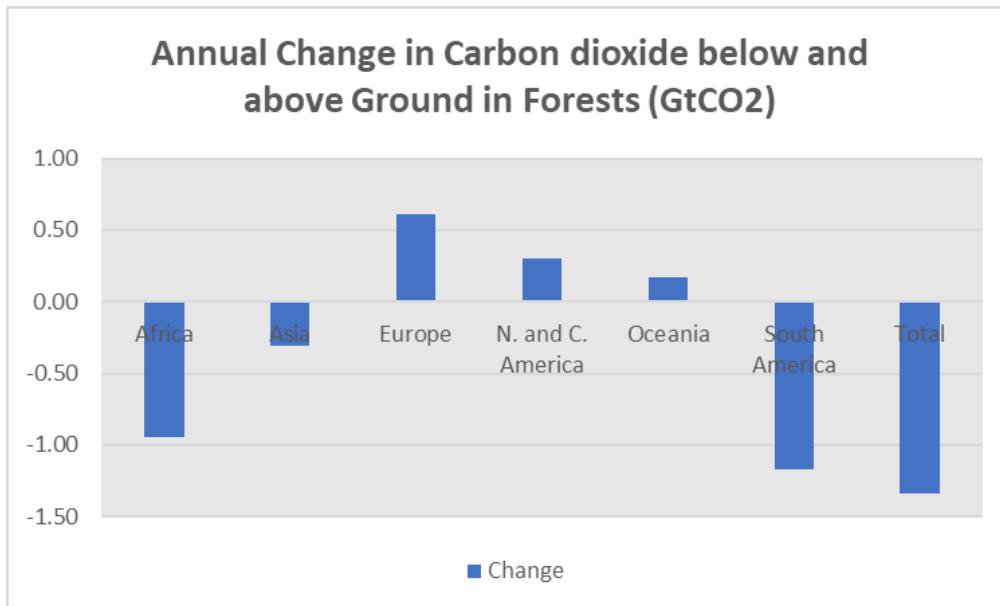


Figure 2.1.5 Annual change in carbon dioxide above and below ground (GtCO₂).

Carbon storage in continents has been decreasing in average 43 GtCO₂ from 1990 or in average 1.7 Gt/a (Table 2.1.1). The decreasing has been largest in South America (1.2 Gt/a) and Africa (1.0 Gt/a).

Table 2.1.1 Carbon storage in living forests by continents (GtCO₂).

Area	1990	1995	2000	2005	2010	2015	2016	Change	Percent
Africa	268	263	257	252	247	243	243	-25.9	-9.6%
Asia	123	122	122	121	119	114	113	-9.7	-7.9%
South America	379	372	365	357	352	349	348	-30.4	-8.0%
Central America	16	16	15	15	14	14	14	-2.4	-14.8%
North America	114	116	118	119	121	122	122	8.8	7.7%
EU	26	27	29	31	33	36	36	10.0	38.0%
Other Europe	129	129	129	130	132	134	135	5.8	4.5%
Oceania	71	71	71	70	70	72	72	1.11	1.6%
Middle East	1.3	1.3	1.3	1.3	1.4	1.0	1.0	-0.27	-21.9%
Total	1127	1117	1108	1097	1091	1085	1084	-43.1	-3.8%

2.2 Carbon storage by continents

Africa

Africa has lost 10 % its carbon in living forests since 1990 (Table 2.2.1). The lost carbon has been 26 GtCO₂ or 1.0 GtCO₂ annually. The largest emissions from forests has been caused by Nigeria (4.5 Gt), Tanzania (4.4 GtCO₂) and Republic of Congo (3.8 GtCO₂).

Table 2.2.1 CO₂ stored in living wood (GtCO₂).

	Area	1990	1995	2000	2005	2010	2015	2016	Change	Percent
1	R. of Congo	74.92	74.19	73.47	72.74	72.01	71.28	71.14	-3.78	-5%
2	Tanzania	24.21	23.34	22.48	21.61	20.75	19.94	19.78	-4.43	-18%
3	Guyana	17.78	17.76	17.74	17.71	17.69	17.63	17.62	-0.15	-1%
4	Angola	16.77	16.60	16.42	16.25	16.08	15.91	15.87	-0.90	-5%
5	Congo	12.79	12.74	12.69	12.64	12.61	12.57	12.56	-0.23	-2%
6	Gabon	10.50	10.50	10.50	10.50	10.50	10.97	11.07	0.57	5%
7	Central African	10.77	10.70	10.63	10.56	10.49	10.42	10.41	-0.35	-3%
8	Cameroon	12.07	11.52	10.97	10.43	9.89	9.34	9.23	-2.84	-23%
9	Zambia	9.46	9.31	9.16	9.01	8.86	8.83	8.82	-0.63	-7%
10	Sudan	8.75	8.56	8.37	7.62	7.45	7.23	7.19	-1.56	-18%
11	Suriname	7.13	7.12	7.11	7.10	7.09	7.08	7.08	-0.05	-1%
12	Côte d'Ivoire	6.64	6.68	6.72	6.77	6.75	6.74	6.73	0.09	1%
13	Mozambique	6.89	6.71	6.53	6.35	6.20	6.02	5.98	-0.91	-13%
14	Madagascar	6.52	6.35	6.19	6.10	5.96	5.89	5.87	-0.65	-10%
15	South Africa	2.96	2.96	2.96	2.96	2.96	2.96	2.96	0.00	0%
16	Nigeria	7.39	6.47	5.56	4.83	3.98	3.06	2.88	-4.51	-61%
17	Ghana	3.01	2.91	2.80	2.62	2.65	2.61	2.60	-0.40	-13%
18	Kenya	2.35	2.06	1.77	2.01	2.17	2.32	2.36	0.00	0%
19	Botswana	2.49	2.46	2.43	2.40	2.37	2.33	2.32	-0.17	-7%
20	Guinea	2.52	2.46	2.39	2.33	2.27	2.21	2.19	-0.32	-13%
21	Liberia	2.44	2.37	2.29	2.22	2.14	2.14	2.14	-0.30	-12%
22	South Sudan	1.82	1.82	1.82	1.82	1.82	1.82	1.82	0.00	0%
23	Zimbabwe	2.56	2.37	2.18	1.99	1.80	1.62	1.59	-0.97	-38%
24	Somalia	1.77	1.69	1.61	1.52	1.44	1.38	1.37	-0.40	-23%
25	Senegal	1.38	1.34	1.31	1.28	1.25	1.22	1.22	-0.16	-11%
26	Chad	1.36	1.32	1.28	1.24	1.11	0.99	0.96	-0.40	-29%
27	Benin	1.22	1.14	1.07	1.02	0.96	0.91	0.90	-0.32	-26%
28	Burkina Faso	1.16	1.10	1.05	1.00	0.95	0.91	0.90	-0.26	-22%
29	Morocco	0.74	0.79	0.83	0.88	0.88	0.88	0.89	0.14	19%
30	Ethiopia	1.46	1.00	0.93	0.87	0.80	0.82	0.82	-0.65	-44%
31	Sierra Leone	0.91	0.88	0.85	0.82	0.79	0.76	0.76	-0.15	-16%
	Top 31	262.7	257.2	252.1	247.2	242.7	238.8	238.0	-24.7	-9%
	32-57	5.76	5.46	5.16	4.97	4.80	4.58	4.53	-1.23	-21%
	Total Africa	268.5	262.7	257.3	252.2	247.5	243.4	242.6	-25.9	-10%

Asia

Emissions of living forests in Asia have been decreasing 9.7 GtCO₂ during year 1990-2016 or 0.37 GtCO₂ annually (Table 2.2.2). The largest losses have happened in Indonesia (19 Gt) and Myanmar (1.9 Gt). The largest increases in China (8.8 Gt) and Japan (1.9 Gt).

Table 2.2.2 CO₂ storage in living forests in Asia (GtCO₂).

	Area	1990	1995	2000	2005	2010	2015	2016	Change	Percent
1	Indonesia	63.72	61.47	59.22	55.78	50.78	45.79	44.79	-18.93	-30%
2	China	16.39	18.01	19.62	21.33	23.32	24.88	25.20	8.81	54%
3	India	8.15	8.43	8.72	9.59	10.27	9.71	9.59	1.44	18%
4	Japan	4.25	4.66	5.06	5.29	6.04	6.04	6.04	1.79	42%
5	Myanmar	7.48	7.07	6.65	6.36	6.06	5.69	5.61	-1.87	-25%
6	Lao People's D	4.23	4.19	4.14	4.06	3.98	3.90	3.88	-0.34	-8%
7	Viet Nam	2.85	3.13	3.40	3.53	3.62	3.76	3.79	0.93	33%
8	Thailand	3.33	3.28	3.23	3.22	3.23	3.16	3.15	-0.18	-5%
9	Mongolia	2.46	2.38	2.30	2.22	2.14	2.06	2.04	-0.42	-17%
10	Nepal	2.21	2.06	1.91	1.78	1.78	1.78	1.78	-0.43	-19%
11	Republic of Ko	0.54	0.71	0.88	1.10	1.34	1.54	1.58	1.04	194%
12	Cambodia	2.23	2.10	1.97	1.82	1.70	1.59	1.56	-0.67	-30%
13	Bhutan	0.98	1.00	1.02	1.04	1.06	1.08	1.08	0.10	10%
14	Pakistan	1.21	1.10	0.99	0.89	0.78	0.64	0.61	-0.60	-50%
15	People's Repu	0.88	0.82	0.76	0.70	0.63	0.56	0.54	-0.33	-38%
16	Kazakhstan	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.00	0%
17	Bangladesh	0.31	0.30	0.30	0.30	0.35	0.36	0.37	0.06	19%
18	Brunei Darussa	0.29	0.29	0.28	0.27	0.26	0.26	0.26	-0.03	-10%
19	Sri Lanka	0.31	0.30	0.29	0.28	0.27	0.26	0.26	-0.05	-16%
20	Timor-Leste	0.39	0.37	0.35	0.32	0.28	0.25	0.24	-0.14	-37%
21	Uzbekistan	0.04	0.04	0.05	0.06	0.07	0.15	0.17	0.13	324%
22	Afghanistan	0.14	0.14	0.14	0.14	0.14	0.14	0.14	0.00	0%
23	Kyrgyzstan	0.11	0.11	0.12	0.14	0.06	0.06	0.06	-0.05	-43%
24	Turkmenistan	0.04	0.04	0.04	0.04	0.04	0.04	0.04	0.00	4%
25	Tajikistan	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.00	-4%
26	Singapore	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.00	-9%
	Total	123.1	122.5	122.0	120.8	118.7	114.2	113.3	-9.7	-8%

Europe

Carbon storage in EU countries has increased by 33 % since 1990 (Table 2.2.3). The absolute increase has been 10 GtCO₂ or 0.38 GtCO₂/a. The largest increases have happened in France (1.6 Gt), Poland (1.3 Gt) and Germany (1.2 Gt).

Table 2.2.3 Carbon storage in EU (GtCO₂).

Area	1990	1995	2000	2005	2010	2015	2016	Change	Percent
1 France	3.54	3.69	3.85	4.27	4.57	5.00	5.09	1.55	44%
2 Germany	3.19	3.51	3.82	3.98	4.11	4.36	4.41	1.22	38%
3 Sweden	3.48	3.60	3.73	4.00	4.04	4.09	4.09	0.61	17%
4 Poland	1.71	1.86	2.00	2.20	2.81	3.01	3.05	1.34	78%
5 Finland	2.32	2.47	2.62	2.73	2.86	2.86	2.86	0.54	23%
6 Romania	1.40	1.40	1.40	1.41	1.43	2.26	2.43	1.02	73%
7 Italy	1.47	1.64	1.82	2.00	2.17	2.35	2.39	0.92	63%
8 Spain	1.19	1.43	1.66	1.90	2.07	2.23	2.27	1.08	90%
9 Austria	1.23	1.29	1.35	1.39	1.41	1.43	1.44	0.21	17%
10 Czechia	1.65	1.12	1.18	1.24	1.28	1.34	1.36	-0.29	-18%
11 Latvia	0.77	0.77	0.85	0.88	0.97	1.05	1.06	0.29	38%
12 United Kingdom	0.49	0.56	0.64	0.72	0.79	0.87	0.88	0.40	81%
13 Slovakia	0.65	0.65	0.70	0.74	0.77	0.80	0.81	0.16	25%
14 Bulgaria	0.46	0.53	0.59	0.67	0.72	0.78	0.79	0.33	71%
15 Lithuania	0.51	0.51	0.53	0.55	0.58	0.61	0.62	0.10	20%
16 Estonia	0.55	0.55	0.58	0.58	0.60	0.61	0.61	0.06	11%
17 Slovenia	0.36	0.36	0.39	0.45	0.48	0.52	0.52	0.16	46%
18 Hungary	0.35	0.37	0.39	0.41	0.43	0.45	0.45	0.10	29%
19 Portugal	0.41	0.41	0.40	0.37	0.38	0.37	0.37	-0.04	-11%
20 Belgium	0.21	0.23	0.22	0.24	0.25	0.27	0.27	0.06	27%
21 Ireland	0.09	0.11	0.12	0.14	0.18	0.19	0.19	0.10	107%
22 Denmark	0.12	0.13	0.14	0.14	0.14	0.15	0.15	0.03	22%
23 Netherlands	0.08	0.08	0.09	0.09	0.11	0.12	0.12	0.05	61%
24 Luxembourg	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.00	0%
25 Cyprus	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.00	53%
26 Liechtenstein	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	7%
27 Malta	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0%
Total	26.29	27.32	29.12	31.12	33.21	35.76	36.27	9.98	38%

Carbon storage in Europe outside EU has increased with 5 % or 5.8 GtCO₂ since 1990 (Table 2.2.4). This corresponds in average 0.22 GtCO₂/a. The largest increases have happened in Russia (1.9 Gt), Turkey (1.0 Gt), Belarus (0.8 Gt) and Ukraine (0.8 Gt).

Table 2.2.4 Carbon storage in Europe outside EU (GtCO₂).

Area	1990	1995	2000	2005	2010	2015	2016	Change	Percent
1 Russian Feder	118.55	118.55	117.91	118.10	119.17	120.27	120.49	1.94	2%
2 Turkey	2.00	2.11	2.22	2.36	2.64	2.96	3.03	1.03	51%
3 Ukraine	2.13	2.13	2.43	2.61	2.78	2.87	2.89	0.76	36%
4 Belarus	1.59	1.59	1.77	1.98	2.24	2.37	2.39	0.80	50%
5 Norway	1.22	1.30	1.38	1.50	1.62	1.75	1.77	0.55	45%
6 Croatia	0.75	0.75	0.81	0.87	0.92	0.94	0.94	0.19	25%
7 Serbia	0.60	0.60	0.63	0.66	0.86	0.87	0.87	0.27	45%
8 Switzerland	0.50	0.51	0.52	0.53	0.55	0.56	0.56	0.06	12%
9 Bosnia and He	0.39	0.39	0.43	0.43	0.43	0.43	0.43	0.04	10%
10 Greece	0.25	0.26	0.27	0.28	0.29	0.30	0.30	0.06	23%
11 Azerbaijan	0.17	0.17	0.18	0.18	0.22	0.26	0.27	0.10	58%
12 North Macedo	0.22	0.22	0.23	0.22	0.22	0.22	0.22	0.00	-1%
13 Montenegro	0.21	0.21	0.21	0.21	0.21	0.21	0.21	0.00	0%
14 Albania	0.18	0.18	0.18	0.18	0.18	0.18	0.18	0.00	1%
15 Republic of M	0.09	0.09	0.10	0.10	0.11	0.11	0.11	0.02	28%
16 Armenia	0.06	0.06	0.06	0.06	0.06	0.06	0.06	0.00	-2%
17 Andorra	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	26%
18 Iceland	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	331%
19 Channel Island	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	33%
20 Gibraltar	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	#DIV/0!
Total	128.90	129.11	129.31	130.28	132.49	134.35	134.73	5.83	5%

North America

Carbon storage in North America has been increase by 8 % or 8.8 GtCO₂ by 1990. The increase has been 10.8 Gt in USA. The carbon storage has decreased in Canada and Mexico.

Table 2.2.5 Carbon storage in North America (GtCO₂).

Area	1990	1995	2000	2005	2010	2015	2016	Change	Percent
1 United States	52.98	55.29	57.61	60.11	62.58	63.54	63.74	10.76	20%
2 Canada	52.90	52.86	52.83	51.83	51.30	51.27	51.26	-1.64	-3%
3 Mexico	7.66	7.57	7.49	7.40	7.34	7.31	7.30	-0.36	-5%
Total	113.53	115.73	117.92	119.34	121.23	122.12	122.30	8.76	8%

Central America

Carbon storage in Central America has been decreased 15 % or 2.4 GtCO₂ since 1990 (Table 2.2.6). The largest decreases have happened in Nicaragua (0.96 Gt) and Honduras (0.85 Gt). Cuba and Dominican Republic have increased their carbon storages.

South America

Carbon storage of forests has decreased in South America 8 % or 30 GtCO₂ since 1990 (Table 2.2.7). The largest decrease has happened in Brazil (1 Gt) and Honduras (0.85 Gt).

Table 2.2.6 Carbon storage in Central America (GtCO₂).

	Area	1990	1995	2000	2005	2010	2015	2016	Change	Percent
1	Ecuador	6.39	6.18	5.97	5.80	5.63	5.46	5.43	-0.96	-15%
2	Panama	2.28	2.24	2.20	2.16	2.12	2.09	2.08	-0.20	-9%
3	Nicaragua	1.86	1.71	1.57	1.42	1.28	1.28	1.28	-0.58	-31%
4	Cuba	0.75	0.93	1.10	1.26	1.08	1.15	1.16	0.41	54%
5	Honduras	1.90	1.69	1.49	1.35	1.21	1.07	1.04	-0.85	-45%
6	Guatemala	1.34	1.26	1.19	1.11	1.03	0.99	0.99	-0.35	-26%
7	Belize	0.72	0.69	0.67	0.65	0.63	0.62	0.62	-0.10	-14%
8	Dominican Rep.	0.29	0.34	0.39	0.43	0.48	0.52	0.53	0.24	83%
9	Jamaica	0.18	0.18	0.18	0.18	0.17	0.17	0.17	0.00	-2%
10	Bahamas	0.17	0.18	0.19	0.19	0.17	0.17	0.17	-0.01	-4%
11	Puerto Rico	0.05	0.06	0.06	0.07	0.08	0.09	0.09	0.04	80%
12	Trinidad and T.	0.08	0.07	0.07	0.07	0.07	0.07	0.07	0.00	-3%
13	El Salvador	0.06	0.06	0.06	0.05	0.05	0.04	0.04	-0.02	-33%
14	Haiti	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.00	-17%
15	Dominica	0.02	0.02	0.02	0.02	0.01	0.01	0.01	0.00	-17%
16	Turks and Caicos	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.00	-4%
17	Saint Vincent & G.	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.00	4%
18	Guam	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.00	0%
19	Saint Lucia	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.00	-11%
20	Cayman Island	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	-4%
	Total	16.14	15.68	15.22	14.84	14.07	13.80	13.75	-2.39	-15%

Table 2.2.7 Carbon storage in South America (GtCO₂).

	Area	1990	1995	2000	2005	2010	2015	2016	Change	Percent
1	Brazil	235.44	231.05	226.66	221.21	218.62	217.15	216.85	-18.59	-8%
2	Colombia	35.67	34.94	34.22	33.38	32.58	32.51	32.50	-3.17	-9%
3	Peru	32.38	32.16	31.95	31.73	31.39	31.04	30.96	-1.42	-4%
4	Venezuela (Bol.)	22.86	22.33	21.80	21.25	21.26	20.96	20.90	-1.96	-9%
5	Bolivia (Plurin.)	17.88	17.50	17.11	16.72	16.29	15.87	15.78	-2.10	-12%
6	Argentina	12.94	12.64	12.35	11.95	11.49	11.05	10.96	-1.98	-15%
7	Paraguay	9.30	8.94	8.59	8.23	7.59	6.88	6.74	-2.56	-28%
8	French Guiana	6.15	6.14	6.13	6.12	6.09	6.09	6.09	-0.06	-1%
9	Chile	4.74	4.81	4.87	4.91	4.94	5.47	5.58	0.83	18%
10	Costa Rica	0.86	0.83	0.79	0.83	0.87	0.93	0.94	0.08	10%
11	Uruguay	0.35	0.48	0.61	0.68	0.77	0.83	0.84	0.49	139%
12	Guadeloupe	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.00	-7%
13	American Samoa	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.00	-4%
14	Grenada	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	-18%
15	Antigua and Barbuda	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	-8%
16	Anguilla	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	-4%
17	Aruba	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0%
18	Norfolk Island	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0%
19	Falkland Islands	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	#DIV/0!
	Total	378.64	371.89	365.14	357.07	351.97	348.83	348.20	-30.43	-8%

Oceania

Carbon storage in Oceanian countries has increased with 2 % or 1,1 GtCO₂ since 1990 (Tabl2 2.2.8). The largest increases have happened in New Zealand (0.54 Gt), Australia (0.32 Gt) and Philippines (0.18 Gt). In other countries the changes have been small.

Table 2.2.7 Carbon storage in Oceania (GtCO₂).

	Area	1990	1995	2000	2005	2010	2015	2016	Change	Percent
1	Australia	29.31	29.34	29.37	29.17	29.19	29.56	29.63	0.32	1%
2	Papua New Gu	22.45	22.44	22.43	22.42	22.41	22.40	22.40	-0.05	0%
3	Malaysia	10.35	9.94	9.53	9.01	9.31	10.22	10.40	0.05	1%
4	New Zealand	4.57	4.69	4.81	4.90	4.99	5.09	5.10	0.54	12%
5	Philippines	2.35	2.37	2.38	2.32	2.18	2.48	2.54	0.18	8%
6	Solomon Islan	0.70	0.69	0.68	0.68	0.67	0.66	0.66	-0.05	-6%
7	Fiji	0.61	0.61	0.62	0.63	0.63	0.65	0.65	0.05	7%
8	Vanuatu	0.28	0.28	0.28	0.28	0.28	0.28	0.28	0.00	0%
9	New Caledoni	0.22	0.22	0.22	0.22	0.22	0.22	0.22	0.00	0%
10	French Polyne	0.03	0.04	0.05	0.06	0.08	0.08	0.08	0.05	182%
11	Micronesia (Fe)	0.07	0.07	0.07	0.07	0.07	0.07	0.07	0.00	1%
12	Palau	0.04	0.04	0.04	0.04	0.04	0.04	0.04	0.00	7%
13	Martinique	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.00	0%
14	Seychelles	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.00	0%
15	Northern Mari	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.00	-10%
16	Kiribati	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.00	2%
17	Mauritius	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.00	-5%
18	Niue	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.00	-6%
19	Marshall Islands	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.00	0%
20	Cook Islands	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.00	12%
	Total	71.06	70.83	70.60	69.91	70.17	71.84	72.17	1.11	2%

3. FOREST PRODUCTS

3.1 Production of coniferous saw wood

Saw wood production has been increasing from 264 Mm³ in 1990 to about 334 Mm³ in 2016. The financial crises in 2009 can be seen in decreasing of production.

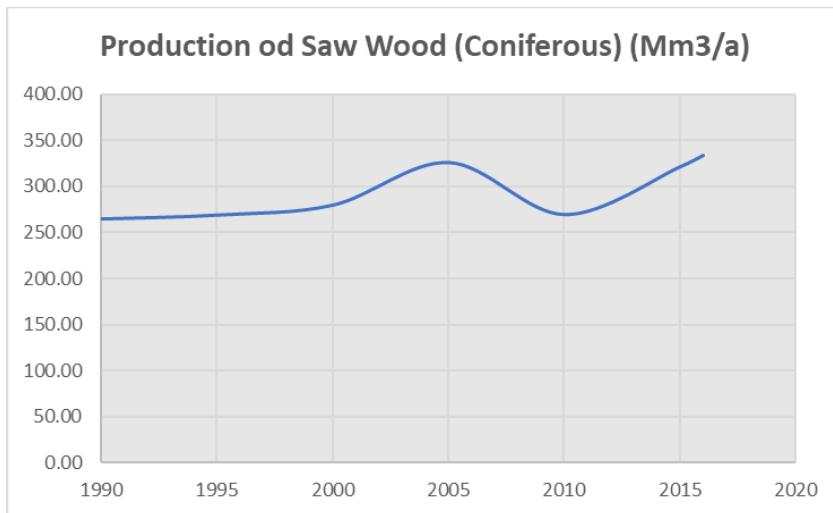


Figure 3.1.1 Production of saw wood (Mm³).

Top five countries of coniferous saw wood are USA, Canada, China, Russia and Germany. They are producing 190 Mm³ of coniferous saw wood, which is more than half of all.

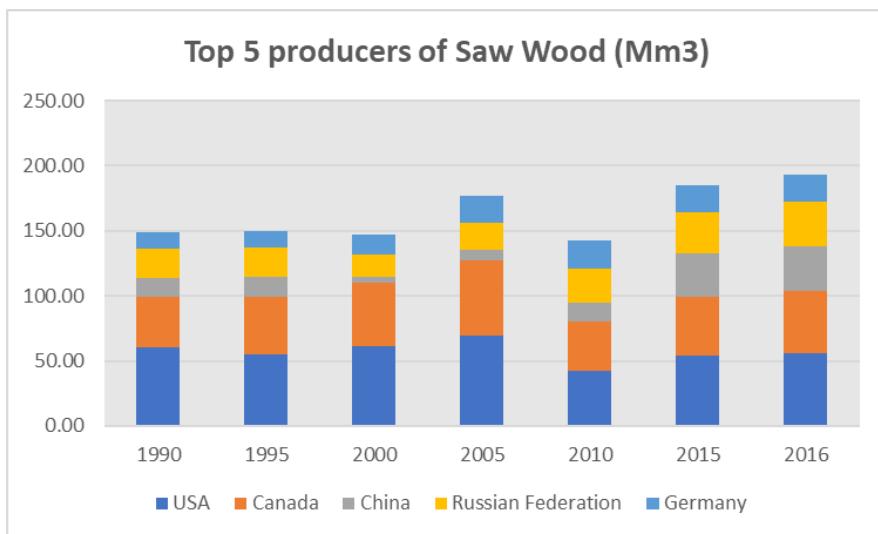


Figure 3.1.2 Top 5 in saw wood production (Mm³/a).

3.2 Non-coniferous saw wood production

Production of non-coniferous saw wood has been about 120-130 million cubic meters (Mm^3/a) annually (Figure 3.2.1).

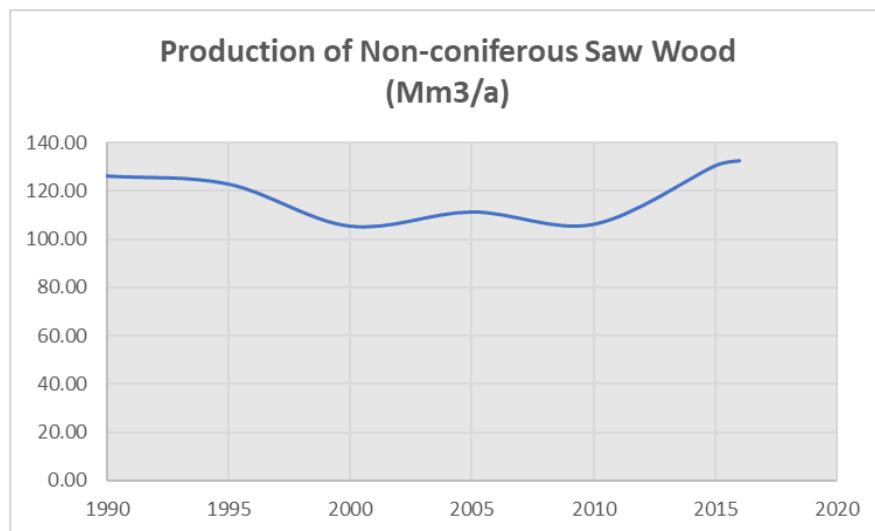


Figure 3.2.1 Production of non-coniferous wood (Mm^3/a).

The top five countries in non-coniferous saw products are China, USA, Viet Nam, Brazil and India (Figure 3.2.2). They produce together 80 million cubic meters of saw wood.

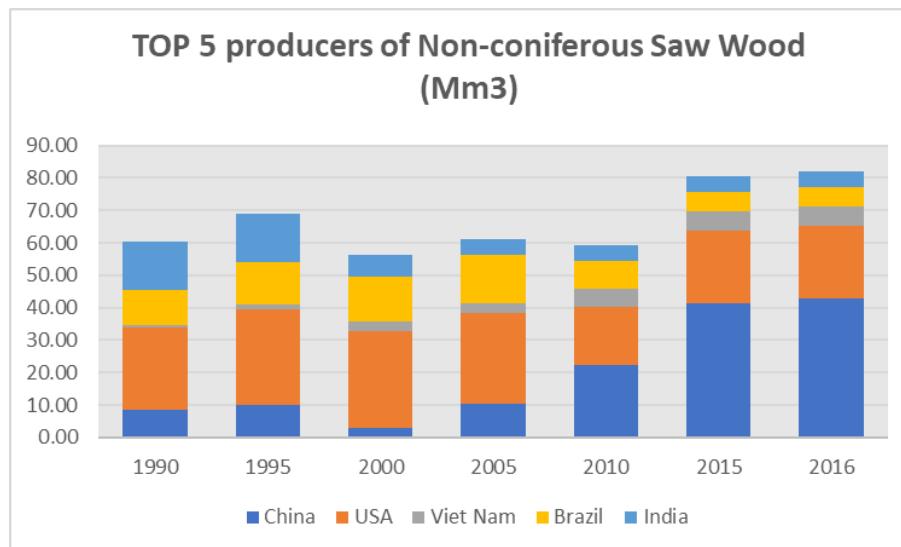


Figure 3.2.2 Top five producers of non-coniferous saw wood (Mm^3/a).

3.3 Total saw wood production

Total saw wood production has been about 400 Mm³ in 1990 and has increased near 470 Mm³ by the year 2016 (Figure 3.3.1).

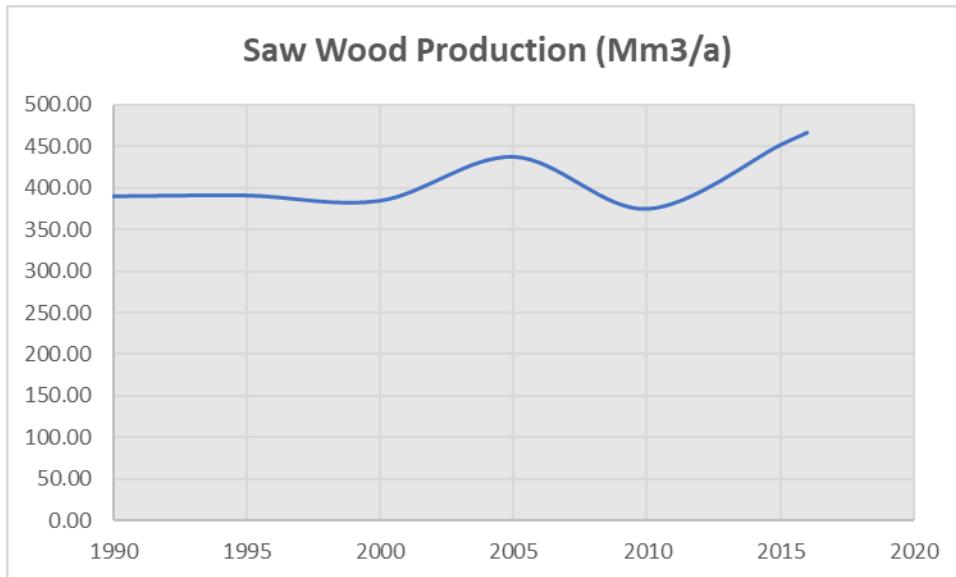


Figure 3.3.1 Saw wood production (Mm³/a).

The top five producers of saw wood are (USA, China, Canada, Russian Federation and Germany (Figure 3.3.2). They have increased their production from about 200 Mm³/a to 260 Mm³/a by 2016.

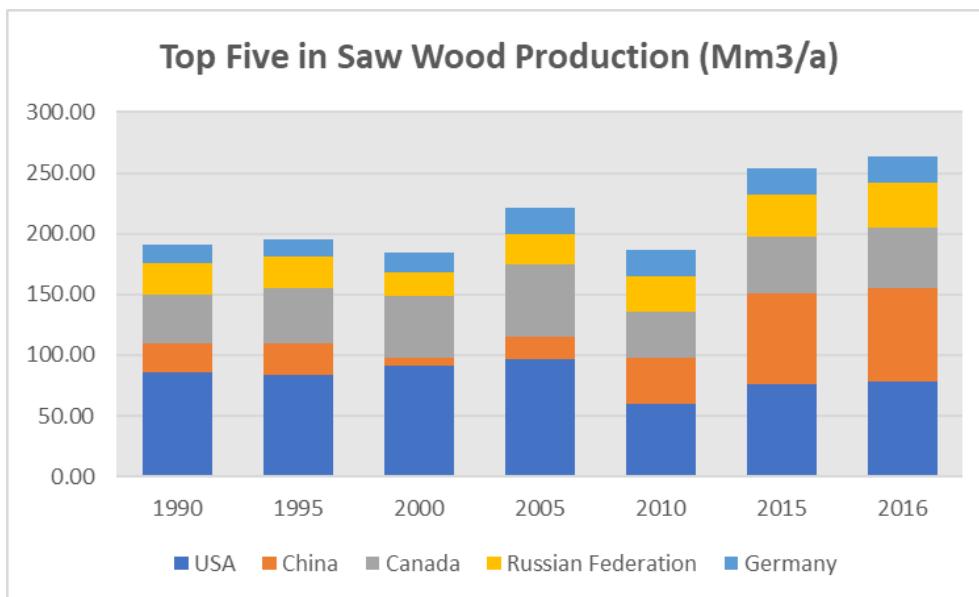


Figure 3.3.2 Top five in saw wood production (Mm³/a).

3.4 Carbon storage in saw wood

Saw wood is normally used for construction of houses. The carbon dioxide stored in saw wood remains in houses for 50 to 100 years. Thus, this CO₂ is out from atmosphere.

I have used heat value of 2 MWh/m³ for wood and an emissions value of 0.4 kgCO₂/kWh. Thus, stored CO₂ in saw wood is about 0.8 kg/m³ and world production of 467 Mm³ of saw wood corresponds to 374 million tons of CO₂.

If we sum the carbon sink of saw wood and carbon sink of living forests (Figure 2.4), we can calculate the net carbon sink of forests and saw wood (Figure 3.4.1). It has been about 730 MtCO₂ during years 2015-2016. This is less than half from the figures from the years 1990-2000, when the net sink was -1700 MtCO₂/a.

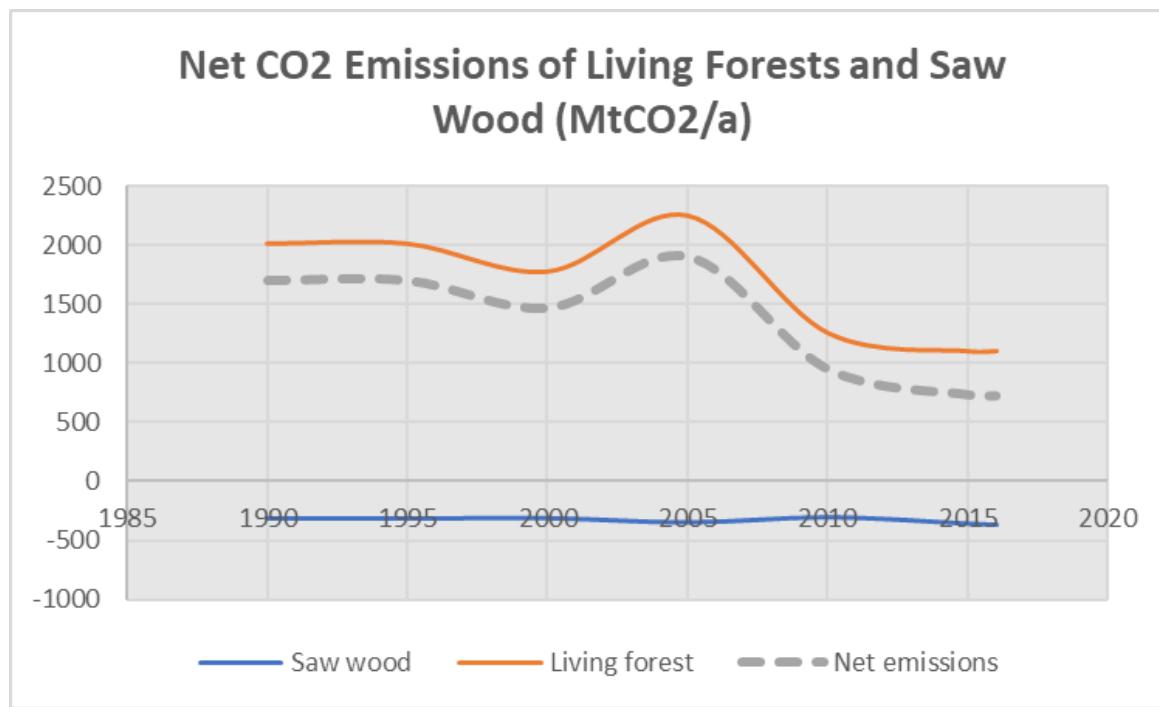


Figure 3.4.1 Net CO₂ emission living forests and saw wood (MtCO₂/a).

4. CHARCOAL PRODUCTION FROM WOOD

4.1 Global production of charcoal

Global charcoal production from wood has been increasing to 53 million tons by the year 2018 (Figure 4.1.1 and 4.1.2).

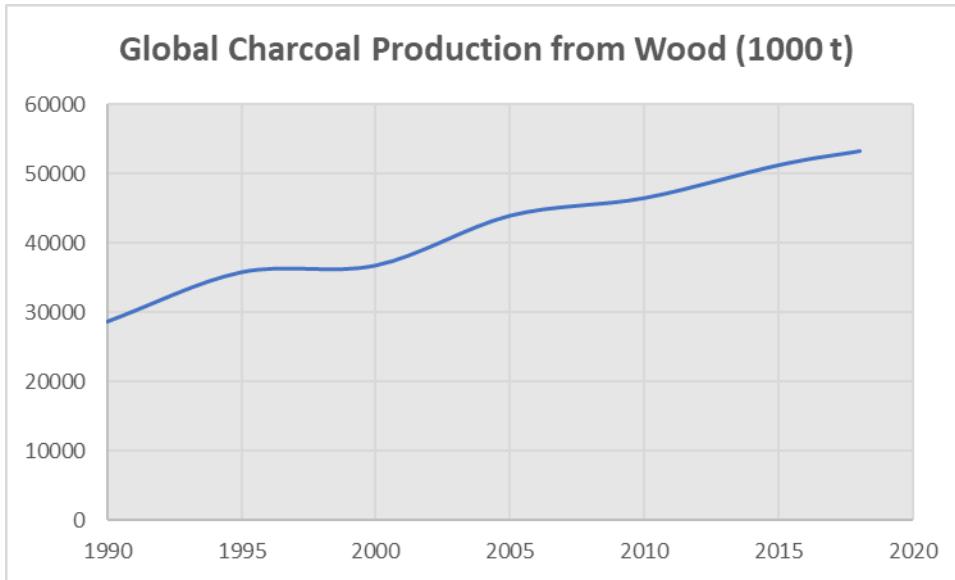


Figure 4.1.1 Charcoal production from wood (1000 t/a).

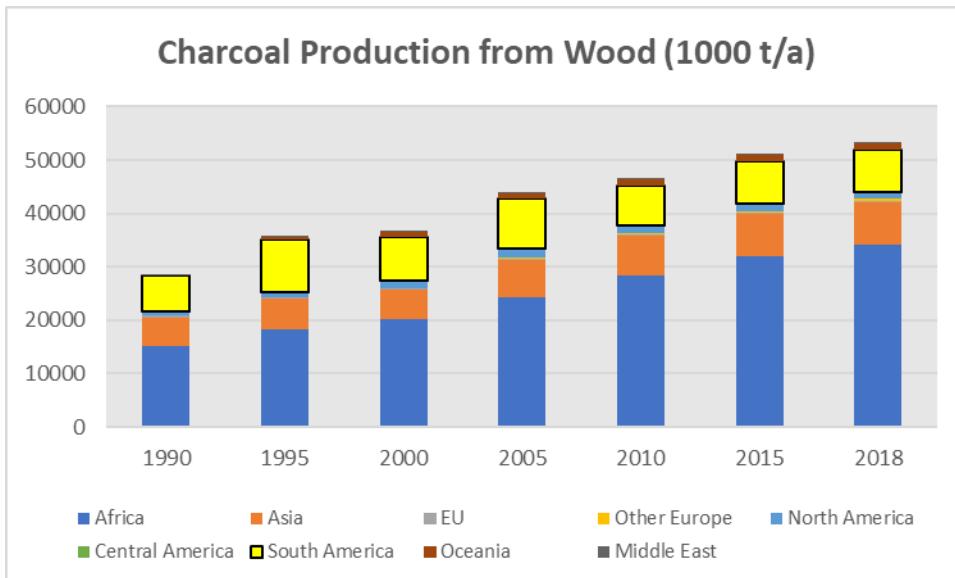


Figure 4.1.2 Charcoal production from wood by continents (1000 t/a).

Charcoal production from wood by continents has been dominated by Africa, Asia and South America (Table 4.1.1).

Table 4.1.1 Charcoal production by continents (1000 t/a).

Area	1990	1995	2000	2005	2010	2015	2018
Africa	15044	18246	20121	24368	28402	32074	34173
Asia	5415	5679	5594	6928	7337	7756	7843
EU	353	325	196	302	245	248	338
Other Europe	0	54	84	203	317	370	383
North America	644	774	1060	1324	1146	1073	958
Central America	300	206	294	226	230	247	293
South America	6505	9927	8308	9373	7474	8050	7943
Oceania	187	365	878	997	1133	1211	1139
Middle East	69	92	137	157	172	195	161
Global	28517	35668	36672	43878	46456	51224	53231

Energy content in charcoal is estimated to be 0.7 toe/ton of charcoal. Efficiency of charcoal manufacturing is about 21 %. The primary energy used by charcoal is then about 180 Mtoe annually (Table 4.1.2).

Table 4.1.2. Primary energy consumed by charcoal production (Mtoe/a).

Area	1990	1995	2000	2005	2010	2015	2018
Africa	50.5	61.3	67.6	81.9	95.4	107.8	114.8
Asia Pacific	18.8	20.3	21.7	26.6	28.5	30.1	30.2
S. and C. America	22.9	34.0	28.9	32.3	25.9	27.9	27.7
North America	2.2	2.6	3.6	4.4	3.9	3.6	3.2
EU	1.2	1.1	0.7	1.0	0.8	0.8	1.1
Other Europe	0.0	0.2	0.3	0.7	1.1	1.2	1.3
Middle East	0.2	0.3	0.5	0.5	0.6	0.7	0.5
Total	95.8	119.8	123.2	147.4	156.1	172.1	178.9

Charcoal production is consuming about 1.3 % of global primary energy, but about 25 % of primary energy consumed in Africa (Table 4.1.3).

Table 4.1.3 Primary energy share of wood charcoal (percent).

Area	1990	1995	2000	2005	2010	2015	2018
Africa	22.7%	25.1%	24.8%	25.1%	24.9%	25.1%	24.9%
Asia Pacific	1.0%	0.9%	0.8%	0.7%	0.6%	0.6%	0.5%
S. and C. America	6.9%	8.3%	6.1%	6.1%	4.1%	4.0%	3.9%
North America	0.1%	0.1%	0.1%	0.2%	0.1%	0.1%	0.1%
EU	0.1%	0.1%	0.0%	0.1%	0.0%	0.1%	0.1%
Other Europe	0.0%	0.0%	0.0%	0.1%	0.1%	0.1%	0.1%
Middle East	0.1%	0.1%	0.1%	0.1%	0.1%	0.1%	0.1%
Total	1.2%	1.4%	1.3%	1.4%	1.3%	1.3%	1.3%

4.2 Charcoal production by continents

Africa

Africa has been the largest producer of charcoal from wood and it is producing 64 % of global charcoal (Table 4.2.1). The top three countries in Africa are Nigeria (4.6 Mt), Ethiopia (4.6 Mt) and Democratic Republic of Congo (2.6 Mt). Also, Ghana and Tanzania produce more than 2 million tons of charcoal.

The same countries have been in the top of list in forest losses in Africa. Nigeria has lost 62 % of its forest area, Ethiopia 25 % and Tanzania 18 % since 1990. Charcoal production might be one reason for this.

Table 4.2.1 Charcoal production in Africa (1000 t/a).

	Area	1990	1995	2000	2005	2010	2015	2018
1	Nigeria	2132	2647	3085	3510	3940	4371	4595
2	Ethiopia	2183	2555	2908	3304	3734	4220	4518
3	DR of the Congo	791	1200	1431	1704	2025	2400	2631
4	Ghana	533	816	1039	1300	1596	1888	2058
5	Tanzania	821	1005	1165	1372	1609	1872	2034
6	Madagascar	343	562	645	910	1195	1560	1560
7	Egypt	1018	1126	1201	1282	1360	1423	1456
8	Somalia	400	510	651	863	1132	1181	1316
9	Zambia	924	1041	810	985	1198	1296	1296
10	Kenya	463	545	641	776	937	1119	1237
11	Uganda	561	643	713	814	931	1066	1146
12	Algeria	385	472	547	619	682	730	753
13	Niger	280	355	424	500	588	688	750
14	Burkina Faso	325	389	112	510	586	673	724
15	Malawi	344	359	392	436	490	553	591
16	Sudan	579	647	743	879	1026	588	588
17	Côte d'Ivoire	274	349	327	420	470	517	538
18	Cameroon	216	289	21	381	429	477	504
19	Chad	230	266	311	355	403	457	491
20	Sierra Leone	192	222	297	336	382	432	462
21	Guinea	192	22	277	311	348	388	412
22	Angola	130	172	205	247	293	348	381
23	Mali	67	81	96	113	133	275	334
24	Liberia	101	84	153	192	235	282	312
25	Senegal	150	75	110	110	300	300	300
26	South Africa	13	26	41	189	189	189	296
27	South Sudan	0	0	0	0	0	272	289
28	Togo	124	220	281	300	228	258	276
29	Burundi	171	209	60	60	60	264	264
30	Mozambique	100	100	100	100	100	263	263
	Top 30	14042	16988	18786	22877	26600	30350	32373
	30 - 51	1002	1258	1336	1491	1802	1724	1800
	Total	15044	18246	20121	24368	28402	32074	34173

Asia

Charcoal production in Asia is about 7.8 million tons annually or 14 % of global production (Table 4.2.2). Largest producers in Asia are India (2.9 Mt), China (1.6 Mt) and Thailand (1.5 Mt).

Table 4.2.2 Production of charcoal in Asia.

	Area	1990	1995	2000	2005	2010	2015	2018
1	India	1507	1617	1661	2880	2880	2880	2880
2	China	1930	1846	1797	1764	1725	1678	1637
3	Thailand	1065	1122	1203	1278	1360	1449	1500
4	Viet Nam	110	127	108	109	115	414	414
5	Myanmar	117	55	23	75	348	321	372
6	Bangladesh	255	273	290	308	324	336	339
7	DR of Korea	103	126	141	150	157	163	167
8	Afghanistan	39	57	81	97	112	130	141
9	Lao People's Dem	0	0	0	0	35	93	93
10	Nepal	50	56	63	70	78	85	89
11	Pakistan	57	110	55	64	72	82	87
12	Cambodia	25	36	31	33	35	37	38
13	Malaysia	0	48	26	28	29	29	29
14	Mongolia	10	12	13	15	16	17	17
15	Japan	109	135	56	35	25	18	15
16	Republic of Korea	1	1	32	10	11	9	9
17	Bhutan	5	5	6	6	7	7	7
18	Singapore	33	31	6	6	5	5	5
19	Sri Lanka	1	22	1	1	2	2	2
20	China, Macao SAR	0	0	0	0	1	1	1
Total		5415	5679	5594	6928	7337	7756	7843

Europe

Charcoal production in EU has been decreasing to 0.34 Mt annually (Table 4.2.3). Charcoal production in Europe outside EU has been growing to 0.38 Mt/a (Table 4.2.4). Europe has been producing 0.7 Mt of charcoal, which is about 1 % of global production.

Table 4.2.3 Charcoal production of charcoal from wood in EU (1000 t/a).

Area	1990	1995	2000	2005	2010	2015	2018
1 Poland	80	27	27	90	63	110	160
2 Spain	65	65	0	0	40	36	50
3 France	69	79	60	51	51	35	40
4 Germany	0	0	0	0	2	2	30
5 Latvia	0	1	11	10	9	11	12
6 Italy	46	34	11	10	10	10	10
7 Portugal	16	16	23	19	19	9	9
8 Czechia	0	1	0	6	7	6	6
9 United Kingdom	0	4	5	5	5	5	5
10 Slovakia	0	3	5	48	3	4	4
11 Bulgaria	20	20	8	24	17	5	2
12 Greece	0	2	12	3	3	2	2
13 Cyprus	1	0	3	3	1	2	2
14 Austria	0	0	0	0	1	1	1
15 Romania	38	48	27	26	9	6	1
16 Estonia	0	0	1	5	3	1	1
17 Slovenia	0	0	0	0	0	1	1
18 Sweden	18	25	3	1	1	1	1
19 Lithuania	0	0	0	1	1	1	1
Total	353	325	196	302	245	248	338

Table 4.2.4 Charcoal production in Europe outside EU (1000 t/a)

Area	1990	1995	2000	2005	2010	2015	2018
1 Ukraine	0	0	9	46	120	130	185
2 Russian Federation	0	46	60	70	76	52	60
3 Albania	0	0	9	55	60	60	60
4 Bosnia and Herzegovina	0	0	0	25	17	86	30
5 Serbia	0	1	1	3	34	22	26
6 Croatia	0	7	4	3	3	8	9
7 Belarus	0	0	1	1	5	5	5
8 Azerbaijan	0	0	0	0	0	5	5
9 Montenegro	0	0	0	0	2	2	2
10 Turkey	0	0	0	0	0	0	1
Total	0	54	84	203	317	370	383

North America

Charcoal production in North America has been about one million tons annually (Table 4.2.5).

Table 4.2.5 Charcoal production in North America (1000 t/a).

	Area	1990	1995	2000	2005	2010	2015	2018
1	U. States of America	500	747	925	940	1070	982	852
2	Mexico	144	27	135	384	76	91	106
	Total	644	774	1060	1324	1146	1073	958

Central America

Charcoal production from wood in Central America has been about 0.3 Mt annually (Table 4.2.6). The largest producer has been Cuba.

Table 4.2.6 Charcoal production in Central America (1000 t/a).

	Area	1990	1995	2000	2005	2010	2015	2018
1	Cuba	19	22	62	61	68	120	120
2	Ecuador	173	68	109	96	83	44	86
3	Haiti	17	23	26	29	32	35	37
4	Dominican Republic	70	70	70	14	19	19	19
5	Equatorial Guinea	6	7	7	8	9	10	11
6	Jamaica	7	8	8	9	10	10	11
7	Panama	4	4	8	5	5	5	5
8	Trinidad and Tobago	2	2	2	2	2	2	2
9	Bahamas	1	1	1	1	1	1	1
10	Belize	1	1	1	1	1	1	1
	Total	300	206	294	226	230	247	293

South America

Charcoal production in South America has been about 7.9 million tons annually (Table 4.2.7). The largest producer has been Brazil, which has produced 2.9 million tons of charcoal. Brazil has been in the top of forest losses.

Oceania

Charcoal production in Oceania has been about one million tons (Table 4.2.8). The largest producers have been Indonesia (0.7 Mt) and Philippines (0.3 Mt).

Table 4.2.7 Charcoal production in South America (1000 t/a).

	Area	1990	1995	2000	2005	2010	2015	2018
1	Brazil	4631	7771	6350	7301	4951	6183	6397
2	Paraguay	120	386	409	234	480	430	430
3	Argentina	294	150	258	347	380	420	397
4	Chile	249	248	253	251	248	245	242
5	Colombia	477	521	329	496	1039	475	160
6	Uruguay	115	116	117	118	118	118	118
7	Bolivia (Plurinational)	117	138	22	36	36	36	36
8	Peru	413	436	473	499	103	20	31
9	Venezuela (Bolivarian Republic of)	24	10	7	7	7	5	25
10	Guyana	1	2	21	22	23	24	25
11	El Salvador	15	17	19	20	21	23	23
12	Honduras	15	18	3	3	28	21	21
13	Nicaragua	14	17	21	24	7	13	13
14	Costa Rica	7	8	9	10	11	12	13
15	Guatemala	13	89	17	5	22	25	12
	Total	6505	9927	8308	9373	7474	8050	7943

Table 4.2.8 Charcoal production in Oceania (1000 t/a).

	Area	1990	1995	2000	2005	2010	2015	2018
1	Indonesia	126	211	735	681	664	664	664
2	Philippines	4	72	41	215	359	426	348
3	Comoros	20	25	29	34	40	45	49
4	Australia	6	25	35	24	23	23	24
5	Reunion	14	13	14	15	15	15	15
6	Sao Tome and Principe	5	6	7	8	9	10	10
7	French Guiana	2	3	4	5	7	9	10
8	Papua New Guinea	4	4	5	6	6	7	7
9	Fiji	2	2	2	2	2	2	2
10	Guadeloupe	2	2	2	2	2	2	2
11	Martinique	1	1	2	2	2	2	2
12	Solomon Islands	1	1	1	1	1	1	1
13	Maldives	0	0	1	1	1	1	1
14	Vanuatu	0	0	0	0	1	1	1
15	New Caledonia	0	0	0	1	1	1	1
16	Samoa	0	0	0	0	0	1	1
17	French Polynesia	0	0	0	0	0	1	1
	Total	187	365	878	997	1133	1211	1139

5 PRODUCTION OF NON-CONIFEROUS FUELWOOD

5.1 Global production of non-coniferous fuelwood

Global production of non-coniferous fuelwood has increased to 1720 million cubic meters annually (Figure 5.1.1).

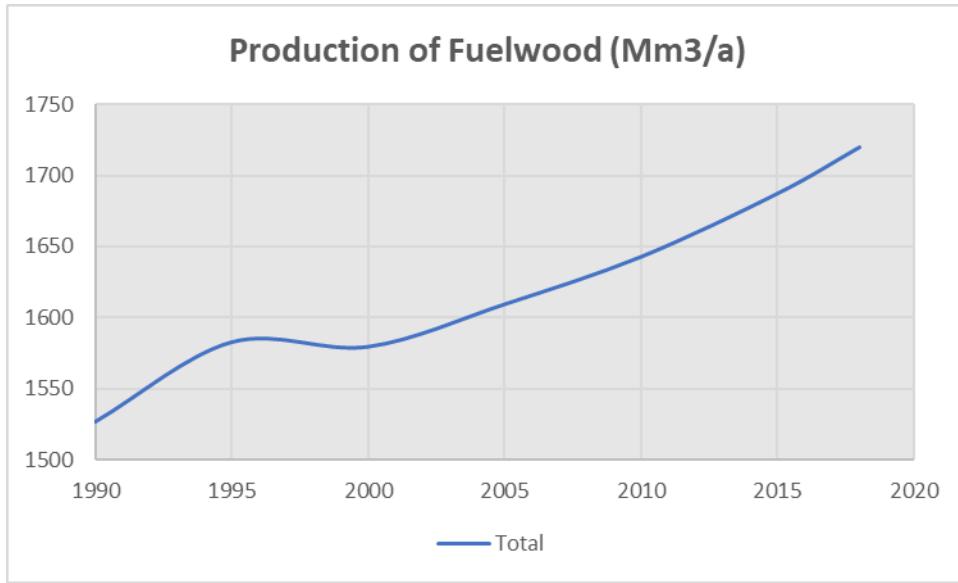


Figure 5.1.1 Global production of non-coniferous fuelwood (Mm³/a).

Africa is producing about 682 Mm³ of non-coniferous fuelwood annually (Table 5.1.1). This corresponds about 40 % of global production. Asia is producing 569 Mm³/a or 33 % of global production.

Table 5.1.1 Production of fuelwood in continents (Mm³/a).

Area	1990	1995	2000	2005	2010	2015	2018
Africa	389.0	438.0	470.0	510.0	546.0	662.0	682.0
Asia	651.8	660.5	648.8	662.7	662.3	576.3	568.9
South America	160.3	171.6	178.1	168.4	162.5	176.5	186.8
Oceania	154.0	128.0	118.8	101.4	85.9	72.9	66.4
North America	95.7	79.1	65.9	64.8	62.2	66.4	83.4
EU	55.0	61.0	65.3	65.1	81.0	81.2	80.3
Other Europe	10.3	30.8	17.5	21.2	26.7	33.9	33.4
Central America	9.7	12.9	14.4	14.9	15.4	17.2	17.5
Middle East	0.9	1.0	1.0	1.1	1.3	1.4	1.5
Total	1527	1583	1580	1610	1643	1688	1720

Assuming, that energy content of wood is 0.2 toe/m³, the fuelwood production is producing 344 Mtoe of primary energy (Table 5.1.2).

Table 5.1.2 Primary energy consumption of production of non-coniferous fuelwood (Mtoe).

Area	1990	1995	2000	2005	2010	2015	2018
Africa	77.8	87.6	94.0	102.0	109.2	132.4	136.4
Asia and Oceania	161.2	157.7	153.5	152.8	149.6	129.8	127.1
S. and C. America	34.0	36.9	38.5	36.7	35.6	38.7	40.9
North America	19.1	15.8	13.2	13.0	12.4	13.3	16.7
EU	11.0	12.2	13.1	13.0	16.2	16.2	16.1
Other Europe	2.1	6.2	3.5	4.2	5.3	6.8	6.7
Middle East	0.2	0.2	0.2	0.2	0.3	0.3	0.3
Total	305	317	316	322	329	338	344

Share of fuelwood from primary energy has been decreasing to 2.5 %, but in Africa the share is still about 30 % (Table 5.1.3).

Table 5.1.3 Share of non-coniferous fuelwood from primary energy (percent).

Area	1990	1995	2000	2005	2010	2015	2018
Africa	34.8%	35.9%	34.4%	31.3%	28.4%	30.8%	29.6%
Asia Pacific	8.9%	6.8%	5.7%	4.1%	3.2%	2.4%	2.1%
S. and C. America	10.2%	9.0%	8.1%	6.9%	5.7%	5.6%	5.8%
North America	0.8%	0.6%	0.5%	0.5%	0.5%	0.5%	0.6%
EU	0.6%	0.7%	0.7%	0.7%	0.9%	1.0%	1.0%
Other Europe	0.1%	0.6%	0.3%	0.4%	0.4%	0.6%	0.5%
Middle East	0.1%	0.1%	0.0%	0.0%	0.0%	0.0%	0.0%
Total	3.8%	3.7%	3.4%	3.0%	2.7%	2.6%	2.5%

5.2 Production of non-coniferous fuelwood by continents

Africa

African countries are producing 40 % of global non-coniferous fuelwood (Table 5.2.1). Top countries are Ethiopia (104 Mm³), Democratic Republic of Congo (86 Mm³) and Nigeria (66 Mm³/a).

Table 5.2.1 Production of non-coniferous fuelwood in Africa (Mm³/a).

Area	1990	1995	2000	2005	2010	2015	2018
1 Ethiopia	68.4	74.6	81.4	87.9	94.2	100.6	104.1
2 DR of the Congo	0.2	0.3	0.3	0.3	0.5	82.5	85.6
3 Nigeria	50.9	56.8	59.4	61.3	63.2	65.3	66.2
4 Ghana	12.9	22.2	26.7	31.9	37.8	44.0	47.6
5 Uganda	29.3	32.2	34.1	36.8	39.6	42.4	43.7
6 Tanzania	18.5	20.4	20.8	21.7	22.8	24.1	24.8
7 Kenya	16.0	17.9	18.7	23.0	23.8	23.8	23.8
8 Zambia	6.4	7.3	16.8	19.1	21.8	23.0	23.0
9 Egypt	14.0	15.4	16.2	17.0	17.5	17.7	17.8
10 Mozambique	14.8	16.7	16.7	16.7	16.7	16.7	16.7
11 Somalia	6.3	7.5	9.2	11.2	13.5	14.5	15.6
12 Sudan	16.3	16.3	16.7	17.7	18.8	15.2	15.5
13 Madagascar	7.4	9.3	9.6	11.1	13.1	13.9	14.7
14 Burkina Faso	9.2	10.4	7.4	10.5	12.8	13.7	14.2
15 Guinea	9.9	11.9	11.4	11.7	12.0	12.2	12.3
16 South Africa	10.6	12.4	12.0	12.0	0.0	12.0	12.0
17 Niger	5.7	6.8	7.8	8.8	9.9	11.0	11.7
18 Cameroon	7.7	8.7	9.1	9.5	9.9	10.4	10.6
19 Zimbabwe	6.3	7.2	8.1	8.1	8.7	9.1	9.3
20 Côte d'Ivoire	0.0	0.9	0.9	0.9	1.0	9.2	9.2
21 Liberia	3.5	2.8	4.7	5.8	7.0	8.3	9.2
22 Chad	4.6	5.2	5.9	6.5	7.1	7.7	8.0
23 Benin	5.6	5.8	5.9	6.1	6.3	6.5	6.6
24 Burundi	5.8	6.7	5.4	8.5	9.3	6.0	6.0
25 Sierra Leone	4.7	4.6	5.4	5.4	5.6	5.8	5.9
26 Malawi	5.2	4.9	5.0	5.1	5.4	5.7	5.9
27 Mali	3.9	4.4	4.7	5.0	5.3	5.6	5.8
28 Senegal	4.7	4.9	5.1	5.3	5.4	5.6	5.6
29 Morocco	5.5	5.8	5.9	5.8	5.7	5.6	5.6
30 Rwanda	6.4	5.2	5.0	5.0	5.0	5.0	5.0
Top 30	361	405	436	476	500	623	642
Top 31-56	28	32	34	34	46	39	40
Top 1-56	389	438	470	510	546	662	682

Asia

Non-coniferous fuelwood production in Asia has been declining to 570 million cubic meters by the year 2018 (Table 5.2.2), Largest producers in Asia are India (294 Mm³) and China (97 Mm³).

Table 5.2.2 Production of fuelwood in Asia.

Area	1990	1995	2000	2005	2010	2015	2018
1 India	267.9	279.9	269.0	296.3	300.0	297.4	294.2
2 China	171.0	149.2	135.5	123.4	112.4	102.7	97.0
3 Myanmar	32.3	31.5	34.5	38.3	38.3	38.3	38.3
4 Pakistan	20.2	21.8	29.6	25.4	28.4	28.4	28.4
5 Bangladesh	27.7	27.9	27.8	27.7	27.3	26.5	25.8
6 Viet Nam	26.5	26.8	26.7	21.3	21.5	20.0	20.0
7 Thailand	21.8	20.7	20.6	19.9	19.3	18.8	18.5
8 Nepal	12.3	12.4	12.7	12.6	12.5	12.2	11.8
9 Cambodia	11.2	11.0	10.1	9.2	8.4	7.8	7.4
10 Japan	0.1	0.2	0.1	0.1	0.1	2.8	6.3
11 Lao People's Demo	0.0	0.0	5.9	5.9	6.0	5.9	5.8
12 Bhutan	3.9	3.9	4.2	4.6	4.9	5.1	5.2
13 Sri Lanka	6.4	9.7	5.9	5.6	5.2	4.9	4.6
14 DPR of Korea	44.2	58.8	64.9	71.1	76.6	2.2	2.3
15 Tajikistan	0.0	0.0	0.0	0.1	0.1	1.8	1.8
16 Afghanistan	0.5	0.7	0.9	1.0	1.1	1.3	1.3
17 Mongolia	0.1	0.1	0.2	0.2	0.2	0.1	0.1
18 Timor-Leste	0.0	0.2	0.2	0.2	0.1	0.1	0.1
19 Singapore	0.0	0.0	0.0	0.0	0.0	0.0	0.0
20 Kyrgyzstan	5.6	5.7	0.0	0.0	0.0	0.0	0.0
21 Uzbekistan	0.0	0.0	0.0	0.0	0.0	0.0	0.0
22 Brunei Darussalam	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total	651.8	660.5	648.8	662.7	662.3	576.3	568.9

EU

Production non-coniferous fuelwood in EU has been about 80 million cubic meters annually (Table 5.2.3). The largest producers have been France (21 Mm³/a) and Germany (14 Mm³/a).

Table 5.2.3 Production of fuelwood in EU (Mm³/a).

Area	1990	1995	2000	2005	2010	2015	2018
1 France	33.2	32.0	27.9	22.1	23.6	23.4	21.3
2 Germany	2.3	4.1	5.0	10.1	15.2	14.3	13.7
3 Italy	3.4	5.0	8.2	8.4	10.2	9.7	9.7
4 Finland	2.0	2.7	2.7	2.6	3.6	4.0	4.2
5 Romania	1.2	2.0	2.7	2.7	2.2	4.1	3.9
6 Sweden	1.9	1.9	3.0	2.0	3.0	3.5	3.5
7 Poland	1.2	1.2	1.3	1.7	2.1	2.8	2.7
8 Hungary	2.4	1.9	2.5	3.0	2.9	2.5	2.6
9 Estonia	0.0	0.5	0.8	0.6	1.2	1.9	2.3
10 Austria	1.3	1.2	1.2	1.5	1.8	2.0	2.0
11 Latvia	0.0	0.8	0.7	0.2	1.3	1.0	2.0
12 Bulgaria	1.4	0.8	1.8	2.4	2.4	2.2	2.0
13 Netherlands	0.1	0.1	0.2	0.2	0.2	1.3	1.9
14 Lithuania	0.0	0.3	1.0	0.6	1.3	1.4	1.3
15 Spain	0.8	2.3	1.3	1.7	4.5	1.6	1.2
16 Greece	1.2	1.2	1.4	0.9	0.6	1.0	1.0
17 Slovenia	0.0	0.2	0.5	0.8	1.0	1.0	0.9
18 Portugal	0.4	0.3	0.4	0.4	0.4	0.4	0.9
19 Belgium	0.5	0.5	0.5	0.6	0.7	0.8	0.8
20 Denmark	0.0	0.0	0.0	0.0	0.0	0.8	0.7
21 Czechia	1.6	1.8	2.0	2.1	2.2	0.8	0.7
22 United Kingdom	0.1	0.1	0.1	0.2	0.4	0.4	0.5
23 Slovakia	0.0	0.2	0.1	0.2	0.2	0.3	0.3
24 Ireland	0.0	0.0	0.0	0.0	0.1	0.1	0.1
25 Luxembourg	0.0	0.0	0.0	0.0	0.0	0.0	0.0
26 Liechtenstein	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total	55.0	61.0	65.3	65.1	81.0	81.2	80.3

Other Europe

Production of non-coniferous fuelwood in Europe outside EU has been 33 Mm³ annually (Table 5.2.4).

Table 5.2.4 Production of non-coniferous fuelwood in Europe outside EU (Mm³/a).

Area	1990	1995	2000	2005	2010	2015	2018
1 Serbia	0.0	1.7	1.8	1.7	6.1	6.2	6.4
2 Russian Federation	0.0	16.3	3.8	4.3	4.2	4.5	4.7
3 Ukraine	0.0	1.0	2.4	4.9	2.7	5.7	4.7
4 Turkey	5.4	6.1	4.1	3.1	2.9	2.8	3.3
5 Belarus	0.0	0.6	0.6	0.9	1.6	2.9	2.7
6 Armenia	0.0	0.1	0.1	0.0	1.8	1.6	1.6
7 Bosnia and Herzegovina	0.0	0.0	0.9	1.3	1.4	1.5	1.5
8 Republic of Moldova	0.0	0.3	0.2	0.3	0.3	1.3	1.2
9 Albania	1.2	0.3	0.3	0.2	0.4	1.1	1.1
10 Norway	0.7	0.4	0.5	0.7	1.4	1.1	1.1
11 Switzerland	0.5	0.6	0.8	0.8	1.0	1.2	1.0
12 Montenegro	0.0	0.0	0.0	0.0	0.7	0.7	0.7
13 North Macedonia	0.0	0.6	0.9	0.7	0.5	0.7	0.7
14 Azerbaijan	0.0	0.0	0.0	0.0	0.0	0.4	0.4
15 Georgia	0.0	0.0	0.3	0.4	0.6	0.5	0.3
16 Croatia	2.6	3.0	1.0	1.8	1.1	1.7	2.1
Total	10.3	30.8	17.5	21.2	26.7	33.9	33.4

North America

Production of non-coniferous fuelwood in North America has been about 80 Mm³ annually
Table 5.2.5

Table 5.2.5 Production of fuelwood in North America.

Area	1990	1995	2000	2005	2010	2015	2018
1 United States of America	66.5	49.3	37.2	35.6	32.5	35.9	55.5
2 Mexico	24.1	25.5	26.3	26.9	27.2	27.2	27.0
3 Canada	5.2	4.3	2.4	2.3	2.5	3.3	0.9
Total	95.7	79.1	65.9	64.8	62.2	66.4	83.4

Central and South America

Production of non-coniferous fuelwood in Central America has been 18 Mm³ annually (Table 5.2.6). and in South America about 187 Mm³ annually (Table 5.2.7).

Table 5.2.6 Production of non-coniferous fuelwood in Central America, Mm3.

Area	1990	1995	2000	2005	2010	2015	2018
1 Guatemala	2.0	4.9	5.5	6.2	6.9	7.6	7.9
2 Ecuador	3.1	3.9	4.4	4.4	3.8	3.8	3.8
3 Haiti	1.5	1.8	1.8	1.8	1.9	1.9	2.0
4 Cuba	0.0	0.0	0.0	0.0	0.0	1.1	1.1
5 Panama	1.4	1.3	1.3	1.2	1.1	1.1	1.0
6 Dominican Republi	0.6	0.6	0.6	0.6	0.9	1.0	1.0
7 Jamaica	0.9	0.3	0.6	0.6	0.6	0.5	0.5
8 Belize	0.1	0.1	0.1	0.1	0.1	0.1	0.1
9 Bahamas	0.0	0.0	0.0	0.0	0.0	0.0	0.0
10 Trinidad and Tobag	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total	9.6	12.9	14.3	14.9	15.3	17.1	17.5

Table 5.2.7 Production of non-coniferous fuelwood in South America, (Mm³/a)

Area	1990	1995	2000	2005	2010	2015	2018
1 Brazil	108.3	114.0	119.2	106.2	99.0	108.4	120.0
2 Chile	6.6	8.3	10.3	11.2	10.8	13.6	13.6
3 Paraguay	4.8	5.3	5.6	6.1	6.6	7.1	7.5
4 Peru	6.5	6.6	7.8	7.4	7.3	7.2	7.2
5 Colombia	0.1	0.2	0.2	0.2	0.3	6.8	5.8
6 Honduras	5.7	5.8	5.9	5.8	5.8	5.6	5.5
7 Nicaragua	5.0	5.0	5.1	5.3	5.4	5.5	5.5
8 Venezuela (Bolivar)	3.0	3.3	3.6	3.8	4.1	4.2	4.3
9 El Salvador	3.6	4.5	4.5	4.2	4.2	4.2	4.1
10 Argentina	3.1	3.5	3.0	4.4	4.4	4.4	4.1
11 Costa Rica	7.6	8.8	8.5	8.7	9.0	3.3	3.3
12 Uruguay	3.1	3.5	1.4	2.0	2.4	2.8	2.5
13 Bolivia (Plurination)	1.9	2.0	2.1	2.3	2.4	2.4	2.5
14 Guyana	0.9	0.9	0.9	0.9	0.9	0.8	0.8
15 French Guiana	0.0	0.1	0.1	0.1	0.1	0.2	0.2
Total	160.3	171.6	178.1	168.4	162.5	176.5	186.8

Oceania

Production of non-coniferous fuelwood in Oceania has been 66 million cubic meters annually (Table 5.2.8).

Table 5.2.8 Production of non-coniferous fuelwood annually in Oceania, Mm³.

Area	1990	1995	2000	2005	2010	2015	2018
1 Indonesia	126.0	100.4	89.0	73.7	59.7	48.3	42.3
2 Philippines	15.2	14.4	13.6	13.0	12.4	11.9	11.5
3 Papua New Guinea	5.5	5.5	5.5	5.5	5.5	5.5	5.5
4 Australia	2.8	3.7	6.7	5.6	4.8	4.1	4.1
5 Malaysia	4.0	3.6	3.4	3.1	2.8	2.6	2.5
6 Cabo Verde	0.1	0.1	0.2	0.2	0.2	0.2	0.2
7 Solomon Islands	0.1	0.1	0.1	0.1	0.1	0.1	0.1
8 RÃ©union	0.1	0.1	0.1	0.1	0.1	0.1	0.1
9 Vanuatu	0.0	0.0	0.1	0.1	0.1	0.1	0.1
10 Samoa	0.1	0.1	0.1	0.1	0.1	0.1	0.1
Total	154.0	128.0	118.8	101.4	85.9	72.9	66.4

6 PODUCTION OF CONIFEROUS FUELWOOD

6.1 Global production

Global production of coniferous fuelwood has been about 220 million cubic meters annually (Figure 6.1.1). Largest producers are Asia and Oceania (84 Mm³/a), EU (38 Mm³/a) and Other Europe (31 Mm³/a) (Table 6.1.1).

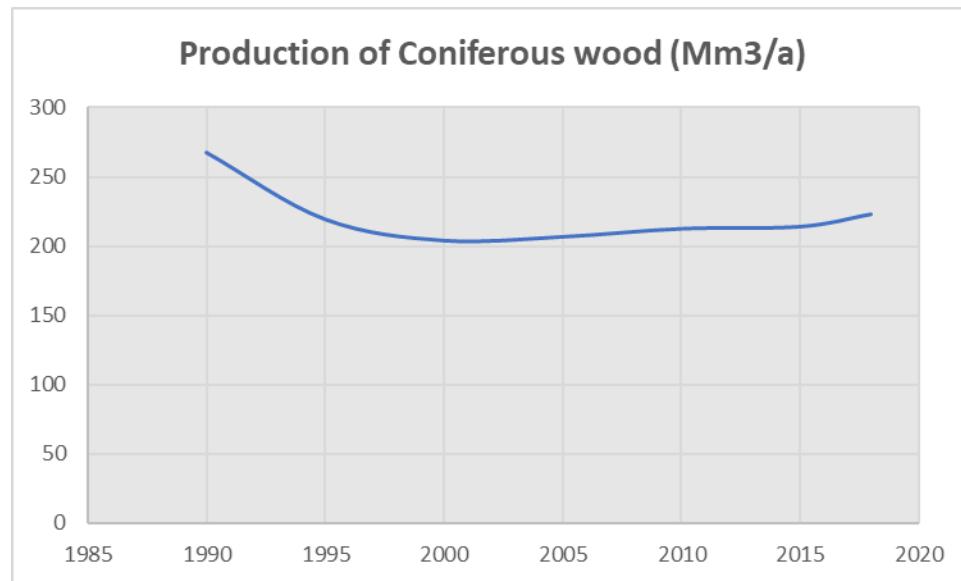


Figure 6.1.1 Production of coniferous fuelwood.

Table 6.1.1 Production of coniferous fuel wood (1000 m³/a)

Area	1990	1995	2000	2005	2010	2015	2018
Africa	10	14	13	16	17	18	18
Asia and Oceania	130	116	107	99	93	87	84
S. and C. America	26	27	29	27	28	26	25
North America	27	24	21	20	20	21	27
EU	15	17	20	27	35	39	38
Other Europe	5	21	13	17	20	23	31
Other countries	54	1	1	1	0	0	0
Total	267	219	204	207	213	214	223

Assuming, that energy content of wood is 0.2 toe/m³, the fuelwood production is producing 45 Mtoe of primary energy (Table 6.1.2).

Table 6.1.2 Primary energy in coniferous fuelwood (Mtoe)

Area	1990	1995	2000	2005	2010	2015	2018
Africa	1.9	2.7	2.7	3.1	3.3	3.6	3.7
Asia and Oceania	26.0	23.2	21.3	19.9	18.5	17.5	16.7
S. and C. America	5.3	5.3	5.8	5.3	5.7	5.1	5.0
North America	5.4	4.7	4.1	4.1	4.1	4.3	5.5
EU	3.1	3.5	4.1	5.5	7.0	7.7	7.5
Other Europe	1.1	4.2	2.7	3.3	3.9	4.7	6.3
Other countries	10.7	0.2	0.2	0.2	0.0	0.0	0.0
Total	53.5	43.9	40.8	41.4	42.5	42.8	44.6

6.2 Production of coniferous fuelwood by continents

Africa

Production of coniferous fuelwood in Africa has been largest in Ethiopia (7.8 Mm³) and Algeria (5.9 Mm³/a) (Table 6.2.1).

Table 6.2.1 Production of coniferous fuelwood in Africa (Mm³/a).

Area	1990	1995	2000	2005	2010	2015	2018
1 Ethiopia	2.48	5.61	6.12	6.61	7.08	7.57	7.83
2 Algeria	3.85	4.39	4.83	5.23	5.58	5.82	5.93
3 Kenya	0.84	0.94	0.98	2.56	2.64	2.64	2.64
4 Morocco	1.04	1.09	1.11	1.09	1.08	1.06	1.05
5 Tunisia	0.19	0.20	0.21	0.21	0.22	0.74	0.74
6 Tanzania	0.02	0.03	0.03	0.03	0.03	0.03	0.03
7 South Africa	1.18	1.38	0.00	0.00	0.00	0.03	0.03
8 Malawi	0.01	0.01	0.01	0.01	0.01	0.01	0.01
9 Zimbabwe	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Total	9.61	13.65	13.28	15.75	16.64	17.91	18.26

Asia

Production of coniferous fuelwood in Asia has been largest in China (Table 6.2.2).

Table 6.2.2 Production of coniferous fuelwood in Asia (Mm3/a).

Area	1990	1995	2000	2005	2010	2015	2018
1 China	116.3	101.5	92.1	83.9	76.4	69.8	66.0
2 India	8.3	8.7	8.3	9.2	9.3	9.2	9.1
3 DPR of Korea	2.8	3.2	3.5	3.7	3.8	3.9	4.0
4 Tajikistan	0.0	0.0	0.0	0.0	0.0	1.8	1.8
5 Pakistan	0.9	0.9	1.3	1.1	1.3	1.1	1.1
6 Afghanistan	0.21	0.28	0.38	0.44	0.50	0.54	0.57
7 Mongolia	0.58	0.18	0.41	0.55	0.61	0.50	0.50
8 R. of Korea	0.00	0.00	0.00	0.00	0.28	0.16	0.12
9 Kazakhstan	0.00	0.34	0.39	0.17	0.22	0.09	0.09
10 Georgia	0.00	0.00	0.03	0.05	0.15	0.06	0.08
11 Nepal	0.06	0.06	0.06	0.06	0.06	0.06	0.06
12 Kyrgyzstan	0.00	0.00	0.01	0.01	0.01	0.01	0.01
13 China, Taiwan Prov.	0.02	0.01	0.00	0.01	0.00	0.01	0.00
Total	129.1	115.2	106.6	99.3	92.7	87.3	83.5

Europe

Europe outside EU is producing coniferous fuelwood 31 Mm3 annually (Table 6.2.3). EU is producing 38 Mm3 annually (Table 6.2.4).

Table 6.2.3 Production of coniferous fuelwood in Europe outside EU (Mm3/a).

Area	1990	1995	2000	2005	2010	2015	2018
1 Russian Federation	0.0	17.1	8.8	10.1	9.7	10.5	11.7
2 Belarus	0.0	0.2	0.4	0.4	0.7	5.4	9.7
3 Ukraine	0.0	0.9	1.6	3.3	5.9	4.4	6.0
4 Turkey	4.4	2.4	1.4	1.9	2.0	1.8	2.4
5 Norway	0.3	0.1	0.2	0.5	0.8	0.6	0.7
6 Switzerland	0.3	0.3	0.8	0.5	0.5	0.5	0.6
7 Croatia	0.00	0.01	0.08	0.02	0.02	0.06	0.06
8 Montenegro	0.00	0.00	0.00	0.00	0.01	0.05	0.05
9 North Macedonia	0.00	0.00	0.00	0.01	0.01	0.02	0.02
10 Republic of Moldova	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Total	5.0	21.1	13.3	16.6	19.6	23.4	31.3

Table 6.2.4 Production of coniferous fuelwood in EU (Mm³/a).

Area	1990	1995	2000	2005	2010	2015	2018
1 Germany	2.1	3.0	3.8	8.0	12.1	9.0	8.1
2 Czechia	1.3	0.5	0.7	0.7	1.3	1.5	3.6
3 Finland	1.0	1.4	1.4	2.5	3.1	3.9	3.5
4 Sweden	1.9	1.9	3.0	3.9	3.0	3.5	3.5
5 Austria	1.4	1.9	1.6	2.2	2.8	3.0	3.2
6 Poland	1.5	1.1	1.2	1.7	2.1	2.7	2.6
7 France	3.7	3.6	3.1	2.5	2.6	2.6	2.4
8 United Kingdom	0.1	0.1	0.1	0.1	1.0	1.6	1.9
9 Denmark	0.2	0.3	0.4	1.0	0.9	1.5	1.4
10 Estonia	0.0	0.1	0.9	0.4	1.0	1.2	1.2
11 Italy	0.2	0.3	1.0	1.0	1.2	1.2	1.2
12 Spain	1.0	0.8	0.3	0.5	0.6	2.9	1.0
13 Bulgaria	0.1	0.0	0.3	0.3	0.3	0.6	0.9
14 Romania	0.7	0.2	0.3	0.3	0.4	1.0	0.7
15 Lithuania	0.00	0.82	0.45	0.53	0.65	0.74	0.44
16 Netherlands	0.03	0.03	0.00	0.05	0.05	0.14	0.42
17 Slovakia	0.00	0.24	0.15	0.15	0.29	0.24	0.26
18 Portugal	0.15	0.19	0.20	0.20	0.20	0.20	0.23
19 Latvia	0.00	0.40	0.94	0.72	0.99	0.20	0.20
20 Slovenia	0.00	0.00	0.00	0.17	0.14	0.20	0.20
21 Hungary	0.06	0.04	0.09	0.10	0.10	0.14	0.13
22 Serbia	0.00	0.02	0.02	0.12	0.10	0.10	0.13
23 Ireland	0.01	0.06	0.05	0.01	0.08	0.11	0.11
24 Greece	0.12	0.17	0.19	0.10	0.07	0.10	0.10
25 Belgium	0.05	0.05	0.05	0.05	0.05	0.06	0.06
26 Luxembourg	0.00	0.00	0.02	0.03	0.05	0.03	0.05
27 Cyprus	0.01	0.01	0.00	0.00	0.00	0.01	0.01
	15.49	17.26	20.32	27.35	35.12	38.55	37.53

America

Production of coniferous fuelwood in North America has been about 27 Mm³/a (Table 6.2.5), in Central America 18 Mm³ (Table 6.2.6) and in South America 8 Mm³/a (Table 6.2.7).

Table 6.2.5 Production of coniferous fuelwood in North America (Mm³/a).

Area	1990	1995	2000	2005	2010	2015	2018
1 United States of Am	15.6	11.6	8.7	8.3	7.9	8.4	15.0
2 Mexico	10.3	10.9	11.3	11.5	11.7	11.7	11.6
3 Canada	1.0	1.1	0.5	0.5	0.7	1.3	0.6
Total	26.9	23.6	20.5	20.4	20.3	21.4	27.3

Table 6.2.6 Production of coniferous fuelwood in Central America (Mm³/a).

Area	1990	1995	2000	2005	2010	2015	2018
1 Guatemala	9.1	7.9	9.0	10.1	11.2	12.3	13.0
2 Honduras	2.8	2.8	2.9	2.9	2.8	2.8	2.7
3 Ecuador	0.5	1.0	1.0	1.1	1.2	1.2	1.3
4 Nicaragua	0.6	0.6	0.6	0.7	0.7	0.7	0.7
5 Haiti	0.13	0.15	0.16	0.16	0.16	0.17	0.17
6 Aruba	0.00	0.00	0.00	0.00	0.00	0.00	0.00
7 Belize	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Total	13.2	12.5	13.7	14.9	16.0	17.2	17.8

Table 6.2.6 Production of coniferous fuelwood in South America (Mm³/a).

Area	1990	1995	2000	2005	2010	2015	2018
1 Chile	1.08	1.45	1.82	1.97	1.90	2.52	2.52
2 Brazil	12.02	12.66	13.23	7.37	7.99	3.29	3.44
3 Colombia	0.00	0.00	0.43	2.28	2.38	2.50	1.29
4 Uruguay	0.00	0.00	0.00	0.00	0.00	0.02	0.04
5 El Salvador	0.02	0.02	0.02	0.02	0.02	0.01	0.01
6 Argentina	0.00	0.08	0.02	0.01	0.02	0.04	0.01
7 Falkland Islands (Ma	0.00	0.00	0.00	0.00	0.01	0.00	0.00
8 Bolivia (Plurinational	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Total	13.12	14.21	15.52	11.65	12.30	8.38	7.31

7 Energy and emissions from charcoal and fuelwood

7.1 Primary energy from wood

Primary energy consumption of charcoal (Table 7.1.1), non-coniferous fuelwood (Table 7.1.2) and coniferous fuelwood (Table 7.1.2) is about 568 Mtoe annually.

Table 7.1.1 Primary energy consumed by charcoal production (Mtoe)/a).

Area	1990	1995	2000	2005	2010	2015	2018
Africa	50.5	61.3	67.6	81.9	95.4	107.8	114.8
Asia Pacific	18.8	20.3	21.7	26.6	28.5	30.1	30.2
S. and C. America	22.9	34.0	28.9	32.3	25.9	27.9	27.7
North America	2.2	2.6	3.6	4.4	3.9	3.6	3.2
EU	1.2	1.1	0.7	1.0	0.8	0.8	1.1
Other Europe	0.0	0.2	0.3	0.7	1.1	1.2	1.3
Middle East	0.2	0.3	0.5	0.5	0.6	0.7	0.5
Total	95.8	119.8	123.2	147.4	156.1	172.1	178.9

Table 7.1.2 Primary energy consumed by non-coniferous fuelwood production (Mtoe)/a).

Area	1990	1995	2000	2005	2010	2015	2018
Africa	77.8	87.6	94.0	102.0	109.2	132.4	136.4
Asia and Oceania	161.2	157.7	153.5	152.8	149.6	129.8	127.1
S. and C. America	34.0	36.9	38.5	36.7	35.6	38.7	40.9
North America	19.1	15.8	13.2	13.0	12.4	13.3	16.7
EU	11.0	12.2	13.1	13.0	16.2	16.2	16.1
Other Europe	2.1	6.2	3.5	4.2	5.3	6.8	6.7
Middle East	0.2	0.2	0.2	0.2	0.3	0.3	0.3
Total	305	317	316	322	329	338	344

Table 7.1.3 Primary energy consumed by coniferous fuelwood production (Mtoe)/a).

Area	1990	1995	2000	2005	2010	2015	2018
Africa	1.9	2.7	2.7	3.1	3.3	3.6	3.7
Asia and Oceania	26.0	23.2	21.3	19.9	18.5	17.5	16.7
S. and C. America	5.3	5.3	5.8	5.3	5.7	5.1	5.0
North America	5.4	4.7	4.1	4.1	4.1	4.3	5.5
EU	3.1	3.5	4.1	5.5	7.0	7.7	7.5
Other Europe	1.1	4.2	2.7	3.3	3.9	4.7	6.3
Other countries	10.7	0.2	0.2	0.2	0.0	0.0	0.0
Total	53.5	43.9	40.8	41.4	42.5	42.8	44.6

Energy production from wood using charcoal and fuelwood is about 578 Mtoe annually (Table 7.1.4). Global share of energy from wood is 4 %, but it is 55 % in Africa and 10 % in South and Central America (Table 7.1.5).

Table 7.1.4 Primary energy consumed in production of wood energy (Mtoe/a).

Area	1990	1995	2000	2005	2010	2015	2018
Africa	130.2	151.6	164.3	187.0	207.9	243.8	254.9
Asia and Oceania	206.0	201.2	196.5	199.3	196.6	177.4	174.0
S. and C. America	62.2	76.2	73.2	74.3	67.2	71.7	73.6
North America	26.7	23.1	20.9	21.5	20.4	21.2	25.4
EU	15.3	16.8	17.9	19.5	24.0	24.7	24.7
Other Europe	3.1	10.6	6.5	8.2	10.3	12.7	14.3
Other countries	11.2	0.7	0.9	0.9	0.9	1.0	0.8
Total	454.7	480.3	480.1	510.7	527.3	552.4	567.6

Table 7.1.5 Primary energy consumed in production of wood energy (percent).

Area	1990	1995	2000	2005	2010	2015	2018
Africa	58.4%	62.1%	60.2%	57.4%	54.1%	56.7%	55.2%
Asia and Oceania	11.4%	8.7%	7.3%	5.3%	4.2%	3.2%	2.9%
S. and C. America	18.7%	18.6%	15.4%	13.9%	10.7%	10.3%	10.5%
North America	1.2%	0.9%	0.8%	0.8%	0.8%	0.8%	0.9%
EU	0.9%	1.0%	1.0%	1.1%	1.4%	1.5%	1.5%
Other Europe	0.2%	1.0%	0.6%	0.7%	0.9%	1.0%	1.1%
Other countries	4.3%	0.2%	0.2%	0.2%	0.1%	0.1%	0.1%
Total	5.6%	5.6%	5.1%	4.7%	4.4%	4.2%	4.1%

7.2 Wood needed for energy production

Wood resources consumed (Mm^3/a) in charcoal production are 256 Mm^3/a (Table 7.2.1), in non-coniferous wood production 1720 Mm^3/a (Table 7.2.2) and coniferous wood production 223 Mm^3/a (Table 7.2.3).

Table 7.2.1 Wood needed for charcoal production (Mm³/a)

Area	1990	1995	2000	2005	2010	2015	2018
Africa	72.1	87.6	96.6	117.0	136.3	154.0	164.0
Asia Pacific	26.9	29.0	31.0	38.0	40.7	43.0	43.1
S. and C. America	32.7	48.6	41.3	46.1	37.0	39.9	39.6
North America	3.1	3.7	5.1	6.3	5.6	5.1	4.6
EU	1.7	1.6	1.0	1.4	1.1	1.1	1.6
Other Europe	0.0	0.3	0.4	1.0	1.6	1.7	1.9
Middle East	0.3	0.4	0.7	0.7	0.9	1.0	0.7
Total	136.9	171.1	176.0	210.6	223.0	245.9	255.6

Table 7.2.2 Wood needed for non-coniferous wood production (Mm³/a)

Area	1990	1995	2000	2005	2010	2015	2018
Africa	389.0	438.0	470.0	510.0	546.0	662.0	682.0
Asia and Oceania	805.8	788.5	767.6	764.1	748.2	649.2	635.3
S. and C. America	169.9	184.5	192.4	183.3	177.8	193.6	204.3
North America	95.7	79.1	65.9	64.8	62.2	66.4	83.4
EU	55.0	61.0	65.3	65.1	81.0	81.2	80.3
Other Europe	10.3	30.8	17.5	21.2	26.7	33.9	33.4
Middle East	0.9	1.0	1.0	1.1	1.3	1.4	1.5
Total	1526.6	1582.9	1579.7	1609.6	1643.2	1687.7	1720.2

Table 7.2.3 Wood needed for coniferous wood production (Mm³/a)

Area	1990	1995	2000	2005	2010	2015	2018
Africa	10.0	14.0	13.0	16.0	17.0	18.0	18.0
Asia and Oceania	130.0	116.0	107.0	99.0	93.0	87.0	84.0
S. and C. America	26.0	27.0	29.0	27.0	28.0	26.0	25.0
North America	27.0	24.0	21.0	20.0	20.0	21.0	27.0
EU	15.0	17.0	20.0	27.0	35.0	39.0	38.0
Other Europe	5.0	21.0	13.0	17.0	20.0	23.0	31.0
Other countries	54.0	1.0	1.0	1.0	0.0	0.0	0.0
Total	267.0	219.0	204.0	207.0	213.0	214.0	223.0

Total wood used for energy production are 2200 Mm³ annually (Table 7.2.4)

Table 7.2.4 Wood needed for energy (Mm³/a)

Area	1990	1995	2000	2005	2010	2015	2018
Africa	471.1	539.6	579.6	643.0	699.3	834.0	864.0
Asia and Oceania	962.7	933.5	905.6	901.1	881.9	779.2	762.4
S. and C. America	228.6	260.1	262.7	256.4	242.8	259.5	268.9
North America	125.8	106.8	92.0	91.1	87.8	92.5	115.0
EU	71.7	79.6	86.3	93.5	117.1	121.3	119.9
Other Europe	15.3	52.1	30.9	39.2	48.3	58.6	66.3
Other countries	55.2	2.5	2.7	2.8	2.1	2.4	2.2
Total	1930	1974	1960	2027	2079	2148	2199

7.3 CO₂ emissions for wood energy

Emissions from burning wood products and manufacturing charcoal have been estimated to be 1750 MtCO₂ annually (Table 7.3.1). It has been largest in Africa (691 mtCO₂/a) and Asia and Oceania (610 MtCO₂/a).

Table 7.3.1 Emissions from manufacturing and burning wood products (MtCO₂/a).

Area	1990	1995	2000	2005	2010	2015	2018
Africa	376.9	431.7	463.7	514.4	559.4	667.2	691.2
Asia and Oceania	770.1	746.8	724.5	720.9	705.5	623.4	610.0
S. and C. America	182.9	208.1	210.1	205.2	194.2	207.6	215.1
North America	100.7	85.5	73.6	72.9	70.2	74.0	92.0
EU	57.4	63.7	69.0	74.8	93.7	97.1	95.9
Other Europe	12.2	41.7	24.7	31.4	38.6	46.9	53.0
Other countries	44.1	2.0	2.1	2.3	1.7	1.9	1.8
Total	1544	1579	1568	1622	1663	1718	1759

CO₂ emissions in world have been about 33.000 MtCO₂ annually (Table 7.3.2). The emissions from wood have been 1758 MtCO₂ annually or 5 % from total emissions (Table 7.3.3). However, the emissions from wood in Africa have been about 56 %.

Table 7.3.2 Global CO₂ emissions (MtCO₂/a).

Area	1990	1995	2000	2005	2010	2015	2018
Africa	647	697	764	912	1072	1174	1236
Asia and Oceania	5359	6761	7720	11192	13987	15877	16724
S. and C. America	657	790	902	994	1164	1322	1262
North America	5662	5950	6619	6787	6376	6049	6036
EU	4370	4086	4096	4272	3945	3463	3440
Other Europe	3940	2819	2488	2629	2547	2767	2840
Other countries	669	799	1079	1341	1889	1968	2148
Total	21304	21901	23667	28128	30980	32620	33685

Table 7.3.3 CO₂ emissions from wood / global emissions (percent).

Area	1990	1995	2000	2005	2010	2015	2018
Africa	58.2%	62.0%	60.7%	56.4%	52.2%	56.8%	55.9%
Asia and Oceania	14.4%	11.0%	9.4%	6.4%	5.0%	3.9%	3.6%
S. and C. America	27.8%	26.3%	23.3%	20.6%	16.7%	15.7%	17.1%
North America	1.8%	1.4%	1.1%	1.1%	1.1%	1.2%	1.5%
EU	1.3%	1.6%	1.7%	1.8%	2.4%	2.8%	2.8%
Other Europe	0.3%	1.5%	1.0%	1.2%	1.5%	1.7%	1.9%
Other countries	6.6%	0.2%	0.2%	0.2%	0.1%	0.1%	0.1%
Total	7.2%	7.2%	6.6%	5.8%	5.4%	5.3%	5.2%

It should be noted that the carbon stock in forest has been decreasing about 1000 MtCO₂ annually, which is also about 3 % of global CO₂ emissions.

Appendices

Appendix 1. Forest area

Appendix 1.1 Largest countries in forest area.

	Forest area Country	1990 Mha	1995 Mha	2000 Mha	2005 Mha	2010 Mha	2015 Mha	2016 Mha	Change Mha	Percent %
1	Russian Federation	809.11	809.11	809.27	808.79	815.14	814.93	814.89	5.78	1%
2	Brazil	546.71	533.99	521.27	506.73	498.46	493.54	492.55	-54.15	-10%
3	Canada	348.27	348.04	347.80	347.58	347.30	347.07	347.02	-1.25	0%
4	United States of Am	302.45	302.99	303.54	304.76	308.72	310.10	310.37	7.92	3%
5	China	157.14	167.07	177.00	193.04	200.61	208.32	209.86	52.72	34%
6	Democratic Republic	160.36	158.81	157.25	155.69	154.14	152.58	152.27	-8.10	-5%
7	Australia	128.54	128.69	128.84	127.64	123.21	124.75	125.06	-3.48	-3%
8	Indonesia	118.55	108.98	99.41	97.86	94.43	91.01	90.33	-28.22	-24%
9	Peru	77.92	77.03	76.15	75.53	74.81	73.97	73.81	-4.12	-5%
10	India	63.94	64.66	65.39	67.71	69.79	70.68	70.86	6.92	11%
11	Mexico	69.76	68.81	67.86	67.08	66.50	66.04	65.95	-3.81	-5%
12	Colombia	64.42	63.11	61.80	60.20	58.64	58.50	58.48	-5.94	-9%
13	Angola	60.98	60.35	59.73	59.10	58.48	57.86	57.73	-3.24	-5%
14	Bolivia (Plurinational)	62.80	61.44	60.09	58.73	56.21	54.76	54.48	-8.32	-13%
15	Zambia	52.80	51.97	51.13	50.30	49.47	48.64	48.47	-4.33	-8%
16	Venezuela (Bolivarian Republic)	52.03	50.59	49.15	47.71	47.51	46.68	46.52	-5.51	-11%
17	United Republic of Tanzania	55.92	53.92	51.92	49.92	47.92	46.06	45.69	-10.23	-18%
18	Mozambique	43.38	42.28	41.19	40.08	38.97	37.94	37.73	-5.64	-13%
19	Papua New Guinea	33.63	33.61	33.60	33.59	33.57	33.56	33.56	-0.07	0%
20	Myanmar	39.22	37.04	34.87	33.32	31.77	29.04	28.49	-10.72	-27%
21	Sweden	28.06	28.11	28.16	28.22	28.07	28.07	28.07	0.01	0%
22	Argentina	34.79	33.33	31.86	30.19	28.60	27.11	26.82	-7.98	-23%
23	Japan	24.95	24.91	24.88	24.94	24.97	24.96	24.96	0.01	0%
24	Gabon	22.00	22.00	22.00	22.00	22.00	23.00	23.20	1.20	5%
25	Congo	22.73	22.64	22.56	22.47	22.41	22.33	22.32	-0.41	-2%
26	Finland	21.88	22.16	22.45	22.14	22.22	22.22	22.22	0.34	2%
27	Malaysia	22.38	21.98	21.59	20.89	22.12	22.20	22.21	-0.17	-1%
28	Central African Repub	22.56	22.48	22.40	22.33	22.25	22.17	22.15	-0.41	-2%
29	Sudan (former)	30.73	29.86	28.98	28.11	27.24	19.21	19.04	-11.69	-38%
30	Lao People's Democ	17.64	17.09	16.53	16.87	17.82	18.76	18.95	1.31	7%
31	Cameroon	24.32	23.22	22.12	21.02	19.92	18.82	18.60	-5.72	-24%
32	Spain	13.81	15.39	16.98	17.28	18.25	18.42	18.45	4.64	34%
33	Chile	15.26	15.55	15.83	16.04	16.23	17.74	18.04	2.77	18%
34	France	14.44	14.86	15.29	15.86	16.42	16.99	17.10	2.67	18%
35	Guyana	16.66	16.64	16.62	16.60	16.58	16.53	16.52	-0.14	-1%
36	Thailand	14.01	15.51	17.01	16.10	16.25	16.40	16.43	2.42	17%
37	Suriname	15.43	15.41	15.39	15.37	15.35	15.33	15.33	-0.10	-1%
38	Paraguay	21.16	20.26	19.37	18.48	16.95	15.32	15.00	-6.16	-29%
39	Viet Nam	9.36	10.55	11.73	13.08	14.13	14.77	14.90	5.54	59%
40	Zimbabwe	22.16	20.53	18.89	17.26	15.62	14.06	13.75	-8.41	-38%

Appendix 1.1 Continued

	Forest area Country	1990 Mha	1995 Mha	2000 Mha	2005 Mha	2010 Mha	2015 Mha	2016 Mha	Change Mha	Percent %
41	Ethiopia	16.74	14.41	13.71	13.00	12.30	12.50	12.54	-4.20	-25%
42	Ecuador	14.63	14.18	13.73	13.34	12.94	12.55	12.47	-2.16	-15%
43	Madagascar	13.69	13.36	13.02	12.84	12.55	12.47	12.46	-1.24	-9%
44	Mongolia	12.54	12.13	11.72	11.31	13.04	12.55	12.46	-0.08	-1%
45	Norway	12.13	12.12	12.11	12.09	12.10	12.11	12.11	-0.02	0%
46	Turkey	9.62	9.90	10.18	10.66	11.20	11.72	11.82	2.20	23%
47	Germany	11.30	11.33	11.35	11.38	11.41	11.42	11.42	0.12	1%
48	Botswana	13.72	13.13	12.54	11.94	11.35	10.84	10.74	-2.98	-22%
49	Iran (Islamic Republi	9.08	9.20	9.33	10.69	10.69	10.69	10.69	1.62	18%
50	Côte d'Ivoire	10.22	10.28	10.33	10.41	10.40	10.40	10.40	0.18	2%
51	New Zealand	9.66	9.90	10.14	10.18	10.15	10.15	10.15	0.49	5%
52	Ukraine	9.39	9.39	9.51	9.58	9.55	9.66	9.68	0.29	3%
53	Poland	8.88	8.97	9.06	9.20	9.33	9.44	9.46	0.58	6%
54	Ghana	8.63	8.77	8.91	9.05	9.20	9.34	9.37	0.74	9%
55	Italy	7.59	7.98	8.37	8.76	9.03	9.30	9.35	1.76	23%
56	Cambodia	12.94	12.25	11.55	10.73	10.09	9.46	9.33	-3.61	-28%
57	South Africa	9.24	9.24	9.24	9.24	9.24	9.24	9.24	0.00	0%
58	Belarus	8.03	8.03	8.27	8.44	8.53	8.63	8.65	0.63	8%
59	Philippines	6.56	6.79	7.03	7.07	6.84	8.04	8.28	1.73	26%
60	Senegal	9.35	9.12	8.90	8.67	8.47	8.27	8.23	-1.12	-12%
61	French Guiana	8.22	8.20	8.18	8.17	8.14	8.13	8.13	-0.09	-1%
62	South Sudan	0.00	0.00	0.00	0.00	0.00	7.16	7.16	0.00	#DIV/0!
63	Romania	6.37	6.37	6.37	6.39	6.52	6.86	6.93	0.56	9%
64	Namibia	8.76	8.40	8.03	7.66	7.29	6.92	6.84	-1.92	-22%
65	Nigeria	17.23	15.19	13.14	11.09	9.04	6.99	6.58	-10.65	-62%
66	Guinea	7.26	7.08	6.90	6.72	6.54	6.36	6.33	-0.94	-13%
67	Somalia	8.28	7.90	7.52	7.13	6.75	6.36	6.29	-2.00	-24%
68	Republic of Korea	6.37	6.33	6.29	6.26	6.22	6.18	6.18	-0.19	-3%
69	Morocco	4.95	4.97	4.99	5.40	5.67	5.63	5.62	0.67	14%
70	Burkina Faso	6.85	6.55	6.25	5.95	5.65	5.35	5.29	-1.56	-23%
71	People's Rep. of Kor	8.20	7.57	6.93	6.30	5.67	5.03	4.90	-3.30	-40%
72	Chad	6.71	6.52	6.33	6.14	5.51	4.88	4.75	-1.96	-29%
73	Mali	6.69	6.30	5.90	5.51	5.11	4.72	4.64	-2.05	-31%
74	Panama	5.04	4.95	4.87	4.78	4.70	4.62	4.60	-0.44	-9%
75	Honduras	8.14	7.26	6.39	5.79	5.19	4.59	4.47	-3.66	-45%
76	Kenya	4.72	4.14	3.56	4.05	4.23	4.41	4.45	-0.27	-6%
77	Benin	5.76	5.41	5.06	4.81	4.56	4.31	4.26	-1.50	-26%
78	Liberia	4.93	4.78	4.63	4.48	4.33	4.18	4.15	-0.78	-16%
79	Turkmenistan	4.13	4.13	4.13	4.13	4.13	4.13	4.13	0.00	0%
80	Greece	3.30	3.45	3.60	3.75	3.90	4.05	4.08	0.79	24%

Appendix 1.1 Continued

	Forest area Country	1990 Mha	1995 Mha	2000 Mha	2005 Mha	2010 Mha	2015 Mha	2016 Mha	Change Mha	Percent %
81	Austria	3.78	3.81	3.84	3.85	3.86	3.87	3.87	0.09	3%
82	Bulgaria	3.33	3.35	3.38	3.65	3.74	3.82	3.84	0.51	15%
83	Nepal	4.82	4.36	3.90	3.64	3.64	3.64	3.64	-1.18	-25%
84	Guatemala	4.75	4.48	4.21	3.94	3.72	3.54	3.50	-1.24	-26%
85	Latvia	3.21	3.21	3.24	3.30	3.35	3.36	3.36	0.15	5%
86	Kazakhstan	3.39	3.39	3.37	3.34	3.31	3.31	3.31	-0.08	-2%
87	Cuba	2.06	2.25	2.44	2.70	2.93	3.20	3.25	1.20	58%
88	Uzbekistan	3.13	3.13	3.21	3.30	3.28	3.22	3.21	0.08	3%
89	Portugal	3.44	3.39	3.34	3.30	3.24	3.18	3.17	-0.27	-8%
90	United Kingdom	2.78	2.87	2.95	3.02	3.06	3.14	3.16	0.38	14%
91	Malawi	3.90	3.73	3.57	3.40	3.24	3.15	3.13	-0.77	-20%
92	Nicaragua	4.51	4.16	3.81	3.46	3.11	3.11	3.11	-1.40	-31%
93	Sierra Leone	3.12	3.02	2.92	2.82	2.73	3.04	3.11	-0.01	0%
94	Georgia	2.76	2.76	2.76	2.77	2.82	2.82	2.82	0.07	2%
95	Costa Rica	2.56	2.47	2.38	2.49	2.61	2.76	2.79	0.22	9%
96	Bhutan	2.51	2.56	2.61	2.66	2.71	2.75	2.76	0.26	10%
97	Serbia and Montenegro	3.01	3.01	3.09	3.10	2.71	2.72	2.72	-0.29	-10%
98	Czechia	2.63	2.63	2.64	2.65	2.66	2.67	2.67	0.04	1%
99	Estonia	2.22	2.22	2.24	2.25	2.23	2.23	2.23	0.01	0%
100	Bosnia and Herzegovina	2.20	2.20	2.19	2.19	2.19	2.19	2.19	-0.01	-1%
101	Lithuania	1.98	1.98	2.02	2.12	2.17	2.18	2.18	0.20	10%
102	Solomon Islands	2.32	2.30	2.27	2.24	2.21	2.19	2.18	-0.14	-6%
103	Hungary	1.80	1.86	1.92	1.98	2.05	2.07	2.07	0.27	15%
104	Sri Lanka	2.28	2.24	2.19	2.12	2.10	2.07	2.06	-0.22	-10%
105	Dominican Republic	1.11	1.30	1.49	1.65	1.82	1.98	2.02	0.91	82%
106	Algeria	1.67	1.62	1.58	1.54	1.92	1.96	1.96	0.30	18%
107	Guinea-Bissau	2.22	2.17	2.12	2.07	2.02	1.97	1.96	-0.25	-11%
108	Uganda	4.75	4.31	3.87	3.43	2.75	2.08	1.94	-2.81	-59%
109	Slovakia	1.92	1.92	1.92	1.93	1.94	1.94	1.94	0.02	1%
110	Croatia	1.87	1.87	1.89	1.90	1.92	1.92	1.92	0.05	3%
111	Uruguay	0.80	1.08	1.37	1.52	1.73	1.85	1.87	1.07	134%
112	Equatorial Guinea	1.86	1.80	1.74	1.69	1.63	1.57	1.56	-0.30	-16%
113	Eritrea	1.60	1.60	1.58	1.55	1.53	1.51	1.51	-0.09	-6%
114	Pakistan	0.15	2.32	2.12	1.90	1.69	1.47	1.43	1.28	866%
115	Bangladesh	1.49	1.48	1.47	1.46	1.44	1.43	1.43	-0.07	-5%
116	Belize	1.62	1.54	1.46	1.42	1.39	1.37	1.36	-0.25	-16%
117	Afghanistan	1.35	1.35	1.35	1.35	1.35	1.35	1.35	0.00	0%
118	Switzerland	1.15	1.17	1.19	1.22	1.24	1.25	1.26	0.11	9%
119	Slovenia	1.21	1.21	1.23	1.24	1.25	1.25	1.25	0.04	3%
120	Azerbaijan	0.86	0.86	0.87	0.88	1.01	1.14	1.17	0.30	35%

Appendix 1.2 Top 80 countries in losses of forest area

	Forest area Country	1990 Mha	1995 Mha	2000 Mha	2005 Mha	2010 Mha	2015 Mha	2016 Mha	Change Mha	Percent %	Cumulat Mha
1	Brazil	546.7	534.0	521.3	506.7	498.5	493.5	492.6	-54.2	-10%	-54.2
2	Indonesia	118.6	109.0	99.4	97.9	94.4	91.0	90.3	-28.2	-24%	-82.4
3	Myanmar	39.2	37.0	34.9	33.3	31.8	29.0	28.5	-10.7	-27%	-93.1
4	Nigeria	17.2	15.2	13.1	11.1	9.0	7.0	6.6	-10.7	-62%	-103.7
5	Tanzania	55.9	53.9	51.9	49.9	47.9	46.1	45.7	-10.2	-18%	-114.0
6	Zimbabwe	22.2	20.5	18.9	17.3	15.6	14.1	13.8	-8.4	-38%	-122.4
7	Bolivia (Plurinational)	62.8	61.4	60.1	58.7	56.2	54.8	54.5	-8.3	-13%	-130.7
8	Dem. Rep. of Congo	160.4	158.8	157.3	155.7	154.1	152.6	152.3	-8.1	-5%	-138.8
9	Argentina	34.8	33.3	31.9	30.2	28.6	27.1	26.8	-8.0	-23%	-146.8
10	Paraguay	21.2	20.3	19.4	18.5	17.0	15.3	15.0	-6.2	-29%	-152.9
11	Colombia	64.4	63.1	61.8	60.2	58.6	58.5	58.5	-5.9	-9%	-158.9
12	Cameroon	24.3	23.2	22.1	21.0	19.9	18.8	18.6	-5.7	-24%	-164.6
13	Mozambique	43.4	42.3	41.2	40.1	39.0	37.9	37.7	-5.6	-13%	-170.2
14	Venezuela (Bolivarian Republic of)	52.0	50.6	49.2	47.7	47.5	46.7	46.5	-5.5	-11%	-175.8
15	Zambia	52.8	52.0	51.1	50.3	49.5	48.6	48.5	-4.3	-8%	-180.1
16	Ethiopia	16.7	14.4	13.7	13.0	12.3	12.5	12.5	-4.2	-25%	-184.3
17	Peru	77.9	77.0	76.2	75.5	74.8	74.0	73.8	-4.1	-5%	-188.4
18	Mexico	69.8	68.8	67.9	67.1	66.5	66.0	66.0	-3.8	-5%	-192.2
19	Honduras	8.1	7.3	6.4	5.8	5.2	4.6	4.5	-3.7	-45%	-195.9
20	Cambodia	12.9	12.3	11.6	10.7	10.1	9.5	9.3	-3.6	-28%	-199.5
21	Australia	128.5	128.7	128.8	127.6	123.2	124.8	125.1	-3.5	-3%	-203.0
22	People's Rep. of Korea	8.2	7.6	6.9	6.3	5.7	5.0	4.9	-3.3	-40%	-206.3
23	Angola	61.0	60.4	59.7	59.1	58.5	57.9	57.7	-3.2	-5%	-209.5
24	Botswana	13.7	13.1	12.5	11.9	11.4	10.8	10.7	-3.0	-22%	-212.5
25	Uganda	4.8	4.3	3.9	3.4	2.8	2.1	1.9	-2.8	-59%	-215.3
26	Ecuador	14.6	14.2	13.7	13.3	12.9	12.6	12.5	-2.2	-15%	-217.5
27	Mali	6.7	6.3	5.9	5.5	5.1	4.7	4.6	-2.1	-31%	-219.5
28	Somalia	8.3	7.9	7.5	7.1	6.8	6.4	6.3	-2.0	-24%	-221.5
29	Chad	6.7	6.5	6.3	6.1	5.5	4.9	4.8	-2.0	-29%	-223.5
30	Namibia	8.8	8.4	8.0	7.7	7.3	6.9	6.8	-1.9	-22%	-225.4
31	Burkina Faso	6.9	6.6	6.3	6.0	5.7	5.4	5.3	-1.6	-23%	-226.9
32	Benin	5.8	5.4	5.1	4.8	4.6	4.3	4.3	-1.5	-26%	-228.4
33	Nicaragua	4.5	4.2	3.8	3.5	3.1	3.1	3.1	-1.4	-31%	-229.8
34	Canada	348.3	348.0	347.8	347.6	347.3	347.1	347.0	-1.3	0%	-231.1
35	Guatemala	4.8	4.5	4.2	3.9	3.7	3.5	3.5	-1.2	-26%	-232.3
36	Madagascar	13.7	13.4	13.0	12.8	12.6	12.5	12.5	-1.2	-9%	-233.6
37	Nepal	4.8	4.4	3.9	3.6	3.6	3.6	3.6	-1.2	-25%	-234.8
38	Senegal	9.4	9.1	8.9	8.7	8.5	8.3	8.2	-1.1	-12%	-235.9
39	Guinea	7.3	7.1	6.9	6.7	6.5	6.4	6.3	-0.9	-13%	-236.8
40	Niger	2.0	1.6	1.3	1.3	1.2	1.1	1.1	-0.8	-42%	-237.6
	Top 40	2169.8	2116.0	2063.7	2017.8	1972.3	1938.9	1932.2	-0.8	-42%	-237.6

Appendix 1.2 Continued

	Forest area Country	1990 Mha	1995 Mha	2000 Mha	2005 Mha	2010 Mha	2015 Mha	2016 Mha	Change Mha	Percent %	Cumulat. Mha
41	Liberia	4.93	4.78	4.63	4.48	4.33	4.18	4.15	-0.78	-16%	-238.4
42	Malawi	3.9	3.73	3.57	3.4	3.24	3.15	3.13	-0.77	-20%	-239.2
43	Togo	0.69	0.59	0.49	0.39	0.29	0.19	0.17	-0.52	-75%	-239.7
44	Panama	5.04	4.95	4.87	4.78	4.7	4.62	4.6	-0.44	-9%	-240.1
45	Congo	22.73	22.64	22.56	22.47	22.41	22.33	22.32	-0.41	-2%	-240.6
46	Central African Rep.	22.56	22.48	22.4	22.33	22.25	22.17	22.15	-0.41	-2%	-241.0
47	Equatorial Guinea	1.86	1.8	1.74	1.69	1.63	1.57	1.56	-0.3	-16%	-241.3
48	Timor-Leste	0.97	0.91	0.85	0.8	0.74	0.69	0.67	-0.29	-30%	-241.6
49	Serbia and Montenegro	3.01	3.01	3.09	3.1	2.71	2.72	2.72	-0.29	-10%	-241.8
50	Kenya	4.72	4.14	3.56	4.05	4.23	4.41	4.45	-0.27	-6%	-242.1
51	Portugal	3.44	3.39	3.34	3.3	3.24	3.18	3.17	-0.27	-8%	-242.4
52	Belize	1.62	1.54	1.46	1.42	1.39	1.37	1.36	-0.25	-16%	-242.6
53	Guinea-Bissau	2.22	2.17	2.12	2.07	2.02	1.97	1.96	-0.25	-11%	-242.9
54	Sri Lanka	2.28	2.24	2.19	2.12	2.1	2.07	2.06	-0.22	-10%	-243.1
55	Kyrgyzstan	0.85	0.85	0.86	0.87	0.68	0.64	0.63	-0.22	-26%	-243.3
56	Mauritania	0.42	0.37	0.32	0.27	0.24	0.22	0.22	-0.19	-47%	-243.5
57	Republic of Korea	6.37	6.33	6.29	6.26	6.22	6.18	6.18	-0.19	-3%	-243.7
58	Malaysia	22.38	21.98	21.59	20.89	22.12	22.2	22.21	-0.17	-1%	-243.9
59	Solomon Islands	2.32	2.3	2.27	2.24	2.21	2.19	2.18	-0.14	-6%	-244.0
60	Guyana	16.66	16.64	16.62	16.6	16.58	16.53	16.52	-0.14	-1%	-244.2
61	El Salvador	0.38	0.35	0.33	0.31	0.29	0.27	0.26	-0.12	-31%	-244.3
62	Suriname	15.43	15.41	15.39	15.37	15.35	15.33	15.33	-0.1	-1%	-244.4
63	Eritrea	1.6	1.6	1.58	1.55	1.53	1.51	1.51	-0.09	-6%	-244.5
64	French Guiana	8.22	8.2	8.18	8.17	8.14	8.13	8.13	-0.09	-1%	-244.6
65	Kazakhstan	3.39	3.39	3.37	3.34	3.31	3.31	3.31	-0.08	-2%	-244.6
66	Mongolia	12.54	12.13	11.72	11.31	13.04	12.55	12.46	-0.08	-1%	-244.7
67	Belgium-Luxembourg	0.76	0.76	0.67	0.67	0.68	0.68	0.68	-0.08	-10%	-244.8
68	Papua New Guinea	33.63	33.61	33.6	33.59	33.57	33.56	33.56	-0.07	0%	-244.9
69	Bangladesh	1.49	1.48	1.47	1.46	1.44	1.43	1.43	-0.07	-5%	-244.9
70	Brunei Darussalam	0.41	0.41	0.4	0.39	0.38	0.38	0.38	-0.03	-8%	-245.0
71	Haiti	0.12	0.11	0.11	0.11	0.1	0.1	0.1	-0.02	-17%	-245.0
72	Albania	0.79	0.78	0.77	0.78	0.78	0.77	0.77	-0.02	-2%	-245.0
73	Norway	12.13	12.12	12.11	12.09	12.1	12.11	12.11	-0.02	0%	-245.0
74	Bosnia and Herzegovina	2.2	2.2	2.19	2.19	2.19	2.19	2.19	-0.01	-1%	-245.0
75	Comoros	0.05	0.05	0.05	0.04	0.04	0.04	0.04	-0.01	-25%	-245.0
76	Sierra Leone	3.12	3.02	2.92	2.82	2.73	3.04	3.11	-0.01	0%	-245.1
77	Jamaica	0.34	0.34	0.34	0.34	0.34	0.34	0.33	-0.01	-3%	-245.1
78	Burundi	0.29	0.24	0.2	0.18	0.25	0.28	0.28	-0.01	-3%	-245.1
79	Dominica	0.05	0.05	0.05	0.05	0.04	0.04	0.04	-0.01	-14%	-245.1
80	United States Virgin Islands	0.02	0.02	0.02	0.02	0.02	0.02	0.02	-0.01	-26%	-245.1
Countries 41-80		225.9	223.1	220.3	218.3	219.7	218.7	218.5	-7.5	-3%	-237.63
Countries 1-80		2395.8	2339.1	2284.0	2236.1	2192.0	2157.5	2150.6	-245.1	-10%	-245.09

Appendix 1.3 Top 80 countries increasing their forest area

	Forest area Countries	1990 Mha	1995 Mha	2000 Mha	2005 Mha	2010 Mha	2015 Mha	2016 Mha	Change Mha	%	Cumulat. Mha
1	China	157.1	167.1	177.0	193.0	200.6	208.3	209.9	52.7	34%	52.7
2	United St. of Amer	302.5	303.0	303.5	304.8	308.7	310.1	310.4	7.9	3%	60.6
3	India	63.9	64.7	65.4	67.7	69.8	70.7	70.9	6.9	11%	67.6
4	Russian Federatior	809.1	809.1	809.3	808.8	815.1	814.9	814.9	5.8	1%	73.3
5	Viet Nam	9.4	10.6	11.7	13.1	14.1	14.8	14.9	5.5	59%	78.9
6	Spain	13.8	15.4	17.0	17.3	18.3	18.4	18.5	4.6	34%	83.5
7	Chile	15.3	15.6	15.8	16.0	16.2	17.7	18.0	2.8	18%	86.3
8	France	14.4	14.9	15.3	15.9	16.4	17.0	17.1	2.7	18%	89.0
9	Thailand	14.0	15.5	17.0	16.1	16.3	16.4	16.4	2.4	17%	91.4
10	Turkey	9.6	9.9	10.2	10.7	11.2	11.7	11.8	2.2	23%	93.6
11	Italy	7.6	8.0	8.4	8.8	9.0	9.3	9.4	1.8	23%	95.3
12	Philippines	6.6	6.8	7.0	7.1	6.8	8.0	8.3	1.7	26%	97.1
13	Iran (Islamic Repub	9.1	9.2	9.3	10.7	10.7	10.7	10.7	1.6	18%	98.7
14	Lao People's Democ	17.6	17.1	16.5	16.9	17.8	18.8	19.0	1.3	7%	100.0
15	Pakistan	0.2	2.3	2.1	1.9	1.7	1.5	1.4	1.3	866%	101.3
16	Gabon	22.0	22.0	22.0	22.0	22.0	23.0	23.2	1.2	5%	102.5
17	Cuba	2.1	2.3	2.4	2.7	2.9	3.2	3.3	1.2	58%	103.7
18	Uruguay	0.8	1.1	1.4	1.5	1.7	1.9	1.9	1.1	134%	104.8
19	Dominican RepUBL	1.1	1.3	1.5	1.7	1.8	2.0	2.0	0.9	82%	105.7
20	Greece	3.3	3.5	3.6	3.8	3.9	4.1	4.1	0.8	24%	106.5
21	Ghana	8.6	8.8	8.9	9.1	9.2	9.3	9.4	0.7	9%	107.2
22	Morocco	5.0	5.0	5.0	5.4	5.7	5.6	5.6	0.7	14%	107.9
23	Belarus	8.0	8.0	8.3	8.4	8.5	8.6	8.7	0.6	8%	108.5
24	Poland	8.9	9.0	9.1	9.2	9.3	9.4	9.5	0.6	6%	109.1
25	Romania	6.4	6.4	6.4	6.4	6.5	6.9	6.9	0.6	9%	109.6
26	Bulgaria	3.3	3.4	3.4	3.7	3.7	3.8	3.8	0.5	15%	110.1
27	New Zealand	9.7	9.9	10.1	10.2	10.2	10.2	10.2	0.5	5%	110.6
28	Tunisia	0.6	0.7	0.8	0.9	1.0	1.0	1.1	0.4	63%	111.0
29	United Kingdom	2.8	2.9	3.0	3.0	3.1	3.1	3.2	0.4	14%	111.4
30	Finland	21.9	22.2	22.5	22.1	22.2	22.2	22.2	0.3	2%	111.8
31	Azerbaijan	0.9	0.9	0.9	0.9	1.0	1.1	1.2	0.3	35%	112.1
32	Algeria	1.7	1.6	1.6	1.5	1.9	2.0	2.0	0.3	18%	112.4
33	Ireland	0.5	0.6	0.6	0.7	0.7	0.8	0.8	0.3	63%	112.7
34	Ukraine	9.4	9.4	9.5	9.6	9.6	9.7	9.7	0.3	3%	112.9
35	Hungary	1.8	1.9	1.9	2.0	2.1	2.1	2.1	0.3	15%	113.2
36	Bhutan	2.5	2.6	2.6	2.7	2.7	2.8	2.8	0.3	10%	113.5
37	Costa Rica	2.6	2.5	2.4	2.5	2.6	2.8	2.8	0.2	9%	113.7
38	Puerto Rico	0.3	0.4	0.5	0.5	0.5	0.5	0.5	0.2	74%	113.9
39	Lithuania	2.0	2.0	2.0	2.1	2.2	2.2	2.2	0.2	10%	114.1
40	CÃ'te d'Ivoire	10.2	10.3	10.3	10.4	10.4	10.4	10.4	0.2	2%	114.3
Top 40		1586.3	1607.1	1626.2	1651.4	1678.2	1696.9	1700.6	114.3	7%	

Appendix 1.3 Continued

	Forest area Countries	1990 Mha	1995 Mha	2000 Mha	2005 Mha	2010 Mha	2015 Mha	2016 Mha	Change Mha	%	Cumulat. Mha
41	Rwanda	0.32	0.33	0.34	0.39	0.45	0.48	0.49	0.17	53%	114.5
42	Latvia	3.21	3.21	3.24	3.3	3.35	3.36	3.36	0.15	5%	114.6
43	Germany	11.3	11.33	11.35	11.38	11.41	11.42	11.42	0.12	1%	114.7
44	Syrian Arab Repub	0.37	0.4	0.43	0.46	0.49	0.49	0.49	0.12	32%	114.8
45	Eswatini	0.47	0.5	0.52	0.54	0.56	0.59	0.59	0.12	25%	115.0
46	Switzerland	1.15	1.17	1.19	1.22	1.24	1.25	1.26	0.11	9%	115.1
47	French Polynesia	0.06	0.08	0.11	0.13	0.16	0.16	0.16	0.1	182%	115.2
48	Austria	3.78	3.81	3.84	3.85	3.86	3.87	3.87	0.09	3%	115.3
49	Republic of Moldo	0.32	0.32	0.32	0.36	0.39	0.41	0.41	0.09	29%	115.4
50	Uzbekistan	3.13	3.13	3.21	3.3	3.28	3.22	3.21	0.08	3%	115.4
51	United Arab Emirat	0.25	0.28	0.31	0.31	0.32	0.32	0.32	0.08	32%	115.5
52	Denmark	0.54	0.56	0.59	0.56	0.59	0.61	0.62	0.07	14%	115.6
53	Fiji	0.95	0.97	0.98	1	0.99	1.02	1.02	0.07	7%	115.7
54	Georgia	2.76	2.76	2.76	2.77	2.82	2.82	2.82	0.07	2%	115.7
55	North Macedonia	0.94	0.94	0.96	0.98	1	1	1	0.06	7%	115.8
56	Croatia	1.87	1.87	1.89	1.9	1.92	1.92	1.92	0.05	3%	115.8
57	Gambia	0.44	0.45	0.46	0.47	0.48	0.49	0.49	0.05	11%	115.9
58	Samoa	0.13	0.15	0.17	0.17	0.17	0.17	0.17	0.04	32%	115.9
59	Slovenia	1.21	1.21	1.23	1.24	1.25	1.25	1.25	0.04	3%	116.0
60	Czechia	2.63	2.63	2.64	2.65	2.66	2.67	2.67	0.04	1%	116.0
61	Israel	0.13	0.14	0.15	0.16	0.15	0.17	0.17	0.04	27%	116.0
62	Iceland	0.02	0.02	0.03	0.04	0.04	0.05	0.05	0.03	214%	116.1
63	Cabo Verde	0.06	0.07	0.08	0.08	0.09	0.09	0.09	0.03	57%	116.1
64	Netherlands	0.35	0.35	0.36	0.37	0.37	0.38	0.38	0.03	9%	116.1
65	Egypt	0.04	0.05	0.06	0.07	0.07	0.07	0.07	0.03	67%	116.2
66	Iraq	0.8	0.81	0.82	0.83	0.83	0.83	0.83	0.02	3%	116.2
67	Slovakia	1.92	1.92	1.92	1.93	1.94	1.94	1.94	0.02	1%	116.2
68	Cyprus	0.16	0.17	0.17	0.17	0.17	0.17	0.17	0.01	7%	116.2
69	Sweden	28.06	28.11	28.16	28.22	28.07	28.07	28.07	0.01	0%	116.2
70	Lesotho	0.04	0.04	0.04	0.04	0.04	0.05	0.05	0.01	25%	116.2
71	Estonia	2.22	2.22	2.24	2.25	2.23	2.23	2.23	0.01	0%	116.2
72	Japan	24.95	24.91	24.88	24.94	24.97	24.96	24.96	0.01	0%	116.3
73	Lebanon	0.13	0.13	0.13	0.14	0.14	0.14	0.14	0.01	5%	116.3
74	Tajikistan	0.41	0.41	0.41	0.41	0.41	0.41	0.41	0	1%	116.3
75	Kuwait	0	0	0	0.01	0.01	0.01	0.01	0	81%	116.3
76	Saint Vincent and G	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0	8%	116.3
77	RÃ©union	0.09	0.09	0.09	0.09	0.09	0.09	0.09	0	1%	116.3
78	Cook Islands	0.01	0.01	0.02	0.02	0.02	0.02	0.02	0	5%	116.3
79	Micronesia (Federat	0.06	0.06	0.06	0.06	0.06	0.06	0.06	0	1%	116.3
80	Liechtenstein	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0	6%	116.3
	Top 41-80	95.32	95.65	96.2	96.85	97.13	97.3	97.32	1.98	2%	
	Top 1-80	1681.7	1702.8	1722.4	1748.3	1775.4	1794.2	1797.9	116.3	7%	

Appendix 1.4 Top 80 countries in percent change in forest area.

	Forest area Country	1990 Mha	1995 Mha	2000 Mha	2005 Mha	2010 Mha	2015 Mha	2016 Mha	Change Mha	Percent %	Cumulat. Mha
1	Togo	0.7	0.6	0.5	0.4	0.3	0.2	0.2	-0.5	-75%	-0.5
2	Nigeria	17.2	15.2	13.1	11.1	9.0	7.0	6.6	-10.7	-62%	-11.2
3	Uganda	4.8	4.3	3.9	3.4	2.8	2.1	1.9	-2.8	-59%	-14.0
4	Mauritania	0.4	0.4	0.3	0.3	0.2	0.2	0.2	-0.2	-47%	-14.2
5	Honduras	8.1	7.3	6.4	5.8	5.2	4.6	4.5	-3.7	-45%	-17.8
6	Niger	2.0	1.6	1.3	1.3	1.2	1.1	1.1	-0.8	-42%	-18.7
7	Peop. Rep. of Kore	8.2	7.6	6.9	6.3	5.7	5.0	4.9	-3.3	-40%	-22.0
8	Zimbabwe	22.2	20.5	18.9	17.3	15.6	14.1	13.8	-8.4	-38%	-30.4
9	Mali	6.7	6.3	5.9	5.5	5.1	4.7	4.6	-2.1	-31%	-32.4
10	Nicaragua	4.5	4.2	3.8	3.5	3.1	3.1	3.1	-1.4	-31%	-33.8
11	El Salvador	0.4	0.4	0.3	0.3	0.3	0.3	0.3	-0.1	-31%	-33.9
12	Timor-Leste	1.0	0.9	0.9	0.8	0.7	0.7	0.7	-0.3	-30%	-34.2
13	Paraguay	21.2	20.3	19.4	18.5	17.0	15.3	15.0	-6.2	-29%	-40.4
14	Chad	6.7	6.5	6.3	6.1	5.5	4.9	4.8	-2.0	-29%	-42.3
15	Montserrat	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	-29%	-42.3
16	Cambodia	12.9	12.3	11.6	10.7	10.1	9.5	9.3	-3.6	-28%	-46.0
17	Myanmar	39.2	37.0	34.9	33.3	31.8	29.0	28.5	-10.7	-27%	-56.7
18	Benin	5.8	5.4	5.1	4.8	4.6	4.3	4.3	-1.5	-26%	-58.2
19	Guatemala	4.8	4.5	4.2	3.9	3.7	3.5	3.5	-1.2	-26%	-59.4
20	Kyrgyzstan	0.9	0.9	0.9	0.9	0.7	0.6	0.6	-0.2	-26%	-59.6
21	United States Virgi	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	-26%	-59.6
22	Ethiopia	16.7	14.4	13.7	13.0	12.3	12.5	12.5	-4.2	-25%	-63.8
23	Nepal	4.8	4.4	3.9	3.6	3.6	3.6	3.6	-1.2	-25%	-65.0
24	Comoros	0.1	0.1	0.1	0.0	0.0	0.0	0.0	0.0	-25%	-65.0
25	Indonesia	118.6	109.0	99.4	97.9	94.4	91.0	90.3	-28.2	-24%	-93.3
26	Cameroon	24.3	23.2	22.1	21.0	19.9	18.8	18.6	-5.7	-24%	-99.0
27	Somalia	8.3	7.9	7.5	7.1	6.8	6.4	6.3	-2.0	-24%	-101.0
28	Argentina	34.8	33.3	31.9	30.2	28.6	27.1	26.8	-8.0	-23%	-109.0
29	Burkina Faso	6.9	6.6	6.3	6.0	5.7	5.4	5.3	-1.6	-23%	-110.5
30	Botswana	13.7	13.1	12.5	11.9	11.4	10.8	10.7	-3.0	-22%	-113.5
31	Namibia	8.8	8.4	8.0	7.7	7.3	6.9	6.8	-1.9	-22%	-115.4
32	Malawi	3.9	3.7	3.6	3.4	3.2	3.2	3.1	-0.8	-20%	-116.2
33	Tanzania	55.9	53.9	51.9	49.9	47.9	46.1	45.7	-10.2	-18%	-126.4
34	Saint Pierre and M	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	-18%	-126.4
35	Haiti	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.0	-17%	-126.4
36	Liberia	4.9	4.8	4.6	4.5	4.3	4.2	4.2	-0.8	-16%	-127.2
37	Equatorial Guinea	1.9	1.8	1.7	1.7	1.6	1.6	1.6	-0.3	-16%	-127.5
38	Belize	1.6	1.5	1.5	1.4	1.4	1.4	1.4	-0.3	-16%	-127.8
39	Ecuador	14.6	14.2	13.7	13.3	12.9	12.6	12.5	-2.2	-15%	-129.9
40	Dominica	0.1	0.1	0.1	0.1	0.0	0.0	0.0	0.0	-14%	-129.9
	Top 1-40	487.4	456.5	427.1	407.0	384.1	361.9	357.5	-129.9	-27%	

Appendix 1.4 Continued.

	Forest area Country	1990 Mha	1995 Mha	2000 Mha	2005 Mha	2010 Mha	2015 Mha	2016 Mha	Change Mha	Percent %	Cumulat. Mha
41	Bolivia (Plurinational)	62.8	61.44	60.09	58.73	56.21	54.76	54.48	-8.32	-13%	-138.3
42	Mozambique	43.38	42.28	41.19	40.08	38.97	37.94	37.73	-5.64	-13%	-143.9
43	Guinea	7.26	7.08	6.9	6.72	6.54	6.36	6.33	-0.94	-13%	-144.8
44	Niue	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0	-13%	-144.8
45	Senegal	9.35	9.12	8.9	8.67	8.47	8.27	8.23	-1.12	-12%	-146.0
46	Venezuela (Bolivarian Republic of)	52.03	50.59	49.15	47.71	47.51	46.68	46.52	-5.51	-11%	-151.5
47	Guinea-Bissau	2.22	2.17	2.12	2.07	2.02	1.97	1.96	-0.25	-11%	-151.7
48	Northern Mariana Islands	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0	-11%	-151.7
49	Brazil	546.71	533.99	521.27	506.73	498.46	493.54	492.55	-54.15	-10%	-205.9
50	Serbia and Montenegro	3.01	3.01	3.09	3.1	2.71	2.72	2.72	-0.29	-10%	-206.2
51	Sri Lanka	2.28	2.24	2.19	2.12	2.1	2.07	2.06	-0.22	-10%	-206.4
52	Belgium-Luxembourg	0.76	0.76	0.67	0.67	0.68	0.68	0.68	-0.08	-10%	-206.5
53	Colombia	64.42	63.11	61.8	60.2	58.64	58.5	58.48	-5.94	-9%	-212.4
54	Madagascar	13.69	13.36	13.02	12.84	12.55	12.47	12.46	-1.24	-9%	-213.6
55	Panama	5.04	4.95	4.87	4.78	4.7	4.62	4.6	-0.44	-9%	-214.1
56	Zambia	52.8	51.97	51.13	50.3	49.47	48.64	48.47	-4.33	-8%	-218.4
57	Portugal	3.44	3.39	3.34	3.3	3.24	3.18	3.17	-0.27	-8%	-218.7
58	Brunei Darussalam	0.41	0.41	0.4	0.39	0.38	0.38	0.38	-0.03	-8%	-218.7
59	Saint Lucia	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0	-7%	-218.7
60	Kenya	4.72	4.14	3.56	4.05	4.23	4.41	4.45	-0.27	-6%	-219.0
61	Solomon Islands	2.32	2.3	2.27	2.24	2.21	2.19	2.18	-0.14	-6%	-219.1
62	Eritrea	1.6	1.6	1.58	1.55	1.53	1.51	1.51	-0.09	-6%	-219.2
63	Mauritius	0.04	0.04	0.04	0.04	0.04	0.04	0.04	0	-6%	-219.2
64	Dem. Rep. of Congo	160.36	158.81	157.25	155.69	154.14	152.58	152.27	-8.1	-5%	-227.3
65	Peru	77.92	77.03	76.15	75.53	74.81	73.97	73.81	-4.12	-5%	-231.4
66	Mexico	69.76	68.81	67.86	67.08	66.5	66.04	65.95	-3.81	-5%	-235.2
67	Angola	60.98	60.35	59.73	59.1	58.48	57.86	57.73	-3.24	-5%	-238.5
68	Bangladesh	1.49	1.48	1.47	1.46	1.44	1.43	1.43	-0.07	-5%	-238.5
69	American Samoa	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0	-5%	-238.5
70	Antigua and Barbuda	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0	-5%	-238.5
71	Sao Tome and Principe	0.06	0.06	0.06	0.06	0.05	0.05	0.05	0	-4%	-238.5
72	Australia	128.54	128.69	128.84	127.64	123.21	124.75	125.06	-3.48	-3%	-242.0
73	Republic of Korea	6.37	6.33	6.29	6.26	6.22	6.18	6.18	-0.19	-3%	-242.2
74	Jamaica	0.34	0.34	0.34	0.34	0.34	0.34	0.33	-0.01	-3%	-242.2
75	Burundi	0.29	0.24	0.2	0.18	0.25	0.28	0.28	-0.01	-3%	-242.2
76	Congo	22.73	22.64	22.56	22.47	22.41	22.33	22.32	-0.41	-2%	-242.6
77	Central African Republic	22.56	22.48	22.4	22.33	22.25	22.17	22.15	-0.41	-2%	-243.1
78	Kazakhstan	3.39	3.39	3.37	3.34	3.31	3.31	3.31	-0.08	-2%	-243.1
79	Albania	0.79	0.78	0.77	0.78	0.78	0.77	0.77	-0.02	-2%	-243.2
80	Trinidad and Tobago	0.24	0.24	0.23	0.23	0.23	0.23	0.24	0	-2%	-243.2
	Tp 40-80	1434.2	1409.7	1385.2	1358.9	1335.2	1323.3	1321	-113.2	-8%	
	Top 1-80	1921.6	1866.2	1812.3	1765.9	1719.3	1685.2	1678.4	-243.2	-13%	

Appendix 1.5 Top 40 in annual forest losses 1990 – 2016.

	Forest area	1990	1995	2000	2005	2010	2015	2016	Average	Trend %
	Country	Mha	Mha	Mha	Mha	Mha	Mha	Mha	Mha	%
1	Brazil	-2.54	-2.54	-2.54	-2.91	-1.65	-0.98	-0.99	-2.08	-52%
2	Indonesia	-1.91	-1.91	-1.91	-0.31	-0.69	-0.68	-0.68	-1.09	-37%
3	Myanmar	-0.44	-0.44	-0.43	-0.31	-0.31	-0.55	-0.55	-0.41	33%
4	Nigeria	-0.41	-0.41	-0.41	-0.41	-0.41	-0.41	-0.41	-0.41	0%
5	Tanzania	-0.40	-0.40	-0.40	-0.40	-0.40	-0.37	-0.37	-0.39	-6%
6	Zimbabwe	-0.33	-0.33	-0.33	-0.33	-0.33	-0.31	-0.31	-0.32	-4%
7	Bolivia (Plurinational)	-0.27	-0.27	-0.27	-0.27	-0.50	-0.29	-0.28	-0.32	-12%
8	Dem. Rep. of Congo	-0.31	-0.31	-0.31	-0.31	-0.31	-0.31	-0.31	-0.31	0%
9	Argentina	-0.29	-0.29	-0.29	-0.33	-0.32	-0.30	-0.29	-0.31	-6%
10	Paraguay	-0.18	-0.18	-0.18	-0.18	-0.31	-0.33	-0.32	-0.24	35%
11	Colombia	-0.26	-0.26	-0.26	-0.32	-0.31	-0.03	-0.02	-0.23	-91%
12	Cameroon	-0.22	-0.22	-0.22	-0.22	-0.22	-0.22	-0.22	-0.22	0%
13	Mozambique	-0.22	-0.22	-0.22	-0.22	-0.22	-0.21	-0.21	-0.22	-3%
14	Venezuela (Bolivarian Republic)	-0.29	-0.29	-0.29	-0.29	-0.04	-0.17	-0.16	-0.21	-25%
15	Zambia	-0.17	-0.17	-0.17	-0.17	-0.17	-0.17	-0.17	-0.17	2%
16	Ethiopia	-0.47	-0.47	-0.14	-0.14	-0.14	0.04	0.04	-0.16	-125%
17	Peru	-0.18	-0.18	-0.18	-0.12	-0.14	-0.17	-0.16	-0.16	1%
18	Mexico	-0.19	-0.19	-0.19	-0.16	-0.12	-0.09	-0.09	-0.15	-39%
19	Honduras	-0.18	-0.18	-0.17	-0.12	-0.12	-0.12	-0.12	-0.14	-15%
20	Cambodia	-0.14	-0.14	-0.14	-0.16	-0.13	-0.13	-0.13	-0.14	-6%
21	Australia	0.03	0.03	0.03	-0.24	-0.89	0.31	0.31	-0.13	-332%
22	People's Rep. of Korea	-0.13	-0.13	-0.13	-0.13	-0.13	-0.13	-0.13	-0.13	2%
23	Angola	-0.13	-0.13	-0.12	-0.13	-0.12	-0.12	-0.13	-0.12	4%
24	Botswana	-0.12	-0.12	-0.12	-0.12	-0.12	-0.10	-0.10	-0.11	-13%
25	Uganda	-0.09	-0.09	-0.09	-0.09	-0.14	-0.13	-0.14	-0.11	30%
26	Ecuador	-0.09	-0.09	-0.09	-0.08	-0.08	-0.08	-0.08	-0.08	-4%
27	Mali	-0.08	-0.08	-0.08	-0.08	-0.08	-0.08	-0.08	-0.08	1%
28	Somalia	-0.08	-0.08	-0.08	-0.08	-0.08	-0.08	-0.07	-0.08	-9%
29	Chad	-0.04	-0.04	-0.04	-0.04	-0.13	-0.13	-0.13	-0.08	72%
30	Namibia	-0.07	-0.07	-0.07	-0.07	-0.07	-0.07	-0.08	-0.07	8%
31	Burkina Faso	-0.06	-0.06	-0.06	-0.06	-0.06	-0.06	-0.06	-0.06	0%
32	Benin	-0.07	-0.07	-0.07	-0.05	-0.05	-0.05	-0.05	-0.06	-13%
33	Nicaragua	-0.07	-0.07	-0.07	-0.07	-0.07	0.00	0.00	-0.05	-100%
34	Canada	-0.05	-0.05	-0.05	-0.04	-0.06	-0.05	-0.05	-0.05	4%
35	Guatemala	-0.05	-0.05	-0.05	-0.05	-0.04	-0.04	-0.04	-0.05	-16%
36	Madagascar	-0.07	-0.07	-0.07	-0.04	-0.06	-0.02	-0.01	-0.05	-79%
37	Nepal	-0.09	-0.09	-0.09	-0.05	0.00	0.00	0.00	-0.05	-100%
38	Senegal	-0.05	-0.05	-0.04	-0.05	-0.04	-0.04	-0.04	-0.04	-7%
39	Guinea	-0.04	-0.04	-0.04	-0.04	-0.04	-0.04	-0.03	-0.04	-17%
40	Niger	-0.06	-0.06	-0.06	-0.01	-0.01	-0.01	-0.01	-0.03	-68%
	40 largest	-10.77	-10.77	-10.45	-9.19	-9.09	-6.70	-6.67	-9.14	-27%

Appendix 2 Mass of CO₂ Stored in forests

Appendix 2.1 Top 120 countries in CO₂ stored in living forests.

	CO ₂ storage in living forests Countries	1990 GtCO ₂	1995 GtCO ₂	2000 GtCO ₂	2005 GtCO ₂	2010 GtCO ₂	2015 GtCO ₂	2016 GtCO ₂	Change GtCO ₂	Change %
1	Brazil	235.4	231.1	226.7	221.2	218.6	217.1	216.9	-18.6	-8%
2	Russian Federation	118.5	118.5	117.9	118.1	119.2	120.3	120.5	1.9	2%
3	Republic of the Congo	74.9	74.2	73.5	72.7	72.0	71.3	71.1	-3.8	-5%
4	United States of America	53.0	55.3	57.6	60.1	62.6	63.5	63.7	10.8	20%
5	Canada	52.9	52.9	52.8	51.8	51.3	51.3	51.3	-1.6	-3%
6	Indonesia	63.7	61.5	59.2	55.8	50.8	45.8	44.8	-18.9	-30%
7	Colombia	35.7	34.9	34.2	33.4	32.6	32.5	32.5	-3.2	-9%
8	Peru	32.4	32.2	31.9	31.7	31.4	31.0	31.0	-1.4	-4%
9	Australia	29.3	29.3	29.4	29.2	29.2	29.6	29.6	0.3	1%
10	China	16.4	18.0	19.6	21.3	23.3	24.9	25.2	8.8	54%
11	Papua New Guinea	22.4	22.4	22.4	22.4	22.4	22.4	22.4	0.0	0%
12	Venezuela (Bolivarian R	22.9	22.3	21.8	21.2	21.3	21.0	20.9	-2.0	-9%
13	Tanzania	24.2	23.3	22.5	21.6	20.7	19.9	19.8	-4.4	-18%
14	Guyana	17.8	17.8	17.7	17.7	17.7	17.6	17.6	-0.2	-1%
15	Angola	16.8	16.6	16.4	16.3	16.1	15.9	15.9	-0.9	-5%
16	Bolivia (Plurinational St	17.9	17.5	17.1	16.7	16.3	15.9	15.8	-2.1	-12%
17	Congo	12.8	12.7	12.7	12.6	12.6	12.6	12.6	-0.2	-2%
18	Gabon	10.5	10.5	10.5	10.5	10.5	11.0	11.1	0.6	5%
19	Argentina	12.9	12.6	12.3	12.0	11.5	11.0	11.0	-2.0	-15%
20	Central African Republic	10.8	10.7	10.6	10.6	10.5	10.4	10.4	-0.4	-3%
21	Malaysia	10.3	9.9	9.5	9.0	9.3	10.2	10.4	0.1	1%
22	India	8.2	8.4	8.7	9.6	10.3	9.7	9.6	1.4	18%
23	Cameroon	12.1	11.5	11.0	10.4	9.9	9.3	9.2	-2.8	-23%
24	Zambia	9.5	9.3	9.2	9.0	8.9	8.8	8.8	-0.6	-7%
25	Mexico	7.7	7.6	7.5	7.4	7.3	7.3	7.3	-0.4	-5%
26	Sudan	8.7	8.6	8.4	7.6	7.5	7.2	7.2	-1.6	-18%
27	Suriname	7.1	7.1	7.1	7.1	7.1	7.1	7.1	0.0	-1%
28	Paraguay	9.3	8.9	8.6	8.2	7.6	6.9	6.7	-2.6	-28%
29	Côte d'Ivoire	6.6	6.7	6.7	6.8	6.8	6.7	6.7	0.1	1%
30	French Guiana	6.2	6.1	6.1	6.1	6.1	6.1	6.1	-0.1	-1%
31	Japan	4.2	4.7	5.1	5.3	6.0	6.0	6.0	1.8	42%
32	Mozambique	6.9	6.7	6.5	6.4	6.2	6.0	6.0	-0.9	-13%
33	Madagascar	6.5	6.4	6.2	6.1	6.0	5.9	5.9	-0.6	-10%
34	Myanmar	7.5	7.1	6.7	6.4	6.1	5.7	5.6	-1.9	-25%
35	Chile	4.7	4.8	4.9	4.9	4.9	5.5	5.6	0.8	18%
36	Ecuador	6.4	6.2	6.0	5.8	5.6	5.5	5.4	-1.0	-15%
37	New Zealand	4.6	4.7	4.8	4.9	5.0	5.1	5.1	0.5	12%
38	France	3.5	3.7	3.8	4.3	4.6	5.0	5.1	1.5	44%
39	Germany	3.2	3.5	3.8	4.0	4.1	4.4	4.4	1.2	38%
40	Sweden	3.5	3.6	3.7	4.0	4.0	4.1	4.1	0.6	17%
	Top 40	1018	1010	1001	990	984	978	976	-42	-4%

Appendix 2.1 Continued.

	CO2 storage in living forests Countries	1990	1995	2000	2005	2010	2015	2016	Change GtCO2	Change GtCO2 %
		GtCO2	GtCO2 %							
41	Lao People's Dem. Rep.	4.23	4.19	4.14	4.06	3.98	3.90	3.88	-0.34	-8%
42	Viet Nam	2.85	3.13	3.40	3.53	3.62	3.76	3.79	0.93	33%
43	Thailand	3.33	3.28	3.23	3.22	3.23	3.16	3.15	-0.18	-5%
44	Poland	1.71	1.86	2.00	2.20	2.81	3.01	3.05	1.34	78%
45	Turkey	2.00	2.11	2.22	2.36	2.64	2.96	3.03	1.03	51%
46	South Africa	2.96	2.96	2.96	2.96	2.96	2.96	2.96	0.00	0%
47	Ukraine	2.13	2.13	2.43	2.61	2.78	2.87	2.89	0.76	36%
48	Nigeria	7.39	6.47	5.56	4.83	3.98	3.06	2.88	-4.51	-61%
49	Finland	2.32	2.47	2.62	2.73	2.86	2.86	2.86	0.54	23%
50	Ghana	3.01	2.91	2.80	2.62	2.65	2.61	2.60	-0.40	-13%
51	Philippines	2.35	2.37	2.38	2.32	2.18	2.48	2.54	0.18	8%
52	Romania	1.40	1.40	1.40	1.41	1.43	2.26	2.43	1.02	73%
53	Belarus	1.59	1.59	1.77	1.98	2.24	2.37	2.39	0.80	50%
54	Italy	1.47	1.64	1.82	2.00	2.17	2.35	2.39	0.92	63%
55	Kenya	2.35	2.06	1.77	2.01	2.17	2.32	2.36	0.00	0%
56	Botswana	2.49	2.46	2.43	2.40	2.37	2.33	2.32	-0.17	-7%
57	Spain	1.19	1.43	1.66	1.90	2.07	2.23	2.27	1.08	90%
58	Guinea	2.52	2.46	2.39	2.33	2.27	2.21	2.19	-0.32	-13%
59	Liberia	2.44	2.37	2.29	2.22	2.14	2.14	2.14	-0.30	-12%
60	Panama	2.28	2.24	2.20	2.16	2.12	2.09	2.08	-0.20	-9%
61	Mongolia	2.46	2.38	2.30	2.22	2.14	2.06	2.04	-0.42	-17%
62	South Sudan	1.82	1.82	1.82	1.82	1.82	1.82	1.82	0.00	0%
63	Nepal	2.21	2.06	1.91	1.78	1.78	1.78	1.78	-0.43	-19%
64	Norway	1.22	1.30	1.38	1.50	1.62	1.75	1.77	0.55	45%
65	Zimbabwe	2.56	2.37	2.18	1.99	1.80	1.62	1.59	-0.97	-38%
66	Republic of Korea	0.54	0.71	0.88	1.10	1.34	1.54	1.58	1.04	194%
67	Cambodia	2.23	2.10	1.97	1.82	1.70	1.59	1.56	-0.67	-30%
68	Austria	1.23	1.29	1.35	1.39	1.41	1.43	1.44	0.21	17%
69	Somalia	1.77	1.69	1.61	1.52	1.44	1.38	1.37	-0.40	-23%
70	Czechia	1.65	1.12	1.18	1.24	1.28	1.34	1.36	-0.29	-18%
71	Nicaragua	1.86	1.71	1.57	1.42	1.28	1.28	1.28	-0.58	-31%
72	Senegal	1.38	1.34	1.31	1.28	1.25	1.22	1.22	-0.16	-11%
73	Cuba	0.75	0.93	1.10	1.26	1.08	1.15	1.16	0.41	54%
74	Bhutan	0.98	1.00	1.02	1.04	1.06	1.08	1.08	0.10	10%
75	Latvia	0.77	0.77	0.85	0.88	0.97	1.05	1.06	0.29	38%
76	Honduras	1.90	1.69	1.49	1.35	1.21	1.07	1.04	-0.85	-45%
77	Guatemala	1.34	1.26	1.19	1.11	1.03	0.99	0.99	-0.35	-26%
78	Chad	1.36	1.32	1.28	1.24	1.11	0.99	0.96	-0.40	-29%
79	Croatia	0.75	0.75	0.81	0.87	0.92	0.94	0.94	0.19	25%
80	Costa Rica	0.86	0.83	0.79	0.83	0.87	0.93	0.94	0.08	10%
Top 41-80		81.63	79.94	79.46	79.51	79.77	80.94	81.17	-0.46	-1%
Top 1- 80		1099.5	1089.8	1080.7	1069.7	1063.5	1058.5	1057.5	-42.0	-4%

Appendix 2.1 Continued.

CO2 storage in living forests Countries	1990 GtCO2	1995 GtCO2	2000 GtCO2	2005 GtCO2	2010 GtCO2	2015 GtCO2	2016 GtCO2	Change GtCO2	Change %
81 Benin	1.22	1.14	1.07	1.02	0.96	0.91	0.90	-0.32	-26%
82 Burkina Faso	1.16	1.10	1.05	1.00	0.95	0.91	0.90	-0.26	-22%
83 Morocco	0.74	0.79	0.83	0.88	0.88	0.88	0.89	0.14	19%
84 United Kingdom	0.49	0.56	0.64	0.72	0.79	0.87	0.88	0.40	81%
85 Serbia	0.60	0.60	0.63	0.66	0.86	0.87	0.87	0.27	45%
86 Uruguay	0.35	0.48	0.61	0.68	0.77	0.83	0.84	0.49	139%
87 Ethiopia	1.46	1.00	0.93	0.87	0.80	0.82	0.82	-0.65	-44%
88 Slovakia	0.65	0.65	0.70	0.74	0.77	0.80	0.81	0.16	25%
89 Bulgaria	0.46	0.53	0.59	0.67	0.72	0.78	0.79	0.33	71%
90 Sierra Leone	0.91	0.88	0.85	0.82	0.79	0.76	0.76	-0.15	-16%
91 Namibia	0.93	0.89	0.85	0.81	0.77	0.73	0.72	-0.20	-22%
92 Equatorial Guinea	0.85	0.82	0.80	0.77	0.74	0.72	0.71	-0.14	-16%
93 Solomon Islands	0.70	0.69	0.68	0.68	0.67	0.66	0.66	-0.05	-6%
94 Fiji	0.61	0.61	0.62	0.63	0.63	0.65	0.65	0.05	7%
95 Belize	0.72	0.69	0.67	0.65	0.63	0.62	0.62	-0.10	-14%
96 Lithuania	0.51	0.51	0.53	0.55	0.58	0.61	0.62	0.10	20%
97 Pakistan	1.21	1.10	0.99	0.89	0.78	0.64	0.61	-0.60	-50%
98 Estonia	0.55	0.55	0.58	0.58	0.60	0.61	0.61	0.06	11%
99 Switzerland	0.50	0.51	0.52	0.53	0.55	0.56	0.56	0.06	12%
100 Iran (Islamic Republic of)	0.91	0.91	0.91	0.93	0.95	0.61	0.54	-0.37	-40%
101 People's Rep. of Korea	0.88	0.82	0.76	0.70	0.63	0.56	0.54	-0.33	-38%
102 Dominican Republic	0.29	0.34	0.39	0.43	0.48	0.52	0.53	0.24	83%
103 Slovenia	0.36	0.36	0.39	0.45	0.48	0.52	0.52	0.16	46%
104 Malawi	0.63	0.61	0.58	0.55	0.53	0.51	0.51	-0.12	-20%
105 Kazakhstan	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.00	0%
106 Hungary	0.35	0.37	0.39	0.41	0.43	0.45	0.45	0.10	29%
107 Bosnia and Herzegovina	0.39	0.39	0.43	0.43	0.43	0.43	0.43	0.04	10%
108 Mali	0.55	0.52	0.49	0.46	0.42	0.39	0.38	-0.17	-31%
109 Eritrea	0.40	0.40	0.39	0.39	0.39	0.38	0.38	-0.02	-4%
110 Portugal	0.41	0.41	0.40	0.37	0.38	0.37	0.37	-0.04	-11%
111 Bangladesh	0.31	0.30	0.30	0.30	0.35	0.36	0.37	0.06	19%
112 Guinea-Bissau	0.39	0.38	0.37	0.36	0.35	0.34	0.34	-0.04	-11%
113 Greece	0.25	0.26	0.27	0.28	0.29	0.30	0.30	0.06	23%
114 Vanuatu	0.28	0.28	0.28	0.28	0.28	0.28	0.28	0.00	0%
115 Azerbaijan	0.17	0.17	0.18	0.18	0.22	0.26	0.27	0.10	58%
116 Belgium	0.21	0.23	0.22	0.24	0.25	0.27	0.27	0.06	27%
117 Brunei Darussalam	0.29	0.29	0.28	0.27	0.26	0.26	0.26	-0.03	-10%
118 Sri Lanka	0.31	0.30	0.29	0.28	0.27	0.26	0.26	-0.05	-16%
119 Uganda	0.63	0.57	0.51	0.45	0.37	0.28	0.26	-0.37	-58%
120 Timor-Leste	0.39	0.37	0.35	0.32	0.28	0.25	0.24	-0.14	-37%
Top 81-120	23.50	22.88	22.84	22.71	22.80	22.33	22.23	-1.27	-5%
Top 1-120	1123.0	1112.7	1103.6	1092.5	1086.3	1080.8	1079.7	-43.3	-4%
All Total 1-226	1127.4	1117.0	1107.8	1096.8	1090.7	1085.4	1084.3	-43.1	-4%

Appendix 2.2 Top 40 in CO₂ losses in living forests

	CO2 storage in living forests Countries	1990 GtCO2	1995 GtCO2	2000 GtCO2	2005 GtCO2	2010 GtCO2	2015 GtCO2	2016 GtCO2	Change GtCO2	Change %
1	Indonesia	63.72	61.47	59.22	55.78	50.78	45.79	44.79	-18.93	-30%
2	Brazil	235.44	231.05	226.66	221.21	218.62	217.15	216.85	-18.59	-8%
3	Nigeria	7.39	6.47	5.56	4.83	3.98	3.06	2.88	-4.51	-61%
4	Tanzania	24.21	23.34	22.48	21.61	20.75	19.94	19.78	-4.43	-18%
5	Republic of the Congo	74.92	74.19	73.47	72.74	72.01	71.28	71.14	-3.78	-5%
6	Colombia	35.67	34.94	34.22	33.38	32.58	32.51	32.50	-3.17	-9%
7	Cameroon	12.07	11.52	10.97	10.43	9.89	9.34	9.23	-2.84	-23%
8	Paraguay	9.30	8.94	8.59	8.23	7.59	6.88	6.74	-2.56	-28%
9	Bolivia (Plurinational St)	17.88	17.50	17.11	16.72	16.29	15.87	15.78	-2.10	-12%
10	Argentina	12.94	12.64	12.35	11.95	11.49	11.05	10.96	-1.98	-15%
11	Venezuela (Bolivarian R)	22.86	22.33	21.80	21.25	21.26	20.96	20.90	-1.96	-9%
12	Myanmar	7.48	7.07	6.65	6.36	6.06	5.69	5.61	-1.87	-25%
13	Canada	52.90	52.86	52.83	51.83	51.30	51.27	51.26	-1.64	-3%
14	Sudan	8.75	8.56	8.37	7.62	7.45	7.23	7.19	-1.56	-18%
15	Peru	32.38	32.16	31.95	31.73	31.39	31.04	30.96	-1.42	-4%
16	Zimbabwe	2.56	2.37	2.18	1.99	1.80	1.62	1.59	-0.97	-38%
17	Ecuador	6.39	6.18	5.97	5.80	5.63	5.46	5.43	-0.96	-15%
18	Mozambique	6.89	6.71	6.53	6.35	6.20	6.02	5.98	-0.91	-13%
19	Angola	16.77	16.60	16.42	16.25	16.08	15.91	15.87	-0.90	-5%
20	Honduras	1.90	1.69	1.49	1.35	1.21	1.07	1.04	-0.85	-45%
21	Cambodia	2.23	2.10	1.97	1.82	1.70	1.59	1.56	-0.67	-30%
22	Ethiopia	1.46	1.00	0.93	0.87	0.80	0.82	0.82	-0.65	-44%
23	Madagascar	6.52	6.35	6.19	6.10	5.96	5.89	5.87	-0.65	-10%
24	Zambia	9.46	9.31	9.16	9.01	8.86	8.83	8.82	-0.63	-7%
25	Pakistan	1.21	1.10	0.99	0.89	0.78	0.64	0.61	-0.60	-50%
26	Nicaragua	1.86	1.71	1.57	1.42	1.28	1.28	1.28	-0.58	-31%
27	Nepal	2.21	2.06	1.91	1.78	1.78	1.78	1.78	-0.43	-19%
28	Mongolia	2.46	2.38	2.30	2.22	2.14	2.06	2.04	-0.42	-17%
29	Ghana	3.01	2.91	2.80	2.62	2.65	2.61	2.60	-0.40	-13%
30	Somalia	1.77	1.69	1.61	1.52	1.44	1.38	1.37	-0.40	-23%
31	Chad	1.36	1.32	1.28	1.24	1.11	0.99	0.96	-0.40	-29%
32	Iran (Islamic Republic of)	0.91	0.91	0.91	0.93	0.95	0.61	0.54	-0.37	-40%
33	Uganda	0.63	0.57	0.51	0.45	0.37	0.28	0.26	-0.37	-58%
34	Mexico	7.66	7.57	7.49	7.40	7.34	7.31	7.30	-0.36	-5%
35	Central African Republic	10.77	10.70	10.63	10.56	10.49	10.42	10.41	-0.35	-3%
36	Guatemala	1.34	1.26	1.19	1.11	1.03	0.99	0.99	-0.35	-26%
37	Lao People's Dem. Rep.	4.23	4.19	4.14	4.06	3.98	3.90	3.88	-0.34	-8%
38	People's Rep. of Korea	0.88	0.82	0.76	0.70	0.63	0.56	0.54	-0.33	-38%
39	Guinea	2.52	2.46	2.39	2.33	2.27	2.21	2.19	-0.32	-13%
40	Benin	1.22	1.14	1.07	1.02	0.96	0.91	0.90	-0.32	-26%

CO₂ losses in 72 countries 805.53 ▶ 788.35 ▶ 772.18 ▶ 752.43 ▶ 735.24 ▶ 720.02 ▶ 716.97 ▶ -88.56 ▶ -11%

Appendix 2.3 CO₂ storage increases in 40 countries

CO ₂ storage in living forests		1990	1995	2000	2005	2010	2015	2016	Change	Change
	Countries	GtCO ₂	%							
1	United States of America	52.98	55.29	57.61	60.11	62.58	63.54	63.74	10.76	20%
2	China	16.39	18.01	19.62	21.33	23.32	24.88	25.20	8.81	54%
3	Russian Federation	118.55	118.55	117.91	118.10	119.17	120.27	120.49	1.94	2%
4	Japan	4.25	4.66	5.06	5.29	6.04	6.04	6.04	1.79	42%
5	France	3.54	3.69	3.85	4.27	4.57	5.00	5.09	1.55	44%
6	India	8.15	8.43	8.72	9.59	10.27	9.71	9.59	1.44	18%
7	Poland	1.71	1.86	2.00	2.20	2.81	3.01	3.05	1.34	78%
8	Germany	3.19	3.51	3.82	3.98	4.11	4.36	4.41	1.22	38%
9	Spain	1.19	1.43	1.66	1.90	2.07	2.23	2.27	1.08	90%
10	Republic of Korea	0.54	0.71	0.88	1.10	1.34	1.54	1.58	1.04	194%
11	Turkey	2.00	2.11	2.22	2.36	2.64	2.96	3.03	1.03	51%
12	Romania	1.40	1.40	1.40	1.41	1.43	2.26	2.43	1.02	73%
13	Viet Nam	2.85	3.13	3.40	3.53	3.62	3.76	3.79	0.93	33%
14	Italy	1.47	1.64	1.82	2.00	2.17	2.35	2.39	0.92	63%
15	Chile	4.74	4.81	4.87	4.91	4.94	5.47	5.58	0.83	18%
16	Belarus	1.59	1.59	1.77	1.98	2.24	2.37	2.39	0.80	50%
17	Ukraine	2.13	2.13	2.43	2.61	2.78	2.87	2.89	0.76	36%
18	Sweden	3.48	3.60	3.73	4.00	4.04	4.09	4.09	0.61	17%
19	Gabon	10.50	10.50	10.50	10.50	10.50	10.97	11.07	0.57	5%
20	Norway	1.22	1.30	1.38	1.50	1.62	1.75	1.77	0.55	45%
21	Finland	2.32	2.47	2.62	2.73	2.86	2.86	2.86	0.54	23%
22	New Zealand	4.57	4.69	4.81	4.90	4.99	5.09	5.10	0.54	12%
23	Uruguay	0.35	0.48	0.61	0.68	0.77	0.83	0.84	0.49	139%
24	Cuba	0.75	0.93	1.10	1.26	1.08	1.15	1.16	0.41	54%
25	United Kingdom	0.49	0.56	0.64	0.72	0.79	0.87	0.88	0.40	81%
26	Bulgaria	0.46	0.53	0.59	0.67	0.72	0.78	0.79	0.33	71%
27	Australia	29.31	29.34	29.37	29.17	29.19	29.56	29.63	0.32	1%
28	Latvia	0.77	0.77	0.85	0.88	0.97	1.05	1.06	0.29	38%
29	Serbia	0.60	0.60	0.63	0.66	0.86	0.87	0.87	0.27	45%
30	Dominican Republic	0.29	0.34	0.39	0.43	0.48	0.52	0.53	0.24	83%
31	Austria	1.23	1.29	1.35	1.39	1.41	1.43	1.44	0.21	17%
32	Croatia	0.75	0.75	0.81	0.87	0.92	0.94	0.94	0.19	25%
33	Philippines	2.35	2.37	2.38	2.32	2.18	2.48	2.54	0.18	8%
34	Slovenia	0.36	0.36	0.39	0.45	0.48	0.52	0.52	0.16	46%
35	Slovakia	0.65	0.65	0.70	0.74	0.77	0.80	0.81	0.16	25%
36	Morocco	0.74	0.79	0.83	0.88	0.88	0.88	0.89	0.14	19%
37	Uzbekistan	0.04	0.04	0.05	0.06	0.07	0.15	0.17	0.13	324%
38	Lithuania	0.51	0.51	0.53	0.55	0.58	0.61	0.62	0.10	20%
39	Hungary	0.35	0.37	0.39	0.41	0.43	0.45	0.45	0.10	29%
40	Bhutan	0.98	1.00	1.02	1.04	1.06	1.08	1.08	0.10	10%
CO ₂ losses in 72 countries		805.53	788.35	772.18	752.43	735.24	720.02	716.97	-88.56	-11%
Forest increases 67 countries		311.78	318.91	326.20	334.71	345.63	355.35	357.29	45.51	15%
Net losses		1117.31	1107.26	1098.38	1087.14	1080.87	1075.36	1074.26	-43.05	-4%

Appendix 3 Saw wood Production

Appendix 3.1 Coniferous saw wood production.

	Coniferous sawwood Countries	1990 Mm3	1995 Mm3	2000 Mm3	2005 Mm3	2010 Mm3	2015 Mm3	2016 Mm3	Change Mm3
1	USA	60.84	54.80	61.14	69.19	42.16	53.79	55.63	-5.22
2	Canada	38.54	44.35	49.38	58.47	37.71	45.36	48.16	9.62
3	China	14.78	15.23	3.86	7.51	14.90	33.10	34.38	19.60
4	Russia	22.53	22.53	17.46	21.27	26.41	32.15	34.29	11.76
5	Germany	12.38	12.93	15.02	20.80	21.16	20.43	21.11	8.73
6	Sweden	11.80	14.74	15.97	17.44	16.64	18.07	18.26	6.46
7	Finland	7.42	9.86	13.32	12.19	9.40	10.60	11.37	3.95
8	Austria	7.21	7.55	10.15	10.88	9.45	8.61	9.26	2.04
9	Brazil	2.80	4.87	7.50	8.94	8.97	8.80	8.60	5.80
10	Japan	26.42	23.39	16.48	12.52	9.28	8.30	8.42	-18.00
11	Chile	2.89	3.39	5.40	8.03	6.18	8.21	8.31	5.42
12	France	7.05	6.83	7.57	7.75	6.89	6.22	6.41	-0.64
13	Turkey	3.35	2.50	3.12	3.79	3.98	5.10	5.82	2.47
14	Australia	1.41	2.12	2.62	3.46	4.20	4.46	4.43	3.02
15	Poland	3.40	3.07	3.53	2.81	3.77	4.32	4.36	0.96
16	Romania	1.36	0.88	2.08	2.58	2.71	4.60	4.34	2.98
17	New Zealand	2.16	2.93	3.90	4.26	4.07	4.02	4.23	2.07
18	Czechia	3.22	3.22	3.78	3.73	4.49	3.92	3.83	0.61
19	United Kingdom	1.94	2.11	2.51	2.73	3.05	3.45	3.62	1.69
20	Latvia	0.95	0.95	3.32	3.22	2.60	2.81	3.21	2.26
21	Norway	2.40	2.21	2.27	2.30	2.12	2.44	2.53	0.13
22	Belarus	0.88	0.94	1.21	2.17	2.30	2.60	2.52	1.64
23	Ukraine	1.60	1.60	1.17	1.74	1.29	2.20	2.50	0.90
24	Mexico	2.03	2.21	2.90	2.22	2.14	2.26	2.40	0.37
25	Republic of Korea	2.88	3.05	4.04	4.20	2.02	2.30	2.18	-0.70
26	India	2.50	2.50	1.10	9.90	2.00	2.00	2.00	-0.50
27	South Africa	1.73	1.44	1.40	2.01	1.58	1.82	1.98	0.25
28	Spain	2.70	2.51	2.80	2.75	1.48	1.42	1.82	-0.88
29	Argentina	0.13	0.63	0.69	1.08	0.76	1.63	1.63	1.50
30	Estonia	0.32	0.32	1.35	1.91	1.64	1.62	1.58	1.27
31	Belgium-Luxembourg	0.93	0.88	0.95	1.08	1.14	1.50	1.40	0.47
32	Slovakia	0.43	0.43	0.85	1.98	1.78	1.15	1.20	0.77
33	Switzerland	1.78	1.34	1.43	1.50	1.40	1.09	1.07	-0.71
34	Portugal	1.75	1.25	1.02	0.91	0.93	1.10	1.05	-0.70
35	Ireland	0.38	0.66	0.89	1.01	0.77	0.90	0.99	0.61
36	Italy	0.88	0.80	0.73	0.79	0.70	0.92	0.95	0.08
37	Lithuania	0.87	0.87	1.00	1.03	0.82	0.78	0.93	0.06
38	Bosnia and Herzegovin.	0.45	0.45	0.45	0.62	0.51	0.71	0.75	0.30
39	Bulgaria	0.86	0.19	0.26	0.43	0.44	0.78	0.71	-0.15
40	Venezuela (Bolivarian I)	0.02	0.02	0.03	0.37	0.67	0.67	0.67	0.65
	Total 1-40	257.95	262.50	274.63	321.56	264.52	316.22	328.88	70.93

Appendix 3.1 Continues

	Confenous sawwood Countries	1990 Mm3	1995 Mm3	2000 Mm3	2005 Mm3	2010 Mm3	2015 Mm3	2016 Mm3	Change Mm3
41	Slovenia	0.34	0.34	0.30	0.39	0.63	0.63	0.63	0.28
42	Pakistan	0.31	0.49	0.42	0.43	0.46	0.46	0.46	0.15
43	Afghanistan	0.38	0.38	0.38	0.38	0.38	0.38	0.38	0.00
44	Denmark	0.46	0.34	0.33	0.18	0.24	0.31	0.32	-0.14
45	Kenya	0.18	0.18	0.18	0.12	0.12	0.27	0.27	0.08
46	Honduras	0.33	0.23	0.44	0.40	0.23	0.30	0.25	-0.07
47	Uruguay	0.08	0.08	0.10	0.09	0.13	0.21	0.23	0.15
48	Croatia	0.10	0.10	0.10	0.08	0.09	0.27	0.22	0.12
49	Kazakhstan	0.23	0.23	0.23	0.11	0.10	0.21	0.21	-0.02
50	Democratic People's Re	0.19	0.19	0.19	0.19	0.19	0.19	0.19	0.00
51	Zimbabwe	0.17	0.36	0.34	0.27	0.16	0.18	0.18	0.02
52	Montenegro	0.05	0.05	0.05	0.05	0.05	0.18	0.17	0.12
53	Serbia and Montenegro	0.16	0.16	0.11	0.15	0.15	0.14	0.15	-0.01
54	Zambia	0.05	0.30	0.15	0.15	0.15	0.15	0.15	0.09
55	Hungary	0.33	0.08	0.08	0.08	0.01	0.17	0.14	-0.19
56	Uganda	0.01	0.05	0.07	0.02	0.02	0.13	0.13	0.12
57	Kyrgyzstan	0.00	0.00	0.00	0.01	0.04	0.12	0.13	0.13
58	Netherlands	0.18	0.20	0.25	0.18	0.15	0.13	0.13	-0.05
59	Colombia	0.24	0.24	0.02	0.10	0.17	0.11	0.10	-0.14
60	Eswatini	0.08	0.09	0.10	0.10	0.10	0.10	0.10	0.03
61	Cuba	0.06	0.06	0.10	0.13	0.13	0.12	0.10	0.04
62	Myanmar	0.04	0.04	0.00	0.06	0.08	0.08	0.08	0.04
63	Fiji	0.04	0.04	0.03	0.04	0.07	0.07	0.07	0.02
64	Greece	0.19	0.21	0.07	0.07	0.07	0.06	0.06	-0.12
65	Rwanda	0.01	0.02	0.02	0.02	0.05	0.05	0.05	0.04
66	Morocco	0.04	0.04	0.04	0.04	0.04	0.04	0.04	0.00
67	Georgia	0.00	0.00	0.00	0.01	0.03	0.03	0.04	0.04
68	Luxembourg	0.11	0.11	0.11	0.11	0.04	0.04	0.04	-0.07
69	Guatemala	0.03	0.26	0.18	0.25	0.04	0.04	0.04	0.01
70	Malawi	0.03	0.03	0.03	0.03	0.03	0.04	0.04	0.01
71	China, Taiwan Province	0.27	0.03	0.02	0.02	0.01	0.03	0.03	-0.24
72	Nicaragua	0.03	0.04	0.10	0.02	0.03	0.03	0.03	-0.01
73	Tunisia	0.02	0.01	0.01	0.01	0.01	0.02	0.02	0.01
74	Madagascar	0.00	0.02	0.00	0.01	0.04	0.05	0.02	0.02
75	Cameroon	0.01	0.01	0.01	0.01	0.01	0.02	0.02	0.01
76	Mongolia	0.51	0.06	0.30	0.30	0.30	0.02	0.02	-0.49
77	Burundi	0.00	0.02	0.02	0.02	0.02	0.02	0.02	0.02
78	Malaysia	0.07	0.15	0.00	0.02	0.02	0.02	0.02	-0.05
79	Nepal	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.00
80	Papua New Guinea	0.04	0.04	0.00	0.01	0.01	0.02	0.02	-0.02
	Total 41-80	5.38	5.31	4.88	4.67	4.60	5.43	5.31	-0.07
	Total 1-80	263.33	267.82	279.51	326.23	269.13	321.65	334.19	70.87
	Total 1-116	264.63	268.86	279.84	326.54	269.40	321.82	334.35	69.72

Appendix 3.2

Non-Conif. Saw wood Country	1990 Mm3	1995 Mm3	2000 Mm3	2005 Mm3	2010 Mm3	2015 Mm3	2016 Mm3	Change Mm3
1 China	8.53	10.01	2.80	10.43	22.32	41.22	42.81	34.27
2 United St. of America	25.30	29.34	29.93	27.83	17.85	22.57	22.54	-2.76
3 Viet Nam	0.79	1.61	2.95	3.23	5.80	6.00	6.00	5.21
4 Brazil	10.93	13.23	13.80	14.62	8.48	6.00	6.00	-4.93
5 India	14.96	14.96	6.80	4.89	4.89	4.89	4.89	-10.07
6 Indonesia	9.01	6.50	6.50	4.33	4.17	4.17	4.17	-4.84
7 Thailand	1.17	0.40	0.20	2.85	2.85	2.85	3.70	2.53
8 Malaysia	8.78	8.23	5.59	5.17	4.30	3.50	3.40	-5.38
9 Turkey	1.57	1.83	2.41	2.66	2.26	2.67	2.68	1.11
10 Russian Federation	3.98	3.98	2.54	2.65	2.46	2.35	2.51	-1.47
11 Nigeria	2.72	2.36	2.00	2.00	2.00	2.00	2.00	-0.72
12 Romania	1.55	0.90	1.32	1.74	1.61	1.70	1.70	0.15
13 Canada	1.20	1.09	1.08	1.72	0.96	1.75	1.56	0.36
14 Myanmar	0.30	0.31	0.55	1.53	1.53	1.53	1.53	1.23
15 Argentina	0.82	0.70	0.72	0.66	1.40	1.50	1.50	0.68
16 France	3.91	3.02	2.97	1.97	1.42	1.29	1.49	-2.42
17 Croatia	0.48	0.48	0.55	0.54	0.58	1.22	1.21	0.74
18 Germany	2.34	1.18	1.32	1.13	0.90	1.06	1.09	-1.25
19 Cameroon	0.59	0.68	1.15	0.66	0.91	1.00	1.00	0.41
20 Pakistan	1.14	0.78	0.67	0.86	0.92	0.92	0.92	-0.22
21 Japan	3.36	1.10	0.62	0.31	0.14	0.93	0.87	-2.49
22 Lao People's Democrati	0.10	0.29	0.20	0.13	0.35	0.75	0.75	0.65
23 Latvia	0.35	0.35	0.58	1.00	0.55	0.67	0.70	0.35
24 Australia	1.75	1.57	1.47	1.23	0.88	0.63	0.67	-1.07
25 Gabon	0.04	0.10	0.09	0.23	0.35	0.65	0.65	0.61
26 Nepal	0.55	0.60	0.61	0.61	0.61	0.61	0.61	0.06
27 Poland	0.73	0.78	0.73	0.55	0.46	0.52	0.59	-0.14
28 Italy	1.08	1.05	0.90	0.80	0.50	0.55	0.55	-0.53
29 Paraguay	0.23	0.40	0.55	0.55	0.55	0.55	0.55	0.32
30 Ukraine	1.31	1.31	0.96	0.67	0.45	0.50	0.55	-0.76
31 Peru	0.49	0.63	0.64	0.74	0.63	0.58	0.53	0.03
32 Ghana	0.47	0.56	0.48	0.52	0.50	0.52	0.52	0.05
33 Ecuador	1.64	1.36	0.59	0.66	0.40	0.50	0.50	-1.14
34 Lithuania	0.08	0.08	0.30	0.42	0.45	0.47	0.48	0.40
35 Bolivia (Plurinational St	0.10	0.15	0.24	0.41	0.46	0.46	0.46	0.36
36 Costa Rica	0.40	0.77	0.37	0.48	0.54	0.46	0.46	0.06
37 Philippines	0.84	0.29	0.15	0.29	0.70	0.32	0.42	-0.42
38 Mexico	0.34	0.12	0.21	0.45	0.30	0.30	0.42	0.08
39 Serbia and Montenegro	0.15	0.15	0.40	0.34	0.44	0.37	0.40	0.25
40 Bangladesh	0.08	0.07	0.07	0.39	0.39	0.39	0.39	0.31
Top 1-40	114.14	113.30	96.00	102.24	97.23	120.91	123.76	9.62

Appendix 3.2 Continued

Non-Conif. Saw wood Country	1990 Mm3	1995 Mm3	2000 Mm3	2005 Mm3	2010 Mm3	2015 Mm3	2016 Mm3	Change Mm3
41 Slovakia	0.22	0.22	0.42	0.64	0.80	0.45	0.38	0.16
42 Mozambique	0.02	0.03	0.03	0.03	0.19	0.40	0.38	0.36
43 Hungary	0.77	0.15	0.21	0.13	0.15	0.32	0.38	-0.39
44 Côte d'Ivoire	0.75	0.70	0.60	0.36	0.70	0.87	0.37	-0.38
45 Bosnia and Herzegovina	0.02	0.02	0.27	0.70	0.31	0.35	0.36	0.34
46 Congo	0.05	0.06	0.09	0.22	0.18	0.37	0.36	0.31
47 Colombia	0.57	0.40	0.57	0.31	0.53	0.34	0.32	-0.25
48 Spain	0.57	0.76	0.96	0.91	0.56	0.27	0.32	-0.25
49 Uganda	0.02	0.15	0.20	0.10	0.09	0.31	0.31	0.29
50 Belgium-Luxembourg	0.26	0.27	0.20	0.21	0.24	0.30	0.30	0.04
51 Venezuela (Bolivarian F	0.18	0.20	0.18	0.19	0.28	0.28	0.28	0.10
52 Cambodia	0.07	0.14	0.02	0.07	0.10	0.45	0.25	0.18
53 Czechoslovakia	0.68	0.27	0.32	0.27	0.25	0.23	0.23	-0.45
54 Belarus	0.61	0.61	0.60	0.57	0.27	0.28	0.23	-0.38
55 Uruguay	0.15	0.19	0.10	0.18	0.22	0.28	0.21	0.06
56 Guatemala	0.01	0.09	0.16	0.10	0.09	0.21	0.21	0.20
57 Papua New Guinea	0.07	0.18	0.04	0.05	0.08	0.06	0.20	0.13
58 South Africa	0.20	0.14	0.10	0.20	0.30	0.15	0.16	-0.05
59 Austria	0.30	0.25	0.24	0.19	0.16	0.13	0.15	-0.14
60 Democratic Republic of	0.12	0.07	0.04	0.08	0.15	0.15	0.15	0.03
61 Chile	0.44	0.41	0.30	0.27	0.17	0.16	0.15	-0.29
62 Benin	0.01	0.02	0.01	0.03	0.08	0.13	0.13	0.12
63 Mali	0.01	0.01	0.01	0.01	0.01	0.13	0.13	0.12
64 Suriname	0.04	0.03	0.06	0.07	0.08	0.15	0.12	0.08
65 Estonia	0.04	0.04	0.09	0.15	0.13	0.15	0.12	0.09
66 Bulgaria	0.25	0.07	0.05	0.14	0.12	0.16	0.11	-0.13
67 Republic of Korea	1.01	0.39	0.50	0.17	0.12	0.12	0.11	-0.90
68 Slovenia	0.17	0.17	0.14	0.14	0.14	0.10	0.11	-0.06
69 Sweden	0.22	0.21	0.21	0.16	0.12	0.10	0.10	-0.12
70 Democratic People's Re	0.10	0.10	0.10	0.10	0.10	0.10	0.10	0.00
71 Rwanda	0.03	0.04	0.06	0.06	0.09	0.09	0.09	0.06
72 Switzerland	0.20	0.14	0.20	0.09	0.06	0.08	0.08	-0.12
73 Denmark	0.41	0.25	0.04	0.02	0.21	0.07	0.07	-0.34
74 Fiji	0.05	0.06	0.04	0.09	0.07	0.07	0.07	0.01
75 Malawi	0.02	0.02	0.02	0.02	0.07	0.07	0.07	0.05
76 Jamaica	0.04	0.06	0.06	0.06	0.06	0.06	0.06	0.02
77 Liberia	0.09	0.09	0.01	0.05	0.08	0.06	0.06	-0.02
78 Netherlands	0.28	0.23	0.14	0.10	0.08	0.06	0.06	-0.22
79 Georgia	0.04	0.04	0.04	0.22	0.04	0.05	0.06	0.02
80 Central African Republi	0.06	0.07	0.10	0.07	0.05	0.07	0.05	-0.01
Top 41-80	9.14	7.28	7.53	7.52	7.49	8.13	7.37	-1.77
Top 1-80	123.28	120.58	103.53	109.76	104.72	129.04	131.13	7.85
All 154	126.07	122.82	105.50	111.35	106.23	130.30	132.37	6.30

Appendix 3.3 Saw wood production

	Saw wood Countries	1990 Mm3	1995 Mm3	2000 Mm3	2005 Mm3	2010 Mm3	2015 Mm3	2016 Mm3	Change Mm3
1	United States of A	86.14	84.14	91.08	97.02	60.01	76.36	78.17	-7.98
2	China	23.58	25.27	6.68	17.96	37.23	74.36	77.21	53.63
3	Canada	39.74	45.44	50.46	60.19	38.67	47.11	49.72	9.98
4	Russian Federatio	26.50	26.50	20.00	23.91	28.87	34.50	36.79	10.29
5	Germany	14.72	14.11	16.34	21.93	22.06	21.49	22.20	7.47
6	Sweden	12.02	14.94	16.18	17.60	16.76	18.17	18.36	6.34
7	Brazil	13.73	18.10	21.30	23.56	17.45	14.80	14.60	0.87
8	Finland	7.50	9.94	13.42	12.27	9.47	10.64	11.42	3.92
9	Austria	7.51	7.80	10.39	11.07	9.60	8.73	9.41	1.90
10	Japan	29.78	24.49	17.09	12.83	9.42	9.23	9.29	-20.49
11	Turkey	4.92	4.33	5.53	6.45	6.24	7.77	8.50	3.58
12	Chile	3.33	3.80	5.70	8.30	6.35	8.37	8.46	5.13
13	France	10.96	9.85	10.54	9.72	8.32	7.51	7.89	-3.07
14	India	17.46	17.46	7.90	14.79	6.89	6.89	6.89	-10.57
15	Romania	2.91	1.78	3.40	4.32	4.32	6.30	6.04	3.13
16	Viet Nam	0.90	1.61	2.95	3.23	5.80	6.00	6.00	5.10
17	Australia	3.15	3.69	4.09	4.69	5.08	5.08	5.10	1.95
18	Poland	4.13	3.84	4.26	3.36	4.22	4.84	4.94	0.82
19	New Zealand	2.20	2.95	3.91	4.27	4.08	4.03	4.24	2.04
20	Indonesia	9.15	6.64	6.50	4.33	4.17	4.17	4.17	-4.98
21	Czechia	3.90	3.49	4.11	4.00	4.74	4.15	4.06	0.16
22	Latvia	1.30	1.30	3.90	4.23	3.15	3.48	3.90	2.60
23	Thailand	1.19	0.43	0.22	2.87	2.85	2.85	3.70	2.51
24	United Kingdom	2.27	2.30	2.62	2.78	3.10	3.49	3.67	1.40
25	Malaysia	8.85	8.38	5.59	5.19	4.32	3.52	3.42	-5.43
26	Ukraine	2.92	2.92	2.13	2.42	1.74	2.70	3.05	0.13
27	Mexico	2.37	2.33	3.11	2.67	2.43	2.55	2.82	0.46
28	Belarus	1.49	1.55	1.81	2.74	2.57	2.88	2.75	1.26
29	Norway	2.41	2.21	2.28	2.33	2.12	2.44	2.53	0.12
30	Republic of Korea	3.90	3.44	4.54	4.37	2.15	2.42	2.29	-1.60
31	Spain	3.27	3.26	3.76	3.66	2.04	1.69	2.14	-1.13
32	South Africa	1.94	1.57	1.50	2.22	1.88	1.97	2.14	0.20
33	Nigeria	2.73	2.36	2.00	2.00	2.00	2.00	2.00	-0.73
34	Estonia	0.35	0.35	1.44	2.06	1.77	1.77	1.70	1.35
35	Belgium-Luxembc	1.19	1.15	1.15	1.29	1.38	1.80	1.70	0.51
36	Angola	0.14	0.63	0.69	1.08	0.77	1.64	1.64	1.51
37	Myanmar	0.33	0.35	0.55	1.59	1.61	1.61	1.61	1.28
38	Slovakia	0.65	0.65	1.27	2.62	2.58	1.60	1.58	0.93
39	Argentina	0.82	0.70	0.72	0.66	1.40	1.50	1.50	0.68
40	Italy	1.95	1.85	1.63	1.59	1.20	1.47	1.50	-0.45
Top 1-40		364.29	367.89	362.71	414.15	350.80	423.89	439.12	74.84

Appendix 3.3 Continued

	Saw wood Countries	1990 Mm3	1995 Mm3	2000 Mm3	2005 Mm3	2010 Mm3	2015 Mm3	2016 Mm3	Change Mm3
41	Croatia	0.58	0.58	0.64	0.62	0.68	1.49	1.43	0.86
42	Lithuania	0.94	0.94	1.30	1.45	1.27	1.25	1.41	0.47
43	Pakistan	1.45	1.27	1.09	1.29	1.38	1.38	1.38	-0.07
44	Switzerland	1.99	1.48	1.63	1.59	1.46	1.16	1.15	-0.83
45	Bosnia and Herzeg	0.47	0.47	0.72	1.32	0.82	1.06	1.11	0.64
46	Portugal	2.09	1.73	1.43	1.01	1.04	1.13	1.09	-1.00
47	Cameroon	0.60	0.69	1.16	0.67	0.92	1.02	1.02	0.42
48	Ireland	0.39	0.68	0.89	1.02	0.77	0.91	0.99	0.60
49	Venezuela (Bolivare	0.20	0.22	0.20	0.56	0.95	0.95	0.95	0.75
50	Bulgaria	1.11	0.25	0.31	0.57	0.55	0.94	0.83	-0.28
51	Lao People's Dem	0.37	0.56	0.20	0.13	0.35	0.75	0.75	0.38
52	Slovenia	0.51	0.51	0.44	0.53	0.76	0.73	0.73	0.22
53	Gabon	0.04	0.10	0.09	0.23	0.35	0.65	0.65	0.61
54	Nepal	0.57	0.62	0.63	0.63	0.63	0.63	0.63	0.06
55	Paraguay	0.23	0.40	0.55	0.55	0.55	0.55	0.55	0.32
56	Serbia and Monte	0.30	0.30	0.50	0.50	0.59	0.51	0.54	0.24
57	Ghana	0.53	0.61	0.48	0.53	0.51	0.53	0.53	0.01
58	Peru	0.50	0.63	0.65	0.74	0.63	0.58	0.53	0.03
59	Hungary	1.10	0.23	0.29	0.22	0.16	0.49	0.52	-0.58
60	Ecuador	1.98	1.70	0.72	0.76	0.52	0.51	0.51	-1.47
61	Bolivia (Plurinatio	0.10	0.16	0.24	0.41	0.47	0.47	0.47	0.36
62	Costa Rica	0.41	0.78	0.37	0.48	0.54	0.46	0.46	0.04
63	Uganda	0.03	0.20	0.26	0.13	0.12	0.44	0.44	0.41
64	Uruguay	0.23	0.27	0.20	0.27	0.35	0.49	0.43	0.21
65	Colombia	0.81	0.64	0.59	0.41	0.69	0.45	0.43	-0.39
66	Philippines	0.85	0.29	0.15	0.29	0.70	0.32	0.42	-0.42
67	Afghanistan	0.40	0.40	0.40	0.40	0.40	0.40	0.40	0.00
68	Bangladesh	0.08	0.07	0.07	0.39	0.39	0.39	0.39	0.31
69	Denmark	0.86	0.58	0.36	0.20	0.45	0.38	0.39	-0.47
70	Mozambique	0.03	0.04	0.03	0.04	0.20	0.40	0.39	0.36
71	Côte d'Ivoire	0.75	0.70	0.60	0.36	0.70	0.87	0.37	-0.38
72	Congo	0.05	0.06	0.09	0.22	0.18	0.37	0.36	0.31
73	Kenya	0.19	0.19	0.19	0.14	0.14	0.30	0.30	0.11
74	Democratic Peopl	0.28	0.28	0.28	0.28	0.28	0.28	0.28	0.00
75	Honduras	0.33	0.23	0.44	0.41	0.23	0.30	0.26	-0.07
76	Cambodia	0.07	0.14	0.02	0.07	0.10	0.45	0.25	0.18
77	Guatemala	0.04	0.36	0.34	0.35	0.13	0.25	0.25	0.21
78	Kazakhstan	0.24	0.24	0.24	0.14	0.11	0.23	0.23	-0.01
79	Montenegro	0.05	0.05	0.05	0.05	0.05	0.22	0.22	0.17
80	Papua New Guine	0.12	0.22	0.04	0.06	0.09	0.08	0.22	0.10
Top 41-80		21.85	19.87	18.88	19.98	21.21	24.75	24.25	2.40
Top 1- 80		386.14	387.76	381.59	434.13	372.01	448.64	463.37	77.23
Top 1- 156		390.70	391.68	385.35	437.89	375.63	452.12	466.72	76.02

Appendix 4 Charcoal production

Appendix 4.1 charcoal production from wood

	Area	1990	1995	2000	2005	2010	2015	2018
1	Brazil	4631	7771	6350	7301	4951	6183	6397
2	Nigeria	2132	2647	3085	3510	3940	4371	4595
3	Ethiopia	2183	2555	2908	3304	3734	4220	4518
4	India	1507	1617	1661	2880	2880	2880	2880
5	DR of the Congo	791	1200	1431	1704	2025	2400	2631
6	Ghana	533	816	1039	1300	1596	1888	2058
7	Tanzania	821	1005	1165	1372	1609	1872	2034
8	China	1930	1846	1797	1764	1725	1678	1637
9	Madagascar	343	562	645	910	1195	1560	1560
10	Thailand	1065	1122	1203	1278	1360	1449	1500
11	Egypt	1018	1126	1201	1282	1360	1423	1456
12	Somalia	400	510	651	863	1132	1181	1316
13	Zambia	924	1041	810	985	1198	1296	1296
14	Kenya	463	545	641	776	937	1119	1237
15	Uganda	561	643	713	814	931	1066	1146
16	United States of America	500	747	925	940	1070	982	852
17	Algeria	385	472	547	619	682	730	753
18	Niger	280	355	424	500	588	688	750
19	Burkina Faso	325	389	112	510	586	673	724
20	Indonesia	126	211	735	681	664	664	664
21	Malawi	344	359	392	436	490	553	591
22	Sudan	579	647	743	879	1026	588	588
23	Côte d'Ivoire	274	349	327	420	470	517	538
24	Cameroon	216	289	21	381	429	477	504
25	Chad	230	266	311	355	403	457	491
26	Sierra Leone	192	222	297	336	382	432	462
27	Paraguay	120	386	409	234	480	430	430
28	Viet Nam	110	127	108	109	115	414	414
29	Guinea	192	22	277	311	348	388	412
30	Argentina	294	150	258	347	380	420	397
31	Angola	130	172	205	247	293	348	381
32	Myanmar	117	55	23	75	348	321	372
33	Philippines	4	72	41	215	359	426	348
34	Bangladesh	255	273	290	308	324	336	339
35	Mali	67	81	96	113	133	275	334
36	Liberia	101	84	153	192	235	282	312
37	Senegal	150	75	110	110	300	300	300
38	South Africa	13	26	41	189	189	189	296
39	South Sudan	0	0	0	0	0	272	289
40	Togo	124	220	281	300	228	258	276
	Top 40	24430	31055	32426	38850	41095	46006	48078

Appendix 4.1 Continued

	Area	1990	1995	2000	2005	2010	2015	2018
41	Burundi	171	209	60	60	60	264	264
42	Mozambique	100	100	100	100	100	263	263
43	Chile	249	248	253	251	248	245	242
44	Mauritania	87	108	131	158	186	212	227
45	Central African	0	0	21	21	192	210	221
46	Tunisia	163	183	195	206	213	204	204
47	Ukraine	0	0	9	46	120	130	185
48	Namibia	35	41	72	102	142	161	183
49	DR of Korea	103	126	141	150	157	163	167
50	Colombia	477	521	329	496	1039	475	160
51	Poland	80	27	27	90	63	110	160
52	Eritrea	0	117	146	163	137	142	142
53	Afghanistan	39	57	81	97	112	130	141
54	Cuba	19	22	62	61	68	120	120
55	Uruguay	115	116	117	118	118	118	118
56	Morocco	72	100	90	99	106	113	117
57	Libya	58	77	89	97	104	111	114
58	Lesotho	63	70	78	87	97	106	111
59	Mexico	144	27	135	384	76	91	106
60	Lao People's D	0	0	0	0	35	93	93
61	Nepal	50	56	63	70	78	85	89
62	Pakistan	57	110	55	64	72	82	87
63	Ecuador	173	68	109	96	83	44	86
64	Guinea-Bissau	38	43	51	57	64	72	77
65	Botswana	34	48	59	67	72	75	75
66	Gambia	31	41	47	53	59	66	69
67	Russian Federa	0	46	60	70	76	52	60
68	Albania	0	0	9	55	60	60	60
69	Djibouti	26	33	39	43	48	52	54
70	Eswatini	19	24	30	36	43	49	52
71	Spain	65	65	0	0	40	36	50
72	Saudi Arabia	3	8	29	35	41	46	50
73	Benin	134	160	183	210	242	49	49
74	Jordan	14	19	29	34	40	46	49
75	Comoros	20	25	29	34	40	45	49
76	Rwanda	205	163	48	48	48	48	48
77	France	69	79	60	51	51	35	40
78	Cambodia	25	36	31	33	35	37	38
79	Haiti	17	23	26	29	32	35	37
80	Bolivia (Plurina	117	138	22	36	36	36	36
	Total 41-80	3072	3334	3115	3907	4633	4511	4493
	Top 40	24430	31055	32426	38850	41095	46006	48078
	Total 1-80	27502	34389	35541	42757	45728	50517	52571

Appendix 4.1 Continued

	Area	1990	1995	2000	2005	2010	2015	2018
81	Peru	413	436	473	499	103	20	31
82	Bosnia and Herzegovina	0	0	0	25	17	86	30
83	Germany	0	0	0	0	2	2	30
84	Malaysia	0	48	26	28	29	29	29
85	Serbia	0	1	1	3	34	22	26
86	Venezuela (Bolivia)	24	10	7	7	7	5	25
87	Yemen	18	28	35	44	54	66	25
88	Guyana	1	2	21	22	23	24	25
89	Australia	6	25	35	24	23	23	24
90	Gabon	10	13	15	18	20	22	23
91	El Salvador	15	17	19	20	21	23	23
92	Iraq	23	23	23	23	23	23	23
93	Honduras	15	18	3	3	28	21	21
94	Dominican Republic	70	70	70	14	19	19	19
95	Mongolia	10	12	13	15	16	17	17
96	Japan	109	135	56	35	25	18	15
97	Reunion	14	13	14	15	15	15	15
98	Nicaragua	14	17	21	24	7	13	13
99	Costa Rica	7	8	9	10	11	12	13
100	Latvia	0	1	11	10	9	11	12
101	Zimbabwe	2	11	11	9	11	12	12
102	Guatemala	13	89	17	5	22	25	12
103	Equatorial Guinea	6	7	7	8	9	10	11
104	Jamaica	7	8	8	9	10	10	11
105	Italy	46	34	11	10	10	10	10
106	Sao Tome and Principe	5	6	7	8	9	10	10
107	French Guiana	2	3	4	5	7	9	10
108	Republic of Korea	1	1	32	10	11	9	9
109	Portugal	16	16	23	19	19	9	9
110	Croatia	0	7	4	3	3	8	9
111	Suriname	6	7	6	7	8	8	8
112	Oman	2	2	4	5	6	7	7
113	Bhutan	5	5	6	6	7	7	7
114	Papua New Guinea	4	4	5	6	6	7	7
115	Czechia	0	1	0	6	7	6	6
116	Belarus	0	0	1	1	5	5	5
117	Congo	3	2	1	3	4	5	5
118	Panama	4	4	8	5	5	5	5
119	Azerbaijan	0	0	0	0	0	5	5
120	United Kingdom	0	4	5	5	5	5	5
	Top 81-120	871	1088	1012	969	650	643	602
	Top 1-80	27502	34389	35541	42757	45728	50517	52571
	Top 1-120	28373	35477	36553	43726	46378	51160	53173

Appendix 4.1 Continued

Area	1990	1995	2000	2005	2010	2015	2018
121 Singapore	33	31	6	6	5	5	5
122 Slovakia	0	3	5	48	3	4	4
123 Kuwait	0	0	2	3	3	3	3
124 Lebanon	8	11	11	11	3	3	3
125 United Arab Emir	2	2	2	2	3	3	3
126 Syrian Arab Repu	1	1	4	3	3	3	3
127 Fiji	2	2	2	2	2	2	2
128 Bulgaria	20	20	8	24	17	5	2
129 Guadeloupe	2	2	2	2	2	2	2
130 Montenegro	0	0	0	0	2	2	2
131 Greece	0	2	12	3	3	2	2
132 Trinidad and Tob.	2	2	2	2	2	2	2
133 Sri Lanka	1	22	1	1	2	2	2
134 Martinique	1	1	2	2	2	2	2
135 Cyprus	1	0	3	3	1	2	2
136 Solomon Islands	1	1	1	1	1	1	1
137 Austria	0	0	0	0	1	1	1
138 Bahrain	0	0	1	1	1	1	1
139 Bahamas	1	1	1	1	1	1	1
140 China, Macao SAI	0	0	0	0	1	1	1
141 Romania	38	48	27	26	9	6	1
142 Estonia	0	0	1	5	3	1	1
143 Slovenia	0	0	0	0	0	1	1
144 Sweden	18	25	3	1	1	1	1
145 Cabo Verde	13	16	20	1	1	1	1
146 Maldives	0	0	1	1	1	1	1
147 Belize	1	1	1	1	1	1	1
148 Turkey	0	0	0	0	0	0	1
149 Qatar	0	0	1	1	1	1	1
150 Lithuania	0	0	0	1	1	1	1
151 Vanuatu	0	0	0	0	1	1	1
152 New Caledonia	0	0	0	1	1	1	1
153 Samoa	0	0	0	0	0	1	1
154 French Polynesia	0	0	0	0	0	1	1
155 Kazakhstan	0	0	0	0	0	0	0
156 Republic of Mold	0	0	0	0	0	0	0
157 Kiribati	0	0	0	0	0	0	0
158 Micronesia (Fede	0	0	0	0	0	0	0
159 Saint Vincent and	0	0	0	0	0	0	0
160 Saint Lucia	0	0	0	0	0	0	0
Top 121-160	145	191	119	153	78	65	58
Top 1-120	28373	35477	36553	43726	46378	51160	53173
Top 1-160	28518	35668	36672	43879	46456	51225	53231

Appendix 5 Fuelwood production

Appendix 5.1 Fuel wood non-coniferous (million m³)

Area	1990	1995	2000	2005	2010	2015	2018
1 India	267.9	279.9	269.0	296.3	300.0	297.4	294.2
2 Brazil	108.3	114.0	119.2	106.2	99.0	108.4	120.0
3 Ethiopia	68.4	74.6	81.4	87.9	94.2	100.6	104.1
4 China	171.0	149.2	135.5	123.4	112.4	102.7	97.0
5 DR of the Congo	0.2	0.3	0.3	0.3	0.5	82.5	85.6
6 Nigeria	50.9	56.8	59.4	61.3	63.2	65.3	66.2
7 United St. of Ameri	66.5	49.3	37.2	35.6	32.5	35.9	55.5
8 Ghana	12.9	22.2	26.7	31.9	37.8	44.0	47.6
9 Uganda	29.3	32.2	34.1	36.8	39.6	42.4	43.7
10 Indonesia	126.0	100.4	89.0	73.7	59.7	48.3	42.3
11 Myanmar	32.3	31.5	34.5	38.3	38.3	38.3	38.3
12 Pakistan	20.2	21.8	29.6	25.4	28.4	28.4	28.4
13 Mexico	24.1	25.5	26.3	26.9	27.2	27.2	27.0
14 Bangladesh	27.7	27.9	27.8	27.7	27.3	26.5	25.8
15 Tanzania	18.5	20.4	20.8	21.7	22.8	24.1	24.8
16 Kenya	16.0	17.9	18.7	23.0	23.8	23.8	23.8
17 Zambia	6.4	7.3	16.8	19.1	21.8	23.0	23.0
18 France	33.2	32.0	27.9	22.1	23.6	23.4	21.3
19 Viet Nam	26.5	26.8	26.7	21.3	21.5	20.0	20.0
20 Thailand	21.8	20.7	20.6	19.9	19.3	18.8	18.5
21 Egypt	14.0	15.4	16.2	17.0	17.5	17.7	17.8
22 Mozambique	14.8	16.7	16.7	16.7	16.7	16.7	16.7
23 Somalia	6.3	7.5	9.2	11.2	13.5	14.5	15.6
24 Sudan	16.3	16.3	16.7	17.7	18.8	15.2	15.5
25 Madagascar	7.4	9.3	9.6	11.1	13.1	13.9	14.7
26 Burkina Faso	9.2	10.4	7.4	10.5	12.8	13.7	14.2
27 Germany	2.3	4.1	5.0	10.1	15.2	14.3	13.7
28 Chile	6.6	8.3	10.3	11.2	10.8	13.6	13.6
29 Guinea	9.9	11.9	11.4	11.7	12.0	12.2	12.3
30 South Africa	10.6	12.4	12.0	12.0	0.0	12.0	12.0
31 Nepal	12.3	12.4	12.7	12.6	12.5	12.2	11.8
32 Niger	5.7	6.8	7.8	8.8	9.9	11.0	11.7
33 Philippines	15.2	14.4	13.6	13.0	12.4	11.9	11.5
34 Cameroon	7.7	8.7	9.1	9.5	9.9	10.4	10.6
35 Italy	3.4	5.0	8.2	8.4	10.2	9.7	9.7
36 Zimbabwe	6.3	7.2	8.1	8.1	8.7	9.1	9.3
37 Côte d'Ivoire	0.0	0.9	0.9	0.9	1.0	9.2	9.2
38 Liberia	3.5	2.8	4.7	5.8	7.0	8.3	9.2
39 Chad	4.6	5.2	5.9	6.5	7.1	7.7	8.0
40 Guatemala	2.0	4.9	5.5	6.2	6.9	7.6	7.9
Top 40	1286	1291	1292	1308	1309	1422	1452

Appendix 5.1 Continued

	Area	1990	1995	2000	2005	2010	2015	2018
41	Paraguay	4.8	5.3	5.6	6.1	6.6	7.1	7.5
42	Cambodia	11.2	11.0	10.1	9.2	8.4	7.8	7.4
43	Peru	6.5	6.6	7.8	7.4	7.3	7.2	7.2
44	Benin	5.6	5.8	5.9	6.1	6.3	6.5	6.6
45	Serbia	0.0	1.7	1.8	1.7	6.1	6.2	6.4
46	Japan	0.1	0.2	0.1	0.1	0.1	2.8	6.3
47	Burundi	5.8	6.7	5.4	8.5	9.3	6.0	6.0
48	Sierra Leone	4.7	4.6	5.4	5.4	5.6	5.8	5.9
49	Malawi	5.2	4.9	5.0	5.1	5.4	5.7	5.9
50	Mali	3.9	4.4	4.7	5.0	5.3	5.6	5.8
51	Colombia	0.1	0.2	0.2	0.2	0.3	6.8	5.8
52	Lao People's Demo	0.0	0.0	5.9	5.9	6.0	5.9	5.8
53	Senegal	4.7	4.9	5.1	5.3	5.4	5.6	5.6
54	Morocco	5.5	5.8	5.9	5.8	5.7	5.6	5.6
55	Papua New Guinea	5.5	5.5	5.5	5.5	5.5	5.5	5.5
56	Honduras	5.7	5.8	5.9	5.8	5.8	5.6	5.5
57	Nicaragua	5.0	5.0	5.1	5.3	5.4	5.5	5.5
58	Bhutan	3.9	3.9	4.2	4.6	4.9	5.1	5.2
59	Rwanda	6.4	5.2	5.0	5.0	5.0	5.0	5.0
60	Angola	2.3	2.8	3.2	3.6	4.0	4.5	4.8
61	Russian Federation	0.0	16.3	3.8	4.3	4.2	4.5	4.7
62	South Sudan	0.0	0.0	0.0	0.0	12.0	4.6	4.7
63	Ukraine	0.0	1.0	2.4	4.9	2.7	5.7	4.7
64	Sri Lanka	6.4	9.7	5.9	5.6	5.2	4.9	4.6
65	Togo	4.6	5.2	5.5	4.4	4.4	4.4	4.4
66	Venezuela (Bolivar)	3.0	3.3	3.6	3.8	4.1	4.2	4.3
67	Finland	2.0	2.7	2.7	2.6	3.6	4.0	4.2
68	El Salvador	3.6	4.5	4.5	4.2	4.2	4.2	4.1
69	Australia	2.8	3.7	6.7	5.6	4.8	4.1	4.1
70	Argentina	3.1	3.5	3.0	4.4	4.4	4.4	4.1
71	Romania	1.2	2.0	2.7	2.7	2.2	4.1	3.9
72	Ecuador	3.1	3.9	4.4	4.4	3.8	3.8	3.8
73	Sweden	1.9	1.9	3.0	2.0	3.0	3.5	3.5
74	Turkey	5.4	6.1	4.1	3.1	2.9	2.8	3.3
75	Costa Rica	7.6	8.8	8.5	8.7	9.0	3.3	3.3
76	Guinea-Bissau	1.9	2.0	2.2	2.4	2.6	2.8	2.9
77	Tunisia	1.7	1.8	1.9	1.9	2.0	2.9	2.9
78	Algeria	1.8	2.0	2.3	2.4	2.6	2.7	2.8
79	Poland	1.2	1.2	1.3	1.7	2.1	2.8	2.7
80	Belarus	0.0	0.6	0.6	0.9	1.6	2.9	2.7
	Top 41-80	138	170	167	172	189	192	195
	Top 1-40	1286	1291	1292	1308	1309	1422	1452
	Top 80	1424	1461	1459	1479	1498	1614	1647

Appendix 5.1 Continued

Area	1990	1995	2000	2005	2010	2015	2018
81 Hungary	2.4	1.9	2.5	3.0	2.9	2.5	2.6
82 Uruguay	3.1	3.5	1.4	2.0	2.4	2.8	2.5
83 Bolivia (Plurination)	1.9	2.0	2.1	2.3	2.4	2.4	2.5
84 Malaysia	4.0	3.6	3.4	3.1	2.8	2.6	2.5
85 Estonia	0.0	0.5	0.8	0.6	1.2	1.9	2.3
86 DPR of Korea	44.2	58.8	64.9	71.1	76.6	2.2	2.3
87 Mauritania	1.2	1.3	1.4	1.6	1.8	2.1	2.2
88 Lesotho	1.3	1.5	2.0	2.1	2.1	2.1	2.1
89 Croatia	2.6	3.0	1.0	1.8	1.1	1.7	2.1
90 Austria	1.3	1.2	1.2	1.5	1.8	2.0	2.0
91 Central African Rep	3.1	3.0	2.0	2.0	2.0	2.0	2.0
92 Latvia	0.0	0.8	0.7	0.2	1.3	1.0	2.0
93 Bulgaria	1.4	0.8	1.8	2.4	2.4	2.2	2.0
94 Haiti	1.5	1.8	1.8	1.8	1.9	1.9	2.0
95 Netherlands	0.1	0.1	0.2	0.2	0.2	1.3	1.9
96 Tajikistan	0.0	0.0	0.0	0.1	0.1	1.8	1.8
97 Eswatini	0.7	0.8	0.9	1.0	1.3	1.3	1.7
98 Namibia	0.7	0.7	0.9	1.1	1.3	1.4	1.6
99 Armenia	0.0	0.1	0.1	0.0	1.8	1.6	1.6
100 Congo	3.6	3.5	3.5	3.4	3.4	1.5	1.5
101 Bosnia and Herzegovina	0.0	0.0	0.9	1.3	1.4	1.5	1.5
102 Afghanistan	0.5	0.7	0.9	1.0	1.1	1.3	1.3
103 Lithuania	0.0	0.3	1.0	0.6	1.3	1.4	1.3
104 Spain	0.8	2.3	1.3	1.7	4.5	1.6	1.2
105 Republic of Moldova	0.0	0.3	0.2	0.3	0.3	1.3	1.2
106 Cuba	0.0	0.0	0.0	0.0	0.0	1.1	1.1
107 Albania	1.2	0.3	0.3	0.2	0.4	1.1	1.1
108 Norway	0.7	0.4	0.5	0.7	1.4	1.1	1.1
109 Gabon	0.5	0.5	0.5	1.1	1.1	1.1	1.1
110 Libya	0.6	0.7	0.8	0.9	1.0	1.0	1.0
111 Panama	1.4	1.3	1.3	1.2	1.1	1.1	1.0
112 Eritrea	0.0	1.9	2.2	1.3	0.9	1.0	1.0
113 Greece	1.2	1.2	1.4	0.9	0.6	1.0	1.0
114 Dominican Republic	0.6	0.6	0.6	0.6	0.9	1.0	1.0
115 Switzerland	0.5	0.6	0.8	0.8	1.0	1.2	1.0
116 Slovenia	0.0	0.2	0.5	0.8	1.0	1.0	0.9
117 Portugal	0.4	0.3	0.4	0.4	0.4	0.4	0.9
118 Canada	5.2	4.3	2.4	2.3	2.5	3.3	0.9
119 Belgium	0.5	0.5	0.5	0.6	0.7	0.8	0.8
120 Guyana	0.9	0.9	0.9	0.9	0.9	0.8	0.8
Top 81-120	88	106	110	119	133	62	62
Top 1-80	1424	1461	1459	1479	1498	1614	1647
Top 120	1512	1567	1569	1598	1631	1676	1709
Top 121-205	54	23	22	20	19	11	11
Total	1566	1590	1591	1618	1650	1687	1720

Appendix 6 Production of coniferous fuelwood (Mm³/a)

Area	1990	1995	2000	2005	2010	2015	2018
1 China	116.3	101.5	92.1	83.9	76.4	69.8	66.0
2 United States of Am	15.6	11.6	8.7	8.3	7.9	8.4	15.0
3 Guatemala	9.1	7.9	9.0	10.1	11.2	12.3	13.0
4 Russian Federation	0.0	17.1	8.8	10.1	9.7	10.5	11.7
5 Mexico	10.3	10.9	11.3	11.5	11.7	11.7	11.6
6 Belarus	0.0	0.2	0.4	0.4	0.7	5.4	9.7
7 India	8.3	8.7	8.3	9.2	9.3	9.2	9.1
8 Germany	2.1	3.0	3.8	8.0	12.1	9.0	8.1
9 Ethiopia	2.5	5.6	6.1	6.6	7.1	7.6	7.8
10 Ukraine	0.0	0.9	1.6	3.3	5.9	4.4	6.0
11 Algeria	3.8	4.4	4.8	5.2	5.6	5.8	5.9
12 Democratic People's	2.8	3.2	3.5	3.7	3.8	3.9	4.0
13 Czechia	1.3	0.5	0.7	0.7	1.3	1.5	3.6
14 Finland	1.0	1.4	1.4	2.5	3.1	3.9	3.5
15 Sweden	1.9	1.9	3.0	3.9	3.0	3.5	3.5
16 Brazil	12.0	12.7	13.2	7.4	8.0	3.3	3.4
17 Austria	1.4	1.9	1.6	2.2	2.8	3.0	3.2
18 Honduras	2.8	2.8	2.9	2.9	2.8	2.8	2.7
19 Kenya	0.8	0.9	1.0	2.6	2.6	2.6	2.6
20 Poland	1.5	1.1	1.2	1.7	2.1	2.7	2.6
21 Chile	1.1	1.5	1.8	2.0	1.9	2.5	2.5
22 Turkey	4.4	2.4	1.4	1.9	2.0	1.8	2.4
23 France	3.7	3.6	3.1	2.5	2.6	2.6	2.4
24 United Kingdom	0.1	0.1	0.1	0.1	1.0	1.6	1.9
25 Tajikistan	0.0	0.0	0.0	0.0	0.0	1.8	1.8
26 Denmark	0.2	0.3	0.4	1.0	0.9	1.5	1.4
27 Colombia	0.0	0.0	0.4	2.3	2.4	2.5	1.3
28 Ecuador	0.5	1.0	1.0	1.1	1.2	1.2	1.3
29 Estonia	0.0	0.1	0.9	0.4	1.0	1.2	1.2
30 Italy	0.2	0.3	1.0	1.0	1.2	1.2	1.2
31 Pakistan	0.9	0.9	1.3	1.1	1.3	1.1	1.1
32 Morocco	1.0	1.1	1.1	1.1	1.1	1.1	1.1
33 Spain	1.0	0.8	0.3	0.5	0.6	2.9	1.0
34 Bulgaria	0.1	0.0	0.3	0.3	0.3	0.6	0.9
35 Tunisia	0.2	0.2	0.2	0.2	0.2	0.7	0.7
36 Romania	0.7	0.2	0.3	0.3	0.4	1.0	0.7
37 Norway	0.3	0.1	0.2	0.5	0.8	0.6	0.7
38 Nicaragua	0.6	0.6	0.6	0.7	0.7	0.7	0.7
39 Canada	1.0	1.1	0.5	0.5	0.7	1.3	0.6
40 Switzerland	0.3	0.3	0.8	0.5	0.5	0.5	0.6
Top 1-40	210	213	199	202	208	210	219

Appendix 6 Continued

	Area	1990	1995	2000	2005	2010	2015	2018
41	Afghanistan	0.21	0.28	0.38	0.44	0.50	0.54	0.57
42	Mongolia	0.58	0.18	0.41	0.55	0.61	0.50	0.50
43	Lithuania	0.00	0.82	0.45	0.53	0.65	0.74	0.44
44	Netherlands	0.03	0.03	0.00	0.05	0.05	0.14	0.42
45	Slovakia	0.00	0.24	0.15	0.15	0.29	0.24	0.26
46	Portugal	0.15	0.19	0.20	0.20	0.20	0.20	0.23
47	Latvia	0.00	0.40	0.94	0.72	0.99	0.20	0.20
48	Slovenia	0.00	0.00	0.00	0.17	0.14	0.20	0.20
49	Haiti	0.13	0.15	0.16	0.16	0.16	0.17	0.17
50	Hungary	0.06	0.04	0.09	0.10	0.10	0.14	0.13
51	Serbia	0.00	0.02	0.02	0.12	0.10	0.10	0.13
52	R. of Korea	0.00	0.00	0.00	0.00	0.28	0.16	0.12
53	Eswatini	0.00	0.00	0.00	0.00	0.00	0.00	0.12
54	Ireland	0.01	0.06	0.05	0.01	0.08	0.11	0.11
55	Greece	0.12	0.17	0.19	0.10	0.07	0.10	0.10
56	Kazakhstan	0.00	0.34	0.39	0.17	0.22	0.09	0.09
57	Georgia	0.00	0.00	0.03	0.05	0.15	0.06	0.08
58	Croatia	0.00	0.01	0.08	0.02	0.02	0.06	0.06
59	Belgium	0.05	0.05	0.05	0.05	0.05	0.06	0.06
60	Nepal	0.06	0.06	0.06	0.06	0.06	0.06	0.06
61	Montenegro	0.00	0.00	0.00	0.00	0.01	0.05	0.05
62	Luxembourg	0.00	0.00	0.02	0.03	0.05	0.03	0.05
63	Uruguay	0.00	0.00	0.00	0.00	0.00	0.02	0.04
64	Tanzania	0.02	0.03	0.03	0.03	0.03	0.03	0.03
65	Syrian Arab Republic	0.00	0.01	0.01	0.02	0.02	0.03	0.03
66	South Africa	1.18	1.38	0.00	0.00	0.00	0.03	0.03
67	Australia	0.79	1.05	0.04	0.03	0.03	0.02	0.02
68	North Macedonia	0.00	0.00	0.00	0.01	0.01	0.02	0.02
69	El Salvador	0.02	0.02	0.02	0.02	0.02	0.01	0.01
70	Kyrgyzstan	0.00	0.00	0.01	0.01	0.01	0.01	0.01
71	Malawi	0.01	0.01	0.01	0.01	0.01	0.01	0.01
72	Cyprus	0.01	0.01	0.00	0.00	0.00	0.01	0.01
73	Argentina	0.00	0.08	0.02	0.01	0.02	0.04	0.01
74	China, Taiwan Province of	0.02	0.01	0.00	0.01	0.00	0.01	0.00
75	Republic of Moldova	0.00	0.00	0.00	0.00	0.00	0.00	0.00
76	Mauritius	0.00	0.00	0.01	0.00	0.01	0.00	0.00
77	Lebanon	0.00	0.00	0.00	0.00	0.00	0.00	0.00
78	Israel	0.00	0.00	0.00	0.00	0.00	0.00	0.00
79	Liechtenstein	0.01	0.01	0.00	0.00	0.00	0.00	0.00
80	Falkland Islands (Malvinas)	0.00	0.00	0.00	0.00	0.01	0.00	0.00
	Top 41-80	3	6	4	4	5	4	4
	Top 1-40	210	213	199	202	208	210	219
	Others	54	1	1	1	0	0	0
	Total	267	219	204	207	213	214	223