

Land Use and Human Settlements

Sources: Food and Agriculture Organization of the United Nations, University of Maryland, United Nations Environment Programme, United Nations Population Division, World Bank, United Nations Human Settlements Programme

	Total Land Area (1000 ha) 2002	Land Area Classifications										Population Density (people per km ²) 2000	Urban Population as a Percent of Total		Percent of Population Living in Cities With More Than		Percent of Urban Population Living in Slum Conditions 2001
		Percent of Total Land Area That Is:											Urban Population as a Percent of Total	100,000 People 2002	1 Million People 2002		
		Forested		Agricultural						Dry-lands (c)							
		MODIS Satellite (a) Imagery, 2000	FAO (b) Estimates, >10% Cover	Arable and Permanent Cropland	Permanent Pasture												
>50% Cover	>10% Cover	2000	1990	2002	1992	2002	1992	2002	1992	2000	2000	1990	2002	2002			
World	13,066,880	24	50	29	30	12	12	27	26	..	45	47	43	..	..	32
Asia (excl. Middle East)	2,406,300	21	38	20	20	21	20	34	34	..	135	35	30	19	12	40	
Armenia	2,820	9	23	12	10	20	20	30	24	98	104	65	67	56	47	2	
Azerbaijan	8,260	8	27	13	11	24	22	32	26	84	94	51	54	29	25	7	
Bangladesh	13,017	11	35	9	8	65	64	5	5	0	958	23	20	13	10	85	
Bhutan	4,700	61	73	64	64	4	3	9	7	0	44	8	6	0	0	44	
Cambodia	17,652	47	82	52	55	22	22	8	8	0	73	17	13	11	8	72	
China	932,742	15	31	17	15	17	14	43	43	34	133	36	27	17	11	38	
Georgia	6,949	42	67	43	43	15	16	28	30	34	76	53	55	38	28	9	
India	297,319	11	44	20	19	57	57	4	4	60	309	28	26	19	11	56	
Indonesia	181,157	78	100	55	62	19	16	6	7	3	111	42	31	24	16	23	
Japan	36,450	71	87	64	64	13	14	1	1	0	336	65	63	..	..	6
Kazakhstan	269,970	1	4	4	4	8	13	69	69	99	6	56	57	34	8	30	
Korea, Dem People's Rep	12,041	..	..	68	68	22	21	0	0	0	185	60	58	34	14	1
Korea, Rep	9,873	59	76	63	63	19	21	1	1	0	472	80	74	78	69	37	
Kyrgyzstan	19,180	2	9	5	4	7	7	49	47	55	25	34	38	20	0	52	
Lao People's Dem Rep	23,080	76	98	53	55	4	4	4	3	0	22	19	15	3	0	66	
Malaysia	32,855	82	97	59	66	23	23	1	1	0	70	62	50	40	19	2	
Mongolia	156,650	3	8	7	7	1	1	83	78	65	2	57	57	31	0	65	
Myanmar	65,755	61	86	51	59	16	15	0	1	..	70	28	25	16	10	26	
Nepal	14,300	34	71	26	32	23	17	12	12	9	160	14	9	7	5	92	
Pakistan	77,088	1	7	3	3	29	27	6	6	83	179	33	31	24	17	74	
Philippines	29,817	50	89	19	22	36	33	5	4	0	252	59	49	28	20	44	
Singapore	67	11	29	3	3	3	3	..	..	0	6478	100	100	..	..	0
Sri Lanka	6,463	33	91	30	35	30	29	7	7	24	283	21	21	14	13	14	
Tajikistan	13,996	0.1	3	3	3	8	7	23	25	40	43	26	32	15	0	56	
Thailand	51,089	28	82	29	31	38	40	2	2	7	119	31	29	17	14	2	
Turkmenistan	46,993	0.0	0.3	8	8	4	3	65	66	100	10	45	45	25	0	2	
Uzbekistan	41,424	0.0	2	4	4	12	12	54	55	99	56	37	40	29	13	51	
Viet Nam	32,549	43	86	30	28	27	21	2	1	0	236	24	20	17	12	47	
Europe	2,260,099	32	65	45	45	13	14	8	8	..	31	73	72	..	..	6
Albania	2,740	16	67	34	37	26	26	16	15	0	108	42	36	15	0	7	
Austria	8,273	55	75	46	45	18	18	23	24	0	97	66	66	..	..	6
Belarus	20,748	47	70	45	33	28	30	15	15	..	48	70	66	47	18	6	
Belgium (d)	3,282	24	48	23	22	26	24	21	211	0	310	97	96	..	..	15
Bosnia and Herzegovina	5,120	57	92	44	44	21	20	20	23	0	78	43	39	20	0	8	
Bulgaria	11,063	29	66	33	31	32	39	16	16	53	73	69	66	33	15	6	
Croatia	5,592	44	81	32	31	28	24	28	19	0	79	58	54	23	0	8	
Czech Rep	7,728	41	68	33	33	43	..	13	..	13	130	74	75	26	13	6	
Denmark	4,243	13	48	11	10	54	60	9	5	0	124	85	85	..	..	6
Estonia	4,239	74	94	46	43	15	27	2	6	0	30	69	71	36	0	12	
Finland	30,459	50	96	65	65	7	8	0	0	0	15	61	61	..	..	6
France	55,010	26	61	28	27	36	35	18	20	0	108	76	74	..	..	6
Germany	34,895	36	62	30	30	34	34	14	15	5	231	88	85	..	..	4
Greece	12,890	16	62	27	25	30	31	36	41	45	83	60	59	..	..	6
Hungary	9,210	18	61	20	19	52	54	12	13	46	108	64	62	38	26	6	
Iceland	10,025	3	35	0	0	0	0	23	23	..	3	92	91	..	..	6
Ireland	6,889	25	62	9	7	16	15	48	49	0	54	59	57	..	..	1
Italy	29,411	26	58	33	32	38	40	15	15	21	191	67	67	..	..	6
Latvia	6,205	70	95	45	43	30	28	10	13	0	37	67	70	43	0	6	
Lithuania	6,268	45	75	31	30	48	49	8	7	0	54	67	68	40	0	6	
Macedonia, FYR	2,543	28	69	35	35	24	26	25	25	37	79	59	58	28	0	8	
Moldova, Rep	3,288	5	44	10	9	65	67	12	11	100	127	46	47	30	0	31	
Netherlands	3,388	13	42	9	9	28	27	30	31	0	383	64	60	..	..	9
Norway	30,625	24	61	27	26	3	3	1	0	0	14	76	72	..	..	6
Poland	30,629	31	60	29	28	46	48	13	13	19	124	62	61	35	15	6	
Portugal	9,150	11	70	40	34	30	33	16	9	29	109	53	47	..	..	14
Romania	22,987	34	66	27	26	43	43	21	21	38	94	55	53	33	10	19	
Russian Federation	1,688,850	32	65	50	50	7	8	5	5	22	9	73	73	49	23	6	
Serbia and Montenegro	10,200	31	65	28	28	37	40	18	21	..	103	52	51	25	16	5	
Slovakia	4,808	49	73	44	41	32	..	18	..	0	110	57	57	12	0	6	
Slovenia	2,014	69	89	55	54	10	12	15	16	0	98	51	51	13	0	6	
Spain	49,944	13	48	28	27	37	40	23	21	69	81	76	75	..	..	6
Sweden	41,162	56	90	60	60	7	7	1	1	0	20	83	83	..	..	6
Switzerland	3,955	40	67	29	28	11	11	28	29	0	174	68	68	..	..	6
Ukraine	57,935	16	52	16	15	58	59	14	13	65	82	67	67	41	19	6	
United Kingdom	24,088	21	57	12	11	24	27	46	48	0	242	89	89	..	..	6
Middle East & N. Africa	1,291,988	1	3	2	2	8	8	28	24	..	31	58	54	39	24	36	
Afghanistan	65,209	0.1	1	2	2	12	12	46	46	94	33	22	18	18	9	99	
Algeria	238,174	0.1	1	1	1	3	3	13	13	21	13	57	51	32	12	12	
Egypt	99,545	0.0	0.5	0	0	3	3	..	..	8	68	42	43	38	28	40
Iran, Islamic Rep	163,620	1	2	4	4	10	11	27	27	90	40	64	56	46	26	44	
Iraq	43,737	0.0	1	2	2	14	13	9	9	100	53	68	70	63	34	57	
Israel	2,171	0.3	9	6	4	20	20	7	7	69	287	92	90	81	62	2	
Jordan	8,893	0.0	0.2	1	1	4	4	8	9	72	56	79	72	58	47	16	
Kuwait	1,782	..	..	0	0	1	0	8	8	92	126	96	95	69	69	3
Lebanon	1,023	1	26	3	4	31	30	2	1	59	334	87	83	66	53	50	
Libyan Arab Jamahiriya	175,954	0.0	0.1	0	0	1	1	8	8	23	3	85	80	94	62	35	
Morocco	44,630	0.2	5	7	7	21	22	47	47	92	65	56	48	36	16	33	
Oman	30,950	0.0	0.1	0	0	0	0	3	3								

For more information, please visit <http://earthtrends.wri.org/datatables/forests>

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		Forested		Agricultural						Drylands (c)	2000		1990	100,000 People 2002	1 Million People 2002		
		MODIS Satellite (a) Imagery, 2000		FAO (b) Estimates, >10% Cover		Arable and Permanent Cropland		Permanent Pasture									
		>50% Cover	>10% Cover	2000	1990	2002	1992	2002	1992								
Sub-Saharan Africa	2,362,209	18	52	20	22	8	7	35	35	..	27	34	28	22	13	73	
Angola	124,670	25	83	56	57	3	3	43	43	19	10	33	26	24	20	83	
Benin	11,062	0.3	94	24	30	25	16	5	5	88	55	42	35	28	0	84	
Botswana	56,673	0.1	21	21	23	1	1	45	45	100	3	50	42	0	0	61	
Burkina Faso	27,360	0.0	32	26	26	16	13	22	22	100	43	17	14	10	0	77	
Burundi	2,568	8	95	3	9	53	51	39	33	0	225	9	6	5	0	65	
Cameroon	46,540	57	91	50	55	15	15	4	4	13	32	49	40	25	18	67	
Central African Rep	62,298	58	98	37	37	3	3	5	5	20	6	41	38	21	0	92	
Chad	125,920	0.4	18	10	11	3	3	36	36	68	6	24	21	9	0	99	
Congo	34,150	70	94	65	65	1	1	29	29	0	10	52	48	22	0	90	
Congo, Dem Rep	226,705	72	99	58	60	3	3	7	7	0	21	30	28	30	19	50	
Côte d'Ivoire	31,800	21	98	22	30	22	19	41	41	..	49	44	40	36	24	68	
Equatorial Guinea	2,805	89	94	62	66	8	8	4	4	0	16	45	35	23	0	87	
Eritrea	10,100	0.0	3	13	14	5	..	69	..	83	32	19	16	22	0	70	
Ethiopia	100,000	9	52	4	5	11	10	20	41	58	59	15	13	5	4	99	
Gabon	25,767	87	97	82	82	2	2	18	18	0	5	81	68	49	0	66	
Gambia	1,000	2	73	43	39	26	16	46	45	97	116	26	25	15	0	67	
Ghana	22,754	12	91	27	32	28	19	37	37	66	82	44	37	20	13	70	
Guinea	24,572	25	98	28	30	6	6	44	44	14	33	33	25	20	19	72	
Guinea-Bissau	2,812	45	108	61	67	19	15	38	38	6	38	32	24	20	0	93	
Kenya	56,914	3	37	29	31	9	8	37	37	68	53	36	25	16	9	71	
Lesotho	3,035	0.5	62	0	0	11	11	66	66	0	59	18	17	9	0	57	
Liberia	9,632	81	99	31	38	6	6	21	21	0	26	45	42	43	43	56	
Madagascar	58,154	19	76	20	22	6	6	41	41	23	27	26	24	12	8	93	
Malawi	9,408	7	90	22	28	26	21	20	20	0	96	15	12	9	0	91	
Mali	122,019	0.1	13	11	11	4	2	25	25	80	10	30	24	12	9	93	
Mauritania	102,522	0.0	0.0	0	0	0	0	38	38	46	3	58	44	23	0	94	
Mozambique	78,409	20	95	38	39	6	5	56	56	38	22	32	21	19	9	94	
Namibia	82,329	0.0	4	10	11	1	1	46	46	91	2	31	27	11	0	38	
Niger	126,670	0.0	0.2	1	2	4	3	9	8	62	9	21	16	11	0	96	
Nigeria	91,077	7	59	15	19	36	36	43	44	58	124	44	35	35	18	79	
Rwanda	2,467	11	90	12	17	56	48	19	26	0	293	14	5	4	0	88	
Senegal	19,253	2	39	32	34	13	12	29	30	94	48	47	40	35	24	76	
Sierra Leone	7,162	54	99	15	20	8	8	31	31	0	62	37	30	26	22	96	
Somalia	62,734	0.1	12	12	13	2	2	69	69	80	14	33	29	21	12	97	
South Africa	121,447	3	38	7	7	13	12	69	68	66	36	56	49	39	29	33	
Sudan	237,600	3	24	25	28	7	6	49	47	67	13	36	27	26	18	86	
Tanzania, United Rep	88,359	11	85	41	42	6	5	40	40	..	37	32	22	14	7	92	
Togo	5,439	2	90	9	13	48	40	18	18	34	80	33	29	15	0	81	
Uganda	19,710	18	95	17	21	37	35	26	26	16	97	12	11	5	5	93	
Zambia	74,339	20	91	42	53	7	7	40	40	16	14	35	39	36	16	74	
Zimbabwe	38,685	3	78	49	57	9	8	44	44	67	32	34	29	28	18	3	
North America	1,879,066	29	55	24	23	12	12	13	14	..	16	79	75	27	13	f	
Canada	922,097	36	62	25	25	5	5	2	2	16	3	79	77	58	f	f	
United States	915,896	23	49	23	23	19	20	26	26	41	30	79	75	27	f	f	
C. America & Caribbean	264,826	27	66	29	33	16	15	38	37	..	64	67	64	41	26	24	
Belize	2,280	73	92	59	74	4	4	2	2	0	11	48	48	0	0	62	
Costa Rica	5,106	59	97	39	42	10	10	46	46	0	77	59	54	36	36	13	
Cuba	10,982	29	90	21	19	34	39	26	25	11	101	75	74	..	..	2
Dominican Rep	4,838	30	89	28	28	33	32	43	43	5	171	58	55	47	32	38	
El Salvador	2,072	34	95	6	9	44	41	38	31	0	295	58	49	32	27	35	
Guatemala	10,843	53	98	26	31	18	16	24	23	0	105	45	41	22	21	62	
Haiti	2,756	8	82	3	6	40	40	18	18	3	289	36	30	23	21	86	
Honduras	11,189	51	98	48	53	13	17	13	13	0	58	44	40	33	20	18	
Jamaica	1,083	58	96	30	34	26	22	21	22	31	235	52	52	35	0	36	
Mexico	190,869	21	56	28	31	14	14	42	41	69	51	75	73	54	32	20	
Nicaragua	12,140	44	95	25	34	18	13	40	40	0	39	56	53	33	25	81	
Panama	7,443	57	96	38	45	9	9	21	20	0	39	56	54	34	34	31	
Trinidad and Tobago	513	60	91	50	55	24	24	2	2	4	251	74	69	31	0	32	
South America	1,752,020	44	81	50	52	7	7	29	29	..	19	80	74	54	36	36	
Argentina	273,669	9	40	12	13	13	11	52	52	53	13	90	87	64	42	33	
Bolivia	108,438	49	74	48	50	3	2	31	31	..	8	62	56	39	31	61	
Brazil	845,942	49	93	64	66	8	7	23	22	15	20	81	75	54	36	37	
Chile	74,880	25	41	21	21	3	4	17	17	21	20	86	83	70	36	9	
Colombia	103,870	66	104	44	45	4	5	40	39	17	37	75	69	54	36	22	
Ecuador	27,684	53	83	37	42	11	11	18	18	63	44	60	55	50	35	26	
Guyana	19,685	91	102	79	81	3	3	6	6	0	4	36	33	30	0	5	
Paraguay	39,730	37	95	57	60	8	6	55	55	55	13	55	49	25	25	25	
Peru	128,000	58	72	51	53	3	3	21	21	37	20	73	69	48	28	68	
Suriname	15,600	85	89	86	86	0	0	0	0	0	3	74	65	..	..	7
Uruguay	17,502	4	97	7	4	8	7	77	77	0	19	92	89	51	51	7	
Venezuela	88,205	56	96	54	57	4	4	21	21	49	27	87	84	58	37	41	
Oceania	849,088	10	30	24	23	6	6	49	51	..	4	73	70	..	..	4
Australia	768,230	4	24	20	20	6	6	52	55	86	3	91	85	..	..	2
Fiji	1,827	..	..	45	46	16	14	10	10	0	45	49	42	21	0	68
New Zealand	26,799	43	73	29	28	13	13	52	52	0	14	86	85	..	..	1
Papua New Guinea	45,286	89	99	66	69	2	2	0	0	1	12	13	13	7	0	19	
Solomon Islands	2,799	82	90	88	89	3	3	1	1	0	15	16	14	0	0	8	
Developed	5,462,781	25	51	31	30	12	12	22	22	..	23	72	70	..	..	8

Land Use and Human Settlements: Technical Notes

DEFINITIONS AND METHODOLOGY

Total Land Area is measured in thousand hectares and excludes the area under inland water bodies. Inland water bodies generally include major rivers and lakes. Data on land area were provided to the Food and Agriculture Organization (FAO) by the United Nations Statistical Division.

Forested Area is calculated by WRI as a percentage of total land area using data from MODIS satellite imagery analyzed by the Global Land Cover Facility (GLCF) at the University of Maryland and from FAO's *Global Forest Resources Assessment 2000* (FRA 2000).

MODIS Satellite Imagery identifies the percent of tree crown cover for each 500-meter pixel image of land area based on one year of MODIS photography. Data were aggregated to country-level by the GLCF at the request of WRI. The values presented here show the percentage of total land area with more than 10 percent or 50 percent of the ground covered by tree crowns.

The Food and Agriculture Organization (FAO) Estimates are drawn from *FRA 2000*. Forest area includes both natural forests, composed primarily of native tree species, and plantations, forest stands that are established artificially. If no other land use (such as agro-forestry) predominates, any area larger than 0.5 hectares with tree crowns covering more than 10 percent of the ground is classified as a forest. Forest statistics are based primarily on forest inventory information provided by national governments; national gathering methodologies can be found at <http://www.fao.org/forestry/fo/fra/index.jsp>. FAO harmonized these national assessments with the 10-percent forest definition mentioned above. In tropical regions, national inventories are supplemented with high resolution Landsat satellite data from a number of sample sites covering a total of 10 percent of the tropical forest zone. Where only limited or outdated inventory data were available, FAO used linear projections and expert opinion to fill in data gaps. If no forest statistics existed for 1990 and 2000, FAO projected forward or backward in time to estimate forest area in the two reference years.

Arable and Permanent Cropland is calculated by WRI as a percent of total land area. Arable land is land under temporary crops (double-cropped areas are counted only once), temporary meadows for mowing or pasture, land under market and kitchen gardens, and land temporarily fallow (less than five years). Abandoned land resulting from shifting cultivation is not included in this category. Permanent cropland is land cultivated with crops that occupy the land for long periods and need not be replanted after each harvest, such as cocoa, coffee, and rubber; this category includes land under trees grown for wood or timber. Wherever possible, data on agricultural land use are reported by country governments in questionnaires distributed by FAO. However, a significant portion of the data is based on both official and unofficial estimates.

Permanent Pasture is calculated by WRI as a percent of total land area. Permanent pasture is land used long-term (five years or more) for herbaceous forage crops, either cultivated or growing wild. Shrublands and savannas may be classified in some cases as both forested land and permanent pasture.

Drylands is calculated by WRI as the percent of total land area that falls within three of the world's six aridity zones—the arid, semi-arid, and dry sub-humid zones. The United Nations Convention to Combat Desertification (UNCCD) adopted this definition of drylands in order to identify areas where efforts combating land degradation should be focused and methods for attaining sustainable development should be promoted. The world is divided into six aridity zones based on the aridity index—the ratio of mean annual precipitation (PPT) to mean annual potential evapotranspiration (PET). Drylands of concern to the UNCCD include those lands with an aridity index between .05 and .65 (excluding polar and sub-polar regions).

Ratios of less than .05 indicate hyper-arid zones, or true deserts. Ratios of 0.65 or greater identify humid zones. The areas with an aridity index between .05 and .65 encompass the arid, semi-arid, and dry sub-humid areas. See the UNCCD's website at <http://www.unccd.int/main.php> for more information. Climatic data from 1950 to 1981 were used to define aridity zone boundaries for the globe with a resolution of about 50 km.

Population Density is calculated by WRI as the number of persons per square kilometer of land area using FAO land-area data shown in the first column. Population data are from the United Nations Population Division.

Urban Population as a Percent of Total is the proportion of a country's total population that resides in areas defined as urban in each of the countries of the world. These definitions vary slightly from country to country. Many countries define an urban area by the total number of inhabitants in a population agglomeration. Typically the threshold for considering a region urban is between 1,000 and 10,000 inhabitants. Other countries specify several of their cities or provinces as urban, and the remaining population is defined as rural. Estimates of the proportion of the population living in urban areas are obtained from national sources. Censuses and population registers are the most common sources of those counts. Once values of the urban proportion at the national level are established, they are applied to estimates and projections of the total national population from *World Population Prospects: The 2002 Revision*.

Percent of Population Living in Cities with More Than 100,000 and 1 Million People indicates population distribution and levels of urbanization within a country. WRI calculated percentages from the *Urban Population in World Bank Regions by City Size* data set and total population figures from the UN Population Division. Urban population data were primarily collected from national statistical offices, international organizations such as the United Nations, and the World Gazetteer web site. Data from national census bureaus in several OECD countries (Canada, United States) were added to complement this data set.

Percent of Urban Population Living in Slum Conditions is the proportion of a country's urban population that is living in households classified as slum dwellings. A slum household is defined by the United Nations Human Settlements Program (UN-HABITAT) as a group of individuals living under the same roof that lacks one or more of the following conditions: "secure tenure status, adequate access to improved water, adequate access to improved sanitation and other infrastructure, structural quality of housing, and sufficient living area."

While the same methodology was used to determine the slum population in all countries, data sources vary. Where available, household surveys, such as Demographic and Health Surveys (DHS) and Multiple Indicator Cluster Surveys (MICS), were the common sources of data. An effort was made to ensure that households were not counted twice, in the event that they lacked more than one of the indicators. In the absence of household surveys, or when household surveys did not provide answers for the desired indicators, the slum populations were estimated. Estimates were derived from a statistical model using available country data and the Human Development Index (HDI) of the United Nations Development Programme (UNDP).



FREQUENCY OF UPDATE BY DATA PROVIDERS

Total Land Area, Arable and Permanent Cropland Area, and Permanent Pasture data are updated annually by the FAO. **Population** data are updated every two years by the United Nations Population Division. **Forested Land Area** based on **Modis Satellite Imagery** was released by the GLCF in 2002. The *FRA* is published by the FAO every 5 years; data in this table are from the 2000 release. **Drylands Area** data were prepared in 1991; no update is planned. Data on urban population by city size are updated continually by the World Bank. **Urban Population Living in Slum Conditions** is the first global compilation of such data.

DATA RELIABILITY AND CAUTIONARY NOTES

Land-area data are intended for broad estimations only and not for strict comparisons. Land-area classification is inherently subjective; experts often express different opinions on the criteria for categorizing ecosystem and use types, and the resolution of the underlying satellite and survey information can vary widely among data sets. In addition, the information on land-area types shown here is from different sources and represents different time periods. They are not intended to represent exclusive land-cover types; some degree of overlap is present.

Forest Cover: As shown in the table, forest cover estimates differ widely based on collection methodology and classification used. FAO uses a more complex definition of forests than is used in the MODIS data set, requiring that there be 10 percent tree cover and that forestry be the predominant land use in the survey area. Thus some areas with tree cover of more than 10 percent may not be counted as forest if the predominant land use is determined to be agriculture, urban settlement, or some other nonforestry use. Because the MODIS tree-cover data set makes no such distinction, the tree cover in the "10 percent and above" categories will sum to a larger area than the FAO forest area for most countries.

MODIS Satellite Imagery: Following publication of the Global Land Cover Characteristics (GLCC) database by GLCF, a number of scientific teams assessed the accuracy of the GLCC's approach by comparing the results with higher-resolution satellite imagery. These teams found that the accuracy of the GLCF's approach was, depending on the assessment approach, in a range from 60 to nearly 80 percent, meaning that the assessment teams' classification of a given area agreed with the GLCF's classification between 60 and 80 percent of the time.

FAO Estimates: FAO acknowledges that the quality of primary data available remains poor, particularly for tropical countries, open woodland areas, and non-production forests. In most tropical countries, forests are not monitored comprehensively or frequently enough to map their extent accurately or to track their rate of change. In the absence of inventory data for specific dates (1990 and 2000), FAO's latest estimates of forest area and change over time are often based on projections and expert opinion and thus remain educated guesses. Just one or two satellite images appear to have been the prime source of new information for some countries with poor inventory data. Open woodlands are difficult to monitor by remote sensing techniques, and government forestry agencies tend not to survey them as part of normal forest inventories. Non-production forests are not included in these totals, even though many appear to meet the FAO definition of forests. While the quality of data from developed countries is generally better than from developing countries, problems still arise with estimates because of differences in national forestry definitions and systems of measurement, and the use of different reference periods. In northern countries, the boundary between forest and tundra is vague. For a discussion of some data reliability issues associated with *FRA 2000*, see <http://pdf.wri.org/fra2000.pdf>.

Drylands: The accuracy of land-area totals is limited by the 50-kilometer resolution of the data set. The climate data set was derived from a limited number of field observations. Actual boundaries between aridity zones are neither abrupt nor static, making delineated borders somewhat artificial. The data should therefore be considered useful as a general indicator of the extent of drylands within each country, rather than as an exact depiction of the climatic situation on the ground. Alternative methods for measuring extent of drylands area include use of soil moisture and agricultural production systems, although these methods may also be subject to similar problems such as low-resolution data, limited field observations, and subjectivity when delineating exact boundaries on the ground.

Percent of Urban Population Living in Slum Conditions: UN-HABITAT's definition of slum conditions, described above, may not always measure living conditions with sufficient precision. Sub-national coverage for the household surveys varies as does the international coverage for the different indicators. Despite these drawbacks, this is the most reliable global data set available on this complex issue.

SOURCES

Total Land Area and Cropland Area: Food and Agriculture Organization of the United Nations (FAO). 2004. FAOSTAT on-line statistical service. Rome: FAO. Available at <http://apps.fao.org>.

Forested Area, Modis Satellite Imagery: University of Maryland Global Land Cover Facility (GLCF). 2002. MODIS 500m Vegetation Continuous Fields Percent Tree Cover. Available at <http://glcf.umiaccs.umd.edu/data/>.

Forested Area, FAO Estimates: Food and Agriculture Organization of the United Nations (FAO). 2001. *Global Forest Resources Assessment 2000—Main Report*. Rome: FAO. Available at <http://www.fao.org/forestry/fo/fra/index.jsp>.

Dryland Area: U. Deichmann and L. Eklundh. 1991. *Global Digital Data Sets for Land Degradation Studies: A GIS Approach*. GRID Case Study Series No. 4. Nairobi, Kenya: United Nations Environment Program/Global Resource Information Database (UNEP/GRID).

Population Density: United Nations Population Division. 2003. *World Population Prospects: The 2002 Revision*. Dataset on CD-ROM. New York: United Nations. Available at <http://www.un.org/esa/population/ordering.htm>.

Urban Population: United Nations Population Division. 2004. *World Urbanization Prospects: The 2003 Revision*. Urban and Rural Areas Dataset (POP/DB/WUP/Rev.2003/ Table A.7). Data set in digital form. Available at <http://www.un.org/esa/population/ordering.htm>. New York: United Nations.

Population by City Size: The World Bank Group. 2004. *Urban Population in World Bank Regions by City Size*. Washington, DC: World Bank. Available at <http://www.worldbank.org/urban/env/population-regions.htm>.

Population Living in Slum Conditions: United Nations Human Settlements Program (UN-HABITAT). 2003. *Slums of the World: The Face of Urban Poverty in the New Millennium?* Nairobi: UN-HABITAT. Available at <http://www.unhabitat.org/publication/slumreport.pdf>.

