The Future of Protected Areas in a Crowded World

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ARE THERE TOO MANY PEOPLE? This is the critical question of our age. Not just for those concerned with parks and other protected areas, or with conservation and the environment, but for everyone. It is a question which cannot be answered solely through empirical analysis because the answer ultimately depends on what kind of world, what kind of natural and social environment, the species *Homo sapiens* wants—or is willing to tolerate. This is so precisely because it is within our capacity to not only control, but to direct our reproductive patterns, as well as to shape (to some extent) our environment's carrying capacity. Moreover, questions of social status, gender inequality, the educational status of women, poverty, materialism and consumerism, the balance of political power, and cultural and religious beliefs are vital components of any sophisticated analysis of population issues. So in fact the question is not just one of numbers of people, but of how people live.

Thus immediately we enter a thicket of qualifications. In fact, it is more like a luxuriant jungle of uncertainty, subjectivity, and controversy. The population debate is certainly not short on controversy. All the contentious issues that have roiled up at one time or another—abortion, the status of women, contraceptive use, gender selection by amniocentesis, state sovereignty, imperialism, North-South inequity, coercion, genocide—are vitally important to sorting out what is, after all, the most momentous issue in human history. Yet, for better or worse, all the controversy has cast something of a pall of censoriousness over the debate. There are those who would rule out any assertion, however judicious, about whether there are too many people because they impute an ulterior motive to those making it.

We think one ought to be free to offer a direct answer, supported by reason and responsibly qualified, to the basic question. Our view is that there are already too many people for the world's environment and its social structures to support *in a humane way given today's economic and political conditions.* It is hardly necessary to recount the overwhelming body of evidence that supports this statement, all of it pointing to unprecedented environmental degradation and human suffering. Never before have billions of people lived in poverty, consumed polluted water, or breathed fouled air—simply because never before have there been billions of people. Many of the problems facing the world today are age-old, but their magnitude is brand-new.

Since there is no chance of reducing the overall global population anytime soon, the only option left is to try to bring about a societal transformation that will lead to a decline in fertility and, eventually, a stabilized world population. Only when that is achieved will it become possible to talk seriously about reducing the global population in a hu-

mane, non-coercive way. Such a transformation is not a pipe dream; in fact, there are signs of it already in countries around the world. It happens that the necessary changes can be coupled with others that will encourage more support for protected areas (and the natural and cultural environment in general). In short, the most promising solution to the overpopulation–overconsumption crisis is a move toward a sustainable society.

It is not our purpose here to survey the field of thought on population–environment interactions, which has a lineage stretching back to Malthus and beyond in Western thought and to Confucius in the East. However, let us outline the boundaries of speculation by giving the extreme views. One is that humans are like cancer in both the way we multiply and our effects on the planet (an analogy first suggested in Gregg 1955 and summarized in Forencich 1992). Light-years away, so to speak, are pro-natalist "cornucopians" who believe that the human mind is "the ultimate resource" because our ingenuity will always allow us to think our way out of any environmental or social problem, and that there is no practical limit to the number of people the earth can support. Therefore, the more humans there are, the better, because there is more of the "raw material" of potential ingenuity (a view exemplified in Simon 1981).

The two extremes, one misanthropic and the other naïve, are not entirely without merit for our aims: at least they indicate the far reaches of the two ideologies that have informed the protected area movement since its beginnings in the 19th century. For many years the prevailing (if unspoken) view among the creators of national parks and wildlife reserves was that people are a problem to be kept at bay outside of (or strictly controlled within) well-delineated boundaries by enforcing exclusionary laws and policies. This reflects the classical Yellowstone-style concept of what a protected area should be. Over the past twenty years or so there has been a remarkable shift away from this concept in reaction to its perceived failure to meet modern conservation and social needs, particularly but not exclusively in the developing world. What might be called a "second wave" of protected areas has come about. These new kinds of protected areas (such as biosphere reserves, co-managed areas, protected landscapes, and extractive reserves) are designed to treat people as partners and potential sources of answers to conservation problems.

The Current Situation

Table 1 gives crude demographic and protected area information for most of the principal political divisions of the world. The columns are as follows.

- **Column A** gives the 1990 population and **Column B** the national population density as of 1993. These data can be used to compare relative size and crowdedness.
- **Column C** gives the average annual percentage change in the size of the population over the period 1985-90. Speaking very roughly (and subjectively), a figure of 0-1% indicates a pattern of near-stability or slight growth, a figure of 1-2% moderate growth, a figure of 2-3% vigorous growth, and a figure over 3% very rapid growth. Figures in parentheses indicate declines. The national figures take into account the effects of migration, but of course the global figure, 1.75%, represents a net average annual increase over the period. (The same holds true for Column D.) For the sake of comparison, keep in mind that between 1000 and 1750 the annual global population growth rate was something on the order of

Table 1. Basic demographic and protected area data

	{A} Population, 1990 (millions)	{B} Population Density, 1993 (per 1,000 ha)	{C} Average Annual Population Change, 1985-90 (%)	{D} Average Annual Population Increment, 1985-90 (1,000s)	{E} Percentage of Population <15 / ≥65, 1992	{F} Gov't View of Fertility, 1992 (H too high S satisf'c'y L too low)	{G} Per Capita GNP, 1991 (US$)	{H} Number of Terrestrial Protected Areas, 1993	{I} Extent of Terrestrial Protected Areas, 1993 (1,000 ha)	{J} Percentage of Land Protected, 1993	{K} Number of Marine & Coastal Protected Areas, 1993	{L} Extent of Marine & Coastal Protected Areas, 1993 (1,000 ha)
WORLD	**5,295.30**	**427**	**1.75**	**81,538**	**33 / 6**	**–**	**–**	**8,619**	**792,266**	**5.9**	**977**	**211,406**
AFRICA												
Algeria	24.96	114	3.01	610	44 / 4	H	1.991	19	12,719	5.3	1	2
Angola	9.19	82	2.63	197	45 / 3	H	–	5	2,641	2.1	2	62
Benin	4.62	459	2.82	105	46 / 3	S	389	2	844	7.5	0	0
Botswana	1.24	24	3.40	33	45 / 3	H	2,666	9	10,025	17.6	–	–
Burkina Faso	8.99	357	2.50	185	48 / 4	H	290	12	2,662	9.7	–	–
Burundi	5.49	2,337	2.80	124	46 / 3	H	218	3	89	3.2	–	–
Cameroon	11.52	270	2.83	263	46 / 3	H	858	14	2,050	4.3	1	160
Central African Rep	3.01	52	2.58	64	42 / 3	H	407	13	6,106	9.8	–	–
Chad	5.55	48	2.28	108	43 / 4	S	212	7	2,980	2.3	–	–
Comoros*	0.55	2,466	3.45	17	48 / 3	H	460	0	0	0.0	0	0
Congo	2.23	71	2.82	51	45 / 3	L	1,060	10	1,177	3.4	1	300
Côte d'Ivoire	11.98	421	3.86	348	48 / 3	S	677	12	1,993	6.2	1	30
Djibouti	0.44	208	4.46	15	45 / 3	S	–	1	10	0.4	0	0
Egypt	52.43	563	2.58	1,127	41 / 4	H	611	13	800	0.8	3	62
Equatorial Guinea	0.35	135	7.22	19	43 / 4	L	345	0	0	0.0	0	0
Ethiopia	49.83	496	2.12	867	46 / 3	H	123	11	2,534	2.1	1	200
Gabon	1.16	50	4.01	36	33 / 6	L	3,879	6	1,045	3.9	2	1,058
Gambia	0.86	932	3.01	21	44 / 3	H	367	3	18	1.6	0	0
Ghana	15.02	723	3.58	421	45 / 3	H	420	8	1,075	4.5	0	0
Guinea	5.76	256	2.23	105	44 / 3	H	498	3	164	0.7	0	0
Guinea-Bissau	0.96	366	1.87	16	41 / 4	H	187	0	0	0.0	0	0
Kenya	23.59	458	3.56	648	49 / 2	H	350	36	3,470	6.0	3	7
Lesotho	1.75	620	2.78	40	43 / 4	H	582	1	7	0.2	–	–
Liberia	2.58	294	3.17	65	46 / 4	H	–	1	129	1.3	0	0
Libya	4.55	29	4.37	149	50 / 2	S	–	3	155	0.1	0	0
Madagascar	12.01	228	3.06	290	47 / 3	H	207	36	1,115	1.9	1	2
Malawi	9.58	1,137	3.42	230	48 / 3	H	200	9	1,059	8.9	–	–
Mali	9.21	83	2.85	210	47 / 4	H	251	11	4,012	3.2	–	–
Mauritania	2.02	22	2.60	43	44 / 3	S	500	4	1,746	1.7	0	0
Mauritius	1.08	5,463	1.09	11	30 / 5	S	2,380	0	0	0.0	1	4
Morocco	25.06	604	2.56	529	41 / 4	H	1,033	10	362	0.8	2	13
Mozambique	14.20	195	2.27	290	44 / 3	S	84	1	2	0.0	0	0
Namibia	1.44	19	2.94	34	46 / 3	–	1,584	11	10,371	12.6	–	–
Niger	7.73	67	3.36	204	49 / 3	H	303	6	9,697	7.7	–	–
Nigeria	108.54	1,310	3.20	2,717	45 / 2	H	305	20	3,062	3.3	0	0
Rwanda	7.03	3,157	2.87	159	48 / 3	H	282	2	327	12.4	–	–
Senegal	7.33	413	2.81	167	46 / 3	H	736	9	2,180	11.1	4	81
Sierra Leone	4.15	627	2.32	80	44 / 3	H	202	2	82	1.1	0	0

AFRICA (continued)	{A} Population, 1990 (millions)	{B} Population Density, 1993 (per 1,000 ha)	{C} Average Annual Population Change, 1985-90 (%)	{D} Average Annual Population Increment, 1985-90 (1,000s)	{E} Percentage of Population <15 / ≥65, 1992	{F} Gov't View of Fertility, 1992 (H too high S satisf'c'y L too low)	{G} Per Capita GNP, 1991 (US$)	{H} Number of Terrestrial Protected Areas, 1993	{I} Extent of Terrestrial Protected Areas, 1993 (1,000 ha)	{J} Percentage of Land Protected, 1993	{K} Number of Marine & Coastal Protected Areas, 1993	{L} Extent of Marine & Coastal Protected Areas, 1993 (1,000 ha)
Somalia	8.68	152	3.20	232	46 / 3	S	–	16	9,383	3.7	0	0
South Africa	37.96	334	2.58	814	40 / 4	H	2,543	235	7,413	6.1	13	152
Sudan	25.20	115	3.11	628	46 / 2	S	–	16	9,383	3.7	0	0
Swaziland	0.75	473	3.07	19	46 / 3	H	1,210	4	46	2.6	–	–
Tanzania	25.99	325	3.28	663	48 / 3	H	95	28	13,000	13.8	0	0
Togo	3.53	714	2.93	83	49 / 2	H	427	11	647	11.4	0	0
Tunisia	8.06	552	2.57	175	38 / 5	H	1,504	6	44	0.3	1	4
Uganda	17.56	964	2.72	383	49 / 2	H	163	32	1,871	7.9	0	0
Zaire	37.39	182	3.18	932	43 / 4	H	–	8	9,917	4.2	0	0
Zambia	8.14	120	3.58	225	49 / 2	H	418	20	6,361	8.5	–	–
Zimbabwe	9.95	282	3.22	249	45 / 3	H	641	25	3,068	7.9	–	–
ASIA												
Afghanistan	16.56	315	(2.02)	(309)	46 / 4	H	–	5	183	0.3	–	–
Armenia	3.33	1,256	–	–	30 / 5	–	1,928	4	222	7.4	–	–
Azerbaijan	7.13	852	–	–	33 / 5	–	1,232	11	178	2.1	–	–
Bahrain	0.52	7,588	3.67	17	35 / 2	S	6,360	0	0	0.0	0	0
Bangladesh	113.68	9,388	2.68	2,528	44 / 3	H	205	8	97	0.7	3	32
Bhutan	1.54	351	2.10	27	39 / 4	S	174	5	906	19.3	–	–
Brunei Darussalam*	0.30	570	–	–	36 / 3	S	15,390	4	122	23.1	–	–
Cambodia	8.34	510	2.40	166	36 / 3	L	202	0	0	0.0	0	0
China	1,153.47	1,292	1.44	14,888	28 / 6	H	364	434	30,767	3.2	20	1,184
Cyprus*	0.70	759	1.04	7	26 / 10	L	7,050	0	0	0.0	0	0
Georgia	5.46	785	–	–	25 / 9	–	1,788	15	187	2.7	–	–
India	846.19	3,016	2.14	15,559	36 / 4	H	330	331	13,160	4.0	14	474
Indonesia	184.28	1,074	2.06	3,275	37 / 4	H	592	186	19,339	10.2	68	8,941
Iran	58.27	386	4.40	1,932	46 / 3	H	2,274	62	7,979	4.8	3	725
Iraq	18.08	455	3.27	462	45 / 3	L	–	0	0	0.0	0	0
Israel	4.66	2,662	1.75	71	31 / 9	L	12,293	21	207	10.0	1	31
Japan	123.54	3,319	0.68	806	18 / 13	L	26,824	685	4,666	12.3	30	637
Jordan	4.01	499	3.07	97	48 / 3	H	935	8	100	1.1	0	0
Kazakhstan	16.74	64	–	–	32 / 6	–	2,026	8	835	0.3	–	–
Kyrgyzstan	4.39	239	–	–	37 / 5	–	1,163	5	197	1.0	–	–
Korea, North	21.77	1,915	1.71	326	29 / 4	S	–	2	58	0.5	0	0
Korea, South	43.38	4,508	1.36	536	26 / 5	S	6,277	26	757	7.6	3	285
Kuwait	2.14	1,024	4.48	69	45 / 1	S	–	1	25	1.4	0	0
Laos	4.20	200	2.29	78	44 / 4	S	218	0	0	0.0	–	–
Lebanon	2.74	2,836	(0.01)	(0)	40 / 5	S	–	1	4	0.3	0	0
Malaysia	17.89	586	2.60	383	37 / 4	S	2,497	48	1,487	4.5	9	52
Mongolia	2.19	15	2.76	49	44 / 4	H	–	15	6,168	3.9	–	–
Myanmar	41.83	678	2.09	745	37 / 4	S	–	2	173	0.3	0	0
Nepal	19.57	1,541	2.85	456	42 / 3	H	170	12	1,109	7.9	–	–
Oman	1.52	80	4.91	55	47 / 3	S	6,148	2	54	0.3	1	1

ASIA (continued)	{A} Population, 1990 (millions)	{B} Population Density, 1993 (per 1,000 ha)	{C} Average Annual Population Change, 1985-90 (%)	{D} Average Annual Population Increment, 1985-90 (1,000s)	{E} Percentage of Population <15 / ≥65, 1992	{F} Gov't View of Fertility, 1992 (H too high S satisf'c'y L too low)	{G} Per Capita GNP, 1991 (US$)	{H} Number of Terrestrial Protected Areas, 1993	{I} Extent of Terrestrial Protected Areas, 1993 (1,000 ha)	{J} Percentage of Land Protected, 1993	{K} Number of Marine & Coastal Protected Areas, 1993	{L} Extent of Marine & Coastal Protected Areas, 1993 (1,000 ha)
Pakistan	118.12	1,661	3.31	3,075	44 / 4	H	383	53	3,655	4.6	1	16
Philippines	62.44	2,232	2.58	1,342	39 / 4	H	728	27	573	1.9	5	31
Qatar*	0.37	335	4.16	14	28 / 1	S	9,920	0	0	0.0	0	0
Saudi Arabia	14.87	77	5.57	601	45 / 3	S	7,893	9	21,197	9.9	2	475
Singapore	2.71	45,869	1.16	29	23 / 6	L	14,263	1	2	2.6	0	0
Sri Lanka	17.22	2,769	1.67	258	35 / 4	H	495	43	784	11.9	6	303
Syria	12.36	748	3.46	329	49 / 4	S	1,141	0	0	0.0	0	0
Tajikistan	5.30	401	–	–	43 / 4	–	697	3	86	0.6	–	–
Thailand	54.68	1,113	1.83	894	34 / 4	H	1,697	106	6,475	12.6	10	625
Turkey	55.99	774	2.50	1,181	35 / 4	H	1,793	18	269	0.3	3	114
Turkmenistan	3.67	81	–	–	41 / 4	–	1,439	8	1,111	2.3	–	–
United Arab Emirates	1.59	204	5.69	67	35 / 1	S	22,170	0	0	0.0	0	0
Uzbekistan	20.51	515	–	–	41 / 4	–	978	10	245	0.5	–	–
Vietnam	66.69	2,178	2.18	1,237	39 / 5	H	–	59	897	2.7	2	34
Yemen	11.68	246	3.43	308	49 / 3	H	557	0	0	0.0	0	0
AUSTRALIA & OCEANIA												
Australia	17.09	23	1.40	213	22 / 11	S	17.068	733	81,403	10.6	184	13,035
Belau (Palau)*	0.01	203	–	–	–	–	–	1	1	2.0	–	–
Cook Islands*	0.01	416	–	–	–	–	–	1	0.2	0.1	–	–
Fd St of Micronesia*	0.09	1,282	–	–	–	–	–	0	0	0.0	0	0
Fiji	0.73	409	1.97	13	38 / 3	H	1,945	4	6	0.3	1	4
French Polynesia*	0.19	579	–	–	37 / 3	–	-	7	11	3.4	–	–
Kiribati*	0.07	968	–	–	–	–	600	10	27	39.1	–	–
Marshall Islands*	0.04	2,517	–	–	51 / 3	–	-	0	0	0.0	0	0
Nauru*	0.01	3,803	–	–	–	–	9,091	0	0	0.0	0	0
New Caledonia*	0.16	88	–	–	33 / 5	–	-	30	60	0.3	–	–
New Zealand	3.39	130	0.84	27	23 / 11	S	12,301	124	2,901	10.7	32	1,386
Niue*	0.01	385	–	–	–	–	–	0	0	0.0	0	0
Papua New Guinea	3.88	92	2.29	75	40 / 3	H	932	6	29	0.1	0	0
Solomon Islands	0.32	126	3.50	9	47 / 3	H	684	0	0	0.0	0	0
Tonga*	0.10	1,339	–	–	–	–	–	6	0.4	0.1	–	–
Tuvalu*	0.01	3,846	–	–	–	–	–	0	0	0.0	0	0
Vanuatu*	0.14	303	–	–	45 / 3	S	860	0	0	0.0	0	0
Wallis & Futuna*	0.01	476	–	–	–	–	–	1	0.003	0.0	0	0
Western Samoa*	0.16	1,438	–	–	40 / 4	H	720	2	0.002	0.0	–	–

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SOUTH AMERICA												
Argentina	32.32	122	1.43	419	30 / 9	S	3,966	100	9,336	3.4	7	1,499
Bolivia	7.17	71	2.55	152	41 / 4	H	654	26	9,250	8.4	–	–
Brazil	149.04	185	2.23	2,856	35 / 5	S	2,920	214	27,742	3.3	20	2,032
Chile	13.17	184	1.68	195	31 / 6	S	2,359	65	13,715	18.1	32	10,050
Colombia	32.30	327	2.11	591	36 / 4	S	1,254	79	9,391	8.2	9	615
Ecuador	10.55	409	2.72	237	41 / 4	H	1,010	15	11,136	39.3	5	8,975
French Guiana*	0.11	13	–	–	–	–	6,700	0	0	0.0	0	0
Guyana	0.80	41	0.80	6	33 / 4	S	302	1	59	0.3	0	0
Paraguay	4.28	117	3.20	109	40 / 4	S	1,266	19	1,483	3.6	–	–
Peru	21.55	179	2.31	424	39 / 4	H	1,055	22	4,176	3.2	4	710
Suriname	0.42	29	1.66	6	34 / 4	S	3,874	13	736	4.5	5	128
Uruguay	3.09	180	0.64	19	26 / 12	L	2,883	8	32	0.2	1	3
Venezuela	19.32	234	2.66	428	38 / 4	S	2,728	104	27,534	30.2	11	704
CARIBBEAN, CENT. AMERICA & NORTH AMERICA												
Barbados*	0.26	5,930	0.16	0	25 / 11	S	6,370	0	0	0.0	0	0
Belize	0.19	89	2.63	4	45 / 6	S	2,176	10	291	12.7	NA	NA
Canada	26.64	30	0.90	222	21 / 11	S	20,740	411	49,448	5.0	48	7,106
Costa Rica	3.02	640	2.91	72	36 / 5	H	1,841	25	621	12.1	7	194
Cuba	10.61	993	0.81	80	23 / 9	S	–	57	894	8.1	6	227
Domincan Rep	7.17	1,575	2.38	144	39 / 3	H	922	18	1,048	21.5	7	270
El Salvador	5.17	2,663	0.92	43	44 / 4	H	1,087	5	19	0.9	0	0
Guatemala	9.20	925	2.82	209	45 / 3	H	944	17	833	7.6	3	13
Haiti	6.49	2,501	1.83	102	45 / 4	H	375	3	10	0.3	0	0
Honduras	5.14	503	3.59	144	46 / 3	H	587	38	543	4.8	1	350
Jamaica	2.42	2,304	1.60	36	34 / 8	H	1,446	1	2	0.1	0	0
Mexico	84.49	472	2.40	1,710	38 / 4	H	2,971	60	9,897	5.1	11	1,119
Nicaragua	3.68	346	2.83	85	47 / 4	H	283	21	952	7.3	1	4
Panamá	2.66	337	2.17	45	35 / 5	S	2,133	15	1,328	17.2	6	898
Trinidad & Tobago	1.31	2,493	1.40	16	34 / 5	H	3,793	9	18	3.4	2	3
USA	249.98	281	0.92	2,142	22 / 13	S	22,356	937	98,456	10.5	107	54,317
EUROPE												
Albania	3.25	1,218	2.07	58	33 / 5	S	–	13	45	1.5	5	28
Austria	7.71	943	0.02	2	17 / 15	S	20,410	187	2,118	25.3	–	–
Belarus	10.26	496	–	–	23 /10	S	3,288	4	237	1.1	–	–
Belgium	9.97	3,311	0.01	1	18 / 15	S	19,043	3	77	2.5	0	0
Bosnia-Hercegovina*	4.35	852	–	–	28 / 6	–	–	–	–	–	–	–
Bulgaria	8.99	807	0.22	20	20 / 13	L	1,818	50	261	2.4	0	0
Croatia*	4.69	829	–	–	21 / 12	–	–	–	–	–	–	–

EUROPE (continued)	{A} Population, 1990 (millions)	{B} Population Density, 1993 (per 1,000 ha)	{C} Average Annual Population Change, 1985-90 (%)	{D} Average Annual Population Increment, 1985-90 (1,000s)	{E} Percentage of Population <15 / ≥65, 1992	{F} Gov't View of Fertility, 1992 (H too high S satisf'c'y L too low)	{G} Per Capita GNP, 1991 (US$)	{H} Number of Terrestrial Protected Areas, 1993	{I} Extent of Terrestrial Protected Areas, 1993 (1,000 ha)	{J} Percentage of Land Protected, 1993	{K} Number of Marine & Coastal Protected Areas, 1993	{L} Extent of Marine & Coastal Protected Areas, 1993 (1,000 ha)
Czechoslovakia†	15.66	1,258	0.24	38	23 / 12	S	2,473	65	2,059	16.1	–	–
Denmark	5.14	1,219	0.00	0	17 / 16	S	23,793	65	409	9.5	3	12
Estonia	1.58	365	0.75	56	22 / 11	–	3,914	37	360	8.0	–	–
Finland	4.98	165	0.51	24	19 / 13	S	24,089	38	850	2.5	0	0
France	56.72	1,043	0.47	258	20 / 14	L	20,486	88	5,300	9.6	27	849
Germany	79.48	2,308	(0.16)	(127)	16 / 15	L	19,204	472	8,781	24.6	14	733
Greece	10.12	792	0.60	58	19 / 14	L	6,530	18	103	0.8	13	84
Hungary	10.55	1,136	(0.12)	(12)	20 / 14	L	2,700	54	577	6.2	–	–
Iceland	0.26	26	1.13	3	26 / 11	S	23,324	20	916	8.9	5	509
Ireland	3.50	505	0.87	30	27 / 11	S	11,245	6	39	0.6	0	0
Italy	57.66	1,966	0.25	141	17 / 14	L	18,588	143	2,008	6.7	18	211
Latvia	2.69	430	0.61	16	21 / 12	–	3,850	21	175	2.7	–	–
Lithuania	3.73	826	0.88	31	23 / 11	–	2,415	0	0	0.0	–	–
Luxembourg*	0.37	1,448	0.32	1	17 / 13	L	24,860	0	0	0.0	–	–
Macedonia*	2.30	894	–	–	29 / 7	–	–	–	–	–	–	–
Malta*	0.35	11,031	0.49	2	23 / 11	S	5,820	0	0	0.0	–	–
Moldova	4.36	1,293	–	–	28 / 8	–	1,700	0	0	0.0	–	–
Netherlands	14.94	4,502	0.48	68	18 / 13	S	18,858	67	353	9.4	10	54
Norway	4.25	140	0.32	13	19 / 16	S	24,065	81	1,609	5.0	12	3,508
Poland	38.18	1,265	0.90	326	25 / 10	S	1,787	80	2,242	7.2	4	73
Portugal	9.87	1,073	0.28	28	21 / 13	S	5,944	23	560	6.1	8	132
Russia	149.28	88	–	–	23 / 10	–	3,469	75	20,033	1.2	–	–
Romania	23.27	1,015	0.47	105	23 / 11	L	1,380	40	1,089	4.6	0	0
Serbia-Montenegro*	10.39	1,016	–	–	24 / 9	–	–	–	–	–	–	–
Slovenia*	1.95	963	–	–	23 / 11	–	7,150	–	–	–	–	–
Spain	38.96	784	0.49	186	20 / 13	S	12,482	161	3,504	6.9	9	75
Sweden	8.57	211	0.10	8	18 / 18	S	25,254	193	2,960	6.6	5	12
Switzerland	6.71	1,725	0.47	30	16 / 15	L	33,850	112	753	18.2	–	–
Ukraine	51.84	865	–	–	22 / 12	S	2,191	17	465	0.8	–	–
United Kingdom	57.41	2,393	0.10	58	19 / 16	S	16,606	131	4,635	18.9	35	1,194

– = not applicable or not available; * = see sources note below; † = before partitioning into Czech Republic and Slovakia.

Except for countries marked with an asterisk, the data come from the following sources: Population, population change, population increment: WRI 1994:268-269 (Table 16.1). Per capita GNP: WRI 1994:256-257 (Table 15.1). Population density: WRI 1994:284-285 (Table 17.1). Protected area columns: WRI 1994:316-317 (Table 20.1). Population <15 / ≥65, government view of fertility: PRB 1992. For an in-depth discussion of the quality of the data, the method by which they were derived, and qualifications thereto, see the technical notes appended to the tables in WRI 1994. For countries marked with an asterisk, the data come from the following sources: Population, population density: Hunter 1993 or WRI 1992. Population change, population increment: WRI 1992. Per capita GNP: WRI 1992 or Hunter 1993 (some of these data refer to years other than 1991). Protected areas columns: WRI 1992 or IUCN 1992a, 1992b, 1992c, 1992d (these data refer to the year 1990). Population <15 / ≥65, government view of fertility: PRB 1992.

0.10%. Only since about 1950 have annual rates reached the levels seen in Column C.

- **Column D** expresses average annual growth as the number of people added to the national population each year. This is a more concrete way to visualize growth. For example, one can quickly see that the world added another 81.5 million to its population every year during 1985-90.
- **Column E** gives the percentage of the population below age 15 and that aged 65 or older. It is a basic indicator of the age structure of the population.
- **Column F** is the government's official view of the fertility situation. Needless to say, the official view may differ from that of even the majority of individuals within the populace, or of segments therein.
- **Column G,** the 1989 per capita gross national product, gives a very general indication of the material wealth of the populace. It is not a reliable measure of natural resource consumption, but does indicate the economic disparities between developed and developing countries.
- **Columns H, I,** and **J** gives the number, extent, and national coverage of terrestrial protected areas in IUCN Categories I-V (see IUCN 1990:10-14). Designations such as strict nature reserve, national park, natural monument, wildlife sanctuary, and protected landscape are included. Excluded are multiple-use areas such as production forests.
- **Columns K** and **L** give the number and extent of marine and coastal protected areas. Included are all protected areas with littoral, coral, island, marine, or estuarine components.

Let us look briefly at some of the demographic issues raised in Table 1.

Sheer population growth. The most striking aspect of the table is the figures in Columns C and D, which show how pervasive population growth is around the world. It is often said that the demographics of the industrialized and developing countries are radically different. This is certainly true in terms of age structure, current and projected growth rates, and innumerable socioeconomic factors. But the underlying, bedrock commonality is that virtually no country has yet stabilized, let alone begun to reduce, its population. There are a handful of exceptions (all in Europe) whose population in 2025 is projected to be lower than it was in 1990: Belgium, Bulgaria, Denmark, Greece, Hungary, and Italy (WRI 1994:269). Outside of these and a few other of the most sparsely populated, slowest-growing countries, tens of thousands of people will continue to be added to national populations each year for decades to come—if current trends continue. The rate of growth is far slower than it was in 1950s and 1960s, but it is growth nonetheless.

The world's population doubled between 1950 and 1990, and is projected to reach about 8.5 billion in 2025 (WRI 1994:268). This fact is the heart of the numbers issue, but one cannot speak of "overpopulation" without linking it to "overconsumption." Out of the mountain of recent scholarly inquiry into environmental questions, the most telling single result to have emerged is this: about 40% of the net primary productivity of plants has been appropriated by humans for our use (Vitousek et al. 1986:372). One species out of thousands is using 40% of the energy upon which all forms of higher life depend. This one fact speaks volumes about overpopulation and overconsumption. *Homo sapiens* has arrogated to itself a grossly disproportionate share of the planet's life-giving photosynthesis. The inevitable result is the destruction of

other species through the extreme simplification of ecosystems. In short, the world is being domesticated, and a token 5% or 10% under protected status may ultimately not be of much account. This is not to say that there will be nothing of nature left in a world of 8 billion people; only that, in comparison with the biological richness which existed within living memory, those vestiges will be like tatters from a tapestry.

Population growth rates. Looking at Column C, we find the highest growth rates (3% and above) in Africa, the Gulf States and some other Asian Islamic countries, and scattered countries elsewhere (e.g., Honduras, Paraguay, Solomon Islands). Rates of 1-3% are common everywhere else outside of Europe. These rather abstract numbers are perhaps better expressed in Column D, the number of people added each year to the population. As we noted above, nearly every country in the world is now adding, and will continue to add for many years to come, tens of thousands of people annually. In many cases the increment will be hundreds of thousands or even millions.

By comparing Columns C and G one gets an idea of the relationship between economic development and population growth. Rates of growth in the wealthiest countries (those with a per capita GNP over $10,000) are usually far lower than those in the poorest countries (per capita GNP less than $580, the World Bank benchmark; see WRI 1992:29). Almost all of the wealthiest countries are growing at an annual rate of less than 1%, while the great majority of the poorest countries—China and Sri Lanka being notable exceptions—are growing at rates of 2% or more. In fact, there is only one example of a poor country with growth rate lower than 1%: Guyana (0.80%). Despite this pattern, as we shall see below the old cliché "development is the best contraceptive" is turning out to be an oversimplification.

Density and distribution. Where people live can be as important a factor as how many people there are. Column B gives nationwide population densities. This is a rough indicator of the "crowdedness" of a country, but it says nothing about how the population is distributed within its borders. A nation might have a high overall population density because most of its people are clustered in urban areas, with the countryside settled much less thickly. In such a country, direct population pressures on protected areas (i.e., demands for resources imposed by nearby residents) could be lower than they might seem from a glance at the national density figure. On the other hand, even a protected area in a remote, sparsely populated region can be subject to major indirect impacts attributable to population-related demands. Here are three examples.

- Resource extraction or production activities adjacent to a park could be driven up by demands in faraway populous areas. Cities, for example, are often built on prime agricultural land; the Food and Agriculture Organization of the United Nations estimates that 1.4 billion ha of arable land will be lost to city growth from 1980 to 2000. Consequently, agricultural productivity per worker has to rise to compensate for an increasingly urbanized population. This could lead to a situation where arable land near protected areas is more intensively farmed than previously, with new chemical inputs that end up in agricultural run-off, increased competition for local water supplies, more soil erosion caused by mechanized equipment, and so on (Ypsilantis 1992:52, 55).
- Air- or waterborne pollution from distant cities or industrial

facilities can have adverse effects. In the USA, smog from greater Los Angeles has damaged Grand Canyon National Park, which lies more than 800 km to the east.

- There may be desires for adjacent vacation developments from people living hundreds of kilometers away. This is a common situation within English national parks (which are actually protected landscapes): holiday and second homes account for a high percentage of dwellings in some parishes (Harmon 1991:36).

The lesson from this is that subnational analyses of density and distribution are needed to determine the full range of population-related impacts on a country's protected areas.

Age structure. Here is where the demographics of the developing and developed countries split. The world's population growth over the coming century will ride on a swelling tide of young people in developing countries. In these countries, mortality rates have dropped sharply in recent decades. Fertility rates—high though they are—actually are now falling quickly too, but not yet as fast. The ensuing gap leaves a situation where over 40% of the population in most of the developing countries is under the age of 15.

Column E tells the story. The left-hand number is the percentage of the country's population under the age of 15; the right-hand number, the percentage 65 or older. The greater the difference between the two, the more skewed the population is toward youthfulness. Most African and Arabic countries have differences of 40 percentage points or more; industrialized countries generally have differences of only 10-15 points.

As the cohort of people under age 15 grow up and reach their child-bearing years, a built-in "demographic momentum" takes hold. As van den Oever and Suprapto (1992) point out, Africa provides the prime example of demographic momentum. In 1990, some 292 million people, 45% of the total population, were under 15. Even if mortality among this group were to be high, by 2005 there would still be something on the order of 250 million Africans—125 million potential couples—aged 15 to 29, the peak age group for reproduction.

> Even if fertility in Africa were to change today and drop to "replacement level," where a couple produce just enough children to replace themselves in the next generation, the population would still increase enormously, due to the sheer number of couples in the reproductive ages. This pattern will be echoed in the future ("baby booms" and "baby busts"). If fertility remains at replacement level, the effect will be less pronounced with each subsequent generation, until the effects of past high population growth rates are entirely cancelled out and a zero population growth rate is achieved (van den Oever and Suprapto 1992:41).

In developed countries, the questions revolve around the implications of an aging population. The debate is moving beyond the old argument over whether restrictive protected areas, such as backcountry or designated wilderness, discriminate against old people who are less physically able to use them. (There does not seem to be any disproportionate lack of support for wilderness or backcountry among older age groups.) The darkling questions waiting down the road are those of "intergenerational equity" within individual countries—a euphemism for the fear that divisive rifts will form between young working people and an increasingly large group of retirees. One of the hallmarks of a

developed country is a public welfare system, often including some form of universal pension for the elderly. How can a shrinking base of young workers, scrambling in an ever-more-competitive global jobs market, generate enough revenue to pay for the welfare? Will expenditures for programs seen as "non-essentials"—which in all likelihood would include protected areas—be cut to compensate? Protected areas tend to have a broad appeal in the wealthy developed countries, but this might not save them if the economic vise tightens enough.

There are two other demographic issues particularly important to the future of protected areas that are not covered in Table 1: urbanization and migration.

Urbanization. Urbanization is a special facet of population density and distribution. The growth of urban areas, and the concentration of increasing percentages of people in them (both globally and within countries), is the demographic hallmark of our age. It is well-known that the future growth of the global population will be concentrated in cities in developing nations. In 1950, 13 of the 25 most populous cities were in lesser-developed countries; by 2000, 20 out of 25 will be (Ypsilantis 1992:52).

We have seen how cities can exert indirect influences on faraway protected areas. Obviously, parks near expanding cities face immediate challenges. Everglades National Park in the USA is a vast freshwater wetland whose ecological integrity is threatened by the greatly increased demand for water for human activities in the southern quarter of the state of Florida. South Florida's population, centered on metropolitan Miami, has increased more than tenfold since 1950. Miami's environs, once dozens of kilometers from the park boundary, now sprawl to its very edges. This, in tandem with intensive agriculture north of the park, has disrupted the delicate water-flow regime that is the lifeblood of the Everglades ecosystem (Webb 1993).

In terms of human psychology, there are profound consequences implicit in switching from a world in which most people grew up in rural areas—close to the land, so to speak—to one in which most grow up in cities. Profound, but unpredictable. It has been suggested that succeeding generations of city-dwellers will eventually become so detached from nature that their support for parks and reserves will fade (cf. Lusigi 1988:44). More to the point, it may be that conditions in burgeoning cities will preclude more and more people from even thinking about nature except sporadically, and then only as an abstract adjunct to the production of food or other necessities. On the other hand, it has also been theorized that humans have an ingrained, almost genetic need for nature (Wilson 1984). If there is such an ineradicable need, then perhaps high concentrations of people in cities will actually fuel increased desire for nature protection as "absence makes the heart grow fonder."

Migration. Rural-to-urban migration, a main force behind the explosive growth of cities around the world, is driven by economic considerations: people move to cities in search of a job or a better standard of living. Those that arrive from depressed rural areas have been termed "economic refugees." There are also economic refugees moving from one rural area to another in search of land. This form of migration is prevalent in countries where land is not distributed equitably. A closely related form of rural-to-rural migration occurs when land-use practices once sustainable become untenable as population increases. People abandoning worked-out land are called "environmental refugees," as are those escaping from natural

or human-caused environmental disasters.

Of course, the classic refugee is one fleeing war or political persecution. Areas adjacent to war zones in Africa, the Balkans, and Central America are among those that have recently received large numbers of refugees. Sometimes they pour into what had been sparsely settled districts near protected areas. For example, the population in the region around Taï National Park in Côte d'Ivoire, one of the last extensive tracts of rainforest in the Guinean zone of West Africa, has increased fivefold in less than a decade. Of the population of 57,000, some 48% are refugees from the war in Liberia who have arrived since 1989 (Castleton and Bonnehin 1992).

Some Examples of Population–Protected Area Interactions

It must be said that Table 1 does not shed much light on the relationship between population growth and protected areas within a given country. The raw numbers of Columns H-L say nothing about how completely the protected areas represent the country's ecosystems, how effective the management of the areas is, what specific population-related problems are at hand, and so on. For this we need to turn to country-by-country evaluations, such as have been gathered by IUCN (1992a; 1992b; 1992c; 1992d).

It is not difficult to imagine the sort of pressures protected areas face in countries that are both heavily and densely populated, such as Bangladesh, China, India, Indonesia, Japan, Nigeria, and Pakistan. What we would like to do here is take a glimpse at population-related issues in a few other countries where the problems may not be so well-known or obvious. We have tried to illustrate a range of existing or potential problems, both direct and indirect.

Kenya, Tanzania. These two East African countries epitomize the popular image of the continent, each boasting populations of spectacular wildlife species. Tourism is the largest foreign exchange earner in Kenya, and Tanzania earns some US$70 million in foreign exchange each year from wildlife tourism and hunting. This is largely due to the reputation of the region's wildlife and natural areas, represented in protected area systems which include such world-renowned national parks as Amboseli, Kilimanjaro, Serengeti, and Tsavo. Kenya's annual growth rate, 3.56%, and Tanzania's, 3.28%, put them among the highest in Africa. In Tanzania, according to Mwalyosi (1986), "there are conflicts between the needs of parks and of local people as populations increase; the loss of wildlife continues as a result of human encroachment into protected areas and of poaching pressure, particularly on elephant and rhino; there is also some concern about the ecological viability of some of the parks as land use changes around their perimeters." In Kenya, despite great advances in family planning (Robey, Rutstein, and Morris 1993:63-64), "population increase, coupled with agricultural encroachment, shifting cultivation, cattle grazing, unlicensed timber extraction for building poles and charcoal, intensive logging, illegal settlement, the conversion of indigenous forest to plantations, subsistence hunting, legal degazetting of forest land for conversion to other types of land use, and rapid industrialisation are threats to the forest resource, both within and around various forest reserves" (IUCN 1992c:127). Kenya's marine parks are threatened by sedimentation, expanding settlements, and pollution.

Congo, Gabon, Zaïre. These countries in Central Africa have large areas of relatively unexploited tropical rainforest, which endows them with an international environmental importance. All have annual growth rates over 2.8%—

Gabon's a staggering 4.01%—and all are expected to maintain rates of over 2.6% through at least 2005. Despite this, Congo's government views fertility as being too low, as does Gabon's, presumably because of the countries' currently low population and density. In Congo, significant areas of natural rainforest remain, but much is already disturbed (IUCN 1992c:60). Gabon has fared better. Its major ecosystems intact, it has been called "one of the few countries in the world that still offers exceptional potential for conservation" (IUCN 1992c:93). The protected areas of both are now under little direct population pressure, but the prospect of long-term high annual growth is disquieting.

Zaïre, the largest nation in Central Africa, is considered a "megadiversity country" in terms of species richness. Forced relocations from some of Zaïre's national parks and sport hunting zones have displaced numerous rural people from their ancestral land without any compensatory benefits. The track record of alienation would seem to make Zaïre's protected areas even more vulnerable to population pressures than they might otherwise be. Even under the best of circumstances, an annual increment of over 1 million people to the population does not bode well for the continued integrity of Zaïre's equatorial forest zone, which has heretofore escaped overexploitation because of low population densities. Even in the remote eastern part of the country, the more accessible transitional forest areas have been largely cleared for agriculture (IUCN 1992c:336-337). One might expect that, as transportation improves, the burgeoning population will start having a direct effect on the rainforests. Perhaps further into the future the same will hold for Congo and Gabon.

Côte d'Ivoire. Such consequences, still speculative in Central Africa, have already come all-too-true in West African countries such as Côte d'Ivoire. Although a small country, Côte d'Ivoire has a significant system of protected areas, covering over 2 million ha. The country's growth rate is 3.86% per year, adding 348,000 people annually to a population of 12 million. Not surprisingly, there is pressure to convert protected areas, often considered to be "unproductive." According to IUCN (1992c:67, summarizing Djédjé Bagno 1990 & Roth and Hoppe-Dominik 1990), "illegal hunting pressure has built up to such an enormous extent, due to greater accessibility of remote areas, increasing human populations and the insufficiency of protein sources for human nutrition," that, despite a twenty-year-old ban on hunting throughout the country, "poaching remains the most serious problem facing protected areas." The sheer number of people produces demand to open up remaining remote areas, with the result that previously unexploited wildlife comes under tremendous pressure. Côte d'Ivoire's situation is an example of protected areas being literally the last bastion of nature, since timber cutting, forest clearance, and livestock grazing have modified or eliminated almost all the natural vegetation outside of them (Roth and Hoppe-Dominik 1990).

Malaysia. Malaysia is considered to be an example of a "rapidly industrializing country"—one whose economy is on the cusp of transforming from an agricultural base to one with vigorous industrial sectors, such as energy production, manufacturing, and transportation. In many ways it is a remarkable social success story, with marked reductions over the past generation in poverty, illiteracy, infant mortality, and the birth rate (WRI 1992:44). Yet the average annual growth rate for 1985-90 remained a high 2.64%, producing an additional 443,000 people each year. In recent years the government has actively pro-

moted population growth, including giving tax incentives for larger families (EIU 1990:8). The increasing population has put direct pressure on Malaysia's forested protected areas, both on the mainland peninsula and in Sabah and Sarawak, the two states on the island of Borneo. Peninsular Malaysia was historically dominated by lowland rainforests rich in biologically important Dipterocarp tree species. Forest cover on the peninsula fell from 90% a century ago to 68% in 1966 and, precipitously, to 47% in 1985. In Sarawak, the forest cover has been reduced to at least 67%; in Sabah, to at least 45%. During this same period there were many advances in the expansion and management of the country's protected areas, but few are under complete legal protection, and authorities are concerned that they will be subject to disturbance as pressure for land and timber increase. Lands have already been excised from several protected areas in response to shifting cultivation (IUCN 1992a:75-76).

Philippines. The Philippines is an example of a country whose protected areas exist on paper only. Some 59 national parks have been established since 1900, but a 1986 assessment found that none met IUCN's international standards for protected areas (Haribon Foundation 1986). This ineffectiveness is caused by direct population pressure in the form of demand for productive land compounded by government corruption and inattention. Deforestation has fragmented the original cover everywhere in the country except for the island of Palawan, where the population density is low. At least 5.7 million people have encroached on lands that are supposed to be protected public domain (Cruz et al. 1992), with some 54,000 ha under cultivation. Plans are now underway to virtually start over and remake the protected areas system (IUCN 1992a:115-116). However, an annual population increment exceeding 1.4 million people, coupled with a per capita GNP of $700, cast grave doubts on the ability of anyone to formulate an effective protected areas system for the Philippines.

Guatemala. Guatemala provides several examples of how migration affects protected areas. In a study of in-migration's effects on protected areas in Guatemala's fast-growing Petén Province, Ypsilantis (1992:57-60) identified five main sources of migrants: former refugees from military and political repression returning from Mexico, Mexican nationals leaving their country because of land-distribution problems and resource depletion, slash-and-burn agriculturalists coming from deforested areas in Guatemala's eastern provinces, landless farmers from the country's southern provinces, and Indians from the Altiplano who are driven out by population increases that have steadily reduced the size of inherited farm allotments to the point where they can no longer sustain young families. In addition, the government has encouraged colonization in Petén under its Instituto Nacional de Transformación Agraria. Sixty thousand people have been relocated, with another 100,000 proposed (Colchester 1991). The agricultural frontier has now moved deep into the Petén forests to the edge of the 1.6-million-ha Maya Biosphere Reserve, which encompasses four national parks (including Tikal, a World Heritage Site) and three "protected biotopes." Immigration into Petén is considered the greatest threat to the biosphere reserve (Santiso 1993).

USA. While examples of most kinds of protected area–population interactions can be found in the United States, the situation at Shenandoah National Park in the state of Virginia exemplifies certain problems endemic to wealthy countries. All of northeastern Virginia is undergoing rapid population growth caused by urban sprawl from the

capital city of Washington. Located within 50 km of Washington, the area around Shenandoah has been transformed from a rural to a near-suburban landscape. The effects of regional population growth on the park have been wide-ranging. Highways have been improved and businesses relocated closer to Shenandoah, which has allowed people with a wide range of occupations to move near the park and still keep their high-wage jobs. Real estate values in the area have risen 400%, with parcels abutting the park even more desired. Farms and woodlots have been subdivided and strip developments are springing up. Wildlife management may change as sport hunting declines among the newcomers on the periphery of the park. Changes in ownership have cut off long-standing points of access to park trails along the boundary. Day-use of the park is now higher than before. Visibility from Shenandoah's famous Skyline Drive has decreased by 50% over the past two decades because of higher industrial pollution, which has also led to airborne pollution of park streams. What people see from Skyline Drive is no longer a pleasing pattern of farms, woodlots, forests, and small towns, but a jumble of industrial facilities, small "farmettes," and housing subdivisions. In response to these population-related issues, Shenandoah's managers have begun cooperative planning to protect park values on nearby lands as well as those inside the boundary (Haskell 1991).

Mediterranean Europe. The Mediterranean Sea is a microcosm of pressures facing coastal areas everywhere (see Hinrichsen 1994). Mediterranean coastal regions now receive 100 million international and domestic tourists each year. According to projections by the Mediterranean Blue Plan commission, under even poor economic conditions that number will rise to 170 million by 2025, and could go as high as 340 million (Batisse 1994). The U.N. Environment Program has projected that the number in 2025 could be as high as 760 million (FNPPE 1993:43). With continuing population growth along the southern and eastern coasts, the pressures on the sea are intensifying. The effects are beginning to show on coastal and near-shore protected areas. For example, long stretches of the Spanish Mediterranean coast have been developed for tourism. The area around Coto Doñana National Park—which is an internationally important confluence of migratory bird routes between Africa and Europe—is no exception. Visitor pressure and excessive water extraction are among the reasons natural water sources within Coto Doñana have been drastically reduced (IUCN 1992b:308). The Portuguese Algarve, France's Côte d'Azur, and the coastal areas of Italy and Greece have seen similar problems.

Societal Transformation

So what are the prospects for protected areas as we head into a century which could well see the world population reach 10 billion people or more? Our analysis proceeds from four propositions:

- The current protected area estate does not satisfactorily protect the natural systems and cultural facets it is meant to safeguard, for two reasons: it is far too small and there are too many other pressing demands to enable governments to devote the funds necessary to manage it properly.
- Widespread public support is a prerequisite for expanding and strengthening the management of the protected area estate.
- Such public support will be impossible to get and keep unless it is built up within a larger context of societal transformation—a transformation which leads first to economic and political secu-

rity, and eventually the stabilization, followed by a gradual reduction, of the world's population.

- Conservationists working in and on behalf of protected areas must contribute to this transformation by (1) continuing to innovate ways of integrating the needs of people with the protection aims of parks and reserves, and (2) concerning themselves with issues of social justice and human development that hitherto have been seen as separate from natural and cultural resource protection.

The first two propositions seem evident. No scientific authority has ever claimed that the existing extent of protected areas is adequate to the tasks set them. The same is true for their funding. Indeed, the consensus is quite to the contrary. The 1982 World Parks Congress proposed a doubling of the protected area estate, to 10% of the global land surface, within ten years (McNeely and Miller 1984). At 5.9%, we are obviously far short of this goal—a goal which itself has more to do with present political realities than with the objective requirements of ecosystem protection. Evidence from conservation biology suggests that far more than 5-10% will have to come under systematic management if biodiversity and the functioning of natural processes are to be protected. This will undoubtedly require funding far higher than is now allotted to protected area conservation.

If we accept the first proposition, then the next follows readily. The move toward second-wave, nonexclusionary designations has been driven by the recognition that public support is essential for making protected areas work under *current* conditions. To expand protected areas further entails even more contentious competition with other, more directly productive forms of land use. There is no reason to think that future protected area expansion can be effected against the wishes of the populace at large and local people in particular.

The societal transformation referred to in the third proposition is by no means speculative or utopian: there are initial signs of it already around the world, manifested in the fact that fertility is now declining across a broad range of developing countries *in the absence of economic growth.*

> Contrary to the expectations of many observers, developing nations are not experiencing the classical demographic transition [from high to low birth and death rates] that took place in many industrialized countries over the past century. In the U.S. and the U.K., for instance, declining birth rates came only after economic growth had brought improvements in health care and education. The transition took many decades. In contrast, recent evidence suggests that birth rates in the developing world have fallen even in the absence of improved living conditions. The decrease has also proceeded with remarkable speed (Robey, Rutstein, and Morris 1993:60).

The authors of this study highlight three reasons for the broad-based fertility decline in developing countries: better education of women, the diffusion through the mass media of contemporary cultural attitudes favoring smaller families, and, most importantly, access to modern methods of contraception. They also make it clear, however, that the mix of factors differs among regions and even between countries (Robey, Rutstein, and Morris 1993:62-67).

A crucial inference to be drawn from these findings is that the kind of wasteful and destructive economic development characteristic of the rise of industrialized countries is

not a prerequisite for reducing fertility. To put it another way, lowered fertility in the developing countries can be attributed to a combination of changes that also happen to be elements of a sustainable society. Better education, access to contraception and family planning, improved health care, heightened status of women—all are among the elements of a transformation to a more equitable, humane, sustainable social structure. (There are, of course, many others; for one view, see Viederman 1993.)

Family planning organizations try to provide their services within the context of the development of the community, the family, and individuals. This should signal to conservationists that controlling fertility is not merely an end in itself or a means of protecting the environment: it is a valuable tool to open up new possibilities for human development, both collectively and individually. *Family planning opens new horizons for people and increases their chances for leading productive and fulfilling lives.* Conservationist approaches to population issues have largely missed this point.

What does all this mean for protected areas? This brings us to our fourth proposition: there must be a mutually reinforcing relationship between human development aims and the environmental and cultural protection aims of parks and reserves. People who are concerned with protected areas must be concerned with population issues. And to be concerned with population issues means being concerned with social and economic justice, the status of women, access to family planning, and a host of other socioeconomic changes needed if we are to establish a sustainable human presence on Earth.

Many family planning agencies have now adopted a community-centered development model that stresses achieving sustainability at the local level. This too is relevant to the future of protected areas. An individual park or reserve can do relatively little to influence sustainability on a national or international scale, but it can contribute a great deal to local sustainable development. This is the driving force behind the movement toward second-wave, nonexclusionary designations. There are numerous examples of integrated conservation-development projects involving protected areas; West and Brechin (1991) treat the subject in detail.

In short, making the economy sustainable is a protected area issue. Family planning is a protected area issue. Getting better education for girls and women is a protected area issue. Human development is a protected area issue.

Stabilization, Reduction, Restoration

Progress toward economic and political security and enhanced human development is the start of the societal transformation; stabilizing and subsequently reducing the world's population is the next step. Reducing the global population is not some arbitrary or ideological goal. Rather, it is a *means* of providing social and economic opportunities that would be impossible to offer in a more populous world. Just as importantly, population reduction allows enhanced appreciation of and support for biological and ecological stability.

It is a telling fact that only a few on the fringe of the population debate are talking about actually reducing the world's population. This is certainly understandable given that there is absolutely no prospect of this happening anytime soon, barring some pandemic catastrophe. Nonetheless, there is no iron law which says that the world's population could not contract—in a humane, non-coercive way—from whatever level it ultimately reaches. If there were consensus from the grassroots up, and enlightened gov-

ernment and other institutional leadership from the top down, every country could turn the tide of growth into a moderated contraction within a few decades. The current dramatic declines in developing-world fertility show that reproduction can be directed downward without destabilizing society.

Admittedly, a consciously moderated population contraction would be unprecedented in recorded history. But if it seems totally far-fetched on a global scale, it certainly is not on a national basis. As we noted above, six European countries are expected to do just that by 2025. Indeed, it is incumbent upon the industrialized countries to lead the way in reducing their national populations because they still consume the lion's share of resources. Fewer North Americans and Europeans means fewer people living wasteful lifestyles (at least in the short run; it would remain to be seen if consumption increases in the South would fill the void). It is the developed countries that have fueled their economic prosperity through large-scale, unsustainable resource depletion and environmental degradation.

In summary, our ideal would be for all developed countries to reduce their fertility to replacement levels or slightly lower, thus embarking on a moderated contraction of their populations, with all of them achieving so-called negative growth rates during the next century. For countries locked in the grip of demographic momentum, the ideal would be to institute as soon as possible the entire range of reforms required for the societal transformation discussed above, with the result that their growth is arrested toward the end of the next century. Then, perhaps early in the 22nd century, the population of the developing countries would begin a moderated contraction too.

But let us imagine now that the year is 2094, and that our ideal has been achieved. The world's population has peaked and is now embarked, through an international consensus, upon the beginnings of a sustained, planned decline. The most intense human pressures on the remaining intact protected areas have been relieved. World leaders have realized that increasing the number, extent, and effectiveness of protected areas is needed to help revive the global environment. The problem is, in many countries practically all land outside protected areas has been heavily modified for human use. What can be done?

Under such circumstances, restoring disturbed ecosystems will be the only way to make additions or repairs to protected area systems (cf. Jordan, Peters, and Allen 1988). Virtually new protected areas could conceivably be made out of degraded or disturbed land. In fact, the first experiments have already begun. Guanacaste National Park in Costa Rica is being knitted together out of private holdings, part of a previously existing national park, and other public holdings with diminished productivity. One of the park's objectives is to use leftover remnants of the once-extensive dry forest as the basis for restoring about 700 square kilometers to a condition able to support all the flora and fauna found in Costa Rica when the conquistadors arrived (WRI and IIED 1988:220). If Guanacaste is successful, it will point the way for remedial protected area expansion in the coming century and beyond.

Conclusion

If there is to be any hope for achieving a world which is both ecologically sustainable and humane, one which has a complement of protected areas safeguarding a meaningful portion of land and water, there will have to be a widespread consensus that redirecting population change is both necessary and desirable. As we have

seen, there is already "bottom-up" momentum for reducing fertility in many countries; this needs to be linked with more "top-down" support from governments and political leaders (cf. Brechin and West 1990). We need to reach a point where most people and their governments support a stabilization-reduction-restoration scenario. The barrier is getting over the idea that reproduction is exclusively a personal matter and that there is no legitimacy in trying to overtly influence individual reproductive decisions. Unless one takes the cynical view that all systems of social improvement are based on coercion rather than consent, it will be seen that a government enunciation of a stabilization-to-reduction population policy is no different *in kind* that any other public policy, whether it be one of economics, national defense, or public welfare.

The next hundred years will decide the fate of the protected area conservation movement. Protected areas might end up devalued and relegated to a sideline role as artifacts, museum-pieces with little practical relevance to what's left of the natural environment. But if we can link environmental protection, human development, and population policy, protected areas might emerge from the crucible as one of the institutions leading the world to sustainability.

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