



3.4 Deforestation and biodiversity

	Forest area		Average annual deforestation		Mammals		Birds		Higher plants ^a		Nationally protected areas	
	thousand sq. km 1995	% of total land area 1995 ^b	sq. km 1990-95	% change 1990-95	Species 1996 ^b	Threatened species 1996 ^b	Species 1996 ^b	Threatened species 1996 ^b	Species 1997 ^b	Threatened species 1997 ^b	thousand sq. km 1996 ^b	% of total land area 1996 ^b
Albania	10	38.2	0	0.0	68	2	230	7	3,031	79	0.8	2.9
Algeria	19	0.8	234	1.2	92	15	192	8	3,164	141	58.9	2.5
Angola	222	17.8	2,370	1.0	276	17	765	13	5,185	30	81.8	6.6
Argentina	339	12.4	894	0.3	320	27	897	41	9,372	247	46.6	1.7
Armenia	3	11.8	-84	-2.7	..	4	..	5	..	31	2.1	7.4
Australia	409	5.3	-170	0.0	252	58	649	45	15,638	2,245	563.9	7.3
Austria	39	46.9	0	0.0	83	7	213	5	3,100	23	23.4	28.3
Azerbaijan	10	11.4	0	0.0	..	11	..	8	..	28	4.8	5.5
Bangladesh	10	7.8	88	0.8	109	18	295	30	5,000	24	1.0	0.8
Belarus	74	35.5	-688	-1.0	..	4	221	4	..	1	8.6	4.1
Belgium	..	..	..	..	58	6	180	3	1,550	2	0.8	..
Benin	46	41.8	596	1.2	188	9	307	1	2,201	4	7.8	7.1
Bolivia	483	44.6	5,814	1.2	316	24	1,274	27	17,367	227	156.0	14.4
Bosnia and Herzegovina	27	53.1	0	0.0	..	10	..	2	..	64	0.2	0.4
Botswana	139	24.6	708	0.5	164	5	386	7	2,151	7	105.0	18.5
Brazil	5,511	65.2	25,544	0.5	394	71	1,492	103	56,215	1,358	355.5	4.2
Bulgaria	32	29.3	-6	0.0	81	13	240	12	3,572	106	4.9	4.4
Burkina Faso	43	15.6	320	0.7	147	6	335	1	1,100	0	28.6	10.5
Burundi	3	12.3	14	0.4	107	5	451	6	2,500	1	1.4	5.5
Cambodia	98	55.7	1,638	1.6	123	23	307	18	..	5	28.6	16.2
Cameroon	196	42.1	1,292	0.6	297	32	690	14	8,260	89	21.0	4.5
Canada	2,446	26.5	-1,764	-0.1	193	7	426	5	3,270	278	921.0	10.0
Central African Republic	299	48.0	1,282	0.4	209	11	537	2	3,602	1	51.1	8.2
Chad	110	8.8	942	0.8	134	14	370	3	1,600	12	114.9	9.1
Chile	79	10.5	292	0.4	91	16	296	18	5,284	329	141.3	18.9
China	1,333	14.3	866	0.1	394	75	1,100	90	32,200	312	598.1	6.4
Hong Kong, China	..	..	..	..	24	0	76	14	1,984	9	0.4	40.4
Colombia	530	51.0	2,622	0.5	359	35	1,695	64	51,220	712	93.6	9.0
Congo, Dem. Rep.	..	..	..	..	415	38	929	26	11,007	78	101.9	4.5
Congo, Rep.	195	57.2	416	0.2	200	10	449	3	6,000	3	15.4	4.5
Costa Rica	12	24.4	414	3.0	205	14	600	13	12,119	527	7.0	13.7
Côte d'Ivoire	55	17.2	308	0.6	230	16	535	12	3,660	94	19.9	6.3
Croatia	18	32.6	0	0.0	..	10	224	4	..	6	3.7	6.6
Cuba	18	16.8	236	1.2	31	9	137	13	6,522	888	19.1	17.4
Czech Republic	26	34.0	-2	0.0	..	7	199	6	..	81	12.2	15.8
Denmark	4	9.8	0	0.0	43	3	196	2	1,450	2	13.7	32.3
Dominican Republic	16	32.7	264	1.6	20	4	136	11	5,657	136	12.2	25.2
Ecuador	111	40.2	1,890	1.6	302	28	1,388	53	19,362	824	119.3	43.1
Egypt, Arab Rep.	0	0.0	0	0.0	98	15	153	11	2,076	82	7.9	0.8
El Salvador	1	5.1	38	3.3	135	2	251	0	2,911	42	0.1	0.5
Eritrea	3	2.8	0	0.0	112	6	319	3	..	0	5.0	5.0
Estonia	20	47.6	-196	-1.0	65	4	213	2	..	2	5.1	12.1
Ethiopia	136	13.6	624	0.5	255	35	626	20	6,603	163	55.2	5.5
Finland	200	65.8	166	0.1	60	4	248	4	1,102	6	18.2	6.0
France	150	27.3	-1,608	-1.1	93	13	269	7	4,630	195	58.8	10.7
Gabon	179	69.3	910	0.5	190	12	466	4	6,651	91	7.2	2.8
Gambia, The	1	9.1	8	0.9	108	4	280	1	974	1	0.2	2.0
Georgia	30	42.9	0	0.0	..	10	..	5	..	29	1.9	2.7
Germany	107	30.7	0	0.0	76	8	239	5	2,682	14	94.2	27.0
Ghana	90	39.7	1,172	1.3	222	13	529	10	3,725	103	11.0	4.8
Greece	65	50.5	-1,408	-2.3	95	13	251	10	4,992	571	3.1	2.4
Guatemala	38	35.4	824	2.0	250	8	458	4	8,681	355	18.2	16.8
Guinea	64	25.9	748	1.1	190	11	409	12	3,000	39	1.6	0.7
Guinea-Bissau	23	82.1	104	0.4	108	4	243	1	1,000	0	0.0	0.0
Haiti	0	0.8	8	3.4	3	4	75	11	5,242	100	0.1	0.4
Honduras	41	36.8	1,022	2.3	173	7	422	4	5,680	96	11.1	9.9



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	Forest area		Average annual deforestation		Mammals		Birds		Higher plants ^a		Nationally protected areas	
	thousand sq. km 1995	% of total land area 1995 ^b	sq. km 1990-95	% change 1990-95	Species 1996 ^b	Threatened species 1996 ^b	Species 1996 ^b	Threatened species 1996 ^b	Species 1997 ^b	Threatened species 1997 ^b	thousand sq. km 1996 ^b	% of total land area 1996 ^b
Hungary	17	18.6	-88	-0.5	72	8	205	10	2,214	30	6.3	6.8
India	650	21.9	-72	0.0	316	75	923	73	16,000	1,236	142.9	4.8
Indonesia	1,098	60.6	10,844	1.0	436	128	1,519	104	29,375	264	192.3	10.6
Iran, Islamic Rep.	15	1.0	284	1.7	140	20	323	14	8,000	2	83.0	5.1
Iraq	1	0.2	0	0.0	81	7	172	12	..	2	0.0	0.0
Ireland	6	8.3	-140	-2.7	25	2	142	1	950	1	0.6	0.9
Israel	1	4.9	0	0.0	92	13	180	8	2,317	32	3.1	15.0
Italy	65	22.1	-58	-0.1	90	10	234	7	5,599	311	21.5	7.3
Jamaica	2	16.2	158	7.2	24	4	113	7	3,308	744	0.0	0.0
Japan	251	66.8	132	0.1	132	29	250	33	5,565	707	25.5	6.8
Jordan	0	0.5	12	2.5	71	7	141	4	2,100	9	3.0	3.4
Kazakhstan	105	3.9	-1,928	-1.9	..	15	..	15	..	71	73.4	2.7
Kenya	13	2.3	34	0.3	359	43	844	24	6,506	240	35.0	6.1
Korea, Dem. Rep.	62	51.2	0	0.0	..	7	115	19	2,898	4	3.1	2.6
Korea, Rep.	76	77.2	130	0.2	49	6	112	19	2,898	66	6.8	6.9
Kuwait	0	0.3	0	0.0	21	1	20	3	234	0	0.3	1.7
Kyrgyz Republic	7	3.8	0	0.0	..	6	..	5	..	34	6.9	3.6
Lao PDR	..	..	..	..	172	30	487	27	..	2	0.0	0.0
Latvia	29	46.4	-250	-0.9	83	4	217	6	1,153	0	7.8	12.6
Lebanon	1	5.1	52	7.8	54	5	154	5	3,000	5	0.0	0.0
Lesotho	0	0.2	0	0.0	33	2	58	5	1,591	21	0.1	0.3
Libya	4	0.2	0	0.0	76	11	91	2	1,825	57	1.7	0.1
Lithuania	20	30.5	-112	-0.6	68	5	202	4	..	1	6.5	10.0
Macedonia, FYR	10	38.9	2	0.0	..	10	..	3	..	0	1.8	7.1
Madagascar	151	26.0	1,300	0.8	105	46	202	28	9,505	306	11.2	1.9
Malawi	33	35.5	546	1.6	195	7	521	9	3,765	61	10.6	11.3
Malaysia	155	47.1	4,002	2.4	286	42	501	34	15,500	490	14.8	4.5
Mali	116	9.5	1,138	1.0	137	13	397	6	1,741	15	45.3	3.7
Mauritania	6	0.5	0	0.0	61	14	273	3	1,100	3	17.5	1.7
Mauritius	0	5.9	0	0.0	4	4	27	10	750	294	0.1	4.9
Mexico	554	29.0	5,080	0.9	450	64	769	36	26,071	1,593	71.0	3.7
Moldova	4	10.8	0	0.0	68	2	177	7	..	5	0.4	1.2
Mongolia	94	6.0	0	0.0	134	12	390	14	2,272	0	161.3	10.3
Morocco	38	8.6	118	0.3	105	18	210	11	3,675	186	3.2	0.7
Mozambique	169	21.5	1,162	0.7	179	13	498	14	5,692	89	47.8	6.1
Myanmar	272	41.3	3,874	1.4	251	31	867	44	7,000	32	1.7	0.3
Namibia	124	15.0	420	0.3	154	11	469	8	3,174	75	106.2	12.9
Nepal	48	33.7	548	1.1	167	28	611	27	6,973	20	11.1	7.8
Netherlands	3	9.8	0	0.0	55	6	191	3	1,221	1	2.4	7.1
New Zealand	79	29.4	-434	-0.6	10	3	150	44	2,382	211	63.3	23.6
Nicaragua	56	45.8	1,508	2.5	200	4	482	3	7,590	98	9.0	7.4
Niger	26	2.0	0	0.0	131	11	299	2	1,170	0	96.9	7.6
Nigeria	138	15.1	1,214	0.9	274	26	681	9	4,715	37	30.2	3.3
Norway	81	26.3	-180	-0.2	54	4	243	3	1,715	12	93.7	30.5
Oman	0	0.0	0	..	56	9	107	5	1,204	30	34.3	16.1
Pakistan	17	2.3	550	2.9	151	13	375	25	4,950	14	37.2	4.8
Panama	28	37.6	636	2.1	218	17	732	10	9,915	1,302	14.2	19.1
Papua New Guinea	369	81.6	1,332	0.4	214	57	644	31	11,544	92	0.1	0.0
Paraguay	115	29.0	3,266	2.6	305	10	556	26	7,851	129	14.0	3.5
Peru	676	52.8	2,168	0.3	344	46	1,538	64	18,245	906	34.6	2.7
Philippines	68	22.7	2,624	3.5	153	49	395	86	8,931	360	14.5	4.9
Poland	87	28.7	-120	-0.1	84	10	227	6	2,450	27	29.1	9.6
Portugal	29	31.4	-240	-0.9	63	13	207	7	5,050	269	5.9	6.4
Puerto Rico	3	31.0	24	0.9	16	3	105	11	2,493	223	0.1	1.1
Romania	62	27.1	12	0.0	84	16	247	11	3,400	99	10.7	4.6
Russian Federation	7,635	45.2	0	0.0	269	31	628	38	..	214	516.7	3.1



3.4 Deforestation and biodiversity

	Forest area		Average annual deforestation		Mammals		Birds		Higher plants ^a		Nationally protected areas	
	thousand sq. km 1995	% of total land area 1995 ^b	sq. km 1990-95	% change 1990-95	Species 1996 ^b	Threatened species 1996 ^b	Species 1996 ^b	Threatened species 1996 ^b	Species 1997 ^b	Threatened species 1997 ^b	thousand sq. km 1996 ^b	% of total land area 1996 ^b
Rwanda	3	10.1	4	0.2	151	9	513	6	2,288	0	3.6	14.6
Saudi Arabia	2	0.1	18	0.8	77	9	155	11	2,028	7	49.6	2.3
Senegal	74	38.3	496	0.7	155	13	384	6	2,086	31	21.8	11.3
Sierra Leone	13	18.3	426	3.0	147	9	466	12	2,090	29	0.8	1.1
Singapore	0	6.6	0	0.0	45	6	118	9	2,168	29	0.0	0.0
Slovak Republic	20	41.4	-24	-0.1	..	8	209	4	..	65	10.5	21.8
Slovenia	11	53.5	0	0.0	69	10	207	3	..	13	1.1	5.5
South Africa	85	7.0	150	0.2	247	33	596	16	23,420	2,215	65.8	5.4
Spain	84	16.8	0	0.0	82	19	278	10	5,050	985	42.2	8.4
Sri Lanka	18	27.8	202	1.1	88	14	250	11	3,314	455	8.6	13.3
Sudan	416	17.5	3,526	0.8	267	21	680	9	3,137	10	86.4	3.6
Sweden	244	59.3	24	0.0	60	5	249	4	1,750	13	36.2	8.8
Switzerland	11	28.6	0	0.0	75	6	193	4	3,030	30	7.1	18.0
Syrian Arab Republic	2	1.2	52	2.2	63	4	204	7	3,000	8	0.0	0.0
Tajikistan	4	2.9	0	0.0	..	5	..	9	..	50	5.9	4.2
Tanzania	325	36.8	3,226	1.0	316	33	822	30	10,008	436	138.2	15.6
Thailand	116	22.8	3,294	2.6	265	34	616	45	11,625	385	70.7	13.8
Togo	12	22.9	186	1.4	196	8	391	1	2,201	4	4.3	7.9
Trinidad and Tobago	2	31.4	26	1.5	100	1	260	3	2,259	21	0.2	3.9
Tunisia	6	3.6	30	0.5	78	11	173	6	2,196	24	0.4	0.3
Turkey	89	11.5	0	0.0	116	15	302	14	8,650	1,876	10.7	1.4
Turkmenistan	38	8.0	0	0.0	..	11	..	12	..	17	19.8	4.2
Uganda	61	30.6	592	0.9	338	18	830	10	5,406	15	19.1	9.6
Ukraine	92	15.9	-54	-0.1	..	15	263	10	..	52	9.0	1.6
United Arab Emirates	1	0.7	0	0.0	25	3	67	4	..	0	0.0	0.0
United Kingdom	24	9.9	-128	-0.5	50	4	230	2	1,623	18	50.6	20.9
United States	2,125	23.2	-5,886	-0.3	428	35	650	50	19,473	4,669	1,226.7	13.4
Uruguay	8	4.7	4	0.0	81	5	237	11	2,278	15	0.5	0.3
Uzbekistan	91	22.0	-2,260	-2.7	..	7	..	11	..	41	8.2	2.0
Venezuela, RB	440	49.9	5,034	1.1	305	24	1,181	22	21,073	426	319.8	36.3
Vietnam	91	28.0	1,352	1.4	213	38	535	47	10,500	341	9.9	3.0
West Bank and Gaza	..	..	..	..	..	..	..	..	..	..	..	..
Yemen, Rep.	0	0.0	0	0.0	66	5	143	13	..	149	0.0	0.0
Yugoslavia, FR (Serb./Mont.)	18	..	..	..	..	..	..	..	..	..	..	..
Zambia	314	42.2	2,644	0.8	229	11	605	10	4,747	12	63.6	8.6
Zimbabwe	87	22.5	500	0.6	270	9	532	9	4,440	100	30.7	7.9
World	32,712 s	25.1 w	101,724 s	0.3 w	..	..	..	..	..	..	8,543.5 s	6.6 w
Low income	7,379	17.8	49,332	0.7	..	..	..	..	..	..	2,442.5	5.9
Excl. China & India	5,334	18.4	48,538	0.9	..	..	..	..	..	..	1,698.4	5.9
Middle income	18,898	32.7	64,086	0.3	..	..	..	..	..	..	2,806.8	4.9
Lower middle income	11,101	30.8	21,162	0.2	..	..	..	..	..	..	1,560.5	4.3
Upper middle income	7,797	35.8	42,924	0.5	..	..	..	..	..	..	1,246.3	5.7
Low & middle income	26,277	26.5	113,418	0.4	..	..	..	..	..	..	5,249.3	5.3
East Asia & Pacific	3,832	24.0	29,956	0.8	..	..	..	..	..	..	1,102.2	6.9
Europe & Central Asia	8,579	36.1	-5,798	-0.1	..	..	..	..	..	..	768.0	3.2
Latin America & Carib.	9,064	45.2	57,766	0.6	..	..	..	..	..	..	1,456.3	7.3
Middle East & N. Africa	89	0.8	800	0.9	..	..	..	..	..	..	242.1	2.2
South Asia	744	15.6	1,316	0.2	..	..	..	..	..	..	213.0	4.5
Sub-Saharan Africa	3,969	16.8	29,378	0.7	..	..	..	..	..	..	1,467.7	6.2
High income	6,436	20.8	-11,694	-0.2	..	..	..	..	..	..	3,294.2	10.8
Europe EMU	683	29.6	-1,880	-0.3	..	..	..	..	..	..	268.4	11.7

a. Flowering plants only. b. Data may refer to earlier years. They are the most recent reported by the World Conservation Monitoring Centre in 1997.



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About the data

The estimates of forest area are from the Food and Agriculture Organization's (FAO) *State of the World's Forests 1999*, which provides information on forest cover as of 1995 and a revised estimate of forest cover in 1990. Forest cover data for developing countries are based on country assessments that were prepared at different times and that, for reporting purposes, had to be adapted to the standard reference years of 1990 and 1995. This adjustment was made with a deforestation model designed to correlate forest cover change over time with ancillary variables, including population change and density, initial forest cover, and the ecological zone of the forest area under consideration. Although the same model was used to estimate forest cover for the 1990 forest assessment, the inputs to *State of the World's Forests 1999* had more recent and accurate information on boundaries of ecological zones and, for some countries, new national forest cover assessments. For the calculation of forest cover for 1995 and the recalculation of the 1990 estimates, new forest inventory information was used for Bolivia, Brazil, Cambodia, Côte d'Ivoire, Guinea-Bissau, Mexico, Papua New Guinea, the Philippines, and Sierra Leone. New information on global totals raised estimates of forest cover. For high-income countries, the United Nations Economic Commission for Europe and the FAO use a detailed questionnaire to survey the forest cover in each country.

No breakdown of forest cover between natural forest and plantation is shown in the table because of space limitations. (This breakdown is provided by the FAO only for developing countries.) For this reason the deforestation data in the table may underestimate the rate at which natural forest is disappearing in some countries.

Deforestation is a major cause of loss of biodiversity, and habitat conservation is vital for stemming this loss. Conservation efforts traditionally have focused on protected areas, which have grown substantially in recent decades. Measures of species richness are one of the most straightforward ways to indicate the importance of an area for biodiversity. The number of small plants and animals is usually estimated by sampling of plots. It is also important to know which aspects are under the most immediate threat. This, however, requires a large amount of data and time-consuming analysis. For this reason global analyses of the status of threatened species have been carried out for few groups of organisms. Only for birds has the status of all species been assessed. An estimated 45 percent of mammal species remain to be assessed. For plants the World Conservation Union's (IUCN) *1997 IUCN Red List of Threatened Plants* provides the first-ever comprehensive listing of threatened species on a global scale, the result of more than 20 years' work by botanists

from around the world. Nearly 34,000 plant species, 12.5 percent of the total, are threatened with extinction.

The table shows information on protected areas, numbers of certain species, and numbers of those species under threat. The World Conservation Monitoring Centre (WCMC) compiles these data from a variety of sources. Because of differences in definitions and reporting practices, cross-country comparability is limited. Compounding these problems, available data cover different periods.

Nationally protected areas are areas of at least 1,000 hectares that fall into one of five management categories defined by the WCMC:

- Scientific reserves and strict nature reserves with limited public access.
- National parks of national or international significance (not materially affected by human activity).
- Natural monuments and natural landscapes with unique aspects.
- Managed nature reserves and wildlife sanctuaries.
- Protected landscapes and seascapes (which may include cultural landscapes).

Designating land as a protected area does not necessarily mean that protection is in force, however. For small countries that may only have protected areas smaller than 1,000 hectares, this size limit in the definition will result in an underestimate of the extent and number of protected areas.

Threatened species are defined according to the IUCN's classification categories: endangered (in danger of extinction and unlikely to survive if causal factors continue operating), vulnerable (likely to move into the endangered category in the near future if causal factors continue operating), rare (not endangered or vulnerable, but at risk), indeterminate (known to be endangered, vulnerable, or rare but not enough information is available to say which), out of danger (formerly included in one of the above categories but now considered relatively secure because appropriate conservation measures are in effect), and insufficiently known (suspected but not definitely known to belong to one of the above categories).

Figures on species are not necessarily comparable across countries because taxonomic concepts and coverage vary. And while the number of birds and mammals is fairly well known, it is difficult to make an accurate count of plants. Although the data in the table should be interpreted with caution, especially for numbers of threatened species (where our knowledge is very incomplete), they do identify countries that are major sources of global biodiversity and show national commitments to habitat protection.

Definitions

- **Forest area** is land under natural or planted stands of trees, whether productive or not (see *About the data*).
- **Average annual deforestation** refers to the permanent conversion of natural forest area to other uses, including shifting cultivation, permanent agriculture, ranching, settlements, and infrastructure development. Deforested areas do not include areas logged but intended for regeneration or areas degraded by fuelwood gathering, acid precipitation, or forest fires. Negative numbers indicate an increase in forest area.
- **Mammals** exclude whales and porpoises.
- **Birds** are listed for countries included within their breeding or wintering ranges.
- **Higher plants** refer to native vascular plant species.
- **Threatened species** are the number of species classified by the IUCN as endangered, vulnerable, rare, indeterminate, out of danger, or insufficiently known.
- **Nationally protected areas** are totally or partially protected areas of at least 1,000 hectares that are designated as national parks, natural monuments, nature reserves or wildlife sanctuaries, protected landscapes and seascapes, or scientific reserves with limited public access. The data do not include sites protected under local or provincial law. Total land area is used to calculate the percentage of total area protected (see table 3.1).

Data sources

The forestry data are from the FAO's *State of the World's Forests 1999*. The data on species are from the WCMC's *Biodiversity Data Sourcebook* (1994) and the IUCN's *1996 IUCN Red List of Threatened Animals* and *1997 IUCN Red List of Threatened Plants*. The data on protected areas are from the WCMC's Protected Areas Data Unit.