1 The state of forest resources – a regional analysis

The Food and Agriculture Organization (FAO), in cooperation with its member countries, has assessed the world's forests resources at 5 to 10 year intervals since 1946. These global assessments provide valuable information to policy-makers at the national and international levels, members of the public and other groups and organizations interested in forestry.

The Global Forest Resources Assessment 2010 (FRA 2010) was the most comprehensive assessment to date (FAO, 2010a). It examined the current status and trends for more than 90 variables related to the extent, condition, uses and values of all types of forests in 233 countries and areas for four points in time: 1990, 2000, 2005 and 2010. FRA 2010 told us that the world's total forest area was just over 4 billion hectares, corresponding to 31 percent of the total land area or an average of 0.6 ha per capita. The five most forest-rich countries (the Russian Federation, Brazil, Canada, the United States of America and China) accounted for more than half of the total forest area. Ten countries or areas had no forest at all and an additional 54 had forest on less than 10 percent of their total land area.

Figure 1: State of the World's Forests 2011 – subregional breakdown

A key message from FRA 2010 was that, while the rate of deforestation and loss of forest from natural causes was still alarmingly high, it was slowing down. At the global level, it decreased from an estimated 16 million hectares per year in the 1990s to around 13 million hectares per year in the last decade. At the same time, afforestation and natural expansion of forests in some countries and areas reduced the net loss of forest area significantly at the global level. The net change in forest area in the period 2000–2010 was estimated at -5.2 million hectares per year (an area about the size of Costa Rica), down from -8.3 million hectares per year in the period 1990–2000. However, most of the loss of forest continued to take place in countries and areas in the tropical regions, while most of the gain took place in the temperate and boreal zones, and in some emerging economies.

Significant progress was made in developing forest policies, laws and national forest programmes. Some 76 countries issued or updated their forest policy statements since 2000, and 69 countries – primarily in Europe and Africa – reported that their current forest law has been enacted or amended since 2005. Close to 75 percent of the world's forests were covered by a national forest programme, i.e. a participatory process for the development and implementation of forest-related policies and international commitments at the national level.

More detailed results are presented in FRA 2010, according to seven key aspects of sustainable forest management: extent of forest resources; forest biological diversity; forest health and vitality; productive functions of forest resources; protective functions of forest resources; socio-economic functions of forests; and the legal, policy and institutional framework. For the purposes of this report, a few of the key findings related to these thematic elements will be discussed, providing an overview at the regional level.

Africa[2]

Extent of forest resources

According to FRA 2010, the estimated forest area in Africa[3] was close to 675 million hectares (Table 1), accounting for about 17 percent of global forest area and 23 percent of the total land area in the region. At the

Table 1: Forest area in Africa, 1990–2010[a]

Subregion	Area (1 000 ha)			Annual change (1 000 ha)		Annual change rate (%)	
	1990	2000	2010	1990–2000	2000–2010	1990–2000	2000–2010
Central Africa	268 214	261 455	254 854	-676	-660	-0.25	-0.26
East Africa	88 865	81 027	73 197	-784	-783	-0.92	-1.01
North Africa	85 123	79 224	78 814	-590	-41	-0.72	-0.05
Southern Africa	215 447	204 879	194 320	-1 057	-1 056	-0.50	-0.53
West Africa	91 589	81 979	73 234	-961	-875	-1.10	-1.12
Total Africa	749 238	708 564	674 419	-4 067	-3 414	-0.56	-0.49
World	4 168 399	4 085 063	4 032 905	-8 334	-5 216	-0.20	-0.13

a All tables and graphs showing trends are based on those countries which provided information for all points in time (1990, 2000, 2005 and 2010). More complete information on the status as of 2010 may be available for some variables. The annual change rate is the gain or loss in percent of the remaining forest area each year within the given period.

[2] For the purposes of this review, countries and areas in Africa are grouped in the following subregions:
- Central Africa: Burundi, Cameroon, Central African Republic, Chad, Democratic Republic of the Congo, Equatorial Guinea, Gabon, Republic of the Congo, Rwanda, Saint Helena, Ascension and Tristan da Cunha, Sao Tome and Principe
- East Africa: Comoros, Djibouti, Eritrea, Ethiopia, Kenya, Madagascar, Mauritius, Mayotte, Réunion, Seychelles, Somalia, Uganda, United Republic of Tanzania
- North Africa: Algeria, Egypt, Libyan Arab Jamahiriya, Mauritania, Morocco, Sudan, Tunisia, Western Sahara
- Southern Africa: Angola, Botswana, Lesotho, Malawi, Mozambique, Namibia, South Africa, Swaziland, Zambia, Zimbabwe
- West Africa: Benin, Burkina Faso, Cape Verde, Côte d'Ivoire, Gambia, Ghana, Guinea, Guinea-Bissau, Liberia, Mali, Niger, Nigeria, Senegal, Sierra Leone, Togo

[3] The countries and areas forming part of the North Africa subregion (Algeria, Egypt, Libyan Arab Jamahiriya, Mauritania, Morocco, Sudan, Tunisia and Western Sahara) also appear in the Near East regional section. The inclusion of these countries and areas in both regions was intentional and necessary, as it reflects the categorization of countries within the FAO Regional Forestry Commissions.

subregional level, Central Africa accounted for 37 percent of the total forest area, Southern Africa for 29 percent, North Africa for 12 percent, and East and West Africa for 11 percent each.

The five countries with the largest forest area (Democratic Republic of the Congo, Sudan, Angola, Zambia and Mozambique) together contained more than half the forest area of the continent (55 percent). Countries reporting the highest percentage of their land area covered by forest were Seychelles (88 percent), Gabon (85 percent), Guinea-Bissau (72 percent), Democratic Republic of the Congo (68 percent) and Zambia (67 percent).

There was a reduction in the rate of net forest loss in the region, from 4.0 million hectares per year in the decade 1990–2000 to 3.4 million hectares per year during the period 2000–2010. A major difference was seen in parts of North Africa, where the net loss dropped from 590 000 ha per year to just 41 000 ha per year. The reduction was mostly a result of Sudan's recent efforts to gather annual data on actual changes taking place, which resulted in much lower figures for 2000–2010 than those estimated for 1990–2000, which were based on fairly old data. Southern Africa had the highest net loss at the subregional level over the last 20 years, although the rate has slowed in recent years.

Countries with large areas of forest also reported the most significant losses. In addition to the five countries with the largest forest area, Cameroon, Nigeria, the United Republic of Tanzania and Zimbabwe also reported large losses. The countries with the highest net

Table 2: Area of planted forest in Africa, 1990–2010

Subregion	Area (1 000 ha)			Annual change (1 000 ha)		Annual change rate (%)	
	1990	2000	2010	1990–2000	2000–2010	1990–2000	2000–2010
Central Africa	482	606	709	12	10	2.32	1.58
East Africa	1 184	1 258	1 477	7	22	0.61	1.62
North Africa	6 794	7 315	8 091	52	78	0.74	1.01
Southern Africa	2 316	2 431	2 639	12	21	0.49	0.82
West Africa	888	1 348	2 494	46	115	4.26	6.35
Total Africa	11 663	12 958	15 409	129	245	1.06	1.75
World	178 307	214 839	264 084	3 653	4 925	1.88	2.09

Table 3: Area of forest designated primarily for conservation of biodiversity in Africa, 1990–2010

Subregion	Area (1 000 ha)			Annual change (1 000 ha)		Annual change rate (%)	
	1990	2000	2010	1990–2000	2000–2010	1990–2000	2000–2010
Central Africa	7 463	8 243	9 711	78	147	1.00	1.65
East Africa	4 806	6 110	7 865	130	176	2.43	2.56
North Africa	13 325	12 597	12 769	-73	17	-0.56	0.14
Southern Africa	9 661	9 429	9 199	-23	-23	-0.24	-0.25
West Africa	14 672	14 972	15 328	30	36	0.20	0.24
Total Africa	49 927	51 351	54 873	142	352	0.28	0.67
World	270 413	302 916	366 255	3 250	6 334	1.14	1.92

loss in percentage terms were Comoros, Togo, Nigeria, Mauritania and Uganda. Ten countries reported a net gain in forest area between 1990 and 2010 with Tunisia, Côte d'Ivoire, Rwanda, Swaziland and Morocco topping the list.

Africa also had extensive areas of land classified as 'other wooded land', with scattered tree growth too sparse to be defined as forest. The total area was more than 350 million hectares, corresponding to 31 percent of the total area of other wooded land in the world, which declined by close to 1.9 million hectares per year (0.5 percent per annum) during the period 1990–2010. The largest losses occurred in Mali, Sudan, the United Republic of Tanzania, Nigeria and Madagascar.

Forest planting programmes were established in several countries for both productive and protective purposes. Africa's total area of planted forests was about 15 million hectares (or 2.3 percent of the total forest area), with the biggest area located in North Africa (Table 2). Sudan had by far the largest area with more than 6 million hectares including governmental, private and community planting schemes. South Africa had almost 2 million hectares of planted forest area of which almost three-quarters were privately owned (corporate growers and individual commercial farmers).

Growing stock and carbon storage were assessed to determine relevant trends related to climate change – while sustainable management, planting and rehabilitation of forests can conserve or increase forest carbon stocks, deforestation, forest degradation and poor management practices reduce them. The region contributed 21 percent of the global total of carbon in forest biomass, with Central Africa containing the largest amount of carbon in forest biomass (Figure 2). Côte d'Ivoire reported the highest level of carbon stock per hectare in the region (177 tonnes per hectare) followed by the Republic of the Congo. Except for North Africa, all the subregions experienced a decline in carbon stocks in forest biomass between 1990 and 2010 because of the loss of forest area.

Biological diversity and protective functions

Around 10 percent of the total forest area in the region was reported to be primary forest (i.e. composed of native species with no clearly visible indications of human activity and no disruptions to ecological processes). However, this figure may be an underestimate because Cameroon and the Democratic

Figure 2: Carbon stock in forest biomass in Africa, 1990–2010 (Gt)

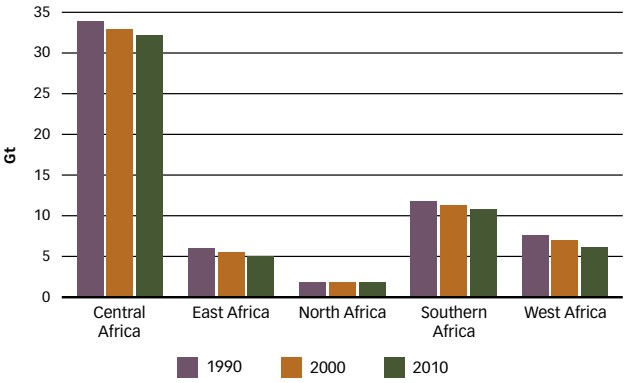
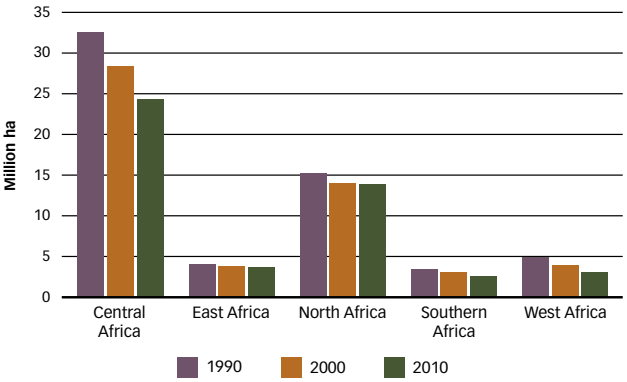


Figure 3: Area of primary forest in Africa, 1990–2010 (million ha)



Republic of the Congo, which together represented 26 percent of the total forest area in the region, did not report on this category. There was evidence of an overall decline in primary forest area in the region (Figure 3), with primary forests declining by more than half a million hectares per year over the period 2000–2010. The five countries that reported the largest primary forest area were Gabon, Sudan, Republic of the Congo, Madagascar and Central African Republic. The countries reporting the largest proportion of their forests as being primary (ranging from 65 to 24 percent) were (in descending order): Gabon, Réunion, Sao Tome and Principe, Republic of the Congo, Malawi and Madagascar. Gabon registered the largest annual loss of primary forest, an area of more than 330 000 ha per year, largely due to a reclassification of primary forests to 'other naturally regenerated forests' because of selective logging and other human interventions within the reporting period.

About 14 percent of the total forest area in Africa was designated for conservation of biological diversity (Table 3). Most of the countries in the region showed an increase in forest area designated for conservation or showed no change since 1990. Just six countries showed a negative trend (Mauritius, Mozambique, Republic of the Congo, Senegal, Sudan and Togo). At the regional level, there was a substantial increase during the last decade, particularly as a result of increases in Central and East Africa. However, Southern Africa showed a negative change because of the decrease in forest area reported by Mozambique.

Only about 3 percent of the forest area was designated primarily for protection of soil and water, compared with 8 percent at the global level. Mozambique reported the largest area (almost 9 million hectares) under this designation, corresponding to 22 percent of its total forest. In terms of percentage, Libyan Arab Jamahiriya reported that all of its forests were designated primarily for protection of soil and water, while Kenya listed 94 percent of its forest area under this category, which corresponded to all its natural forest. Comoros reported that two-thirds of its forest area was designated for soil and water conservation while Algeria and Egypt both recorded around 50 percent of their forest area under this designation; in Algeria most of this was inaccessible forest area, and in Egypt all of this was planted. Africa's total forest area designated for soil and water protection showed a net loss of 0.9 million hectares in the last decade, while globally this area increased by more than 27 million hectares over the same period (Table 4).

Productive and socio-economic functions

The extent of forests designated for production of wood and non-wood forest products (NWFPs) declined in Africa over the last 20 years (Table 5). As conservation areas

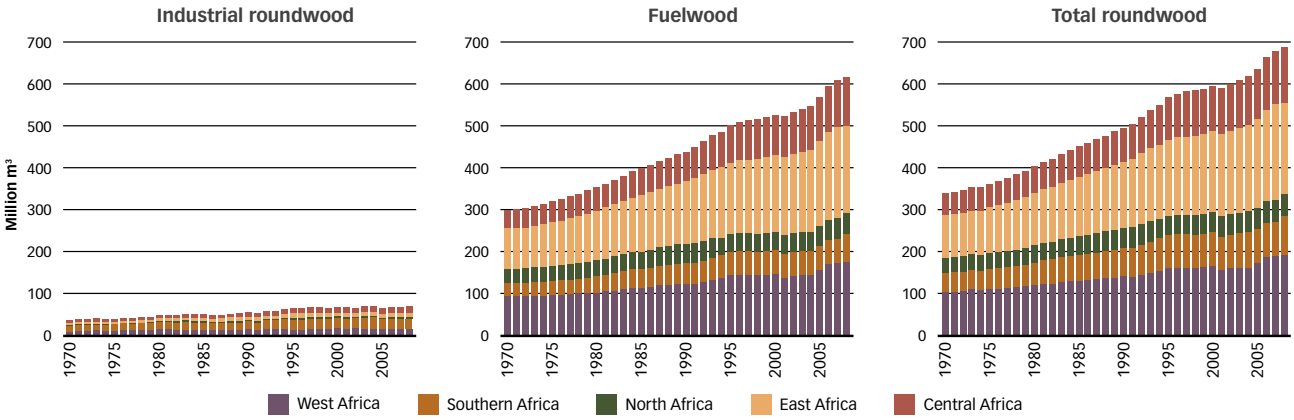
Table 4: Area of forest designated primarily for protection of soil and water in Africa, 1990–2010

Subregion	Area (1 000 ha)			Annual change (1 000 ha)		Annual change rate (%)	
	1990	2000	2010	1990–2000	2000–2010	1990–2000	2000–2010
Central Africa	342	752	662	41	-9	8.20	-1.27
East Africa	3 703	3 596	3 475	-11	-12	-0.29	-0.34
North Africa	4 068	3 855	3 851	-21	n.s.	-0.54	-0.01
Southern Africa	10 300	9 715	9 136	-59	-58	-0.58	-0.61
West Africa	2 297	2 529	2 417	23	-11	0.97	-0.45
Total Africa	20 709	20 447	19 540	-26	-91	-0.13	-0.45
World	240 433	271 699	299 378	3 127	2 768	1.23	0.97

Table 5: Area of forest designated primarily for production in Africa, 1990–2010

Subregion	Area (1 000 ha)			Annual change (1 000 ha)		Annual change rate (%)	
	1990	2000	2010	1990–2000	2000–2010	1990–2000	2000–2010
Central Africa	66 944	66 197	59 844	-75	-635	-0.11	-1.00
East Africa	34 330	31 127	27 957	-320	-317	-0.97	-1.07
North Africa	39 557	36 637	36 819	-292	18	-0.76	0.05
Southern Africa	36 950	34 834	33 199	-212	-163	-0.59	-0.48
West Africa	33 164	33 898	28 208	73	-569	0.22	-1.82
Total Africa	210 944	202 693	186 027	-825	-1 667	-0.40	-0.85
World	1 181 576	1 160 325	1 131 210	-2 125	-2 911	-0.18	-0.25

Figure 4: Volume of wood removals in Africa, 1970–2008 (million m³)



Source: FAOSTAT

increased, this may have caused the area of productive forests to decline. It may also be an indication that concessions were cancelled or productive forests were being cleared to convert the land to non-forest uses.

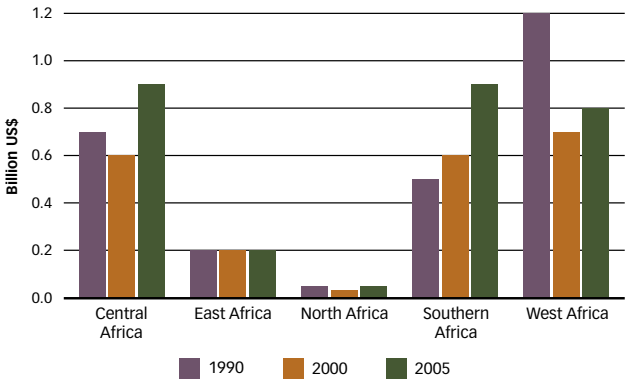
Central and West Africa's areas of forest designated primarily for productive functions fell considerably between 2000 and 2010. In Central Africa, the decrease was largely the result of a change in Gabon's forest legislation in 2001 and a reassignment of forest functions, which reduced the country's productive forest area by nearly one-half. In the same subregion, Cameroon showed the highest increase in forest area designated for production over the last ten years, due to recent designations of additional forest concessions, community and communal forests and hunting reserves. In West Africa, the biggest decreases took place in Liberia and Nigeria. In Liberia, the reported decline was caused by the cancellation of forest concessions after 2005.

Only 10 percent of wood removals in Africa were used as industrial roundwood, while the rest was used as fuelwood (Figure 4). Africa accounted for 33 percent of global fuelwood removals and only 5 percent of global industrial wood removals. However, there was considerable variation between the subregions, largely due to differences in access and the proportion of commercial species. Fuelwood removals increased in line with growing population and despite the decline in the area of forest designated for productive purposes. In the absence of information on annual allowable harvests, it was difficult to conclude whether current removals were sustainable. Since market demand and access were key determinants of the intensity of removal, easily accessible areas were more intensively logged than those that were remote.

Socio-economic trends in Africa were mixed and only 27 countries in the region – representing just 33 percent of Africa's forest area – reported on the value of forest products. The value of wood removals (fuelwood and industrial roundwood) increased in the region from US$2.6 billion in 1990 to about US$2.9 billion in 2005, although they declined in West Africa (Figure 5). However, Africa's share of the global value of wood removals remained significantly lower than its potential. In 2005, the value of industrial wood removals in the region was estimated at only 11 percent of the global value, while fuelwood removals made up nearly 50 percent of the value of global fuelwood removal. As limited information was available on this variable, it is likely these values are underestimated.

The value of wood products in the formal economic sector was concentrated in a small number of countries, and it was not possible to conclude how much of the

Figure 5: Value of wood removals in Africa, 1990–2005 (billion US$)



value was generated from legally harvested timber, NWFPs and subsistence removals, respectively, because of weak monitoring and reporting capacity in several key countries. Exudates, food and living animals were the most important NWFPs extracted from African forest areas. However, very little information was reported on this variable.

More than half a million people were reportedly involved in the primary production of goods in forests in Africa (Table 6). A number of countries reported growth in employment in the formal forest sector while others reported a decline. For instance, forestry employment in Algeria doubled from 2000 to 2005. Liberia noted a decrease in employment, however, mainly due to the 2003 sanctions imposed by the UN Security Council, which halted government revenues from logging thus affecting employment levels.

The scarcity of information on production and employment in the informal sector means that these reports do not provide an accurate picture of the importance of the sector for national economies. A significant proportion of wood production (fuelwood, in particular) and processing (e.g. pit-sawing, charcoal production, and collection and trade of NWFPs) took place in the informal sector and has not been adequately evaluated. Improvements in the understanding of the informal sector are needed to suggest better policies and practices for greater sustainability.

Table 6: Employment in primary production of forest goods in Africa, 2005 (1 000 FTE)

Subregion	Employment in primary production of goods, 2005
Central Africa	30
East Africa	12
North Africa	209
Southern Africa	139
West Africa	181
Total Africa	571
World	10 537

Asia and the Pacific[4]

Extent of forest resources

Forests cover slightly less than one-third of the total land area of the Asia and the Pacific region. Based on estimates for FRA 2010, the region's forested area was 740 million hectares in 2010, accounting for about 18 percent of the global forest area (Table 7). East Asia contained the largest forest area (255 million hectares), followed by Southeast Asia (214 million hectares),

Table 7: Forest area in Asia and the Pacific, 1990–2010

Subregion	Area (1 000 ha)			Annual change (1 000 ha)		Annual change rate (%)	
	1990	2000	2010	1990–2000	2000–2010	1990–2000	2000–2010
East Asia	209 198	226 815	254 626	1 762	2 781	0.81	1.16
South Asia	78 163	78 098	80 309	-7	221	-0.01	0.28
Southeast Asia	247 260	223 045	214 064	-2 422	-898	-1.03	-0.41
Oceania	198 744	198 381	191 384	-36	-700	-0.02	-0.36
Total Asia–Pacific	733 364	726 339	740 383	-703	1 404	-0.10	0.19
World	4 168 399	4 085 063	4 032 905	-8 334	-5 216	-0.20	-0.13

[4] For the purposes of this review, countries and areas in the Asia and the Pacific region are grouped into the following subregions:
- East Asia: China, Democratic People's Republic of Korea, Japan, Mongolia, Republic of Korea
- South Asia: Bangladesh, Bhutan, India, Maldives, Nepal, Pakistan, Sri Lanka
- Southeast Asia: Brunei, Cambodia, Indonesia, Lao People's Democratic Republic, Malaysia, Myanmar, Philippines, Singapore, Thailand, Timor-Leste, Viet Nam
- Oceania: American Samoa, Australia, Cook Islands, Federated States of Micronesia, Fiji, French Polynesia, Guam, Kiribati, Marshall Islands, Nauru, New Caledonia, New Zealand, Niue, Norfolk Island, Northern Mariana Islands, Palau, Papua New Guinea, Pitcairn, Samoa, Solomon Islands, Tokelau, Tonga, Tuvalu, Vanuatu, Wallis and Futuna Islands

Oceania (191 million hectares) and South Asia (80 million hectares). The five countries with the largest forested area (China, Australia, Indonesia, India and Myanmar) accounted for 74 percent of the forest in the region, with China and Australia alone accounting for almost half the forest area of the region. The Federated States of Micronesia reported that 92 percent of its land area was covered by forests while six countries reported that forests covered no more than 10 percent of their total land area. Two of these, Nauru and Tokelau, reported no forest at all.

In the Asia and the Pacific region as a whole, forests were lost at a rate of 0.7 million hectares per year in the 1990s but grew by 1.4 million hectares per year over the period 2000–2010. This was primarily due to large-scale afforestation efforts in China, where the forest area increased by 2 million hectares per year in the 1990s and by an average of 3 million hectares per year since 2000. Bhutan, India, the Philippines and Viet Nam also registered forest area increases in the last decade.

Despite the net increase in forest area reported at the regional level, deforestation continued at high rates in many countries. Southeast Asia experienced the largest decline in forest area in the region in the last ten years, with an annual net loss of forests of more than 0.9 million hectares. However, when compared with figures for 1990–2000 (-2.4 million hectares per year), this represented a significant drop. Oceania also experienced a negative trend, primarily because severe drought and forest fires in Australia have exacerbated the loss of forest since 2000 and caused it to register the largest annual loss of any country in the region between 2000 and 2010. Cambodia, Indonesia, Myanmar and Papua New Guinea also reported large forest losses in the last decade.

Planted forests (i.e. forests established through planting and/or deliberate seeding of native or introduced tree species) made up 16 percent of the forest area in the region. Planted forests experienced a substantial increase within the last ten years in the Asia and the Pacific region (Table 8). Most of the region's planted forests were established through afforestation programmes. China contributed the bulk of this growth through several large programmes that aimed to expand its forest resources and protect watersheds, control soil erosion and desertification, and maintain biodiversity.

China, India and Viet Nam have established targets for large-scale forest planting and also developed incentive programmes for smallholders to plant more trees. China plans a 50 million hectare increase in the area of its planted forests by 2020, with the aim of covering 23 percent of the total land area with forests, a target which may be reached by 2015 if current planting rates continue. India set a target to cover 33 percent of its land area with forests and tree cover by 2012. Based on figures supplied in FRA 2010, some 25 percent of India's land area was covered by forests, other wooded land or other land with tree cover in 2010. To this should be added an unknown area of line plantings and other 'trees outside forests'. The Government of Viet Nam aimed to restore forest cover to 43 percent by 2010 and, according to the information provided for FRA 2010, this target was achieved.

Growing stock and carbon storage were also important parameters in determining the relevant trends in the extent of forest resources. Total carbon stored in forest biomass was 44 Giga tonnes (Gt) in the Asia and the Pacific region as a whole. Carbon stocks in forest

Table 8: Area of planted forests in Asia and the Pacific, 1990–2010

Subregion	Area (1 000 ha)			Annual change (1 000 ha)		Annual change rate (%)	
	1990	2000	2010	1990–2000	2000–2010	1990–2000	2000–2010
East Asia	55 049	67 494	90 232	1 244	2 274	2.06	2.95
South Asia	6 472	7 999	11 019	153	302	2.14	3.25
Southeast Asia	10 059	11 737	14 533	168	280	1.56	2.16
Oceania	2 583	3 323	4 101	74	78	2.55	2.12
Total Asia–Pacific	74 163	90 553	119 884	1 639	2 933	2.02	2.85
World	178 307	214 839	264 084	3 653	4 925	1.88	2.09

biomass decreased by an estimated 159 million tonnes annually during the period 2000–2010, despite an increase in the forest area in the region. The decreasing trend occurred because the forest converted to other uses contained more biomass and carbon than the newly established forests. East Asia and South Asia registered a positive trend in forest carbon stocks over the period 1990–2010, while Southeast Asia and Oceania experienced a net loss (Figure 6).

Figure 6: Carbon stock in forest biomass in Asia and the Pacific, 1990–2010 (Gt)

Figure 7: Area of primary forest in Asia and the Pacific, 1990–2010 (million ha)

Biological diversity and protective functions

Primary forests accounted for 19 percent of the total forest area of the region. Data indicated that the area of primary forests decreased in all the Asia and the Pacific subregions. Southeast Asia experienced a loss of primary forests, but the trend slowed in recent years. In Oceania, the decline in primary forest accelerated since the 1990s (Figure 7). The data collected did not allow for an analysis of the proportion of net loss of primary forest that was caused by deforestation and conversion compared with the opening of primary forests to selective logging or other human activities, which would move the forest to the class 'other naturally regenerated forest' in the FRA 2010 classification system.

The area of forest designated primarily for conservation of biodiversity accounted for 14 percent of the total forest area. Since 2000, this area has increased by almost 14 million hectares in the Asia and the Pacific region as a whole (Table 9). Oceania registered a small contraction in the area designated for conservation of biodiversity since 2000. The area of forest within formally established protected areas represented 22 percent of the forest area in the region. Southeast Asia reported the highest percentage of forest within protected areas in the region (32 percent) while Oceania reported the lowest (16 percent).

Nineteen percent of the forest area in the region was primarily designated for the protection of soil and water

Table 9: Area of forest designated primarily for conservation of biological diversity in Asia and the Pacific, 1990–2010

Subregion	Area (1 000 ha)			Annual change (1 000 ha)		Annual change rate (%)	
	1990	2000	2010	1990–2000	2000–2010	1990–2000	2000–2010
East Asia	10 167	10 798	14 889	63	409	0.60	3.26
South Asia	15 037	15 530	22 191	49	666	0.32	3.63
Southeast Asia	32 275	35 475	38 655	320	318	0.95	0.86
Oceania	7 196	8 412	8 234	122	-18	1.57	-0.21
Total Asia–Pacific	64 675	70 215	83 969	554	1 375	0.83	1.80
World	270 413	302 916	366 255	3 250	6 334	1.14	1.92

resources. The area of forest assigned for protective functions increased by 17 million hectares in the 1990s and by 26 million hectares between 2000 and 2010 primarily because of large-scale planting in China (Table 10). An odd trend was observed in Southeast Asia, where forest areas with a protective function increased from 1990 to 2000 and then fell again from 2000 to 2010 because of the heterogeneous situation within the subregion. There was a steady increase in forest cover with a protective function in the Philippines and Thailand, while the opposite trend was observed in Indonesia, Lao People's Democratic Republic and Timor-Leste. The area of protective forest increased over the period 1990–2000 in Malaysia, Myanmar, Viet Nam and Oceania, although it fell in these areas throughout the next decade.

Productive and socio-economic functions

In the Asia and the Pacific region, 32 percent of the total forest area was designated primarily for production of wood, fibre, bioenergy and/or NWFPs. The area designated for production has fallen since 2000 in the region as forests were designated for other management purposes such as conservation of biodiversity and protection of soil and water. Only South Asia and Oceania showed an increasing trend for this category (Table 11).

Wood removed from forests and other wooded land constituted an important component of the productive function of forests. For the Asia and the Pacific region as a whole, total removals declined by 10 percent from 1.16 billion m^3 in 1990 to 1.04 billion m^3 in 2010 (Figure 8). Reductions in fuelwood removals accounted for the bulk of this fall. Removals of industrial roundwood in the region remained quite stable (approximately 280 million m^3 per year) over the past two decades. Roundwood supply remained unchanged despite partial logging bans and log export restrictions in some

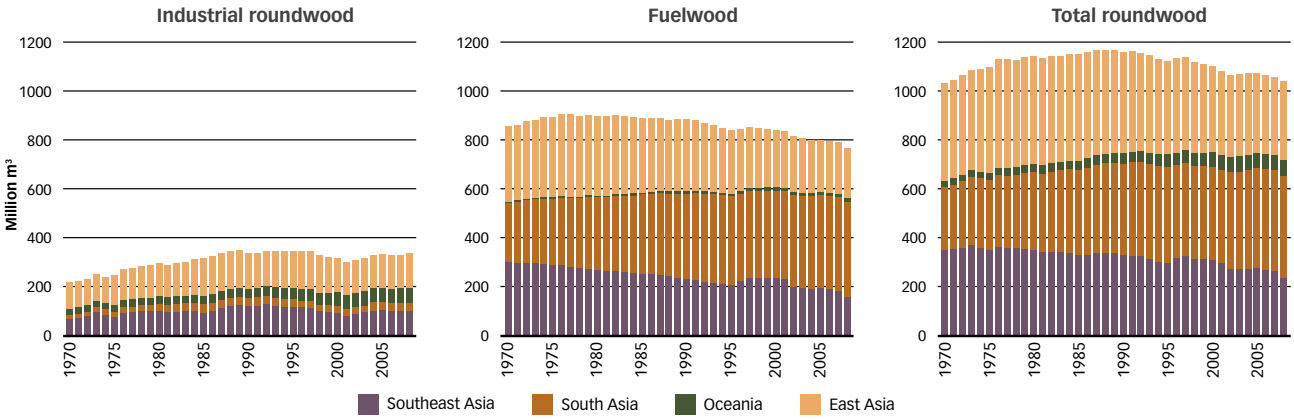
Table 10: Area of forest designated primarily for protection of soil and water in Asia and the Pacific, 1990–2010

Subregion	Area (1 000 ha)			Annual change (1 000 ha)		Annual change rate (%)	
	1990	2000	2010	1990–2000	2000–2010	1990–2000	2000–2010
East Asia	24 061	38 514	65 719	1 445	2 721	4.82	5.49
South Asia	12 125	12 296	12 760	17	46	0.14	0.37
Southeast Asia	43 686	45 636	43 741	195	-190	0.44	-0.42
Oceania	1 048	1 078	888	3	-19	0.28	-1.92
Total Asia–Pacific	80 920	97 524	123 108	1 660	2 558	1.88	2.36
World	240 433	271 699	299 378	3 127	2 768	1.23	0.97

Table 11: Area of forest designated primarily for production in Asia and the Pacific, 1990–2010

Subregion	Area (1 000 ha)			Annual change (1 000 ha)		Annual change rate (%)	
	1990	2000	2010	1990–2000	2000–2010	1990–2000	2000–2010
East Asia	126 936	119 592	94 711	-734	-2 488	-0.59	-2.31
South Asia	18 255	18 684	19 713	43	103	0.23	0.54
Southeast Asia	96 554	109 973	104 526	1 342	-545	1.31	-0.51
Oceania	7 241	11 180	11 569	394	39	4.44	0.34
Total Asia–Pacific	248 986	259 429	230 519	1 044	-2 891	0.41	-1.17
World	1 181 576	1 160 325	1 131 210	-2 125	-2 911	-0.18	-0.25

Figure 8: Volume of wood removals in Asia and the Pacific, 1970–2008 (million m³)



Source: FAOSTAT

countries (China, Indonesia, Malaysia and Thailand) because the increased supply of wood from planted forests (not covered by the restrictions) and imports replaced supply from natural forests.

The value of wood and NWFP removals is an indicator of the contribution of forests to national economies and of socio-economic benefits of forests. The value of total wood removals (including roundwood and fuelwood) in 2005 was around US$29 billion in the Asia and the Pacific region as a whole. Subregional trends in the value of wood removals between 1990 and 2005 fluctuated and only Oceania reported an increasing trend in the value of wood removals since 1990 (Figure 9). Forests in the region also provided a large variety of NWFPs collected mainly for home consumption, which had an important economic value that was only partially accounted for. Data on the value of these removals were reported by 16 countries, accounting for 70 percent of the forest area of the region. NWFP removals reached a total reported value of US$7.4 billion in the region as a whole.

The level of employment in forestry is also an indicator of both the social and economic value of the sector to society. Table 12 shows employment in the primary production of forest goods and related services, (i.e. excluding the processing of wood and NWFPs). The reported level of employment in the region was very high (8.2 million) compared with the world total (10.5 million), as a result of the inclusion of people employed to establish forest plantations and other part-time jobs. Conversely, most countries' statistics did not include people collecting fuelwood and NWFPs for subsistence purposes, although some provided partial estimates of subsistence employment. Employment in forestry declined slightly from 1990 to 2005, mainly as a result of China's partial logging ban in the late 1990s and general increases in labour productivity (e.g. increased mechanization of harvesting operations).

Figure 9: Value of wood removals in Asia and the Pacific, 1990–2005 (billion US$)

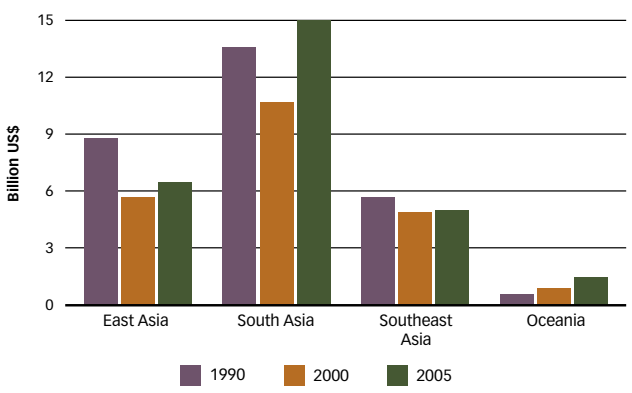


Table 12: Employment in primary production of forest goods in Asia and the Pacific, 2005 (1 000 FTE)

Subregion	Employment in primary production of goods, 2005
East Asia	1 293
South Asia	6 396
Southeast Asia	457
Oceania	27
Total Asia–Pacific	8 172

Europe[5]

Extent of forest resources

The region of Europe consists of 50 countries and areas with a total forest area of just over 1 billion hectares or about 25 percent of the global forest area. Based on statistics from FRA 2010, forests covered about 45 percent of total land area in Europe, ranging from 0 in Monaco to 73 percent in Finland. Forest area in Europe was dominated by the Russian Federation, which contained the largest forest area in the world. The country reported a forest area of almost 810 million hectares or over 80 percent of Europe's forest area and one-fifth of the global forest area. For practical reasons, this report provides the figures for Europe, Europe excluding the Russian Federation, and the Russian Federation separately.

Europe's forest area continued to grow between 1990 and 2010, although the rate of increase slowed over the period analysed (Table 13). The expansion of forest area was a result of new forest planting and natural expansion of forests onto former agricultural land. In the last decade, the annual net increase in forest area was just under 700 000 ha per year, down from close to 900 000 ha per year during the 1990s. In comparison with other regions, Europe was the only region with a net increase in forest area over the entire period 1990–2010. The forest area in the Russian Federation was virtually stable, with a small increase in the 1990s and a small decline in the period 2000–2010. This slight fluctuation was insignificant in statistical terms given the large forest area. The reported forest area for Europe excluding the Russian Federation was 196 million hectares in 2010.

The net increase in forest area in Europe over the period 2000–2010 was due in large part to a few countries, led by Spain (118 500 ha per year) and Sweden (81 400 ha per year), followed by Italy, Norway, France and Bulgaria. However, the apparent increase in forest area in Sweden between 2000 and 2005 was largely the result of a change in assessment methodology rather than an actual change. The largest percentage increases in the last decade were reported by countries with low forest cover: Iceland (5.0 percent per year) and the Republic of Moldova (1.8 percent per year). Estonia, Finland and the Russian Federation were the only European countries to report a net loss of forest area over the period 2000–2010, together accounting for an average decrease of 51 000 ha per year; however, this amounted to less than a 0.01 percent loss per year.

The increases in the area of planted forests in Europe also slowed in the last decade, when compared with the global trend over the same time period (Table 14). Close to 7 percent of the region's forest area was composed of planted forests in 2010. About half of the net increase in forest area over the past 20 years was a result of an increase in the area of planted forests. About half of the net increase in forest area over the last 10 years was due to afforestation, with the balance of the increase resulting from the natural expansion of forests mainly onto former agricultural land.

Table 13: Forest area in Europe, 1990–2010

Region	Area (1 000 ha)			Annual change (1 000 ha)		Annual change rate (%)	
	1990	2000	2010	1990–2000	2000–2010	1990–2000	2000–2010
Russian Federation	808 950	809 269	809 090	32	-18	n.s.	n.s.
Europe excluding Russian Federation	180 521	188 971	195 911	845	694	0.46	0.36
Total Europe	989 471	998 239	1 005 001	877	676	0.09	0.07
World	4 168 399	4 085 063	4 032 905	-8 334	-5 216	-0.20	-0.13

[5] Countries and areas included in this regional section for the purposes of this review are: Albania, Andorra, Austria, Belarus, Belgium, Bosnia and Herzegovina, Bulgaria, Croatia, Czech Republic, Denmark, Estonia, Faroe Islands, Finland, France, Germany, Gibraltar, Greece, Guernsey, Holy See, Hungary, Iceland, Ireland, Isle of Man, Italy, Jersey, Latvia, Liechtenstein, Lithuania, Luxembourg, Malta, Monaco, Montenegro, Netherlands, Norway, Poland, Portugal, Republic of Moldova, Romania, Russian Federation, San Marino, Serbia, Slovakia, Slovenia, Spain, Svalbard and Jan Mayen Islands, Sweden, Switzerland, The Former Yugoslav Republic of Macedonia, Ukraine, United Kingdom.

In Europe, the total carbon stock in forest biomass was estimated at 45 Gt or almost 16 percent of the world total (Figure 10). Europe excluding the Russian Federation accounted for almost 13 Gt and here the annual increase was about 145 tonnes per year in 2000–2010 compared with 135 tonnes per year in the 1990s. In the Russian Federation the carbon in forest biomass was relatively stable with a minor decrease in the 1990s and a slight increase over the last decade.

Figure 10: Carbon stock in forest biomass in Europe, 1990–2010 (Gt)

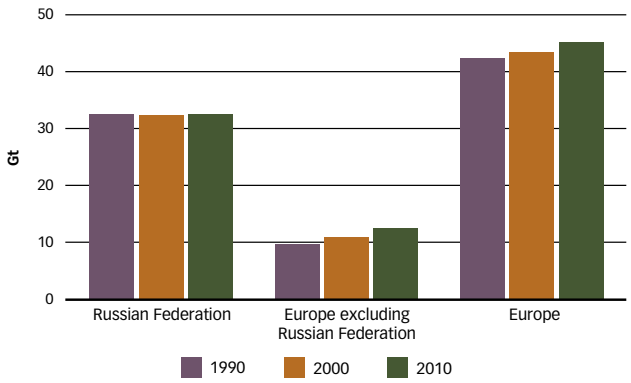
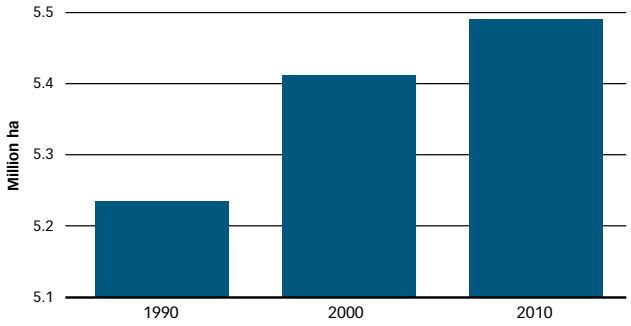


Figure 11: Area of primary forest in Europe excluding the Russian Federation, 1990–2010 (million ha)



Biological diversity and protective functions

About 26 percent of Europe's forest area was classified as primary forest, compared with 36 percent of the world as a whole. The large majority of this area was located in the Russian Federation. Excluding the Russian Federation, less than 3 percent of Europe's forests were classified as primary forest. The data indicated a slightly increasing trend in primary forests in Europe excluding the Russian Federation (Figure 11). The Russian Federation reported a decrease of 1.6 million hectares per year in the 1990s, which reversed to show a gain of 164 000 ha per year in the period from 2000 to 2010. This change was mainly the result of a modification in the classification system introduced in 1995 rather than actual changes in primary forest area. A number of countries reported an increase in the area of primary forest, which can occur when countries set aside natural forest areas in which no intervention should take place. With time, these areas evolve into forests in which there are no clearly visible indications of human activity and the ecological processes are not significantly disturbed, thus meeting the definition of primary forest as used in the FRA process. It should be noted that information was missing from some forest rich countries such as Finland.

Throughout the 1990s and 2000s there was a positive global trend in the extent to which forest ecosystems were designated for the conservation of biological diversity, with the total increase over 20 years approaching 100 million hectares, equivalent to a 35 percent rise in conservation area. In Europe, the forest area designated primarily for conservation of biological diversity doubled over the same period (Table 15). Most of this increase occurred in the 1990s, but the area continued to grow

Table 14: Area of planted forests in Europe, 1990–2010

Region	Area (1 000 ha)			Annual change (1 000 ha)		Annual change rate (%)	
	1990	2000	2010	1990–2000	2000–2010	1990–2000	2000–2010
Russian Federation	12 651	15 360	16 991	271	163	1.96	1.01
Europe excluding Russian Federation	46 395	49 951	52 327	356	238	0.74	0.47
Total Europe	59 046	65 312	69 318	627	401	1.01	0.60
World	178 307	214 839	264 084	3 653	4 925	1.88	2.09

between 2000 and 2010 at just over 2 percent per year. Some 10 percent of the forest area in Europe (excluding the Russian Federation) was designated for biodiversity conservation, compared with a global average of 12 percent. In the Russian Federation, the forest area designated for conservation increased from 1.5 percent in 1990 to 2.2 percent of total forest area in 2010, largely due to national policies that strengthened nature conservation.

In Europe, 4 percent of the total forest area was located within formally established protected areas. Excluding the Russian Federation, this figure rose to 12 percent. Over the last decade, the annual increase in the area of forest within a protected area system was almost 560 000 ha per year, compared with about 910 000 ha per year in the previous decade (1990–2000).

The forest area primarily designated for protection of soil and water accounted for 9 percent of the total forest area in the region. A large increase in this area was recorded in the decade from 1990 to 2000 (Table 16). The Russian Federation was mainly responsible for this significant increase and, although a similar trend was observed in Europe excluding the Russian Federation, it was less pronounced.

The positive trends in forest area designated primarily for protection of soil and water indicate that countries in Europe have recognized the importance of protective forest functions. Concern about maintaining the protective functions of forests were the driving force behind the forest laws in many countries, notably in mountainous regions. Although considerable research has been carried out on the benefits of forest protection, they are difficult to quantify because they are rarely valued in markets and tend to be highly site-specific.

Productive and socio-economic functions

In Europe, 52 percent of the total forest area was designated primarily for production (57 percent excluding the Russian Federation), compared with a global average of 30 percent. The area of Europe's forests designated primarily for production declined significantly in the 1990s, but increased slightly over the last decade (Table 17). Country data suggested an

Table 15: Area of forest designated primarily for conservation of biological diversity in Europe, 1990–2010

Region	Area (1 000 ha)			Annual change (1 000 ha)		Annual change rate (%)	
	1990	2000	2010	1990–2000	2000–2010	1990–2000	2000–2010
Russian Federation	11 815	16 190	17 572	438	138	3.20	0.82
Europe excluding Russian Federation	6 840	13 203	19 407	636	620	6.80	3.93
Total Europe	18 655	29 393	36 979	1 074	759	4.65	2.32
World	270 413	302 916	366 255	3 250	6 334	1.14	1.92

Table 16: Area of forest designated primarily for protection of soil and water in Europe, 1990–2010

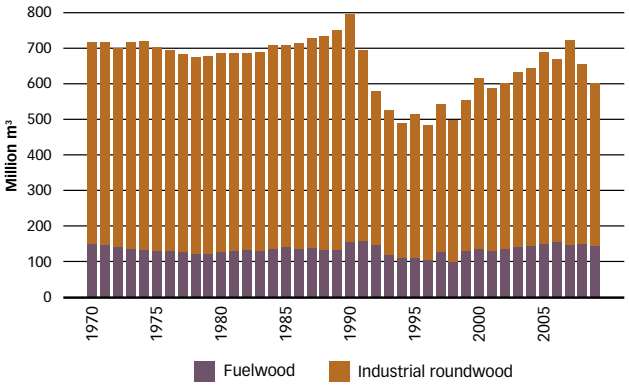
Region	Area (1 000 ha)			Annual change (1 000 ha)		Annual change rate (%)	
	1990	2000	2010	1990–2000	2000–2010	1990–2000	2000–2010
Russian Federation	58 695	70 386	71 436	1 169	105	1.83	0.15
Europe excluding Russian Federation	18 237	20 403	21 559	217	116	1.13	0.55
Total Europe	76 932	90 788	92 995	1 386	221	1.67	0.24
World	240 433	271 699	299 378	3 127	2 768	1.23	0.97

increase in the total growing stock in many countries, especially in areas of central Europe. The net result at the regional level has been an increase in total growing stock in cubic metres and in cubic metres per hectare over the last 20 years.

Wood removals provide another indicator of the productive functions of forest. During the early 1990s, total wood removals in Europe declined because of the collapse of the eastern European economies (Figure 12). Although removals rebounded slightly in later years, they once again dropped sharply in conjunction with the 2008–2009 recession in Europe as a result of declining demand for wood. The value of wood removals in Europe excluding the Russian Federation also dipped at the end of the 1990s, and rose again between 2000 and 2005 (Figure 13). Excluding the Russian Federation, Europe accounted for 24 percent of the world's industrial roundwood removals, but only 5 percent of the world's forest area. Including the Russian Federation, Europe accounted for 32 percent of global industrial roundwood removals. With Europe's forest area and growing stock expanding, it would seem that a high level of wood removal for production is not incompatible with sustainable forest management in countries with relatively developed economies and stable institutions. The volume of wood harvested in Europe's forests was increasing, yet remained considerably below increment (UNECE/FAO, 2007).

A substantial quantity of NWFPs were harvested for self-consumption in Europe, although they rarely entered markets or were recorded in national statistics. NWFPs have an important economic value. Data on the quantity and value of NWFP removals were reported by 29 countries despite the fact that comprehensive data were limited in most countries. Some countries submitted data on a limited number of products. The reported total value of NWFP removals reached US$8.4 billion in Europe, which is still considered to be an incomplete estimate. Globally, the reported value of NWFP removals amounted to US$18.5 billion in 2005.

Figure 12: Wood removals in Europe, 1970–2009 (million m³)



Source: FAOSTAT

Figure 13: Value of wood removals in Europe excluding the Russian Federation (billion US$)

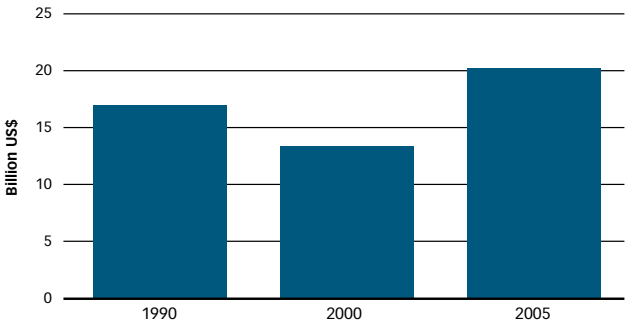


Table 17: Area of forest designated primarily for production in Europe, 1990–2010

Region	Area (1 000 ha)			Annual change (1 000 ha)		Annual change rate (%)	
	1990	2000	2010	1990–2000	2000–2010	1990–2000	2000–2010
Russian Federation	446 679	411 437	415 791	-3 524	435	-0.82	0.11
Europe excluding Russian Federation	111 363	111 229	108 829	-13	-240	-0.01	-0.22
Total Europe	558 042	522 666	524 620	-3 538	195	-0.65	0.04
World	1 181 576	1 160 325	1 131 210	-2 125	-2 911	-0.18	-0.25

Some 1.1 million people were employed in the primary production of forest goods in Europe (Table 18). However, employment levels declined significantly over the period 1990–2005. As noted in UNECE/FAO (2005), "labour productivity has been rising faster than production, so total employment in the forest sector has been steadily falling". The effect of the recession in Europe was also likely to result in a drop in employment after late 2008.

Table 18: Employment in primary production of forest goods in Europe, 2005 (1 000 FTE)

Region	Employment in primary production of goods, 2005
Russian Federation	444
Europe excluding Russian Federation	665
Total Europe	1 109
World	10 433

Latin America and the Caribbean[6]

Extent of forest resources

The region of Latin America and the Caribbean has abundant forest resources, with almost 49 percent of its total land covered by forest in 2010. With an estimated 891 million hectares, it accounted for around 22 percent of the world's forest area. Brazil was one of the five most forest-rich countries in the world with 13 percent of the global forest area and was the country with the largest extent of tropical forest. The five countries with the largest forest area in the region (Brazil, Peru, Colombia, the Plurinational State of Bolivia and the Bolivarian Republic of Venezuela) represented 84 percent of the total forest area of the region.

Forest area continued to decline in Central and South America, with the leading cause of deforestation being the conversion of forest land to agriculture and urbanization. Within the region, the largest decline in forest area continued to be in South America, although this has slowed and in percentage terms remained stable since 1990 (Table 19). The largest percentage loss of forest area continued to take place in Central America, although the rate has fallen in this subregion since 2000. Chile, Costa Rica and Uruguay were among the countries that increased their forest areas. Forest area also increased in the Caribbean, mainly through natural expansion of forest onto abandoned agricultural land. The total area of other wooded land in the region accounted for 187 million hectares or 10 percent of the total land area. In Central America and the Caribbean the area of other wooded land was stable, while in South America there was a reduction of more than half a million hectares per year between 1990 and 2010.

Table 19: Forest area in Latin America and the Caribbean, 1990–2010

Subregion	Area (1 000 ha)			Annual change (1 000 ha)		Annual change rate (%)	
	1990	2000	2010	1990–2000	2000–2010	1990–2000	2000–2010
Caribbean	5 901	6 433	6 932	53	50	0.87	0.75
Central America	25 717	21 980	19 499	-374	-248	-1.56	-1.19
South America	946 454	904 322	864 351	-4 213	-3 997	-0.45	-0.45
Total Latin America and the Caribbean	978 072	932 735	890 782	-4 534	-4 195	-0.47	-0.46
World	4 168 399	4 085 063	4 032 905	-8 334	-5 216	-0.20	-0.13

[6] For the purposes of this report, Latin American and Caribbean countries and areas are grouped into the following subregions:
- Central America: Belize, Costa Rica, El Salvador, Guatemala, Honduras, Nicaragua, Panama
- South America: Argentina, Bolivia (Plurinational State of), Brazil, Chile, Colombia, Ecuador, Falkland Islands (Malvinas), French Guiana, Guyana, Paraguay, Peru, Suriname, Uruguay, Venezuela (Bolivarian Republic of). It should be noted that a dispute exists between the Government of Argentina and the United Kingdom of Great Britain and Northern Ireland concerning sovereignty over the Falkland Islands (Malvinas).
- Caribbean: Anguilla, Antigua and Barbuda, Aruba, Bahamas, Barbados, Bermuda, British Virgin Islands, Cayman Islands, Cuba, Dominica, Dominican Republic, Grenada, Guadeloupe, Haiti, Jamaica, Martinique, Montserrat, Netherlands Antilles, Puerto Rico, Saint Kitts and Nevis, Saint Lucia, Saint Martin (French part), Saint Vincent and the Grenadines, Saint Barthélemy, Trinidad and Tobago, Turks and Caicos Islands, United States Virgin Islands

Globally, planted forests comprised about 7 percent of total forest area. In Latin America and the Caribbean they made up less than 2 percent of total forest area and the region accounted for less than 6 percent of the global area of planted forests. However, planted forests have expanded at a rate of about 3.2 percent per year in the region over the last decade (Table 20). Brazil, Chile, Argentina, Uruguay and Peru showed the largest increase in the area of planted forest between 2000 and 2010.

It was estimated that in Latin America and the Caribbean the total carbon stored in forest biomass was 104 Gt and it decreased by an estimated 424 million tonnes annually during the period 1990–2010 (Figure 14). Central and South America registered a net loss over the period 1990–2010, while the Caribbean showed an overall gain in carbon in forest biomass.

Biological diversity and protective functions

Primary forests in Latin America and the Caribbean accounted for 75 percent of the total forest area and the region held 57 percent of the world's primary forests. Most of the primary forest was located in inaccessible or protected areas. Despite this, there was a significant loss of primary forest outside protected areas, particularly in South America. Caribbean countries reported that the area of primary forest had been stable since 1990. Central America increased its net loss from 54 000 ha per year in the decade 1990–2000 to 74 000 ha annually from 2000 to 2010 (Figure 15). The data collected did not allow for an analysis of the proportion of this net loss that was caused by deforestation and conversion to other uses, compared with that resulting from the opening up of primary forests to selective logging or other human activities,

Figure 14: Carbon stock in forest biomass in Latin America and the Caribbean, 1990–2010 (Gt)

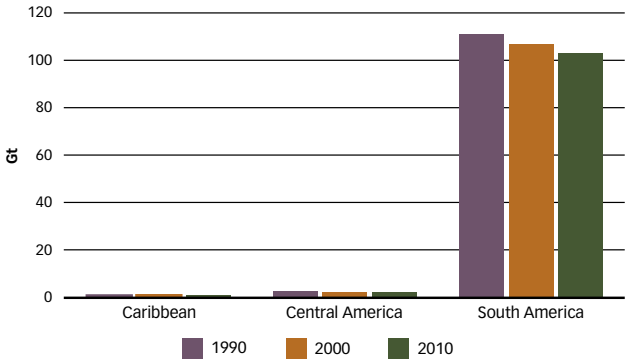
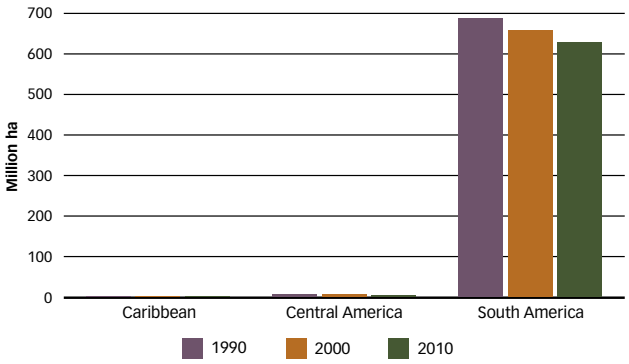


Figure 15: Area of primary forest in Latin America and the Caribbean, 1990–2010 (million ha)



which would mean that the forest was reclassified as 'other naturally regenerated forest' in the FRA 2010 classification system.

Table 20: Area of planted forest in Latin America and the Caribbean, 1990–2010

Subregion	Area (1 000 ha)			Annual change (1 000 ha)		Annual change rate (%)	
	1990	2000	2010	1990–2000	2000–2010	1990–2000	2000–2010
Caribbean	391	394	547	n.s.	15	0.09	3.34
Central America	445	428	584	-2	16	-0.37	3.14
South America	8 276	10 058	13 821	178	376	1.97	3.23
Total Latin America and the Caribbean	9 111	10 880	14 952	177	407	1.79	3.23
World	178 307	214 839	264 084	3 653	4 925	1.88	2.09

In Latin America and the Caribbean, 14 percent of the forest area was designated primarily for the conservation of biological diversity. This area has increased by more than 3 million hectares annually (or 4.5 percent per year) since 2000 (Table 21) with the vast majority of this increase in South America. A total of 18 percent of the total forest area in the region was located in formally designated protected areas.

The forest area designated for protection of soil and water resources represented 7 percent of the total forest area in the region, compared with 8 percent globally. This area increased slightly between 1990 and 2010 (Table 22), with virtually all of the increase being in the Caribbean. The countries with the highest proportion of their forest area designated for protective functions were (in descending order): Cuba, Chile, Ecuador, Trinidad and Tobago, and Honduras.

Productive and socio-economic functions

In 2010, about 14 percent of all forest area in the region was designated primarily for production, compared with a global average of 30 percent. Latin America and the Caribbean contained 10 percent of the total worldwide forest area designated for productive purposes. Guyana reported the largest proportion of forest area designated primarily for production (97 percent), followed by Uruguay (64 percent), Haiti (54 percent), the Bolivarian Republic of Venezuela (49 percent) and Chile (46 percent). While the forest area designated for productive functions fell at the global level, it grew in Latin America and the Caribbean, primarily in South America (Table 23).

Wood removals in the region showed continued growth over the past two decades. Fuelwood accounted for slightly more than half (57 percent) of total wood removals

Table 21: Area of forest designated primarily for conservation of biodiversity in Latin America and the Caribbean, 1990–2010

Subregion	Area (1 000 ha)			Annual change (1 000 ha)		Annual change rate (%)	
	1990	2000	2010	1990–2000	2000–2010	1990–2000	2000–2010
Caribbean	617	671	711	5	4	0.85	0.58
Central America	4 337	4 023	3 677	-31	-35	-0.75	-0.90
South America	40 683	52 548	84 222	1 187	3 167	2.59	4.83
Total Latin America and the Caribbean	45 637	57 243	88 610	1 161	3 137	2.29	4.47
World	270 413	302 916	366 255	3 250	6 334	1.14	1.92

Table 22: Area of forest designated primarily for protection of soil and water in Latin America and the Caribbean, 1990–2010

Subregion	Area (1 000 ha)			Annual change (1 000 ha)		Annual change rate (%)	
	1990	2000	2010	1990–2000	2000–2010	1990–2000	2000–2010
Caribbean	869	1 106	1 428	24	32	2.44	2.58
Central America	124	114	90	-1	-2	-0.90	-2.33
South America	48 656	48 661	48 549	1	-11	n.s.	-0.02
Total Latin America and the Caribbean	49 650	49 881	50 066	23	19	0.05	0.04
World	240 433	271 699	299 378	3 127	2 768	1.23	0.97

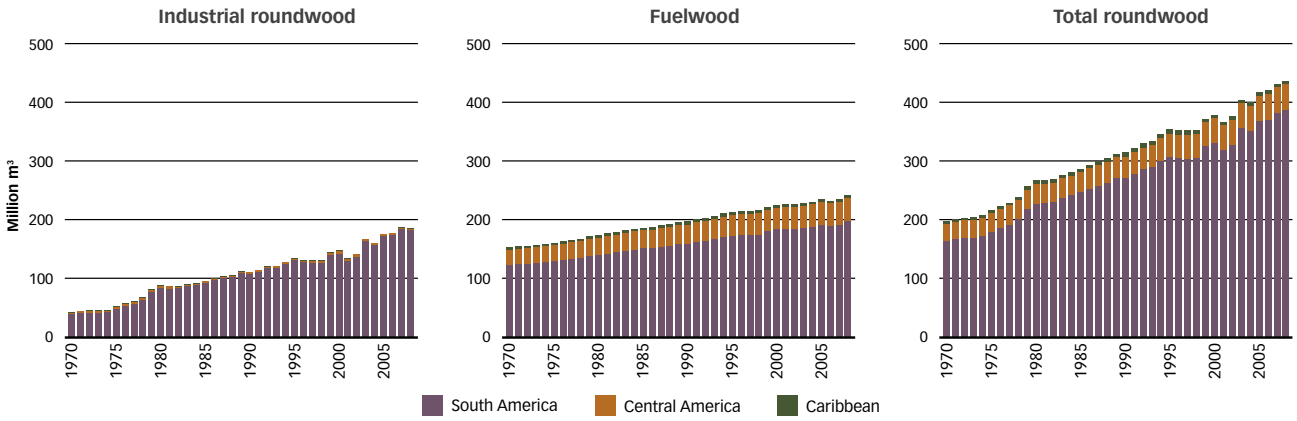
in the region. In Central America and the Caribbean, by far the majority of wood removed from forest was for fuelwood (90 percent), while in South America removals were equally distributed between industrial roundwood and fuelwood (Figure 16).

Very limited information was reported on NWFPs so it was difficult to draw any conclusions about these removals. The reports indicated that food products, live animals and exudates were the principal NWFPs extracted from the forests in Latin America and the Caribbean. NWFP collection was mainly practised by forest-dependent people and was generally not registered in official trade statistics.

Wood removals in the region were estimated to be worth about US$6.8 billion or 7 percent of the world total in 2005. Regional trend analysis (based on those countries that provided information for all the reporting years) showed a drop in the value from 1990 to 2000, which rebounded between 2000 and 2005 (Figure 17). Information on the value of fuelwood continued to be scarce. Most of the countries in Latin America and the Caribbean noted that quantitative data related to the extraction of fuelwood both for domestic and industrial purposes was very limited or non-existent.

More than 350 000 full-time jobs were reported in the primary production of goods from forests (the figures exclude employment in wood processing industries) (Table 24). Global employment in forestry declined over the period 1990–2005, but in Latin America and the Caribbean there was an upward swing of 3.4 percent from 2000 to 2005. Suriname and Brazil nearly doubled the number of full-time jobs related to forestry over the last five years. Honduras, Nicaragua and El Salvador also showed a rising trend. Most other countries in the region did not present sufficient data to report a trend.

Figure 16: Volume of wood removals in Latin America and the Caribbean, 1970–2008 (million m³)



Source: FAOSTAT

Table 23: Area of forest designated primarily for production in Latin America and the Caribbean, 1990–2010

Subregion	Area (1 000 ha)			Annual change (1 000 ha)		Annual change rate (%)	
	1990	2000	2010	1990–2000	2000–2010	1990–2000	2000–2010
Caribbean	879	860	1 028	-2	17	-0.21	1.80
Central America	1 743	1 620	1 522	-12	-10	-0.73	-0.62
South America	70 857	75 866	80 827	501	496	0.69	0.64
Total Latin America and the Caribbean	73 478	78 346	83 378	487	503	0.64	0.62
World	1 181 576	1 160 325	1 131 210	-2 125	-2 911	-0.18	-0.25

Figure 17: Value of wood removals in Latin America and the Caribbean (billion US$)

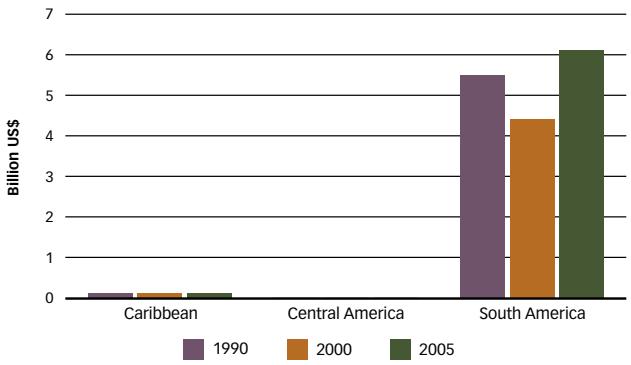


Table 24: Employment in primary production of forest goods in Latin America and the Caribbean, 2005 (1 000 FTE)

Subregion	Employment in primary production of goods, 2005
Caribbean	41
Central America	83
South America	239
Total Latin America and the Caribbean	363
World	10 537

The Near East[7]

Extent of forest resources

Although the Near East[8] accounted for close to 16 percent of the world's land area, it represented only 3 percent of the world's forest area as of 2010. Of the 33 countries and areas included in this region, 26 are 'low forest cover countries' where forest occupied less than 10 percent of the land area; one country (Qatar) reported no forest at all. According to FRA 2010, the total forest area in the region in 2010 was 122 million hectares or 6 percent of the land area.

North Africa contained the greatest share (65 percent) of the region's forest area, followed by Western Asia (22 percent) and Central Asia (13 percent) (Table 25). In the Near East, the trend in forest area shifted from a net loss of 518 000 ha per year in the 1990s to a net gain of 90 000 ha per year over the last decade. However, this trend should be viewed as a general estimate, as few countries could provide reliable data from comparable assessments over time. Trends in Central and Western Asia were quite stable: forest area declined slightly in some countries and increased slightly in others, with the exception of Turkey, which experienced rapid gains over the period 1990–2000. In North Africa, however, the trends fluctuated and the data suggested that a net loss of more than half a million hectares of forest per year in the 1990s became a net gain in the last decade. This was at least partly a result of a change in assessment methodology in Sudan.

Table 25: Forest area in the Near East, 1990–2010

Subregion	Area (1 000 ha)			Annual change (1 000 ha)		Annual change rate (%)	
	1990	2000	2010	1990–2000	2000–2010	1990–2000	2000–2010
Central Asia	15 901	15 980	16 016	8	4	0.05	0.02
North Africa	85 123	79 224	78 814	-590	-41	-0.72	-0.05
Western Asia	25 588	26 226	27 498	64	127	0.25	0.47
Total Near East	126 612	121 431	122 327	-518	90	-0.42	0.07
World	4 168 399	4 085 063	4 032 905	-8 334	-5 216	-0.20	-0.13

[7] For the purposes of this report, the Near East countries and areas are grouped into the following subregions:
- Western Asia: Afghanistan, Bahrain, Cyprus, Israel, Iran (Islamic Republic of), Iraq, Jordan, Kuwait, Lebanon, Occupied Palestinian Territory, Oman, Qatar, Saudi Arabia, Syrian Arab Republic, Turkey, United Arab Emirates, Yemen
- Central Asia: Armenia, Azerbaijan, Georgia, Kazakhstan, Kyrgyzstan, Tajikistan, Turkmenistan, Uzbekistan
- North Africa: Algeria, Egypt, Libyan Arab Jamahiriya, Mauritania, Morocco, Sudan, Tunisia, Western Sahara

[8] The countries and areas forming part of the North Africa subregion (Algeria, Egypt, Libyan Arab Jamahiriya, Mauritania, Morocco, Sudan, Tunisia and Western Sahara) also appear in the Africa regional section. The inclusion of these countries and areas in both regions was intentional and necessary, as it reflects the categorization of countries within the FAO Regional Forestry Commissions.

Forest established through planting or seeding made up 12 percent of the forest area of the region. This was mainly composed of native species (95 percent). The area of planted forest showed an increase in all subregions in the last 20 years (Table 26).

It was estimated that the forests of the Near East stored 3.5 Gt of carbon in biomass in 2010 and that this amount had increased over the last 10 years. Only North Africa's carbon stock declined in the last 20 years, mainly because of the reduction of forest area (Figure 18).

Biological diversity and protective functions

Primary forests accounted for 14 percent of the total forest area in the Near East, with more than 80 percent of the region's primary forest being located in Sudan. The area of primary forest declined by some 100 000 ha per year in the 1990s, but has since remained largely stable (Figure 19).

The forest area designated for biodiversity conservation in the Near East has increased by 85 000 ha annually over the last ten years and by 2010 accounted for close to 13 percent of the total forest area in the region. Most of this increase took place in Central Asia (Table 27). Overall, 16 percent of the forests in the region were within legally established protected areas, with the highest percentage being found in North Africa (18 percent).

Figure 18: Carbon stock in forest biomass in the Near East, 1990–2010 (Gt)

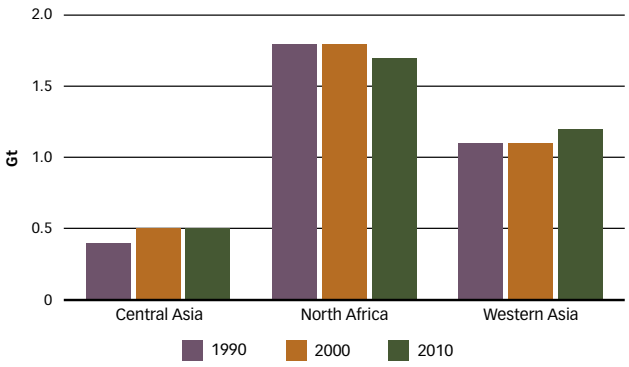


Table 26: Area of planted forests in the Near East, 1990–2010

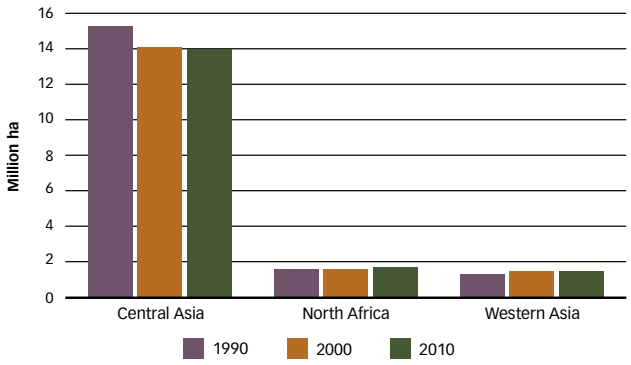
Subregion	Area (1 000 ha)			Annual change (1 000 ha)		Annual change rate (%)	
	1990	2000	2010	1990–2000	2000–2010	1990–2000	2000–2010
Central Asia	1 470	1 771	1 918	30	15	1.89	0.80
North Africa	6 794	7 315	8 091	52	78	0.74	1.01
Western Asia	3 208	3 926	5 073	72	115	2.04	2.60
Total Near East	11 471	13 012	15 082	154	207	1.27	1.49
World	178 307	214 839	264 084	3 653	4 925	1.88	2.09

Table 27: Area of forest designated primarily for conservation of biological diversity in the Near East, 1990–2010

Subregion	Area (1 000 ha)			Annual change (1 000 ha)		Annual change rate (%)	
	1990	2000	2010	1990–2000	2000–2010	1990–2000	2000–2010
Central Asia	795	1 039	1 566	24	53	2.71	4.19
North Africa	13 325	12 597	12 769	-73	17	-0.56	0.14
Western Asia	915	1 056	1 208	14	15	1.45	1.35
Total Near East	15 035	14 692	15 544	-34	85	-0.23	0.56
World	270 413	302 916	366 255	3 250	6 334	1.14	1.92

Fourteen percent of the forest area in the region was designated primarily for the protection of soil and water resources. Collectively, the region increased these areas by some 60 000 ha annually over the last 20 years (Table 28). At the subregional level, the rate of increase in forest area designated for protection in Central Asia dropped over the last ten years in comparison with the previous decade. Gains were made here in the second half of the 1990s largely because Georgia changed the designation of a part of its forest from social services to soil protection and water regulation. Western Asia's area of protective forest by contrast expanded in the last decade, mainly as a result of Turkey's increasing attention to soil erosion problems that caused the country to dedicate a larger portion of its forests to the conservation of soil and water.

Figure 19: Area of primary forest in the Near East, 1990–2010 (million ha)



Productive and socio-economic functions

In the Near East region 38 percent of the forest area was primarily designated for the production of wood and NWFPs. After the overall area of productive forest dropped in the 1990s, it remained stable from 2000 onwards. At the subregional level, the trend in area designated primarily for production was quite heterogeneous: Central Asia registered a positive trend, which accelerated in the last ten years; North Africa's productive forest area fell over the period 1990–2000 and rose slightly between 2000 and 2010; and in Western Asia, the area increased in the 1990s and then decreased again in the last ten years (Table 29).

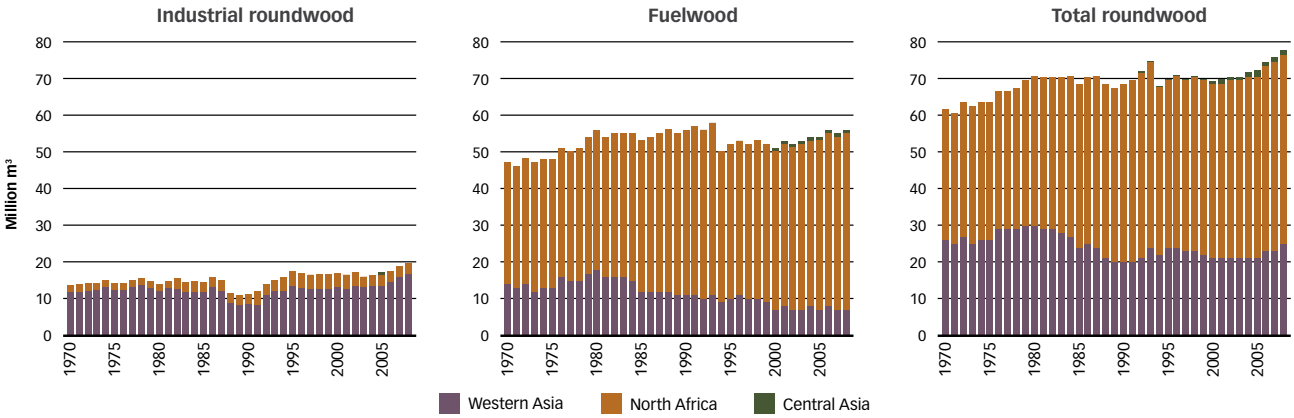
Table 28: Area of forest designated primarily for protection of soil and water in the Near East, 1990–2010

Subregion	Area (1 000 ha)			Annual change (1 000 ha)		Annual change rate (%)	
	1990	2000	2010	1990–2000	2000–2010	1990–2000	2000–2010
Central Asia	10 361	10 974	10 983	61	1	0.58	0.01
North Africa	4 068	3 855	3 851	-21	n.s.	-0.54	-0.01
Western Asia	1 861	2 086	2 685	22	60	1.15	2.56
Total Near East	16 290	16 914	17 520	62	61	0.38	0.35
World	240 433	271 699	299 378	3 127	2 768	1.23	0.97

Table 29: Area of forest designated primarily for production in the Near East, 1990–2010

Subregion	Area (1 000 ha)			Annual change (1 000 ha)		Annual change rate (%)	
	1990	2000	2010	1990–2000	2000–2010	1990–2000	2000–2010
Central Asia	27	28	90	n.s.	6	0.36	12.37
North Africa	39 557	36 637	36 819	-292	18	-0.76	0.05
Western Asia	9 539	9 657	9 439	12	-22	0.12	-0.23
Total Near East	49 123	46 323	46 348	-280	3	-0.59	0.01
World	1 181 576	1 160 325	1 131 210	-2 125	-2 911	-0.18	-0.25

Figure 20: Volume of wood removals in the Near East, 1970–2008 (million m³)



Source: FAOSTAT

The region accounted for only 2 percent of global wood removals, more than 70 percent of which was used as fuelwood (Figure 20). Turkey was the only country in the region where industrial roundwood removals were significant (14 million cubic metres) and played an important role as a source of raw material for wood industries. Approximately 296 000 people were employed in 2005 in the primary production of goods in the region (Table 30). Of these, 209 000 were in North Africa.

Information on the value of NWFPs was provided by only 13 countries in the region, with a total value of US$126 million as of 2005. The reported annual value of wood products in the Near East region was close to US$2 billion in 2005. However, information was missing from most of the countries in Central Asia, so the true value is likely to be considerably higher. In Western Asia, Jordan and Turkey recorded a sharp drop in the value of wood products between 1990 and 2000, which was only partly recovered during the period 2000–2005 (Figure 21).

North America[9]

Extent of forest resources

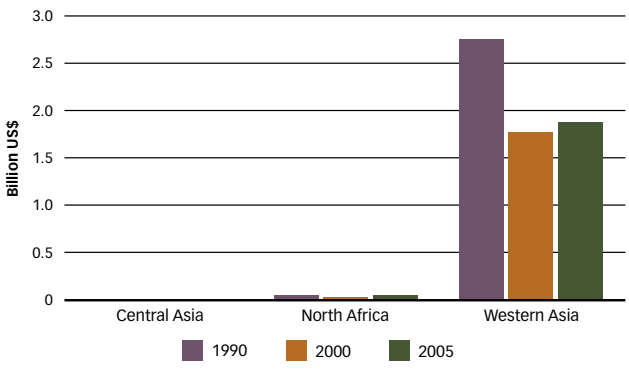
In 2010 forests covered 34 percent of North America's land area and accounted for 17 percent of the global forest area. In the North American region, the forest area in 2010 was estimated to be slightly larger than in 1990 (Table 31). While Canada reported no change in forest area, Mexico registered a decreasing rate of loss over the last 20 years, which was outweighed by a net gain in forest area in the United States of America.

Globally, planted forest made up about 7 percent of the world's total forest area. In North America, a total of 6 percent of the forest area (more than 37 million hectares) was planted forest, accounting for 14 percent of the world total (Table 32). In Canada, planted forests represented 3 percent of the total forest area, in Mexico, 5 percent and in the United States of America, 8 percent. The area of planted forest in the three countries continued to increase.

Table 30: Employment in primary production of forest goods in the Near East, 2005 (1 000 FTE)

Subregion	Employment in primary production of goods, 2005
Central Asia	38
North Africa	209
Western Asia	49
Total Near East	296

Figure 21: Value of wood removals in the Near East, 1990–2005 (billion US$)



[9] For the purposes of this report, North America includes Canada, Mexico and the United States of America (excluding US territories in the Caribbean).

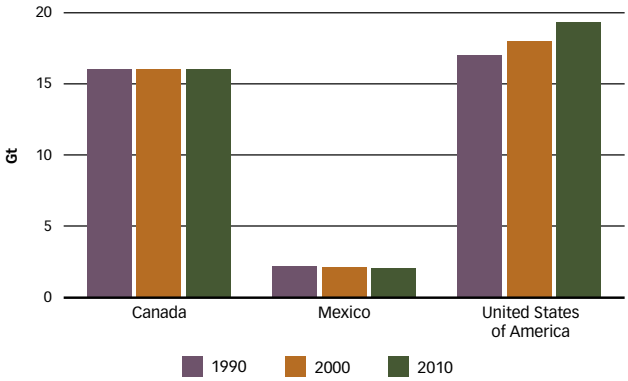
Canada, Mexico and United States of America all reported on carbon in forest biomass (Figure 22) with a positive overall trend for the region.

Biological diversity and protective functions

North America accounted for 25 percent of global primary forest in 2010, which corresponded to 41 percent of the forest area in the region. In Canada and Mexico, 53 percent of the countries' forest area was classified as primary forest, while in the United States of America it made up 25 percent. The area of primary forest in the region overall increased slightly in the last decade (Figure 23). This can occur when countries set aside natural forest areas in which no intervention should take place.

North America designated 15 percent of its forest for the conservation of biological diversity compared with 12 percent at the global level. At a national level, the United States of America classified 25 percent of its forest under this designation, the highest in the region, followed by Mexico (13 percent) and Canada (5 percent). Canada showed no change over the period analysed, while the area in Mexico rose and in the United States of America the area decreased (Table 33). Nine percent

Figure 22: Carbon stock in forest biomass in North America, 1990–2010* (Gt)



* The figures presented for Canada are FAO estimates as Canada only reported carbon in forest biomass of 'managed forests' in accordance with reporting requirements for the UNFCCC.

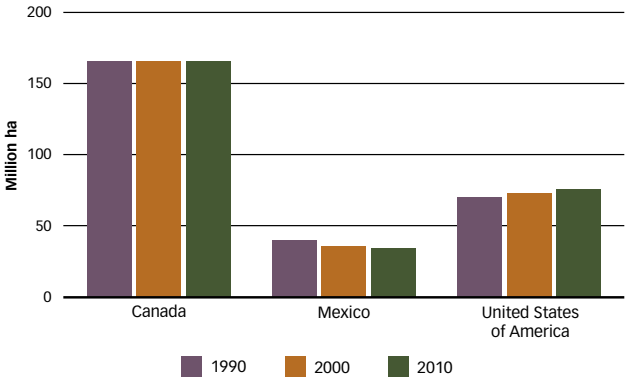
Table 31: Forest area in North America, 1990–2010

Region	Area (1 000 ha)			Annual change (1 000 ha)		Annual change rate (%)	
	1990	2000	2010	1990–2000	2000–2010	1990–2000	2000–2010
Canada	310 134	310 134	310 134	0	0	0	0
Mexico	70 291	66 751	64 802	-354	-195	-0.52	-0.30
United States of America	296 335	300 195	304 022	386	383	0.13	0.13
Total North America	676 760	677 080	678 958	32	188	n.s.	0.03
World	4 168 399	4 085 063	4 032 905	-8 334	-5 216	-0.20	-0.13

Table 32: Area of planted forest in North America, 1990–2010

Region	Area (1 000 ha)			Annual change (1 000 ha)		Annual change rate (%)	
	1990	2000	2010	1990–2000	2000–2010	1990–2000	2000–2010
Canada	1 357	5 820	8 963	446	314	15.67	4.41
Mexico	350	1 058	3 203	106	215	-	11.71
United States of America	17 938	22 560	25 363	462	280	2.32	1.18
Total North America	19 645	29 438	37 529	979	809	4.13	2.46
World	178 307	214 839	264 084	3 653	4 925	1.88	2.09

Figure 23: Area of primary forest in North America, 1990–2010 (million ha)



of the forest area in the region falls within a protected area system, ranging from 8 percent of the forest area in Canada to 13 percent of the forest area in Mexico.

In North America, the protection of soil and water are embedded in forest legislation, policy and guidance on sound forest management practices. The protection of soil and water are primary considerations in the development of forest plans and practices. While legislation, regulations and policy exists to guide where forest areas must be set aside, these areas are not legally defined and captured on land use maps. As a result, forest areas that are set aside for the purposes of soil and water conservation are included in the multiple use primary designated function.

Productive and socio-economic functions

About 14 percent of the forest area in North America was designated primarily for production in 2010, compared with 30 percent at the global level (Table 34). The vast majority of this area (93 percent) was located in the United States of America, where 30 percent of the forest area was designated primarily for productive purposes, compared with only 5 percent of Mexico's forest area and 1 percent of Canada's. An additional 68 percent of the forest area in the region was designated for multiple use – in most cases including the production of wood and NWFPs. There was

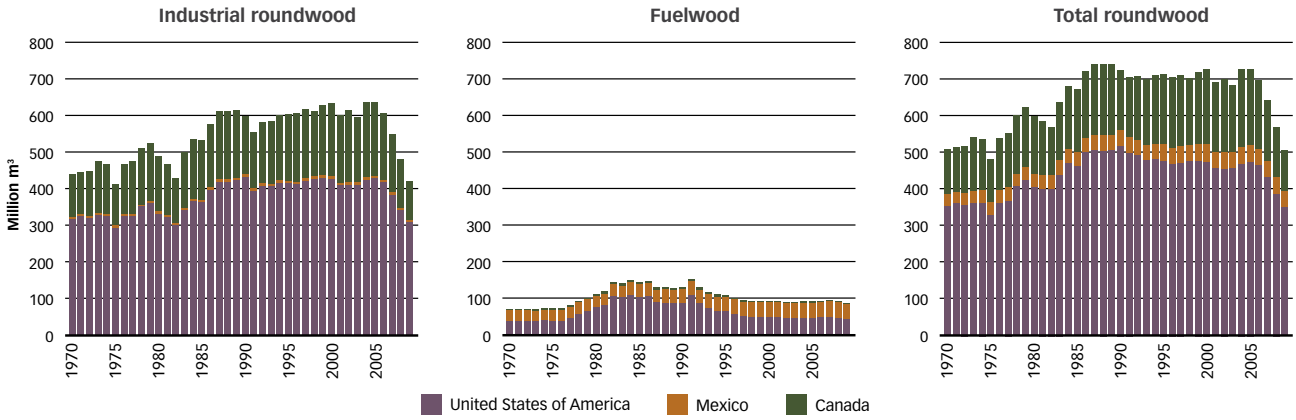
Table 33: Area of forest designated primarily for conservation of biological diversity in North America, 1990–2010

Region	Area (1 000 ha)			Annual change (1 000 ha)		Annual change rate (%)	
	1990	2000	2010	1990–2000	2000–2010	1990–2000	2000–2010
Canada	15 284	15 284	15 284	0	0	0	0
Mexico	4 547	4 457	8 488	-9	403	-0.20	6.65
United States of America	69 980	72 878	75 277	290	240	0.41	0.32
Total North America	89 811	92 619	99 049	281	643	0.31	0.67
World	270 413	302 916	366 255	3 250	6 334	1.14	1.92

Table 34: Area of forest designated primarily for production in North America, 1990–2010

Region	Area (1 000 ha)			Annual change (1 000 ha)		Annual change rate (%)	
	1990	2000	2010	1990–2000	2000–2010	1990–2000	2000–2010
Canada	3 928	3 928	3 928	0	0	0	0
Mexico	0	1 058	3 203	106	215	-	11.71
United States of America	76 632	82 520	90 007	589	749	0.74	0.87
Total North America	80 560	87 506	97 138	695	963	0.83	1.05
World	1 181 576	1 160 325	1 131 210	-2 125	-2 911	-0.18	-0.25

Figure 24: Volume of wood removals in North America, 1970–2009 (million m³)



Source: FAOSTAT

a large variation in the proportion of forest for multiple use within the region with values ranging from 46 percent in the United States of America to 87 percent in Canada. A combination of the two areas (production plus multiple use) may thus provide a better picture of the area available for wood supply in this region.

Only 10–15 percent of the wood removed in North America was used as fuelwood. The remainder was industrial roundwood consumed by wood processing and pulp industries. The long-term trends (Figure 24) show that in North America (the United States of America and Canada in particular), wood removals fluctuated widely over the past four decades. This suggests that forest owners and managers were quick to adjust wood supply depending on the level of demand for forest products and prices. The recent economic and housing crises in the United States of America led to a sharp decline in industrial roundwood removals (about 30 percent). The information available on NWFPs at the regional level was insufficient to draw conclusions or to identify trends. The principal reported products were Christmas trees, maple products, resins, hides and skins, and fruit. The value of wood products increased steadily between 1990 and 2005 (Figure 25), but has since fallen sharply.

Countries were requested to report on paid employment in terms of full-time equivalents involved in primary production of forest goods (Table 35). Mexico did not provide data for this variable. The United States of America showed a continuous decrease in employment from 1990 to 2005. Canada's figures indicated that the employment level rose by 18 percent between 1990 and 2000 and then declined by 20 percent between 2000 and 2005.

Figure 25: Value of wood products in North America (billion US$)

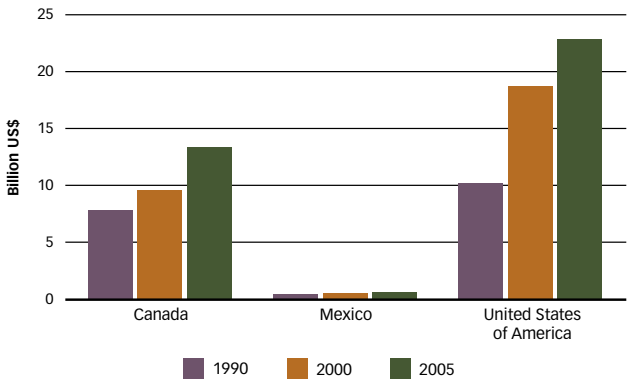


Table 35: Employment in primary production of forest goods in the United States of America and Canada, 1990–2005 (1 000 FTE)

	Employment in primary production of goods		
	1990	2000	2005
Canada	73	87	70
United States of America (paid employment only)	103	98	84