

## Notes

### INTRODUCTION: HOSTAGES TO HUBRIS

1. “Recessional” (Kipling 1942, p. 893). Although the poem may appear to present second thoughts about imperialism, what is known about Kipling’s views when he published it shows that it “was never intended as in any sense anti-imperialist” (Ricketts 1999, p. 237). “Recessional” led to considerable controversy at the time over the degree of imperial caution being urged (e.g., see also Gilmour 2002; Mallett 2003).

For brevity, the last two stanzas of the poem were omitted in the epigraph to this book. They read as follows:

If, drunk with sight of power, we loose  
Wild tongues that have not Thee in awe—  
Such boasting as the Gentiles use  
Or lesser breeds without the Law—  
Lord God of Hosts, be with us yet,  
Lest we forget, lest we forget!

For heathen heart that puts her trust  
In reeking tube and iron shard—  
All valiant dust that builds on dust,  
And guarding calls not Thee to guard—  
For frantic boast and foolish word,  
Thy Mercy on Thy People, Lord!

2. Cotterell 1980.
3. Leick 2001, p. 242.
4. Leick 2001, pp. 222ff.
5. Dalley 1997.
6. Layard 2001 (1882), p. 5.
7. Leick 2001.
8. E.g., Roaf 1990, pp. 18ff.
9. E.g., Jacobsen and Adams 1958.
10. Cotterell 1980.
11. E.g., Redman 1999, pp. 136–139.
12. Roux 1980, pp. 391ff.
13. Sadly, the remnants of the Assyrian people were subjected to intense persecution by Turks, Kurds, Persians, and others from World War I to after World War II, with tens of thousands of deaths (Yacoub 1986).
14. The decline was actually quite an uneven affair of complex social-ecological interactions (Adams 1978; Tainter 1988; Tainter 2000; Yoffee

- and Cowgill 1988). The Mesopotamian collapse is now being studied in the context of complex adaptive systems (Gunderson and Holling 2001; Levin 1999) and resilience theory (Redman and Kinzig 2003).
15. For details, see Leick 2001.
  16. Diamond 2003a.
  17. Central Intelligence Agency (CIA), Iraq, in *The World Factbook* 2003 (CIA, Washington, DC, 2003), <http://www.cia.gov/cia/publications/factbook/geos/iz.html#Geo>.
  18. Green 1979, p. 272.
  19. For a while, they even collected tribute from the once great maritime city of Tyre (Cotterell 1980, p. 131), sited in what is now southern Lebanon. Tyre was captured by the crusaders and then recaptured by Muslims and destroyed in AD 1291, to be remembered along with Nineveh in Kipling's poem.
  20. Healy 1991.
  21. Nagle and Burstein 2002, p. 40.
  22. Quoted in Starr 1991, p. 133. This is the source for much of the material in this paragraph.
  23. Union of Concerned Scientists 1993. The entire statement is reprinted in Ehrlich and Ehrlich 1996, pp. 242–250.
  24. National Academy of Sciences USA 1993. The report is reprinted in Ehrlich and Ehrlich 1996, pp. 233–242.
  25. E.g., Ehrlich 1989; Sapolsky 1997; Bazzaz et al. 1998.
  26. E.g., Pirie 1966; Blanko et al. 1967; Oak Ridge National Laboratory 1968; Dyson 1975. For analysis, see Cloud 1968; Ehrlich and Holdren 1969; Ehrlich 1975; and Ehrlich and Mooney 1983.
  27. Pirie 1966, 1969.
  28. Oak Ridge National Laboratory 1968.
  29. Newman and Kenworthy 1989, pp. 106, 148, 164; Kay 1997, p. 15; Freund and Martin 1993, p. 7.
  30. For an introduction to the drawbacks of modern agricultural technology, see Ehrlich et al. 1993, 1995; Smale 1997; Shiva 1999; and Smil 2000.
  31. It can also be defined as one that has resilience, that is, the ability to absorb shocks and stresses without losing fundamental valued properties. What exactly is meant by a sustainable society (or ecosystem) is a more difficult technical issue than it may appear. See, e.g., discussions in Gunderson and Holling 2001.
  32. Ornstein and Ehrlich 1989.
  33. For a recent pertinent analysis, see Rosa et al. 2003.
  34. Union of Concerned Scientists 1993.

#### CHAPTER I: THE HUMAN PREDICAMENT

1. "Recessional" (Kipling 1942, p. 893).
2. World Resources Institute 2000.

3. Study of Critical Environmental Problems 1970. The first mention we have found of humanity being a geological force is in Osborne 1948, chap. 3. For a more recent assessment, see Vitousek et al. 1997.
4. Ehrlich 1993.
5. Schneider 1997b; Intergovernmental Panel on Climate Change (IPCC) 2001.
6. This has been summarized in a simple identity:  $I = PAT$ . All the equation says is that the environmental impact of a society ( $I$ ) can be estimated by multiplying the number of people ( $P$ ) in the society by the affluence ( $A$ ) per person, measured by the level of consumption. ( $A$  is used for affluence instead of  $C$  for consumption simply because  $IPAT$  is euphonious and  $IPCT$  isn't.) That product is then multiplied by the technology factor ( $T$ ), which includes the social, economic, and political arrangements connected with supplying what is consumed (Ehrlich and Ehrlich 1990; Ehrlich and Holdren 1971; Holdren and Ehrlich 1974; Ehrlich 1995).
7. Vitousek et al. 1986, 1997; Pimm 2001.
8. E.g., Diamond 1997; Sachs and Warner 2001.
9. E.g., Ehrlich 2000.
10. This is the subject of a large and somewhat contentious literature. See, e.g., Landes 1999; Davis 2001; Easterly 2002; Acemoglu et al. 2002, 2003.
11. Population Reference Bureau 2003.
12. Pritchett 1997.
13. Recent advances in India and China may have brought about a small reversal of this trend (World Bank and International Monetary Fund 1999).
14. World Bank and International Monetary Fund 1999, p. 2; World Bank 2001.
15. There is evidence that some hunter-gatherer groups, besides being culturally integrated and not jealous of the condition of others, were able to supply their material needs in a relatively few hours per day.
16. GDP is the total flow of goods and services produced in a nation over a year. Gross national product (GNP) is GDP with the income earned by people living in the country from investments outside the country added in, and the income accruing to foreigners living abroad subtracted. Average per capita GDP in North America and Europe rose from about \$7,500 in 1950 to more than \$25,000 in 1999 (in constant U.S. dollars) (Worldwatch Institute 2000). Per capita GDP for sub-Saharan Africa was \$500 in 1999, and it was even lower in many countries, such as Burundi, Chad, and Ethiopia.
17. Here we have used figures on per capita GDP (gross domestic product—the sum of all goods and services produced in a society divided by its population size) as a measure of wealth. More recently, economists have

devised another measure, PPP (purchasing power parity). PPP is essentially the per capita GDP corrected for price differences between nations in the dollar value of goods and services one could buy in the United States with a given amount of money. We use this measure for some later comparisons. Purchasing power in very poor countries often differs considerably from that in the United States. Thus, in terms of purchasing power, sub-Saharan nations, excluding South Africa, have an average per capita income of about \$1,000 (World Bank 2001).

18. World Bank 2000. Some Asian countries, especially in East Asia, have per capita GDPs resembling Europe's, whereas some others are among the world's poorest. The two largest nations, China and India, are still ranked as lower-middle and lower-income, respectively, by the World Bank, although China's GDP has been increasing rapidly in recent years. Latin America has made some progress, if unevenly, and per capita GDPs there have roughly doubled since 1950, to \$6,500 in 1999; see Worldwatch Institute 2002.
19. E.g., Feshbach and Friendly 1992. Average per capita GDPs of the former Soviet bloc are barely one-fifth those of the market-based industrialized nations.
20. The United States, Canada, Japan, Australia, New Zealand, and countries in Europe, except for the former Soviet Union and its eastern European satellites.
21. World Bank 2000.
22. Pritchett 1997.
23. While *purchasing power* gives a more accurate view of the buying power of individuals, given differences in costs of essential goods and services, most people in sub-Saharan Africa are surviving on two dollars a day or less. Purchasing power figures here are from Population Reference Bureau 2003.
24. Directly or indirectly—much of the grain is fed to animals that in turn are eaten by people. The leading cereals are wheat, rice, maize, and a variety of coarse grains such as oats, rye, millet, and sorghum.
25. Worldwatch Institute 2002.
26. Ehrlich et al. 1993. International food agencies were also created in the 1970s to stockpile food surpluses and distribute emergency supplies in areas threatened by famine. While the grain stocks thus used have been minuscule in the global food picture, they have repeatedly saved lives in suffering societies such as Ethiopia, Sudan, and, most recently, Afghanistan and Iraq.
27. Leisinger et al. 2002; World Bank 2000; see also Gardner and Halweil 2000. A recent report by the World Health Organization estimated that some 3.4 million people, mostly children, die of hunger every year, not counting hundreds of thousands of children who die prematurely of diseases that wouldn't have killed them had they been well fed.

28. E.g., Anonymous 2003f.
29. Pers. comm., 17 August 2003. In the counterintuitive language of economists, the solution for hunger is to increase the demand for food among the poverty-stricken (remember, supply will attempt to keep up with demand—the willingness or ability to *pay* for something).
30. Smil 2000, pp. 251–264.
31. Since 1950, while grain harvests tripled, meat production expanded more than fivefold. Aquaculture, in scarcely twenty years, has grown from a negligible source to account for more than 30 percent of the total fish harvest (Worldwatch Institute 2002; World Resources Institute 1998), most of which also ends up on the tables of the rich.
32. The global birthrate has dropped impressively in the past three decades, from 1.8 percent per year in the mid-1970s to 1.2 percent (United Nations [Population Division] 2003) or 1.3 percent (Population Reference Bureau 2003) now. But one should not be misled by that clear progress. The 1.8 percent was applied to a population of 4 billion, meaning that only slightly more than 70 million people were being added to the population each year.
33. Smil 2000, pp. 182–187.
34. E.g., Smil 2000, pp. 302–303.
35. The leading food exporters are the United States, Canada, Australia, Argentina, Thailand, and members of the European Union. It is ironic that the rich industrial countries that so heavily depend on resources from other regions reverse the flow by supplying basic foods to those regions.
36. But see Smale (1997), who doesn't think the problems of genetic erosion and vulnerability, at least in wheat, are as severe or as traceable to the green revolution as often claimed.
37. Ted Agres, Biodiversity treaty called disastrous, *The Scientist*, 10 September 2003, <http://www.the-scientist.com>.
38. Yield is production of a given crop per unit area.
39. Worldwatch Institute 2002.
40. Smil 2000, p. 315. Thomas Robert Malthus was the famous British economist and clergyman who warned in 1798 that population growth could outstrip food supply.
41. Falcon 2002; Falcon and Fowler 2002.
42. Shiva 2003, p. 149.
43. Quoted in Hughes 1975, p. 70.
44. For an excellent recent history, see Williams 2003.
45. World Resources Institute 2000; Food and Agriculture Organization of the United Nations (FAO) 2001; Bryant et al. 1997. The situation is complicated by the differing methods of calculating forest cover and loss among various international agencies.
46. Bryant et al. 1997; Worldwatch Institute 2002.

47. World Resources Institute 2000.
48. World Resources Institute 2000.
49. Reuters, U.S. Democrats blast Bush plan to cut land purchases, 13 February 2003.
50. Oldeman 1998; Daily 1995.
51. Smil 2000.
52. Gardner 1996; Imhoff et al. 1998.
53. American Farmland Trust 1997.
54. Kolankiewicz and Beck 2001.
55. See <http://www.touregypt.net/fayoum2.htm>. The site is about sixty-five miles southwest of Cairo, and the dam blocked a natural canal that connected the lake in the depression to the Nile.
56. See <http://geography.about.com/library/weekly/aa012698.htm?once=true&>.
57. Eckholm 2003, pp. 1ff.; [http://www.chinaonline.com/refer/ministry\\_profiles/threegorgesdam.asp](http://www.chinaonline.com/refer/ministry_profiles/threegorgesdam.asp). More than 15 million people are expected to benefit from the resultant flood control and electricity generation.
58. Gleick 2002.
59. Simon 1998; Gleick 2000.
60. The controlled water supply from irrigation more than doubles crop yields. Some 40 percent of the world's agricultural products are from irrigated land. Postel 1998, 1999; Food and Agriculture Organization of the United Nations (FAO), FAOSTAT Statistics Database, land use and irrigation data collections, <http://apps.fao.org>; Meinzen-Dick and Rosegrant 2001; Worldwatch Institute 2002.
61. Reisner 1986; Postel et al. 1996.
62. Postel 1998, 1999.
63. Gleick 2000.
64. Associated Press 2003.
65. Opie 1993, pp. 3–4.
66. Glennon 2002, p. 32.
67. Jehl 2002.
68. Postel 1999; Gleick et al. 1999. For an example of struggles over Colorado River water, see Murphy 2003b.
69. Postel 1998, 1999; Meinzen-Dick and Rosegrant 2001; Worldwatch Institute 2002.
70. Postel 1998.
71. Meinzen-Dick and Rosegrant 2001.
72. Anonymous 2003l.
73. Gleick et al. 2002. While in many cases prices for water *should* be higher to reflect all the costs in human effort and environmental decline involved in providing it (in economic terms, water's "social costs"), one legitimate role for government is to subsidize the supply of so vital a substance to those unable to pay their share of those costs.

74. Murphy 2003a; Service 2003.
75. Gleick 2002.
76. Agence France-Presse 2002.
77. Meinzen-Dick and Rosegrant 2001.
78. Gleick 2002.
79. Effluvium from confined animal feeding operations (CAFOs), which often hold tens of thousands of hogs in a concentrated complex of buildings, is pumped into lagoons, from which it may leak or be washed out by storms into nearby streams or offshore. In the latter case, the effects may resemble the Gulf of Mexico dead zone.
80. World Resources Institute 2000.
81. The importance of wise management of increasingly constrained water resources for future food production and human well-being was elucidated in a recent study by the International Food Policy Research Institute; see Rosegrant et al. 2003, pp. 24–36. The analysis showed that failure to address the problem politically was likely to result in higher water prices and increased domestic shortages (and thus less consumption by poorer groups). Significantly reduced grain production because of inefficient irrigation would lead to higher food prices and further deterioration of water-dependent natural ecosystems.
82. Pauly et al. 2002; Pauly and Maclean 2003.
83. Ehrlich et al. 1977. The plight of the whales was a centerpiece of the first United Nations Conference on the Human Environment in 1972, and regulation of whaling ensued, more or less successfully, including bans on hunting of the most endangered species. Following this, some whale species began to show signs of recovery. But by 2003 things seemed to be moving backward. A new study indicated that previous estimates of original unexploited whale populations had been too small, and thus the degree of overharvesting had been underestimated (Roman and Palumbi 2003). Meanwhile, first Japan and Norway and then Iceland had returned to whaling under the supremely phony excuse that it was for “scientific research.”
84. World Resources Institute 1998; Food and Agriculture Organization of the United Nations (FAO) 1997.
85. Lubchenco et al. 2003; Pearce 2003b; Leahy 2003.
86. Pauly and Watson 2003.
87. Jackson et al. 2001. Coastal populations of fish, shellfish, sea turtles, and marine mammals have been harvested so intensively that most of them, even where supposedly underfished today, are very small in comparison with prehistoric levels.
88. Thirty square miles of coastal marshes are lost annually in the United States alone. Perhaps 15 to 20 percent of the marine harvest is composed of fishes that depend on those wetlands for part of their life history, representing some 25 to 30 percent of the value of the catch

because of the higher prices commanded by shellfish and a few prized fish species. These are guesstimates by a very knowledgeable fisheries biologist, Andrew A. Rosenberg, Department of Natural Resources, University of New Hampshire (pers. comm., 7 January 2003). Global warming, which is also connected to human population size and growth, is exacerbating the trend of wetlands loss (Ray et al. 1992).

89. The *Exxon Valdez* spilled almost 11 million gallons of oil.
90. Pew Oceans Commission, *America's Living Oceans: Charting a Course for Sea Change* (Pew Oceans Commission, Arlington, VA, May 2003), executive summary, [http://www.pewoceans.org/oceans/oceans\\_overview.asp](http://www.pewoceans.org/oceans/oceans_overview.asp).
91. Watson and Pauly 2001.
92. Worldwatch Institute 2002.
93. Naylor et al. 2000; for a recent overview, see Naylor et al. 2003.
94. Ellis 2003.
95. Pearce 2003c.
96. For one approach, see Zabel et al. 2003.
97. Especially natural capital in the form of biodiversity (Ehrlich and Ehrlich 1981, 1992; Wilson 2002).
98. Repetto and Holmes 1983; Repetto et al. 1987.

#### CHAPTER 2: THE COSTS OF SUCCESS

1. Catton 1980, p. 17.
2. Carson 1962; for the book's accuracy and impact, see Ehrlich 1979.
3. Ehrlich et al. 1977, pp. 854ff.
4. E.g., Rudd 1964; Woodwell 1967.
5. Genesis 1:28. God said, "Be fruitful and increase in number: fill the earth and subdue it" (Committee on Bible Translation 1984, pp. 1–2). Our daughter, Lisa, was told by an intelligent but uneducated Latin American-born friend many years ago that the friend was disgusted by her sister, who kept having babies even though she was on welfare. Surprised, because she knew her friend was a fundamentalist Christian, Lisa asked if the sister wasn't just following the biblical injunction. Her friend simply replied, "Ya conquistada"—It's subdued already.
6. Daily 1997; Ehrlich and Ehrlich 1992; Ehrlich and Roughgarden 1987, pp. 519ff.
7. Ehrlich and Ehrlich 1981; Daily 1997; Chapin et al. 2000; Beattie and Ehrlich 2001.
8. Ehrlich and Mooney 1983, p. 252.
9. There is a trend toward such valuation, however (e.g., Daily and Ellison 2002).
10. Social costs are examples of negative externalities.
11. E.g., Tilman et al. 1994; Heywood 1995; Myers 1996; Hughes et al. 1997, 2000; Tilman 2000.
12. E.g., Rolston 1988; Nash 1989. Unfortunately, this ethical view is not

widely enough shared. For example, people are exterminating our closest living relatives on the planet, chimpanzees and bonobos, through a combination of habitat destruction and hunting for “bushmeat” by local human groups. Yet humanity has already learned much about itself by studying these fascinating other apes (Ehrlich 2002; Goodall 1986; Waal 1997), so close to us that Jared Diamond christened human beings the “third chimpanzee” (Diamond 1991). And we may have much more to learn, especially from the bonobos. After all, they solve their disputes not with warfare but usually with mutual genital rubbing (Waal 1997, pp. 108ff.)!

13. Defined as areas still largely capable of supplying their original suite of ecosystem services sustainably.
14. Balmford et al. 2002; the quote is from p. 953. The opportunity costs in the calculation are the value of the next best possible uses of the areas preserved—for instance, the sale price of timber that might be harvested from a reserve.
15. Myers 1979; Ehrlich and Ehrlich 1981.
16. Marshall and Ward 1996; Raup 1991.
17. Myers 1988, 1990.
18. Tilman et al. 1994; Hanski and Ovaskainen 2002.
19. Ehrlich and Daily 1993; Daily and Ehrlich 1995; Ceballos and Ehrlich 2002.
20. This definition is oversimplified but will do for our purposes. For more details, see Ehrlich and Hanski 2004.
21. Hughes et al. 1997, 2000.
22. A serious question has arisen as to how the scarce resources devoted to conservation should be allocated between two important goals of preserving biodiversity. One is preserving hot spots, areas such as the Amazon basin, which is incredibly rich in species; the other is protecting “cool spots,” places not incredibly rich in species diversity but with many populations of a relatively few species delivering essential services to humanity (Kareiva and Marvier 2003).
23. For some insight into crooked Florida politics for those who don’t remember the 2000 presidential election, see Hiaasen 2001 and Palast 2002.
24. Kiple 1993, p. 962.
25. McCarthy 2003; Pain et al. 2003.
26. Pain et al. 2003.
27. Quoted in Ehrlich and Ehrlich 1981, p. 250.
28. Ehrlich 2000, pp. 171–172.
29. Myers 1996; Ehrlich 2001b; Palumbi 2001b.
30. World Resources Institute 2000. There also are about 1.7 billion domestic sheep and goats and many billions of chickens.
31. Ehrlich and Ehrlich 1981; Daily 1997.

32. Coevolution is the reciprocal evolution of ecologically intimate organisms—for instance, parasites creating selection pressures on hosts, predators on prey, herbivores on plants, and, in each case, vice versa—Ehrlich and Raven 1964.
33. E.g., King 1984; Drake et al. 1989; Simberloff et al. 1997; Baskin 2002; O'Dowd et al. 2003.
34. Baskin 2002.
35. E.g., Palumbi 2001a, 2001b.
36. Intergovernmental Panel on Climate Change (IPCC) 2002; Karl and Trenberth 2003.
37. Sample 2003.
38. World Meteorological Organization, Extreme weather events might increase, press release, 2 July 2003, Geneva.
39. Root et al. 2003; Parmesan and Yohe 2003.
40. Curran et al. 2003.
41. Wolfson and Schneider 2002. These are the conditions prevailing on the moon and presumably on Mars (which is farther from the sun and even colder). Venus, by contrast, is so shrouded in greenhouse gases—mainly CO<sub>2</sub>—that it is too hot for life as we know it.
42. Intergovernmental Panel on Climate Change (IPCC) 2002.
43. Wolfson and Schneider 2002. A positive feedback occurs when the results of a process themselves enhance the process.
44. These gases remain in the atmosphere for various amounts of time on average, ranging from many centuries for some CFCs and related chemicals to a century or so for CO<sub>2</sub> and N<sub>2</sub>O and perhaps a decade for CH<sub>4</sub>.
45. Benedick 1991; Turco 1997.
46. Technically, this process is known as evapotranspiration.
47. Firor and Jacobsen 2002.
48. Root et al. 2003; Parmesan and Yohe 2003.
49. For more on potentially catastrophic nonlinearities in the climate system, see Pearce 2003a.
50. Schneider 1997b, pp. 90–92; Firor and Jacobsen 2002.
51. Harte et al. 1991.
52. Simonich and Hites 1995; McGinn 2002.
53. Colborn et al. 1996; for updates, see <http://www.ourstolenfuture.org/>.
54. Baker et al. 1996.
55. Goolsby et al. 1997.
56. Harte et al. 1991.
57. Ehrlich et al. 1977, pp. 574–575.
58. Ehrlich et al. 1977, pp. 571ff.
59. Cone 2003.
60. Ehrlich et al. 1977, p. 574.
61. Smil 2000, p. 82.

62. See, most recently, Hileman 2003, which describes recent findings on rising adverse effects of toxic exposures on children in the United States.
63. Worldwatch Institute 2002; World Health Organization (WHO), Air pollution, fact sheet no. 187, September 2000, <http://www.who.int/inf-fs/en/fact187.html>.
64. Colborn et al. 1996.
65. Daily and Ehrlich 1996a, 1996b.
66. Brasher and Altman 2003.
67. AIDS symptoms usually don't appear until years after HIV exposure. The modes of transmission and the long symptom-free period have led to denial of the problem by both infected individuals and governments, especially in very poor countries where many people are uneducated and health facilities are weak to non-existent.
68. Baranauckas 2002.
69. For some notion of the seriousness of the flu threat, see Webster and Walker 2003 and Webby and Webster 2003.
70. Daily and Ehrlich 1996a; McMichael 2001.
71. Total confirmed infections totaled only somewhat more than 4,000.
72. Ginsburg 2003.
73. Altman 2003.
74. McMichael 2001, pp. 301ff.
75. The SARS episode clearly revealed shortcomings in the global health network, including lack of uniformity in testing procedures, but nevertheless the disease was successfully contained. The question is, will it recur? If it does, will it again be quickly detected and contained? See Altman 2003.
76. With people, the concept of carrying capacity is quite complex—for details, see Daily and Ehrlich 1992 and Ehrlich et al. 1992.
77. Wackernagel et al. 2002.
78. The numbers cited, for example, do not consider a buffer of land devoted to the critical task of biodiversity preservation. If the reserve for conservation of 12 percent of biologically productive land recommended by the Brundtland Report (World Commission on Environment and Development 1987) were included in the figures, overshoot would have begun in the early 1970s and the current overshoot would be some 40 percent (Wackernagel et al. 2002).
79. Borgstrom 1965.
80. Rees 1996; Wackernagel and Rees 1996.
81. Rees 2001, p. 230. If you would like to calculate your footprint, see any of the following Web sites: <http://www.lead.org/leadnet/footprint/intro.htm>; <http://www.redefiningprogress.org/programs/sustainabilityindicators/ef/>; <http://www.earthday.net/footprint/index.asp> (or <http://www.myfootprint.org/>); <http://www.ecologicalfootprint.com/>.

82. Rees 2002.
83. Rahnema 2002; Cobb 2002.
84. Stone 2002.
85. Gardner and Halweil 2000.
86. Ehrlich and Ehrlich 1981; Vitousek et al. 1986; Ehrlich et al. 1995; Daily 1995.
87. E.g., Simonich and Hites 1995.
88. E.g., Buchmann and Nabhan 1996; Nabhan and Buchmann 1997; Inouye 2001.
89. Schneider and Londer 1984; Schneider 1989, 1997b.
90. Michener et al. 1997.
91. Shiva 2003, p. 147.
92. Anderson and May 1991.
93. For an in-depth analysis of the connections in complex systems, see Gunderson and Holling 2001.
94. E.g., Vitousek et al. 1996, 1986, 1997; Vitousek and Matson 1993.
95. Holdren and Ehrlich 1974; Holdren 1991; National Academy of Sciences USA 1993; Union of Concerned Scientists 1993.
96. Vitousek et al. 1997, p. 499.

#### CHAPTER 3: THE TIDE OF POPULATION

1. Osborne 1948, p. 201.
2. This story was first told in Ehrlich 1997.
3. Action Comores, Environmental crisis in the Comores, <http://vsb.nott.ac.uk/Action-Comores/achomepage3.html>.
4. Anonymous 1997a.
5. Sangonet, Le chef autoproclamé de l'île sécessionniste d'Anjouan (Comores), le colonel Saïd Abeid, renversé par un putsch ce 9 août 2001 (Sangonet, 2003), <http://www.sangonet.com/Fich2ActuaInterAfric/AnjouanPutsch9aout01.html>; Central Intelligence Agency (CIA), Comoros, in *The World Factbook 2003* (CIA, Washington, DC, 2003), <http://www.cia.gov/cia/publications/factbook/geos/cn.html>. See also (Europa World 2003); Africa Intelligence, Surveys: The Anjouan crisis, *Indian Ocean Newsletter*, [http://www.africaintelligence.com/dossiers/aia/dos\\_aia\\_com\\_anjouan.asp](http://www.africaintelligence.com/dossiers/aia/dos_aia_com_anjouan.asp).
6. U.S. Department of State, Bureau of Consular Affairs, Consular information sheet: Comoros, <http://travel.state.gov/comoros.html>.
7. Central Intelligence Agency (CIA), Comoros, in *The World Factbook 2003* (CIA, Washington, DC, 2003), <http://www.cia.gov/cia/publications/factbook/geos/cn.html>.
8. Diamond 1989; Ehrlich 2000, especially pp. 161ff. For an interesting recent examination of this issue, see d'Errico 2003.
9. Ehrlich 2000; for references, see p. 403, note 36.

10. Ehrlich 2000; especially chap. 10.
11. E.g., Smith 1995.
12. Easter Island is a classic example (Diamond 1995). Some other civilizations in which population growth probably played a role in generating collapse include those of the classic Maya, the Anasazi, and the Greeks (Ehrlich and Ehrlich 1996, pp. 84–86).
13. E.g., Tainter 1988, 2000; Webster 2002; Redman and Kinzig 2003.
14. Diamond 1995, 1997.
15. E.g., Davis 2001.
16. United Nations (Population Division) 2001, 2003.
17. Population Reference Bureau 1976, 2002.
18. United Nations (Population Division) 2003.
19. Wackernagel and Rees 1996, p. 15.
20. T. Bearden, Drought in the Northeast, *NewsHour with Jim Lehrer*, 23 April 2002.
21. Brody 2003.
22. McMichael 2001, pp. 117–118; Blockstein 1998.
23. Population growth of states in the 1990s is from U.S. Census data summarized in McGeeveran 2003.
24. Brown and Halweil 1998.
25. Severe acid rain from this source was reported two decades ago in Harte 1983. The situation persists: see, e.g., APEC Virtual Center for Environmental Technology Exchange, Acid rain in China, <http://www.apec-vc.org.cn/english/dq/ccaid.htm>; UNEPnet/Mercure Beijing Earth Station, State of the environment, China '97: Acid rain, <http://svr1-pek.unep.net/soechina/acid/acids1.htm>; C. Kirk, Environment report—July 5, 2002: Conditions in China, [http://www.manythings.org/voa/02/020705er\\_t.htm](http://www.manythings.org/voa/02/020705er_t.htm).
26. Current population statistics in this chapter are from the Population Reference Bureau's (PRB's) annual World Population Data Sheet or its Web site (<http://www.prb.org>) unless otherwise cited. The data sheet is an invaluable resource and can be purchased from the PRB, 1875 Connecticut Ave., NW, Suite 520, Washington, DC 20009-5728.
27. Yang and Schneider 1997–1998; in typical projections, China will pass the United States in CO<sub>2</sub> emissions well before 2050—see the table on p. 400.
28. For a view we share, see Diamond 1997.
29. The TFR is essentially the lifetime average number of children born per woman in a population (technically, TFR is calculated by running an imaginary cohort of newborn females through the age-specific fertility and mortality schedules pertaining for the year in which the estimate is made, and determining how many children the average woman bears in her lifetime). In replacement reproduction, the extra fraction

- of a child is to compensate for those newborn infants who do not survive to reproductive age.
30. Ornstein and Ehrlich 1989.
  31. Population Reference Bureau 2003.
  32. Ehrlich 1968.
  33. Vogt 1948; Brown 1954.
  34. This ignores the centrally planned economies of the Soviet Union, most of which were industrialized by then and had low fertilities but stagnant economies.
  35. For more details, see Ehrlich et al. 1995.
  36. Along the way to that understanding, there was considerable controversy over whether family planning programs were of any value in lowering birthrates—a controversy that reached its zenith at the first United Nations World Population Conference in 1974. Motivation was the key issue: why do people choose to have larger or smaller families? The answer was not at all clear at that time, but much has been learned since, especially about the importance of women's schooling and economic opportunities (e.g., Ehrlich et al. 1995).
  37. Ehrlich et al. 1995.
  38. United Nations Population Fund (UNFPA) 2002.
  39. United Nations (Population Division) 2003.
  40. U.S. Census Bureau, International Data Base (IDB), Summary demographic data for United States, October 2002 version, <http://www.census.gov/cgi-bin/ipc/idbsum?cty=US>. In the early 1970s, the U.S. TFR fell as low as 1.7, but then it rose slowly until about 2001. Then it dropped slightly, possibly in response to the economic recession.
  41. Ehrlich et al. 1995.
  42. World Bank 2000.
  43. Ehrlich et al. 1995.
  44. Literacy and health data in this and succeeding paragraphs are from World Bank 2000; TFRs are from Population Reference Bureau 2002.
  45. One example is Bangladesh, which had a TFR of 3.6 in 2003, reduced from 4.9 since 1990 (Population Reference Bureau 1990, 2003). A family planning success story resulted from recruitment of village women to provide information, advice, and materials to neighboring families, along with basic health care—an echo of China's "barefoot doctors" of the 1970s. Yet female literacy is low—some 27 percent in 1997—and hunger and poverty are still prevalent. Several Southeast Asian nations have reduced their TFRs below 3, including Vietnam, Indonesia (the world's fourth largest nation, with more than 200 million people), and Sri Lanka. Some other Asian countries, including Malaysia, the Philippines, Nepal, and Pakistan, have more slowly

- reduced their TFRs to between 3 and 4 but have mixed success in development. Western Asia and northern Africa also present a varied picture: as we indicated, conservative societies, such as in Saudi Arabia and Yemen, have maintained high birthrates despite high incomes and female literacy rates; others have seen declines in average family sizes to levels ranging from 2.5 to 5.
46. Population Reference Bureau 1990, 2003. Perhaps more important, average family size in Brazil, in the same period, dropped from 3.3 to 2.2, and in Mexico, the second largest nation in the region, from 3.8 to 2.8. Except for some Caribbean islands with below-replacement reproduction, Latin American TFRs range between 2 and 4.7.
  47. Population Reference Bureau 2003. In the mid-1980s, Kenya was a record-holder, with a TFR of 8.1; by 2003, its TFR had fallen to 4.4.
  48. United Nations (Population Division) 2003. Prospects are also discouraging in some countries in western Asia, where the TFR in Yemen is 7.2, in the Palestinian territory 5.9, in Saudi Arabia 5.7, and in pre-war Iraq 5.4, but the total number of people involved is about 100 million, as opposed to nearly 700 million in sub-Saharan Africa. In addition, the wealth of the oil-rich nations of the Middle East helps buffer some of the consequences of rapid population growth there.
  49. E.g., Dasgupta 1993, 2000, 2003.
  50. Dasgupta 2003, p. 222.
  51. Dasgupta 2003, p. 233.
  52. Kates and Haarmann 1992.
  53. United Nations (Population Division) 2003.
  54. United Nations (Population Division) 2003.
  55. United Nations (Population Division) 2001; United Nations (Population Division) 2003; Lamprey et al. 2002.
  56. United Nations (Population Division) 2003.
  57. By 2002, besides more than 20 million deaths from AIDS in the two decades since it was recognized, nearly 40 million more people were infected and likely to die prematurely, and an additional 45 million people were expected to be infected by 2010 (Lamprey et al. 2002; United Nations Joint Programme on HIV/AIDS [UNAIDS] 2002). Unsafe sex and HIV/AIDS were ranked second in the World Health Organization's list of leading risk factors (Agence France-Press 2002).
  58. United Nations (Population Division) 2003.
  59. O'Neill and Balk 2001.
  60. Recent United Nations projections extend only to 2050.
  61. The momentum results from previous higher birthrates that produced ever larger generations of people, who then become parents and grandparents, living alongside their children and grandchildren, before dying

of old age. When a formerly growing population reaches replacement reproduction, it takes roughly a lifetime (seventy or so years) before growth stops. If fertility falls below replacement level, there will still be a lag, although a shorter one, before growth ends and the population starts to shrink slowly.

62. United Nations (Population Division) 2003.
63. E.g., Bruni 2002; Wattenberg 1987.
64. The relationship of population growth and structure to political instability is both important and complex (Goldstone 1991), and we're dealing with only one obvious aspect here.
65. Approximately 90 percent of those on the FBI's most wanted terrorist list in 2001 were males who were twenty-two to thirty-four years old when their first alleged terrorist act took place (Federal Bureau of Investigation, Most wanted terrorists, <http://www.fbi.gov/mostwant/terrorists/fugitives.htm>).
66. Merari 1990.
67. United Nations (Population Division) 2001.
68. Browne 2002.
69. Ehrlich and Ehrlich 1989.
70. Ehrlich and Holdren 1971.
71. Such as the Competitive Enterprise Institute. For an egregious example, see Eberstadt 1995.
72. United Nations (Population Division) 2002b.
73. Sheehan 2002.
74. Sheehan 2002.
75. Sheehan 2002.
76. Technically, it is described by an equation of degree higher than one. The square example is of degree two.
77. Diamond 1991, pp. 168–169.
78. Stambaugh 1988, p. 337.
79. Carcopino 1940, p. 42.
80. McNeill 1976, pp. 115ff.; Stark 1996, chap. 4.
81. Daily and Ehrlich 1996a; Levin and Anderson 1999; McMichael 2001, chap. 4.
82. E.g., Ehrlich and Ehrlich 1970, pp. 148–150.
83. For a recent report from the frontlines, see Anonymous 2003g.
84. Calhoun 1962.
85. Ehrlich and Freedman 1971.
86. For a fascinating account of how people adapted to the horrors of Nazi extermination camps, see Frankl 1984.
87. For more details, see Ehrlich and Ehrlich 1990.
88. Homer-Dixon 1994; Homer-Dixon and Blitt 1998.
89. Cooley 1984; Kelly and Homer-Dixon 1998; Klare 2001.

90. Howard and Homer-Dixon 1998.
91. E.g., Gizewski and Homer-Dixon 1998; Renner 2002.
92. *New Scientist* 1975.
93. Klare 2001; for fascinating background information on Afghanistan, see Rashid 2001.
94. E.g., Mimouni 1992.
95. E.g., Courbage 1994; Fargues 1997.
96. Population Reference Bureau 2001.
97. Fargues 2000.
98. *Undocumented* is the current politically correct euphemism for *illegal*.
99. Population Reference Bureau 2003.
100. Projected from United States Census Bureau, 2002, <http://www.census.gov/>.
101. United Nations (Population Division) 2003.
102. For a general discussion, with emphasis on migration from Mexico to the United States, see Ehrlich et al. 1981.
103. Ehrlich et al. 1981.
104. Many migrants to industrialized countries send part of their earnings back home, which compensates in part for the resources or profits that rich countries extract from developing ones. The same is true for urban migrants in developing countries. An African son who moves from his family's poor farm, gets a job in the city, and sends money home may allow his family to have a better diet (which may increase its productivity) and substitute kerosene for firewood, taking some pressure off dwindling local forests. Depending on the son's consumption level and other factors, in many cases migration thus may help to reduce overall environmental pressures.
105. United Nations (Population Division) 2003.
106. Liu et al. 2003.
107. Frank 1999, p. 3.
108. In 2002, some of the nations poised on the edge of population shrinkage because of low birthrates were Finland, Greece, Italy, Portugal, the Czech Republic, Slovakia, Hungary, Poland, and Russia. South Africa, Botswana, and Zimbabwe were, tragically, projected to shrink because of high mortality from AIDS. While Russia's TFR is far below replacement level (1.3, compared with 2.1), breakdowns in public health have led to high death rates: 16 per 1,000, compared with 9 per 1,000 in the United States; life expectancy of sixty-five years, compared with seventy-seven (Population Reference Bureau 2002).
109. This includes the United Nations demographers, whose medium projection included a TFR for Europe in the period 2045–2050 of 1.8; in 2002 it was 1.4. But the projection doesn't assume a rebound above replacement level. United Nations (Population Division) 2003.

## CHAPTER 4: THE CONSUMPTION FACTOR

1. Rosenblatt 1999, p. 2.
2. Sabloff 1994.
3. Webster 2002, pp. 234–236.
4. Wilk 1985.
5. Webster 2002; Diamond 2003b.
6. For what follows in this paragraph, we're deeply indebted to Richard D. Hansen (pers. comm., 17 June 2003).
7. Hansen 1995.
8. Schreiner 2002.
9. Hansen 1998.
10. Webster 2002, p. 348.
11. Ehrlich and Ehrlich 1989, 1991b.
12. World Bank 2001.
13. Cross 2000, p. 1. Much of what follows is covered in depth in this interesting book.
14. Cohen 2002, p. 11.
15. For a fine description of the consumer society in the context of its environmental impact, with wonderful examples, see Durning 1992.
16. In technical economic terms, a “negative externality.”
17. Frank 1999, p. 3.
18. Liu et al. 2003.
19. World Resources Institute 2003.
20. Kiley 2002.
21. Kiley 2002.
22. The rest was used as fuel for commercial vehicles, trucks, railroads, aircraft, industrial machinery, space heating, power generation, and the military.
23. Friedman 2003a.
24. A *very* crude estimate. Roughly half of the petroleum used in the United States goes into gasoline for motor vehicles, about half of which are private cars. If \$110 billion of the roughly \$340 billion military budget (including veterans' benefits) is assignable to obtaining the approximately 175 billion gallons of imported petroleum consumed, and the oil used to run automobiles comes from imported oil (as opposed to domestic) in the same ratio as overall consumption (58 percent), that amounts to more than \$0.38 per gallon in any use, including, of course, fuel for Hummers.
25. Frank 1999, pp. 1–2.
26. Frank 1999, p. 24.
27. Results of a Zogby International poll of Americans whose yearly incomes exceeded \$250,000 or who had a net worth greater than \$1 million. Reported in Arthur Spiegelman, *The rich are eyeing space tourism*, poll says, Reuters (Los Angeles), 20 May 2002.

28. Material in this paragraph is based primarily on Tempest 2002.
29. Pirages and Ehrlich 1972.
30. Myers and Kent 2004. This book is the main source for the material in this paragraph.
31. Purchasing power parity adjusts national currency values to “international dollars.” PPP indicates how much the per capita GNP in local currency would purchase as dollars in the United States (<http://pacific.commerce.ubc.ca/xr/PPP.html>). Depending on the country, that can be between 1.4 and 4.8 times more than international exchange dollars.
32. Hughes et al. 2002.
33. Much of what follows is based on Tucker 2000.
34. Carrere 2001.
35. In 2003, we discovered that large areas of the lowland forest of New Britain had been converted to palm plantations, damaging much of the ecotourism potential of the area.
36. Siscawati 2001.
37. Bishop 2003.
38. For information about environmental impacts on bird fauna, see Lambert and Collar 2002.
39. Bishop 2003.
40. Nobody knows the origin of the name.
41. Information in this paragraph is largely from Samuel Kepuknai, Kiunga, Papua New Guinea (pers. comm., 1 August 2003).
42. Edward Zackery, Port Moresby, Papua New Guinea, pers. comm., 12 August 2003.
43. Vogt 1948.
44. Vogt 1948, p. 284. The American public might be enlightened if the precise impact of their population growth on the demand for tropical products could be easily calculated. Obviously, the 140 million Americans of the World War II era consumed much less from the tropics than did the 285 million Americans in 2000, but the harvesting, shipping, and storage technologies that now bring many tropical products to American markets were also less advanced in 1945, so per capita demand for the products has doubtless increased disproportionately. Population growth and rising per capita affluence have a multiplicative interaction, and they can be further augmented, as in this case, by technological advances. Unfortunately, the role of population growth in both rich and poor societies in generating the consumption that has caused so much tropical deforestation is very complex. Even so, the obvious role of increasing numbers of affluent people in amplifying demand for timber is frequently neglected.

Since World War II, there has been about a twenty-five-fold increase in transport activity globally (how much of that is carrying tropical goods to rich countries is not known). That consumption-related activity car-

ries with it a substantial environmental burden. As a single example of its scale, it is estimated that a plate of food on an American dinner table has traveled, on average, some 1,500 miles before it makes the trip from plate to mouth (Mander 2003, p. 117). For those fond of tropical fruits, the mileage is doubtless much higher.

45. E.g., see <http://www.ourstolenfuture.org/>.
46. Rosegrant et al. 2001.
47. Klare 2001; Renner 2002.
48. Renner 2002, p. 6.
49. Klare 2001, p. 196; Jared Diamond, pers. comm., 15 September 2003.
50. Aceh and Lhokseumawe 2002; Perlez 2003.
51. Renner 2002, pp. 40–42.
52. Renner 2002.
53. World Resources Institute 2003, pp. 132–136. See also World Bank 2003 and Anonymous, How banks do well while doing good, editorial, *New York Times*, 18 November 2003.
54. E.g., Rall 2002; note also Rashid 2001, especially the map opposite p. 1, and chap. 12.
55. PakNews.com, Agreement on US \$3.2 billion gas pipeline project signed, 28 December 2002, [http://www.truthout.org/docs\\_02/12.30A.afgh.pipe.p.htm](http://www.truthout.org/docs_02/12.30A.afgh.pipe.p.htm).
56. Central Asia Gas Pipeline, Consortium formed to build Central Asia gas pipeline, news release, 27 October 1997, <http://www.unocal.com/uclnews/97news/102797a.htm>.
57. Rashid 2001, p. 6.
58. BBC News, Afghanistan plans gas pipeline, 13 May 2002, <http://news.bbc.co.uk/1/hi/business/1984459.stm>.
59. The oil connection, as well as President Bush's lying to get the United States to attack Iraq, was made explicit by Senator Max Cleland (CNN, *NewsNight with Aaron Brown*, 25 September 2002).
60. For a short, not politically correct rant on the role that oil played in creating the modern Middle East, see Day 1998; for a scholarly history, Fromkin 1989 is excellent. The best single book we've found on oil is Daniel Yergin's (1991).
61. At this writing (December 2003), no threatening stock of weapons of mass destruction (WMD) has been found (Power 2003), and the U.S. government has given no coherent reason why, if Iraqis *did* have WMD, they could not have been deterred from using them. After all, the United States deterred the Soviet Union from using tens of thousands of such weapons (and vice versa) for decades, and there was never any sign that Saddam Hussein or his henchmen were suicidal.
62. But soon after the invasion, U.S. and British refiners began to take advantage of the occupation; see O'Brien 2003.

63. Yager and Steinberg 1975; Ehrlich et al. 1977; Yergin 1991.
64. Kleveman 2003.
65. Baer 2003.
66. The Saudi and Iraqi governments badly need oil revenues and would doubtless continue to sell oil to anyone who would buy. But, among other things, their facilities are very vulnerable to acts of terrorism by their own increasingly radicalized populations.
67. David Corn, Bush's *Top Gun* photo-op, *The Nation*, 1 May 2003, <http://www.thenation.com/capitalgames/index.mhtml?bid=3&pid=633>. Bush obviously enjoyed playing soldier after having worked hard to avoid being a real one. See, e.g., Sugg 2002; for more, see <http://www.awolbush.com/>.
68. Pratap Chatterjee, The war on terrorism's gravy train, *CorpWatch*, 2 May 2002, <http://www.corpwatch.org/issues/PID.jsp?articleid=2471>.
69. Halliburton was described by *New York Times* columnist Bob Herbert as "a slithery enterprise with its rapacious tentacles in everybody's pockets. It benefits from doing business with the enemy, from its relationship with the U.S. military when the U.S. is at war with the enemy, and from contracts to help rebuild the defeated enemy" (Herbert 2003a). By May 2003, the Halliburton subsidiary had received nearly \$500 million for work related to Iraq, much of it under the "Logistics Civil Augmentation Program, an obscure but lucrative contract to provide logistical support to the army" (letter from Henry A. Waxman, Democrat from California, ranking minority member, House of Representatives Committee on Government Reform, to Les Brownlee, acting secretary of the Army, 29 May 2003). See also Herbert 2003b and Neil Mackay, Carving up the new Iraq, *Glasgow Sunday Herald*, 13 April 2003, <http://www.sundayherald.com/33021>. As another columnist, Conn Hallinan, put it, "War is bad business? Not for everyone." Conn Hallinan, War is good business, ZNet, 11 January 2003, <http://www.zmag.org/content/showarticle.cfm?SectionID=15&ItemID=2851>. (Hallinan is provost of the University of California, Santa Cruz, and a columnist for the *San Francisco Examiner*.) The best way to "support our troops" surely is not to get them killed to keep America overconsuming and make more money for giant corporations (Anonymous 2003a). Interestingly, the latter editorial did not mention former secretary of state George Shultz' chairmanship of the advisory board of the Committee for the Liberation of Iraq, a front group for Bush's plans to invade Iraq (Herbert 2003b); see also Kurt Nimmo, The Committee for the Liberation of Iraq: PR spinning the Bush doctrine, *CounterPunch*, 19 November 2002, <http://www.globalpolicy.org/ngos/credib/2002/1119bush.htm>. That the life of even one American youngster (to say nothing of those of thousands of Iraqis) should be lost in such an enterprise was a disgrace.

70. Herbert 2003b. See also U.S. awards contract to rebuild Iraq's infrastructure, Associated Press, 17 April 2003; And the winner is Bechtel, *New York Times*, 19 April 2003.
71. Krugman 2003; Johnson 2003. Representative Henry Waxman of the House Committee on Government Reform put the situation equally plainly, describing Halliburton's price gouging in transporting gasoline from Kuwait to Baghdad: "There is growing evidence that favored contractors like Halliburton and Bechtel are getting sweetheart deals that are costing the taxpayer a bundle but delivering scant results . . . the Administration is shielding Halliburton and Bechtel from any competition by granting them virtual monopolies over basic services." Contracting abuses in Iraq, statement of Rep. Henry A. Waxman to House Committee on Government Reform, 108th Cong., 1st sess., 15 October 2003, [http://www.house.gov/reform/min/pdfs\\_108/pdf\\_inves/pdf\\_admin\\_halliburton\\_contract\\_oct\\_15\\_state.pdf](http://www.house.gov/reform/min/pdfs_108/pdf_inves/pdf_admin_halliburton_contract_oct_15_state.pdf). On the other hand, conservative columnist David Brooks claims that the corporations that get to rake in war profits are determined by bureaucrats in a well-structured procurement system (Brooks 2003).
72. Much of what follows is based on Ehrlich and Liu 2002.
73. Prestowitz 2003.
74. See <http://www.bp.com/centres/energy/oil/reserves.asp>.
75. Klare 2002; Baer 2003.
76. Klare 2001, pp. 29ff.
77. As represented by conservative interventionists, who explicitly believe that "At no time in history has the international security order been as conducive to American interests and ideals. The challenge for the coming century is to preserve and enhance this 'American peace.'" This is to be done by building and repositioning U.S. military forces and maintaining "nuclear strategic superiority." Thomas Donnelly, *Rebuilding America's defenses: Strategy, forces, and resources for a new century*, Project for the New American Century, September 2000, <http://www.newamericancentury.org/publicationsreports.htm>, p. iv.
78. Much of what follows is based on proclamations in the National Security Strategy: see National Security Council, *The National Security Strategy of the United States of America*, 20 September 2002, <http://www.whitehouse.gov/nsc/nss.html>; see also <http://www.whitehouse.gov/homeland/>.
79. E.g., Deffeyes 2001; Monbiot 2003b.
80. "Recessional" (Kipling 1942, p. 892).
81. Daalder and Lindsay 2003. *Preemptive* is actually the wrong term unless there is a clear, immediate threat (there was none from Iraq). *Precautionary* would be more accurate, but *preemptive* is more current.
82. On nuclear agreements, see John P. Holdren, Testimony before Senate Committee on Foreign Relations, 12 September 2002.

83. The Kyoto Protocol is the implementing mechanism for the first phase of compliance with the Framework Convention on Climate Change produced at the Earth Summit in 1992. See Athanasiou and Baer 2002; Dernbach 2002.
84. Linking the U.S. love affair with SUVs and George W. Bush's pressing for war on Iraq, Thomas Friedman wrote that going to war partly for oil would look better if it were accompanied by "a real program for energy conservation." (That seems unlikely, since Bush's friends make money by selling oil, not conserving it.) Friedman concluded: "I have no problem with a war for oil . . . provided we behave in a way that makes clear to the world we are protecting everyone's access to oil at reasonable prices—not simply our right to binge on it" (Friedman 2003b).
85. Quoted in An open letter to the members of Congress, *The Nation*, editorial, 14 October 2002.
86. Richard Neville, American psycho, *Sydney Morning Herald*, 19 May 2001, [http://www.richardneville.com/PDFs/American\\_Psycho\\_excerpt.pdf](http://www.richardneville.com/PDFs/American_Psycho_excerpt.pdf).
87. Nussbaum 2002.
88. E.g., Singer 2002.

#### CHAPTER 5: TECHNOLOGY MATTERS

1. Basalla 1988, p. 205.
2. Roan 1989 provides a good overview of the ozone discussion that follows.
3. Molina and Rowland 1974.
4. The overall history of this surprise is well told in Roan 1989, an accurate popular book.
5. Farman et al. 1985.
6. TOMS operated by measuring solar ultraviolet radiation "backscattered" from the lower atmosphere through the stratospheric ozone layer. The deep plunge during 1980–1982 was not detected because, although the readings at first were above the 180 "throw-out" value, the data were not examined closely enough to detect the downward trend immediately. American scientists eventually noted some decline, but by then TOMS was beyond its expected useful life, which added uncertainty to interpretation of the data.
7. This reconstruction of the Nimbus-7 story is based on e-mail correspondence with F. Sherwood Rowland, December 1995, and was first published in Ehrlich and Ehrlich 1996, p. 289.
8. Solomon et al. 1986.
9. European Fluorocarbon Technical Committee, HCFCs: Environment, 2001, <http://www.fluorocarbons.org/frame.htm?chfamilies/HCFCs/environ/environ.htm>.
10. E.g., Commoner 1971.

11. Allenby and Richards 1994; Gottlieb 1995.
12. World Resources Institute 2003; Allenby and Richards 1994.
13. Perrin 1979.
14. Dower 2003.
15. Success, of course, is narrowly defined here in terms of what people decide they want. By many standards (e.g., environmental impact, comfort, and time to travel short distances) trains would be more successful than airplanes.
16. Falcon and Fowler 2002; Walter Falcon, Stanford University, pers. comm., 17 August 2003.
17. Geller 2003.
18. For instance, was the green revolution a response to increasing population or to advances in technology? Are proliferating freeways a response to population growth, increased affluence, or some combination? Rising congestion, pollution, and greenhouse gas emissions generated by more and more vehicles obviously are all products of interactions between population, affluence, and technology.
19. Ehrlich and Holdren 1971; Holdren and Ehrlich 1974; Ehrlich and Ehrlich 1990; Ehrlich 1995; McDaniel and Borton 2002.
20. Schneider 1997b; Intergovernmental Panel on Climate Change (IPCC) 2001.
21. Per capita energy use is better than per capita gross domestic product (GDP) in gauging environmental impact for a number of reasons. In a service-based economy, GDP may be the same as for one based on heavy industry, but per capita energy use might be considerably less. Also, inefficient energy use is much more environmentally damaging and provides less service per unit employed than efficient use, and energy demand also is affected by factors such as climate or transportation and settlement patterns.
22. Calculated from data in World Bank 2001.
23. The term *commercial energy* refers to that sold in markets. It does not include the gathering and use of fuelwood by poor rural families—which also increased in the past half-century.
24. Worldwatch Institute 2000, 2002.
25. World Bank 2000; Ehrlich et al. 1992.
26. Calculated from data in World Bank 2000.
27. World Bank 2000.
28. For a pioneering analysis, see Holdren 1991.
29. Holdren 1990.
30. Intergovernmental Panel on Climate Change (IPCC) 2001.
31. Holdren 1991; Von Wiezacker et al. 1998.
32. We use the term *engineering efficiency* here to distinguish it from economic efficiency—a policy increases economic efficiency if it produces aggregate net benefits (increases welfare).

33. Von Wiezacker et al. 1998.
34. For insight into the importance of access to petroleum deposits, see Yergin 1991 and Economides and Oligney 2000.
35. Energy Information Service 2002; World Resources Institute 2000.
36. Von Wiezacker et al. 1998; Rosenfeld 1999; Casten 1998.
37. Schneider et al. 2002.
38. With regard to the latter, the barrier to adoption has primarily been the relatively high purchase price of the lightbulbs, even though the cost is soon recovered by reduced power bills and replacement costs.
39. Wind is actually also a form of solar power, since the sun's energy drives the weather system. So is hydropower, since it is solar energy that lifts water from the surface so it can rain and snow into mountain watersheds. So are biomass and fossil fuels, which represent solar energy captured by photosynthesis recently and in the distant past. But we use the term *solar power* here to refer to direct solar energy as captured in solar thermal apparatus and solar photovoltaic cells.
40. Geller 2003, chaps. 3 and 5; Dernbach 2002; see especially chaps. 2, 3, and 28.
41. Bush's EPA even failed to support the administration's most highly touted program of energy conservation, dramatically slashing its budget (Hebert 2003).
42. Von Wiezacker et al. 1998; Geller 2003, chap. 2.
43. Romero 2003.
44. Geller 2003, chap. 1.
45. Announcement from the World Meteorological Organization, July 2003, reported in Anonymous 2003k.
46. Schneider et al. 2002; Athanasiou and Baer 2002; Goulder 2002; Burns 2002; Sawin 2003. Details of the protocol can be found in Grubb et al. 1999. For an interesting but technical analysis of the incentive structure, successes, and failures of international environmental treaties by a first-rate economist, see Barrett 2003.
47. Stokstad 2003; Rosencranz 2002; Anonymous 2003j; Kennedy 2003. The Clinton administration was more interested in energy efficiency but did not press very hard for it and was stymied by a Republican Congress after 1994.
48. Romm 1999.
49. To see that some politicians (or ex-politicians) do their homework, see the excellent article by Wirth et al. 2002.
50. Makhijani and Saleska 1999.
51. Geller 2003; Mock et al. 1997.
52. Ehrlich 1995.
53. E.g., Wyman 1999.
54. Geller 2003, chap. 1.
55. Johansson et al. 1993.

56. Geller 2003, chap. 2. In the United States, development of both wind and solar power has also been impeded by the government's failure to provide appropriate incentives, although subsidies and tax breaks have continued to be lavished on the coal, oil, and gas industries.
57. Worldwatch Institute 2003.
58. Romero 2003.
59. Broder 2002; Opper et al. 2002; Opper 2003.
60. Worldwatch Institute 2003.
61. Stephen Schneider, Stanford University, pers. comm., January 2003.
62. Ehrlich and Ehrlich 1991a, p. 60.
63. World Resources Institute 2000.
64. Wright 1999. Figures for vehicle numbers conflict from one source to another according to the way they are categorized. Later editions of the *World Almanac* do not include numbers for vehicles registered in the United States other than passenger cars. Thus, the 76 million trucks (a category that includes sport utility vehicles) counted for 1996 in the 1999 almanac are not seen in later editions.
65. McGeeveran 2003.
66. Bernow et al. 2002. Feasible mileage levels for cars and light trucks for 2015 and 2020 are indicated on p. 200.
67. Consumers Union 2002.
68. McGeeveran 2003.
69. Sheehan 2001. That it can be accomplished, however, is shown in the success of Portland, Oregon: Jeff Gerritt, Portland shows how to control sprawl: Boundary pushed growth into city, *Detroit Free Press*, 5 May 1999, <http://www.freep.com/news/metro/qport5.htm>; Northwest Environment Watch, Sprawl and smart growth in metropolitan Portland, 9 May 2002, [http://www.northwestwatch.org/press/recent\\_portsprawl.asp](http://www.northwestwatch.org/press/recent_portsprawl.asp); Northwest Environment Watch, Fueling up: Gasoline consumption in the Pacific Northwest, 23 October 2002, [http://www.northwestwatch.org/press/recent\\_gas.asp](http://www.northwestwatch.org/press/recent_gas.asp); Reid Ewing et al., Measuring sprawl and its impact: The character and consequences of metropolitan expansion (Smart Growth America, Washington, DC, 2002), <http://www.smartgrowthamerica.com/sprawlindex/sprawlindex.html>.
70. This ratio does not include trucks or SUVs; including them, the ratio is 0.79 motor vehicle per person. A similar proportion in China would increase the numbers to an even more gargantuan level.
71. Data on U.S. automobile registrations are from McGeeveran 2003; estimated number of vehicles in China is from World Resources Institute 2000. There were about 133.6 million registered cars in the United States in 2001 and perhaps 3.9 million in China in the late 1990s. To have the same ratio of autos to people, China would need some 598 million.

72. Worldwatch Institute 2003.
73. McGeveran 2003.
74. Organicraze, *Sierra Club Currents* 3, no. 77 (Thursday, 16 October 2003), Currents@sierraclub.org.
75. Freund and Martin 1993; Kay 1997.
76. American Public Transportation Association 2002.
77. Ogden 1999.
78. Ehrlich and Ehrlich 1991a, pp. 61–62; Ogden 1999. See also Romm 2004.
79. Tromp et al. 2003.
80. Dunn 2001.
81. E.g., Smith 1995.
82. Ehrlich et al. 1995.
83. E.g., Glaeser 1987.
84. E.g., New Mexico State University, College of Agriculture and Home Economics, News center, <http://spectre.nmsu.edu/media/news2.lasso?i=News599>; Peter Walker, Patsy Waterfall, and Vicki Richards, To drip or not to drip, that is the question, *Arizona Water Resource* 8, no. 3 (November–December 1999), <http://ag.arizona.edu/AZWATER/awr/dec99/drip.htm>.
85. Smil 2000, p. 130.
86. Ehrlich and Ehrlich 1990, p. 97.
87. Daily et al. 2001, 2003. The approach of conservation biologists to the crucial job of preserving humanity's natural capital is gradually getting more realistic. They have also added to their important focus on saving species diversity the equally critical one of conserving populations and thus ecosystem services (e.g., Ceballos and Ehrlich 2002; Hughes et al. 1997, 2000; Kareiva and Marvier 2003; Luck et al. 2003). Those services are crucial for, among other things, supporting agricultural production. And some progress is being made in aligning conservation goals with financial incentives—making protection of Earth's biological capital profitable (Daily and Ellison 2002). An example is Costa Rica's practice of paying farmers to preserve forests on their land, thus monetizing ecosystem services (carbon sequestration, flood control, pollinator protection, etc.) that normally do not enter the financial economy.
88. Ehrlich and Ehrlich 1996, pp. 165–166.
89. Ehrlich et al. 1995.
90. Lubchenco et al. 2003; Pauly and Watson 2003.
91. Countryside biogeography can help, but ultimately the amount of the planet's land area set aside in relatively large tracts to maintain nature also must be increased.
92. To get this point of view, see Hill 2002 or visit the Web site of the Nuclear Energy Institute: <http://www.nei.org/>. The question of which

- energy technologies should substitute for current fossil fuel systems in order to reduce CO<sub>2</sub> emissions is now gaining prominent notice in the press; e.g., see Chang 2003.
93. Makhijani and Saleska 1999.
  94. E.g., Holdren and Raven 2002.
  95. Beck 1999.
  96. Bivens 2003.
  97. Hirsch et al. 2003.
  98. Schwartz 2003. Subsequent news stories indicated that upward of 7,000 more people were killed in Germany.
  99. Such as graphite moderation. For more on the active-passive problem, see Garwin and Charpak 2001.
  100. A fundamental problem is that, because of the rush to show that nuclear power could be a benefit for humanity, early generations of power reactors were basically scaled-up submarine reactors. They get a lot of power out of a small volume (have a “high power density”), since submarines must be as small as possible to avoid detection. A high power density is accompanied by a relatively high risk of accident, however. Had the reactors been designed for land-based power generation from the ground up, they would be a lot safer. For a basic discussion of how nuclear power can be generated and the problems nuclear technologies can present, see Ehrlich et al. 1977.
  101. Holdren and Herrera 1971, chap. 4, especially pp. 84–85.
  102. Ehrlich and Ehrlich 1996.
  103. E.g., Willrich and Taylor 1974; Holdren 1976.
  104. Bennett 2003.
  105. Garwin and Charpak 2001. For a technical discussion of both nuclear terrorism and bioterrorism, see Richard Garwin, Nuclear and biological megaterrorism, 21 August 2002, <http://www.fas.org/rlg/020821-terroris.htm>. Those who are concerned today about the possession of nuclear weapons by rogue states and groups such as al Qaeda might want to read the warning we and John Holdren gave about proliferation a quarter-century ago in a book on environmental sciences (Ehrlich et al. 1977, pp. 453–456); Holdren was primarily responsible for that section.
  106. E.g., Turco et al. 1983; Ehrlich et al. 1983.
  107. Federation of American Scientists, Strategic command and control, 5 October 2000, <http://www.fas.org/nuke/guide/russia/c3i/>. One shouldn't be fooled by the story that Presidents Yeltsin and Clinton had “de-targeted” Russian and U.S. missiles so they are no longer aimed at each other. This is a typical official lie—before launch, the missiles could be almost instantly retargeted (Weinberg 2003).
  108. Weinberg 2003.

109. See John P. Holdren, “Beyond the Moscow Treaty,” testimony before the Committee on Foreign Relations, United States Senate, Hearings on Treaty on Strategic Offensive Reductions, 12 September 2002.
110. National Transportation Safety Board, Aircraft accident report: Loss of control and impact with Pacific Ocean, Alaska Airlines flight 261, <http://www.ntsb.gov/publictn/2002/AAR0201.htm>.
111. Wald 2002.
112. Perrow 1999. In the Alaska Airlines example, the failure of a jackscrew caused a critical part, the horizontal tail, to malfunction lethally.
113. Perrow 1999.
114. Lipton et al. 2003. It seems possible that the power failure that afflicted most of Italy a month later had similar roots (Povoledo 2003).
115. Sherman 2003. They are also called “man-portable surface-to-air missiles.”
116. Perrow 1999, pp. 355ff.
117. Myers and Kent 2001.
118. Ehrlich and Birks 1990.
119. Struglinzky 2002.
120. Anonymous 2003n; Michael Scherer, The half-life of pork, MotherJones.com, 19 June 2003, [http://www.motherjones.com/news/update/2003/25/we\\_435\\_01.html](http://www.motherjones.com/news/update/2003/25/we_435_01.html).
121. Garwin and Charpak 2001.
122. Dispersion helps too; for example, rooftop solar panels are vastly safer than centralized power plants, especially nuclear power plants; they are also significantly safer than living downstream from large dams or near oil refineries. Terminals for giant liquefied natural gas (LNG) tankers and other large LNG facilities should be sited far from population centers. In addition, the heights of buildings could be limited; super-sized high-rises, as the World Trade Center towers were, can be disasters waiting to happen—by earthquake, fire, accidental or deliberate airplane impact, or terrorist attack by other means. Large refineries, smelters, and chemical plants should not be sited in or near large cities, regardless of labor force considerations.
123. Perrow 1999, p. 354.
124. This aspect of the human predicament was elucidated in Barney 1980.
125. Myers and Kent 2001.
126. Myers and Kent 2001, pp. 22–25.
127. Wright 1999.
128. A classic example is the massive subsidization of sugar growing in Florida wherein U.S. taxpayers, through the machinations of corrupt politicians, pour money into the pockets of rich growers and help destroy the everglades and Florida Bay (Hiaasen 2001, p. 61). Investigative reporter Carl Hiaasen’s book and, especially, his wonderful novels about Florida,

arguably the most corrupt state of the United States, offer a hilarious opportunity to savor how political power works for the rich and against the poor and the environment. In the process, Americans are forced to pay at least twice the world market price of sugar. Charles Schumer, now a Democratic senator, called the sugar subsidy “one of the most insidious, inefficient, Byzantine, special-interest Depression-era programs” (Anonymous 2001); what follows is based primarily on this source.

Besides greatly increasing the price of sugar, the subsidy raises the price of corn-based sweeteners, makes every product containing sugar more expensive, costs taxpayers as much as \$1.8 billion annually, and hurts the economies of developing nations such as Mexico and the Philippines (and poor farmers in those nations), which would like to sell us sugar at prices far below those charged by the Florida barons but can’t because of import restrictions. Subsidies of \$1.5 billion have led to a million tons of surplus sugar being stored in government warehouses. Those subsidies were bought by payments of \$3.4 million to politicians of both political parties, including George W. Bush, Al Gore, Hillary Clinton, Rick Lazio, and Dick Gephardt. The sugar barons covered all their bases. Republican senator Judd Gregg of New Hampshire wanted to shift the sugar subsidy dollars into the federal Food Stamp Program, but Congress refused. Hillary Clinton refused to support that because she wanted help in shoveling money via a subsidy to New York’s dairy farmers. Your tax dollars at work.

The problem extends far beyond the borders of the United States (Anonymous 2003d), as the turmoil at the World Trade Organization’s conference on agricultural subsidies at Cancun in September 2003 made abundantly clear. The conference ended early when delegates from the Caribbean region, Asia, and Africa walked out (Becker 2003a). No decisions were made in the face of angry demonstrations by farmers from developing countries and strong insistence by their governments that the rich countries’ subsidies were destructive of their agricultural systems and were preventing their entry into the world market.

129. Parry and Small 2002.

#### CHAPTER 6: BILLIONS, BIRTHRATES, AND POLICIES

1. Martin Luther King Jr., speech delivered on receiving the Margaret Sanger Award in Human Rights, 1966.
2. Kelly 2002.
3. See also Daily and Ehrlich 1992.
4. Ehrlich et al. 1992.
5. Remember, though, that going beyond the limited areas that can be set

aside as preserves, scientists called countryside biogeographers are working to make disturbed areas more hospitable to biodiversity; e.g., see Daily et al. 2003.

6. Vitousek et al. 1997, p. 498.
7. Rollin 1995.
8. Daily et al. 1994.
9. To allow a large margin of safety against an unexpected overshoot, 1.5 billion would be more in accordance with the precautionary principle. That would be the number at the turn of the twentieth century, and what is said in the rest of the paragraph would still apply.
10. For details and references on many of the issues discussed in this section, see Ehrlich et al. 1995.
11. Bledsoe et al. 1999.
12. Ehrlich et al. 1995, pp. 74–75.
13. Holl et al. 1993, p. 322.
14. Ehrlich et al. 1995, p. 96.
15. Ehrlich et al. 1995, pp. 87–89.
16. In recent years, new birth control methods have become available. One is simply a new use for an old method—the “morning after” pill. Taken within a few days after sexual contact, it can prevent pregnancy. Another, more controversial one is RU-486 (mifepristone), a pharmaceutical treatment that arrests an early pregnancy and is effective for as long as nine weeks after conception. RU-486 was invented in France and has been in use in Europe and other developed nations since the early 1990s (Lader 1991). But its approval by the U.S. Food and Drug Administration was held up for years by the anti-abortion movement in the United States, and its availability is still hindered by that opposition and by the public’s lack of knowledge of its existence.
17. United Nations Population Fund (UNFPA) 2002; Caldwell et al. 2002.
18. Dasgupta 1993.
19. Dasgupta 2003, p. 235.
20. Potts et al. 1977.
21. Potts et al. 1977, p. 89. One estimate cited a range of 390,000 to 860,000 per year around 1970.
22. Brunner 2002, p. 131. See also data from the Centers for Disease Control at <http://www.cdc.gov/od/oc/media/pressrel/fs031031.htm>.
23. Anonymous 1997b.
24. If we were mosses, the haplophase (in which there is only one copy of each chromosome in the cell, as in human sperm and eggs) would be the large, obvious, dominant “adult” stage, not the diplophase (with at least two copies per cell) as in *Homo sapiens*.
25. Ehrlich et al. 1995.

26. Ehrlich et al. 1995, pp. 113–119.
27. Attané 2002; Population Reference Bureau 2003.
28. United Nations (Population Division) 2002b.
29. Ehrlich et al. 1992.
30. Ehrlich 1968, pp. 136–137.
31. Lawrence Goulder, pers. comm., long ago. A more detailed treatment of this topic can be found in a paper Paul and Gretchen Daily wrote with him: Ehrlich et al. 1992.
32. For insight into the plight of those poor, see Ehrenreich 2001.
33. For a discussion giving historical background, see Tim Flannery's superb book *The Future Eaters* (1994), pp. 363–375.
34. Central Intelligence Agency (CIA), Australia, in *The World Factbook* 2003 (CIA, Washington, DC, 2003), <http://www.cia.gov/cia/publications/factbook/geos/as.html#Geo>.
35. Recher 1999.
36. Frank Talbot, pers. comm., Sydney, 8 December 2002.
37. Talbot 2000.
38. Unlike the system of scientific support in the United States, which awards competitive grants to scientists employed in universities and research institutions, Australia's government employs scientists directly in CSIRO, which has offices and laboratories in each of the states.
39. Barney Foran and Franzi Poldy, Future dilemmas: Options to 2050 for Australia's population, technology, resources, and environment (CSIRO Sustainable Ecosystems, Canberra, October 2002), <http://www.cse.csiro.au/research/Program5/futuredilemmas/>.
40. For more insight into Murdoch's power and behavior, see Cockburn 2003.
41. Katharine Betts, pers. comm., 22 September 2003.
42. The insightful headline on this brilliant editorial (*Weekend Australian*, 9–10 November 2002, p. 18) was "Population Debate Is about People."
43. *The Australian*, 29 November 2000, p. 3.
44. Information and quotes are from Dasgupta 2003, pp. 198–199.
45. Fogel 1994, 1999; Maddison 2001.
46. Ehrlich and Ehrlich 1987, pp. 186–187.
47. Parsons 1977. The same problem can be seen by considering Dasgupta 2003, pp. 130–131 and note 32.
48. Dasgupta 2001, pp. 130–131. This was a very rough calculation (and, for example, average world per capita purchasing power parity is now a little more than \$7,000), but changing the numbers by even 50 percent changes his conclusion not at all.
49. For many examples, see Ehrlich and Ehrlich 1996.
50. Kelly 2002. Of course, scientists have documented how adaptable we

are. (For a summary, see Ehrlich 2000.) And wiser Australians, led by their ecological community, *are* adapting when they have fewer children and challenge their growth-maniac political leaders by pointing out the likely environmental costs of further growth of their overpopulated nation. Indeed, as we have seen, people around the world have been restricting their reproduction “in response to new situations.”

51. Michael Millett, We'll be right with 50 million, *Sydney Morning Herald*, 2 November 2002, <http://www.smh.com.au/articles/2002/11/01/1036027035712.html>.
52. Charles Birch, pers. comm., November 2002. Birch, among many other accomplishments, was co-author of the book that transformed ecology into a modern science (Andrewartha and Birch 1954), and his ideas remain seminal.
53. Andrew Beattie, pers. comm., November 2002. Dr. Graham Pyke, principal research scientist at the Australian Museum, agreed, noting that population boosters usually overlook resource constraints such as limited fresh water (pers. comm., November 2002).
54. Harry Recher, pers. comm., Sydney, 8 December 2002.
55. See Saunders et al. 1993.
56. Lefroy et al. 1993.
57. Wentworth Group 2002.
58. Millett and Nicholls 2002. Carr is one of the few leading politicians anywhere who understand the human predicament.
59. Bob Carr, pers. comm., 8 December 2002. We highly recommend Carr's book *Thoughtlines* (Carr 2002).
60. Ehrlich 2000, 2002.

#### CHAPTER 7: CONSUMING LESS

1. Trent Lott, interviewed on NBC's *Meet the Press*, 10 November 2002.
2. Collins 2000; much of what follows is based on this fine book. See also Cohen 2002. The quote by Trent Lott in the epigraph is quite typical; to see how central growth is to government policy, visit the U.S. Department of Commerce's Web site (<http://www.commerce.gov/>).
3. Collins 2000, p. 39.
4. Cohen 2002.
5. E.g., Tversky and Kahneman 1986; Green and Shapiro 1994.
6. Holdren et al. 1995.
7. John Snow, interviewed on NBC's *Meet the Press*, 11 May 2003.
8. This assumes Snow meant real growth rates, which would be the only meaningful ones. But even if 1–2 percent of that was inflation, preposterous levels of wealth would soon be generated.
9. Fogel 1999, p. 6.
10. Economic journalist Martin Wolf, who emphasizes the connection be-

tween competitive market economies and democracy, claims that zero economic growth would quickly lead to an authoritarian government (Wolf 2003). We can't be sure whether he's right, but we can be certain that, if society survives long enough, we'll sooner or later find out.

11. Boulding 1966, p. 9.
12. Perhaps others haven't paid much attention to this not only because they think the end of growth is too far off to worry about but also because they see few questions that interest them professionally in a no-growth situation. But we think that moving away from the temporary (on a historical time scale) growth-and-consumption mania that grips most societies today *will* pose challenges to economists—some pretty interesting ones at that.
13. For a sample of the discussion of these issues, see Daly 1973, 1991b, 1996; Perrings 1987; and Daly and Cobb 1994. On the related topic of the problems of growth, see Douthwaite 1993.
14. The consumption factor in GNP includes more than what individuals consume; it also includes the goods and services collectively consumed through local, state, and federal governments.
15. E.g., Dolan 1969; Weisskopf 1971, chapter on “GNP-Fetishism”; Ehrlich et al. 1977, pp. 844ff.
16. Dasgupta 2001, p. 29.
17. Of course, first-rate economists understand it isn't supposed to do these things, but many economists and pundits often speak as if it did.
18. There are technical issues in the relationship, for example, of NNP to genuine wealth, having to do with the inevitable changes in accounting (“social” or “shadow”) prices of capital assets, which we have not gone into. Those interested should consult Dasgupta 2001, pp. 149–151.
19. There have been attempts to develop other indices of well-being (see Daly and Cobb 1989), such as the United Nations Development Programme's Human Development Index (HDI), but none have really taken hold. GNP is what is reported regularly in the press, especially in business reports.
20. E.g., Dasgupta 2001, pp. 29–30. This wonderful book is a must for those wishing to consider the role of natural capital in producing human well-being. We've learned a great deal from it and have leaned on it heavily. See also Arrow et al. 2003.
21. This idea owes much to the thought of Kenneth Boulding (1966).
22. This definition of overconsumption, living beyond one's means even if those means are not enough to satisfy basic needs sustainably, should not be confused with consuming much more than required for satisfaction of basic needs, which is the meaning we use throughout *Nineveh*. This discussion and what follows are largely based on Arrow et al. 2003.
23. Technically an externality of rich-nation consumption.

24. Quoted by Peter Raven in *Calypso Log*, June 1989.
25. Davis 2001.
26. From a pioneering study by economists Kirk Hamilton and Michael Clemens (1999).
27. For a technical perspective, see discussions of the difference between engineering resilience and ecosystem resilience, as well as other issues, in Gunderson and Holling 2001.
28. Arrow et al. 2003.
29. Diener and Diener 1995; Diener and Lucas 1998.
30. Easterlin 1973; Myers and Diener 1995.
31. Easterlin 1995; Frank 1999, p. 72.
32. Argyle 2001, p. 139. For a general discussion, see pp. 138–144.
33. Hamilton 2002.
34. For a summary in an evolutionary context, see Ehrlich 2000. Work on this issue stretches at least back to Veblen 1967 (1899).
35. Donald Kennedy, pers. comm., Chocolate Group seminar, Stanford University, 14 January 1999.
36. Townsend 1987.
37. Durning 1992, p. 40. See this excellent source for an in-depth discussion of “the dubious rewards of consumption.”
38. The term comes from Schor 1998. See also Howarth 1996.
39. Wilkinson 1997; see especially fig. 5.6.
40. Frank 1999, chap. 4. As we will discuss later, the most serious costs are probably environmental.
41. Frank and Cook 1995.
42. Ehrlich 2000.
43. Green 2003.
44. Ehrlich 2000, pp. 193, 238–239, 330–331.
45. Maschio 2002.
46. For more details written for the layperson, see Ehrlich 2000, pp. 16ff.
47. Boesch and Boesch-Achermann 2000, pp. 202–204.
48. Hrdy and Williams 1983, p. 7.
49. Details and references on the issues in this and the two preceding paragraphs can be found in Ehrlich 2000.
50. Frank 1999, p. 16.
51. The first was Djoser’s (2654–2635 BC) Step Pyramid. Construction of true pyramids started under Snefru (Snoferu) (2613–2589 BC).
52. First reports of its building came from the Greek historian-tourist Herodotus (ca. 425 BC) almost 2,000 years after the pyramid’s construction, and details of how it was built remain uncertain. Were straight earthen ramps used, or did workers travel upward on a spiral ramp around the growing pyramid, or did they use switchbacks? The leveling was to a precision of close to two inches. The outer limestone cladding

- (which made the pyramid smooth but is now mostly worn away) was so well fitted that even today one can't slide paper between the blocks.
53. For an excellent modern discussion of the pyramids, on which we base some of the above, see Lehner 1997.
  54. The fascinating story of the resurrection of the lost ancient Egyptian language can be found in Solé and Valbelle 2002.
  55. Quoted from Brackman 1980, p. 3, who in turn was quoting Diodorus Siculus, a Greek historian of the first century BC.
  56. Frank and Cook 1995.
  57. Frank 1999, p. 53.
  58. Deffeyes 2001.
  59. Parris N. Glendening, address to Society of Environmental Journalists, Baltimore, Maryland, 11 October 2002.
  60. E.g., Durning 1992; Stern et al. 1997; Schor 1998; Frank 1999; Cross 2000; Princen et al. 2002.
  61. Cross 2000, p. 53.
  62. Pincetl 1999.
  63. E.g., Ehrlich and Ehrlich 1989.
  64. Phillips 2002, p. 76.
  65. See Frank 1999, pp. 211ff., for a summary.
  66. Frank 1999, pp. 223ff.; Seidman 1997.
  67. Frank 1999, pp. 213–226.
  68. Pigou 1920.
  69. Goulder 1995b; Bovenberg and Goulder 1996; Baumol and Oates 1998; Dasgupta 2001.
  70. Goulder 1995a, 1995b.
  71. There is an extensive technical economics literature on Pigovian taxes and related topics. For a fine overview, see Dasgupta 2001, especially chaps. 10 and 11.
  72. Federal Insurance Contributions Act.
  73. E.g., see <http://www.cato.org/dailys/6-24-98.html> for the Cato Institute feeling good about dumping iron filings in the ocean.
  74. This quote and some of the CEO salary numbers are from *The Hightower Lowdown* 5, no. 6 (June 2003); other salary information is from Institute of Management and Administration (IOMA), *Report on Salary Surveys*, June 2003, [http://web.lexis-nexis.com/universe/document?\\_m=6da287b34898898d12edc3989cac38cd&\\_docnum=1&wchp=dGLbVtb-1SlAl&\\_md5=570dc9d6db7d9d09a93d4f365fd100ea](http://web.lexis-nexis.com/universe/document?_m=6da287b34898898d12edc3989cac38cd&_docnum=1&wchp=dGLbVtb-1SlAl&_md5=570dc9d6db7d9d09a93d4f365fd100ea).
  75. E.g., Ehrenreich 2001.
  76. E.g., Kelly 2001.
  77. Pearson 1969.
  78. Holdren 1991. That gap is growing today, even within the United States, where the top 400 taxpayers received more than 1 percent of total U.S. income (Johnston 2003). This represents a return to previous highs of

wealth concentration of the late Gilded Age (say, 1905–1906; data are scanty) and the late 1920s (better data). The share of wealth held by the top 1 percent of the American population roughly doubled between 1976 and 2000 (Phillips 2002, pp. 121ff.).

79. Nye 2001, pp. 8ff.
80. Daily et al. 1994.
81. Korten 1995, p. 261.

#### CHAPTER 8: A CULTURE OUT OF STEP

1. Boulding 1966, p. 14.
2. Ehrlich 2000, p. 5.
3. Franklin D. Roosevelt, address to the 77th Congress, January 6, 1941; we are indebted to Peter Raven for supplying us with the text.
4. Hitler 1943 (1925); see, e.g., pp. 344–345 on the vesting of unlimited power and authority in the elected leader of a young movement—like National Socialism. See also Adorno et al. 1950 and Fromm 1995 (1960).
5. For a discussion of how this culture gap evolved, see Ornstein and Ehrlich 1989 and Ehrlich 2000.
6. Ehrlich and Holm 1963, pp. 285ff.; Ehrlich 2000, p. 63. Anthropologists and social scientists often formulate more complex definitions of culture; e.g., Holloway 1969; Waal 1999. They started long ago. Pioneering anthropologist Edward B. Tylor defined it thus: “Culture or Civilization, taken in its wide ethnographic sense, is that complex whole which includes knowledge, belief, art, morals, law, custom, and any other capabilities and habits acquired by man as a member of society” (Tylor 1920 [1871], p. 1). Defining culture as humanity’s store of non-genetic information is more general and a lot shorter.
7. E.g., Ornstein and Ehrlich 1989.
8. National Academy of Sciences USA 1993 and Union of Concerned Scientists 1993 are outstanding examples, but there have been literally thousands of books, scientific papers, and popular articles on the topic.
9. We’re considering human history here as beginning with the first small-brained upright hominids about 5 million years ago. If we don’t consider upright small-brained hominids as “human” but restrict the term to *Homo sapiens*, then today’s kind of power has been around for about 1 percent of our history.
10. E.g., Barnard and Woodburn 1988, pp. 7ff.; Bétéille 1994.
11. Summarized and documented in Ehrlich 2000, chap. 10.
12. Saul 1997.
13. Bacevich 2002.
14. Bacevich 2002, pp. 149–157; Mark Shields, Bush’s “ouchless” war against Saddam Hussein, 27 August 2002, <http://www.cnn.com/2002/ALLPOLITICS/08/27/column.shields/>.
15. C. Suetonius Tranquillus, *The Lives of the Twelve Caesars*, vol. 5, Project

- Gutenberg eBook, 2003, <http://www.gutenberg.net/browse/BIBREC/BR6390.HTM>, sec. XVII.
16. The material that follows is based on the introduction to a book Paul wrote for his fellow ecologists (Ehrlich 1997).
  17. Bishop et al. 1997.
  18. Mander 2003, p. III. Mander started out as an advertising executive.
  19. Specter 1994; Kuman 1994; Daily and Ehrlich 1996a, 1996b.
  20. Leopold 1966, p. 197.
  21. Union of Concerned Scientists 1993.
  22. Barney 1980.
  23. Barney 1980, p. iii.
  24. See, e.g., Representative Henry A. Waxman's presentation of the issue at [http://www.house.gov/reform/min/politicsandscience/example\\_wetlands.htm](http://www.house.gov/reform/min/politicsandscience/example_wetlands.htm).
  25. Clymer 2002.
  26. *Lancet* 2002.
  27. Letter to EPA assistant administrator Stephen L. Johnson from Jay Vroom (president of CropLife America) and Allen James (president of RISE), 8 July 2002; letter to EPA administrator Christine Todd Whitman from Representative Henry A. Waxman, ranking minority member of the Committee on Government Reform of the House of Representatives, 20 December 2002. See also Wargo 1998.
  28. See, e.g., Ehrlich and Ehrlich 1996, chap. 10.
  29. E.g., Harte et al. 1991; Simonich and Hites 1995; Colborn et al. 1996.
  30. Vidal 2003.
  31. Symons 2003.
  32. U.S. House of Representatives, Democratic Staff Committee on Resources, Weir science: The Interior Department's manipulation of science for political purposes, 17 December 2002. See <http://resourcescommittee.house.gov/resources/democrats/hot2002/weird-science.html> for a link to the report.
  33. Eric V. Schaeffer, Cheney named new EPA chief, TomPaine.common sense, 21 May 2003, <http://www.tompaine.com/feature2.cfm/ID/7863>.
  34. Bruce Morton, Contempt citation isn't what it used to be, CNN, 7 August 1998, <http://www.cnn.com/ALLPOLITICS/1998/08/10/contempt.morton/>.
  35. Symons 2003.
  36. Pianin 2003.
  37. We are especially indebted to Scott Stephenson for his help on this topic. See also Natural Resources Defense Council (NRDC), Rewriting the rules, year-end report 2002: The Bush administration's assault on the environment, <http://www.nrdc.org/legislation/rollbacks/rollbacksinx.asp#>.

38. Jay MacDonald, A Hummer of a tax break for business drivers, 10 October 2003, [http://www.bankrate.com/brm/itax/biz\\_tips/20030403a1.asp](http://www.bankrate.com/brm/itax/biz_tips/20030403a1.asp).
39. Minnard 2003. Miller is Southwest Director of Defenders of Wildlife.
40. Kolbert 2003. Another atrocity was committed in November 2003. At that time it was announced that the EPA would drop investigations into fifty power plants accused of past violations of the Clean Air Act—a reward for the utility industry, which had contributed heavily to Bush campaigns. Democratic senator Frank Lautenberg of New Jersey stated: “This latest attack on the environment sends a clear message to the president’s corporate polluting cronies. . . . Profits are more important than cleaning the air for children who suffer from asthma and seniors with respiratory diseases” (Drew and Oppel 2003).
41. Revkin and Seelye 2003b.
42. Letter to the editor, *New York Times*, 21 June 2003. Whitman ended her EPA career with a pathetic media defense of the bowdlerized report.
43. Thucydides 1910 (ca. 400 BC); see Pericles’ “Funeral Oration” (pp. 93–94).
44. See the program’s Web site at <http://www.leopoldleadership.org/content/index.jsp>.
45. For a fine, balanced overview, see Pigliucci 2002.
46. An added complexity in trying to understand social issues and formulate sound policy to deal with them is that non-specialists are apt to think they know the answers of social science ahead of time.
47. Ehrlich and Ehrlich 1996, p. 1.
48. E.g., Brock 2002, pp. 86–87. Much disinformation is targeted at fooling the public into thinking there is no problem of anthropogenic climate change. A recent example is an exercise by the George C. Marshall Institute (whose president, William O’Keefe, was once an executive of the American Petroleum Institute) attempting to discredit the idea that recent global warming is at least partly caused by human activities and to assert that climate scientists are deeply divided on that issue—they are not (Nesmith 2003). For technical details, see Mann et al. 2003.
49. See <http://www.luntz.com/>. See also <http://www.luntzspeak.com/>.
50. See Luntz Research Companies, The environment: A cleaner, safer, healthier America, <http://www.luntzspeak.com/graphics/LuntzResearch.Memo.pdf>; Lee 2003.
51. Ehrlich 2001a.
52. For details on press coverage by a first-rate journalist, see Colin Woodard, The tabloid environmentalist: How a pseudo-scientist duped the big media—big time, TomPaine.common sense, 7 December 2001, <http://www.tompaine.com/feature.cfm/ID/4747>.

53. E.g., for scientific reviews, see the series in the January 2002 issue of *Scientific American*.
54. Colin Woodard, The shifty environmentalist, TomPaine.common sense, 14 January 2003, <http://www.tompaine.com/feature.cfm/ID/7089>.
55. Bjorn Lomborg, The truth about the environment, *Economist*, 2 August 2001.
56. Doomsday postponed, *Economist*, 6 September 2001.
57. They attacked even though the committee's members were not a group of environmental scientists: "The panel's ruling—objectively speaking—is incompetent and shameful." The *Economist's* deputy editor, Clive Crook, said the Danish decision "offers nobody any reason to change their minds on Lomborg's books." Colin Woodard, The shifty environmentalist, TomPaine.common sense, 14 January 2003, <http://www.tompaine.com/feature.cfm/ID/7089> (Woodard cites similar statements from other Lomborg fans).
58. The full quote included the following: "The *Economist* staff (even those higher up) who claim to be economists are PPE (Philosophy, Politics, Economics) inspired. The magazine writers write very well indeed (the undergraduate tutorial system from which they have emerged focuses on writing skills), but the economics on which they base their pieces . . . is rarely above the sophomoric. But the unwary would miss that fact because of the self confidence with which the writers draft their pieces (another feature of the British undergraduate education system in the Humanities). You will have noticed, for example, that the *Economist* regards the economics of the natural environment as concerning externalities, which is certainly the beginning of a thought, but the *Economist* firmly believes that it should be the end of the thought process." Partha Dasgupta, e-mail to a set of colleagues, 13 January 2003. This gives the flavor of Dasgupta's remarks, stimulated by the *Economist's* treatment of Lomborg. Those who want the details can consult his fine book *Human Well-being and the Natural Environment* (Dasgupta 2001).
59. Quoted in Speth 2003, p. 161.
60. Pielke 2003.
61. See, for example, the symposium titled "The Politicization of Science: Learning from the Lomborg Affair" at the 2003 meeting of the American Association for the Advancement of Science, Denver, Colorado, 16 February 2003.
62. See, e.g., Bradotti et al. 1994, p. 143.
63. Except in the former case, perhaps, by tobacco company executives.
64. Sahlins 1968; Diamond 1989.
65. Ehrlich 2000.
66. Diamond 1997.

67. It might, for instance, reinforce urges in the Indian military to launch a nuclear strike at Pakistan should it appear that Islamic extremists might seize control of the Pakistani government and that country's nuclear weapons.
68. Kristof 2003.
69. Lapham 2003; Clarke 2003.
70. The total fertility rate (TFR—roughly, completed family size) in many countries with largely Catholic populations has fallen to record low levels. In 2002, the TFR in the Czech Republic was 1.1, that in Spain 1.2, Austria 1.3, Italy 1.3, Germany 1.3, Poland 1.3, Portugal 1.5, France 1.9, and Puerto Rico 1.9. The rate that will eventually lead to zero population growth is 2.1 or less, and that is about the current rate in the United States (Population Reference Bureau 2002).
71. Maguire 2003. He also pointed out: “The Vatican—newly allied with conservative Muslim nations—blocked reference to contraception and family planning at a U.N. conference in Rio de Janeiro in 1992. This alliance also disrupted proceedings at a 1994 U.N. conference in Cairo, where any reasonable discussion of abortion was impeded.”
72. Mydans 2003 and the Population Reference Bureau are the sources of what follows.
73. For a detailed discussion of conscious evolution, see Ornstein and Ehrlich 1989, especially chap. 9.
74. Diamond 1991.
75. On pseudokin, see Ehrlich 2000, p. 193. See the same source for a discussion of which, if any, of our diverse behaviors are in some sense genetically “programmed.” Outside of kin recognition and preference and a penchant for group living, most other behaviors can probably be most parsimoniously explained by cultural evolution in a very smart, language-possessing animal who has a need for food, sex, and security, who lives in a vast diversity of habitats, and who has certain constraints on its perceptual systems and on its mental abilities (e.g., limits to the number of relationships or obligations it can keep track of).
76. For an interesting discussion of moral structures in early hunter-gatherers and later civilizations, see Black 1976, 1998.
77. Ornstein and Ehrlich 1989.
78. Ehrlich 2000, especially chap. 1 and pp. 299–300.
79. Flack and de Waal 2000.
80. For example, can humanity find ways to minimize the instability that historically has sometimes been generated by a combination of small-group attitudes, migration of peoples, and the spread of free-market democracy? “Market-dominant minorities,” such as the Chinese in Indonesia, Malaysia, the Philippines, and other parts of Southeast Asia and the Indians in East Africa, often can take advantage of the system

and breed great resentment by their economic success. The advent of democracy can transfer power to the majority and lead to its tyranny, often with disastrously vengeful results. The issue of the market-dominant minorities and how their existence can generate murder and mayhem is described in Amy Chua's fine book *World on Fire* (2003).

81. An outstanding example of performing a biological task is ecologist Dan Janzen's "growing" of the Guanacaste Conservation Area—a long crusade to use the area's ecosystem services to finance the regeneration of its original flora and fauna (Daily and Ellison 2002; Janzen 2000).
82. Ehrlich 2000, pp. 325–326 and p. 431, note 117. More than thirty years ago, Paul attempted to achieve a fusion of the preposterous structure of the social sciences in order to get a "behavioral sciences" core course taught in Stanford University's Human Biology Program, but the disciplinary structure prevented it. Interestingly, today distinguished social scientists are very critical of that structure; e.g., see Wallerstein 2003.
83. Schneider 1992; Daily and Ehrlich 1999.
84. Schneider 1988. Schneider is one of the most thoughtful interdisciplinary scientists; see also Schneider 1997a.
85. In the United States, which has the best university system in the world, the parallel with the fate of the medical community is disturbing. A couple of decades ago, physicians had total control of the health-care system and enjoyed high incomes and splendid perks. But they showed no interest in managing the enterprise, in which technological advances were pushing the costs of first-rate treatment through the roof. The government's failure to take appropriate remedial action and the privatization of medical care resulted in the mess we have today, with health maintenance organizations (HMOs) telling doctors how many patients they must see per hour and what procedures and drugs they are allowed to recommend. If members of American university faculties persist in largely ignoring the parallel need to transform the system of higher education, they will not be in much of a position to help heal the disconnect, and, like the doctors, they might end up as largely powerless employees rather than independent professionals.

Interestingly, the business community is providing some clues to methods that both scientists and non-scientists who wish to become moral entrepreneurs (those who wish to create ethical rules for society to follow) might employ in steering society toward sustainability. Business has done it through developments in the relatively new area of marketing. See, e.g., Becker 1963, p. 147. Scientists should not ignore the skills and effectiveness of marketing and public relations simply because they may disapprove of some of the uses to which business puts them.

86. Turco et al. 1983; Ehrlich et al. 1983.
87. E.g., Hertz 2001, chap. 11.

## CHAPTER 9: HUMAN BEHAVIOR AT THE MILLENNIUM

1. Boulding 1966, pp. 3–4.
2. The terms *full world* and *empty world* were first used by pioneering “steady-state” economist Herman Daly (1991a). They are, of course, ideas closely related to Boulding’s “cowboy” and “spaceship” economies; see Boulding 1966.
3. Vitousek et al. 1986.
4. Worldwatch Institute 2002; World Resources Institute 2000.
5. Spencer 1891 (1860); Carneiro 1970.
6. See Ehrlich 2000, pp. 238ff., for an overview.
7. Hauer 1988.
8. North 1986.
9. Renfrew 1982.
10. Tainter 2000, p. 36.
11. Boulding 1966; quotes in this paragraph are on pp. 11–12.
12. E.g., Kant 1956 (1788), 1996 (1797); Mill 1998 (1863), 2003 (1859).
13. E.g., Rawls 1971.
14. Property rights are a complex issue; see, e.g., Bromley 1991. See also Hanna et al. 1995, 1996; Arrow 1996; and Ostrom and Schlager 1996.
15. E.g., Ehrlich and Ehrlich 1981, p. 258.
16. Recher 2002.
17. A pioneering attempt was Graham Allison’s classic study of the Cuban missile crisis (1971). It’s not that social scientists haven’t tried to find answers; it’s just that it’s extremely difficult. For instance, in attempting to model group behavior in “rational actor theory,” “rational choice theory,” and “public choice theory,” social scientists early employed an appealing assumption that people could reasonably be viewed as rational utility maximizers. By this is meant that individuals do what they think will provide them with a maximum of satisfaction. But there is increasing evidence that this often is not an adequate description of individual human behavior. A large literature has developed around attempts to discover the degree to which human beings in some sense act “rationally” and have more or less stable preferences, as exemplified by the work of Tversky and Kahneman (1986, 1974); Stigler and Becker (1977); Goetze and Galderisi (1989); Thaler (1992); Coleman (1994); Hines and Thaler (1995); Siegel and Thaler (1997); Gintis (2000); and Bowles (2001). See also Green and Shapiro 1994. Such contradictions as radically different consumption and childbearing choices made by individuals sharing the same information about the environment make development of a coherent theory of behavior extremely difficult. Worse yet, it is often virtually impossible to aggregate individual behaviors to determine group preferences (Arrow 1951), although rational choice theorists assume that group behaviors are the collective

result of individual choices (with the individuals usually thought to be maximizing utility). And, for many reasons, common interests do not necessarily produce collective actions (Olson 1971 [1965]; Kerr 1996). This is especially a result of the “free rider” problem. Free riders are individuals who gain benefits from collective actions while not paying their share of the costs. For instance, we do not ordinarily donate to gun control groups, but we nonetheless benefit from the small progress they have made in restricting handgun insanity in the United States—in this case, we’re free riders. Sorting out motives, such as why people are often willing to bear the costs of free riders, can be difficult (Bandura 1997, pp. 488–489).

18. Levin 1999.
19. Skocpol 1979; Goldstone 1991; Collins 1994; Braithwaite 1994. Similarly, historians can document shifting attitudes over centuries on biological topics such as animal rights, race, the place of women in society, and approaches to conservation, tracing their cultural microevolution (Ehrlich 2000, pp. 228–229), without aggregating the views of individuals. In just such a way, Peter Grant could document genetic microevolution in Galápagos finches (e.g., 1986) without knowing anything of the shifting frequencies of nucleotide sequences that, in aggregate, interacted with environmental change and produced the observed trends.
20. Summarized in Ehrlich 2000 and Ehrlich and Feldman 2003.
21. Daily and Ehrlich 1996b.
22. Sen Gupta 1999.
23. Thinley 1999.
24. E.g., Hiaasen 2001 (see also his wonderful novels); Palast 2002; personal observation.
25. Talbot 2000.
26. E.g., Rogers 1995; Walt 2000.
27. Gladwell 2000; Coleman et al. 1966.
28. Dasgupta 2000, 2003.
29. For a good summary of the distinctions, see Blackmore 1999, pp. 47ff.
30. Mosteller 1981.
31. Betts 1999, p. 10.
32. Kuper 1999.
33. Some analysts think it was because Christians were more compassionate than pagans, which lowered their death rates and increased their numbers (e.g., Stark 1996).
34. Adler and Adler 2000.
35. In the scientific way of orienting to the world, deviance is still both a major factor in the definition of groups and a generator of stickiness, despite the rewards that may eventually accrue to scientific heretics such as Galileo, Darwin, and Einstein (see also Kuhn 1962).

36. Weber 1946, pp. 61ff., 280.
37. E.g., Ehrlich and Ehrlich 1991a, pp. 254–256.
38. Ehrlich 2000, pp. 308ff.
39. E.g., Bentham 1988 (1789); Mill 1998 (1863); Singer 1972, 2002. We don't see any evolutionary basis for ethics—moral lessons can't be derived from the process or results of evolution. We see little evidence for a genetic evolution of particular ethical positions, nor do we see a basis for grounding the selection of behaviors that are ethical in supposed “genetic tendencies” contributing to them. Such a view would suggest a belief in a genetically determined human nature, which to a large degree is illusory (Farber 1994; Ehrlich and Feldman 2003).
40. The picture is not totally dark. Some organizations have been established to encourage discussions of ethics. These include, for example, the Institute for Global Ethics (<http://www.gloablethics.org>), with the broad goal of promoting ethical behavior from the individual to the national level; the Eco-Ethics International Union (<http://www.eei.org>), focusing on ecological (environmental) ethics; the Ethics Resource Center (<http://www.ethics.org>), which concentrates on institutional ethics (e.g., business ethics, anti-corruption efforts); and those connected with organized religions. The latter include, for example, the World Council of Churches, the American Ethical Union (<http://www.aeu.org>), and the Unitarian Universalist Association as well as those with specific moral missions, such as opposing abortion, euthanasia, and infanticide (e.g., the Center for Life Principles; see <http://www.lifeprinciples.net>). But none of these have the global reach and access to the media that is achieved by forums such as the Intergovernmental Panel on Climate Change (IPCC). Biologists themselves could press to add working groups on ethics to the IPCC and to the related Millennium Ecosystem Assessment.
41. Cavalli-Sforza and Feldman 1981; Ehrlich 2000, 2002.
42. The Universal Declaration of Human Rights is available online at <http://www.hrweb.org/legal/undocs.html>.
43. Becker 1963.
44. Ehrlich 1968; liberals like to dream up rights, assuming people are intrinsically good; conservatives, assuming that people are intrinsically sinful, have long hated the idea of rights except those of God and the aristocracy, and the centuries-old views of Burke (2001 [1789–1790]) and de Maistre (1994 [1797]) are alive and well among neoconservatives today. People are, of course, neither intrinsically good nor intrinsically evil (Ehrlich 2000).
45. E.g., William Kristol on *Nightline*, March 5, 2003.
46. Nye 2001.
47. Mishra 2003.
48. Ehrlich et al. 1977, pp. 454, 914ff. John Holdren and we wrote almost

- thirty years ago, “. . . all countries that want nuclear bombs *eventually* will get them, but it is essential to slow the process as much as possible, in order to give the world political community as much time as possible to work out institutions and measures that will make the use of nuclear bombs less likely” (Ehrlich et al. 1977, p. 916).
49. For detailed information on this, see the Nuclear Threat Initiative’s Web site, [http://www.nti.org/e\\_research/cnwm/overview/cnwm\\_home.asp](http://www.nti.org/e_research/cnwm/overview/cnwm_home.asp). “A 10 kiloton bomb (roughly the size of that which devastated Hiroshima) detonated by terrorists at Grand Central Station on a typical work day would likely kill some half million people and inflict over a trillion dollars in direct economic damage. America and its way of life would be changed forever” (Bunn et al. 2003, pp. viii–ix). Those interested in their own and society’s survival might wish to read the entire report (available online at [http://www.nti.org/e\\_research/cnwm/overview/report.asp](http://www.nti.org/e_research/cnwm/overview/report.asp)) and then discuss it in detail with their congressional representatives.
  50. For an overview, see [http://www.ucsusa.org/global\\_security/missile\\_defense/index.cfm](http://www.ucsusa.org/global_security/missile_defense/index.cfm). For the Bush administration’s preposterous plan to deploy such a defense in time for the 2004 election, see Coyle 2003. Among other things, Coyle says: “Rumsfeld can either meet a political imperative by October 2004 or build a missile defense system that works. But the technical and operational challenges of an effective missile defense system are such that the Pentagon cannot do both.”
  51. Weinberg 2003.
  52. E.g., Ehrlich and Liu 2002.
  53. Anonymous 2002a.
  54. Ehrlich et al. 1999.
  55. Perrin 1979.
  56. Mansfield and Snyder 1995.
  57. Singer 1975.
  58. E.g., Naess 1973.
  59. Stone 1974.
  60. E.g., Singer 1993, 2002.
  61. Mirrlees 1971 was the seminal paper; it started an entire subject called “public economics.” For a less technical discussion, see Dasgupta 1982, especially pp. 207ff. Much of its focus falls, quite naturally, on tax policy (Slemrod 1990) or redistribution through grants (Ballard 1988).
  62. Millennium Ecosystem Assessment 2003.
  63. Seyfang 2003.
  64. E.g., Levin 1999; Carpenter et al. 1999; Gunderson and Holling 2001; Redman and Kinzig 2003.
  65. E.g., Tainter 2000.
  66. Daniel Esty and Maria Ivanova of the Yale Center for Environmental Law and Policy have proposed the creation of a global environmental

mechanism (GEM) to replace much of today's fragmented and uncoordinated international environmental regime. In their proposal, the GEM would "provide adequate information that can help to track trends, highlight issues, characterize the problems to be addressed, provide analysis and policy options, and facilitate agreement on coordinated intervention. It would provide a 'policy space' for environmental negotiation and bargaining. It should also insure the sustained buildup of capacity at the international, national, and local scales to address the pressing issues of pollution control and natural resource management" (Esty and Ivanova 2003, p. 68). The GEM could work as the main formal coordinating agency in the United Nations with responsibility for environmental affairs. As such, it could be a host agency for the MAHB, much as the World Meteorological Organization sponsors the IPCC, perhaps in partnership with the United Nations Development Programme.

67. Davis 2001.
68. Dasgupta 2002.
69. While social scientists have long been concerned with the use and abuse of power, they have traditionally viewed the exercise of power as socially constrained. That is, social scientists normally evaluate the limitations put on power according to the degree to which people will permit others to control their activities—in other words, as a study of politics. The literature is enormous and diverse—for a few examples, see Weber 1946; Russell 1938; Dahl 1957; Bachrach and Baratz 1962; Lenski 1966; and McNeill 1982.
70. This would immediately raise the question of how to reduce the malignancies in the corporate-government relationship. We will deal with this issue more deeply in the next chapter. Two excellent recent additions to the huge literature on this are Hertz 2001 and Hartmann 2002.
71. For early examples, see Diamond 1997; for a more contemporary one, see Turco et al. 1983 and Ehrlich et al. 1983.
72. Ornstein and Ehrlich 1989.
73. Dernbach 2002; Sitarz 1993.
74. Ehrlich 2001c, pp. 159ff.

#### CHAPTER 10: SUSTAINABLE GOVERNANCE IN AMERICA

1. Sandel 1996, p. 3.
2. Revkin and Seelye 2003a.
3. Anonymous 2003c.
4. United States Senate, Republican Policy Committee, John Kyl, chairman, The shaky science behind the climate change sense of the Congress resolution, 2 June 2003, <http://rpc.senate.gov/~rpc/releases/2003/evo60203.pdf>.
5. E.g., see Miura 2003; see also <http://web.lexis-nexis.com/universe/>

document?\_m=c5b86e867ecf9e62d7e048a792e4de00&\_docnum=7&wchp=dGLb.

6. E.g., Stavins 1988.
7. Many of these are discussed in the report of the President's Council on Sustainable Development issued under the Clinton administration (Anderson and Lash 1999).
8. Humanity has struggled with issues related to governance from long before Plato until after Thoreau and right up to today's politicians and political scientists. Governments, whether run by despots or democrats, whether assuming that their power came from God or from their selection by an electorate, are all burdened by that ancient dilemma: power corrupts, and absolute power corrupts absolutely. Thus, people can never afford to lose sight of the need to constrain power.
9. Most people who invoke the name of Adam Smith in support of the idea of unrestrained markets have probably read little of *The Wealth of Nations* (Smith 1976 [1776]) and nothing of his *Theory of Moral Sentiments* (1974 [1759]). As John Ralston Saul put it: "How poor Adam Smith got stuck with disciples like the market economists and the neoconservatives is hard to imagine. He is in profound disagreement with their view of society" (1997, p. 159).
10. "Asymmetric information" in the jargon of economists. Monopolies are also a well-known cause of market failure.
11. For a fine discussion of markets, see McMillan 2002.
12. Ehrlich 2000.
13. Winston Churchill, speech before the House of Commons, 11 November 1947.
14. E.g., Zakaria 2003.
15. On our side in trying to improve governance is that humanity now has a great deal more knowledge of human behavior than it had in the time of Plato (see Ehrlich 2000 for a summary) or even in the times of Machiavelli (1981 [1513]), Hobbes (1997 [1651]), Locke (1988 [1690]), Rousseau (1762), or Churchill some two millennia later. We know, for example, that people were never "solitary" and so never came together to form a social contract, even though too many still, in Hobbes' immortal words, lead lives that are "nasty, brutish, and short" (1997 [1651], p. 70). We are descended from non-human organisms that were highly social for millions of years. We know that people are not intrinsically good or evil—that societies decide, on many different bases, what good and evil are. That's a view, we must admit, that some sophists such as Protagoras already had before 400 BC. As we pointed out earlier, biologists know that there is no genetically programmed "human nature" that explains human violence, reconciliation, honesty, criminality, intelligence, mate choice, or most other interesting behaviors—and genetics certainly

- doesn't explain people's choices of governance systems (Ehrlich and Feldman 2003).
16. Many people are ready to follow authoritarian commands, even when the commands involve doing violence to others, and even in situations in which they are not personally threatened (e.g., Milgram 1974; see also Ornstein 1988, pp. 581–584).
  17. For a recent view, see Berman 2003.
  18. Such as is occurring with the USA Patriot Act. See Tim Grieve, *The secret society*, 18 April 2003, [http://www.salon.com/news/feature/2003/04/18/patriot\\_act/index.html](http://www.salon.com/news/feature/2003/04/18/patriot_act/index.html).
  19. Madison 1999 (1787), p. 289.
  20. China, which may eventually fractionate into a rich coastal nation and a desperately poor inland one, faces severe problems in this regard. Recently, one official was asked by the central government to investigate corruption in a private clinic in provincial Wuhan (a city of 5 million in the center of the country). He was badly beaten by thugs on the staff of the clinic's owner, in one of a series of such incidents that China's leaders have proven unable to suppress or punish because local officials are beholden to local economic interests (Rosenthal 2003).
  21. A persuasive device "intended . . . to induce conviction that a given legal result is just and proper" (Fuller 1967).
  22. Quoted in Hessen 1993, p. 563.
  23. See differing views in Hessen 1993 and Samuelson and Nordhaus 1989.
  24. Korten 1995; Barber 1995; Mander and Goldsmith 1996; Caldwell 1997; Hertz 2001.
  25. E.g., Frith and Frith 1999.
  26. Ehrlich 2000, p. 311, and references cited there.
  27. Committee on Bible Translation 1984, p. 863 (Matthew 7:12).
  28. As in the Sullivan principles of social responsibility. The principles deal with equal opportunity, employees' rights of association, adequate compensation, workplace safety, community involvement, and so on. They were originally developed in 1977 by Rev. Leon H. Sullivan as a code of conduct for corporations operating in South Africa; see <http://globalsullivanprinciples.org/principles.htm>.
  29. In *Case of Sutton's Hospital*, 1612, quoted in Evans 1968, p. 128.
  30. Thom Hartmann, Now corporations claim the "right to lie," 1 January 2003, <http://www.CommonDreams.org/views03/0101-07.htm>.
  31. For details, see Hartmann 2002, chap. 6.
  32. Kennard 2002.
  33. Anonymous 2002b.
  34. Teather 2003.
  35. Anonymous 2003i.
  36. Hawken 1993, p. 108.

37. The mission of the Heritage Foundation is to “formulate and promote conservative public policies,” and its Web site features an encomium from Rush Limbaugh to the effect that “some of the finest conservative minds in America today” do their work there (<http://www.heritage.org/about/>). Much more can be gleaned from David Brock’s *Blinded by the Right* (2002). Brock once worked at Heritage, and he wrote, among other things, “Heritage is a tax exempt foundation, requiring that it not engage in activities or lobbying benefiting a political party. However, the organization functioned as a de facto arm of the GOP, churning out slick position papers” (pp. 78–79).
38. E.g., Waldmeir 2003.
39. For some examples, see Daily and Ellison 2002, pp. 47ff.
40. E.g., Gelbspan 1997.
41. Buffett 2003; ABC *Nightline*, 21 May 2003.
42. A recent survey found that Americans making more than \$70,000 gave 3.3 percent, those making \$50,000–\$69,999 gave 5.6 percent, and those making \$30,000–\$49,999 gave 8.9 percent. The issue is complicated by estate taxes and, we suspect, heavy giving to churches by those with less income (Anonymous 2003m).
43. Kelly 2001.
44. Friedman 1970.
45. Ehrlich et al. 1977, p. 879. Corporations live happily with regulations they helped create that say, for instance, they can emit no more than ten tons per day of some toxic substance, because they can then poison us with as much as ten tons with legal impunity. They like the regulations that decree that warnings by the surgeon general must be on all packs of cigarettes. Then they can point to those warnings when people dying of tobacco-related illnesses sue them—the victim was warned and we were obeying government regulations, they say in court. They often use their resources to gain control of those supposed to regulate them, laws or no laws. The salmon aquaculture industry in British Columbia supplies a routine example (Naylor et al. 2003). For more disgusting details, see Hartmann 2002, chap. 10.
46. The giving of unreasonable financial incentives to upper-level managers at the expense of both stockholders and employees at last led the U.S. Securities and Exchange Commission to seek a corporate accounting reform bill, the Sarbanes-Oxley Act of 2002 (Orndorff 2003).
47. Kelly 2001, p. 108.
48. Shiva 2003, p. 152.
49. Mayer 1990, p. 660.
50. Legal transcript of *Mostyn Neil Hamilton v. Mohamed Al Fayed*, 19 November 1999, quoted in Hertz 2001, p. 100.
51. Bill Bilderback, pers. comm., Los Angeles, 4 July 2003.

52. For details on how Exxon Corporation's mismanagement was so extreme as to make it ridiculous to call this an accident, see Palast 2002, pp. 100–105.
53. David Korten suggested this a decade ago (1995, p. 311). We urge you to read the most recent edition of his book (Korten 2001) for a much more detailed discussion of issues related to reining in corporations.
54. Hertz 2001, p. 6.
55. See Korten 2001, pp. 187–188. See also Saul 1997, chap. 4.
56. Korten 1995, p. 317.
57. Kelly 2001.
58. World Resources Institute 2003, chap. 6.
59. See <http://www.sierraclubfunds.com>. Full disclosure: we just purchased some!
60. Originally a group of propertied white males.
61. Originally members of the House of Representatives and state legislators who, in turn, would select senators and presidential electors.
62. Madison 1999 (1787), pp. 46–51.
63. It worked pretty well originally. It did not, however, prevent otherwise admirable people from doing unadmirable things, as when the founding fathers managed to pass laws that made sure they were first in line to get their government loans repaid with interest after the American Revolution. Morgan 1992, p. 131.
64. The similarity of this neologism to *mediocrity* and the related term *mediocracy*, “rule by the mediocre,” is not accidental.
65. Olson 1971 (1965).
66. Becker 2003c; data are from Center for Responsive Politics, Agribusiness: Long-term contribution trends, <http://www.opensecrets.org/industries/indus.asp?Ind=A>.
67. Arianna Huffington, Hungry lobbyists gnawing away at democracy, 19 August 1999, <http://www.ariannaonline.com/columns/files/081999.html>.
68. Center for Responsive Politics, Lobbyists database, 2003, <http://www.opensecrets.org/lobbyists/index.asp>.
69. Kelly 2001, p. 161. Of course, mobilization bias and lobbying can benefit non-governmental organizations such as the Sierra Club that are trying to move society toward sustainability, but often they are outdone by interests with less admirable goals. Members of Congress are heavily pressured by business interests and constituent groups and by the need to be perpetually raising funds for the television commercials that now play a central role in elections—and too many just cave in. One suspects that the average quality of representatives has declined as their power to perform independently has waned, but part of the problem has been the proliferation of topics they need to be informed about.

70. Marsha Kinder, ONEUSC, University of Southern California, The embedded news coverage of the war, 26 May 2003, [http://www.usc.edu/programs/oneusc/kinder\\_embedded.html](http://www.usc.edu/programs/oneusc/kinder_embedded.html).
71. John Baker, Effects of the press on Spanish-American relations in 1898, 2001, <http://www.humboldt.edu/~jcb10/spanwar.shtml>.
72. Stockdale and Stockdale 1990; Jim Stockdale, pers. comm., over the South Pacific, January 1996. The lies put patriotic military people such as Stockdale, who knew that the war was based on a lie, in a terrible psychological position.
73. In the middle of the 2002 congressional election campaign, further evidence of the then nearly comatose state of U.S. investigative reporting appeared. Bob Woodward, who with Carl Bernstein had played a significant role in exposing the Watergate scandal, published a book on the administration's behavior in response to the 9/11 attacks (Woodward 2002). It was a fawning, one-dimensional puff-piece that made Woodward's book indistinguishable from an administration press release. For a more favorable view, see Hitchens 2003; for a more humorous take, see Adams 2003.
74. See, e.g., Wells 2003. For a laundry list of Bush lies, refer to Corn 2003; see also Anonymous 2003b and Conason 2003. For an extremely amusing discussion of the recent orgy of right-wing lying, see Franken 2003. All presidents and administrations lie; the Bush administration has just pressed on to new heights of prevarication, outdoing even the administrations of Lyndon B. Johnson and Richard Nixon.
75. Alterman 2003.
76. When was the last time you heard one of those pundits say something that indicated that he or she was knowledgeable about science and technology?
77. Hindman and Cukier 2003.
78. *NOW with Bill Moyers*, 23 May 2003; see Big media: Overview, <http://www.pbs.org/now/politics/bigmedia.html>. Even conservatives are disturbed by this trend; e.g., see Safire 2003.
79. Kaplan 1998.
80. Blinder 1997.
81. Zakaria 2003.
82. Zakaria 2003, p. 167.
83. In the 1960s and 1970s, it was not clear whether human use of the atmosphere as a garbage dump was going to lead to warming or cooling, and roughly half of the factors that were driving toward warming were unknown (Ehrlich and Ehrlich 1970, pp. 145ff.; Ehrlich and Ehrlich 1991a, pp. 76ff.).
84. See Daly 1991b, pp. 61ff., for details.
85. Economists have long recognized the shortcomings of the most used

macroeconomic indicators, but no satisfactory replacement has yet been adopted. The FEA could, in theory, change that (Nordhaus and Tobin 1972; Daly and Cobb 1989).

86. Ehrlich 1968, p. 138; Ehrlich and Ehrlich 1970, pp. 288ff.
87. Morgan 1995.
88. E.g., Hertz 2001, pp. 56ff.
89. Wilkinson 1997.
90. Not the Federal Election Commission, which is focused on enforcing campaign finance laws.
91. E.g., see U.S. Senate, Republican Policy Committee, S.J. Res. 18—constitutional amendment allowing Congress and the states to regulate contributions and expenditures in elections, 12 March 1997, <http://rpc.senate.gov/~rpc/releases/1997/SJRES18.LO.htm>.
92. See <http://caselaw.lp.findlaw.com/scripts/getcase.pl?court=US&vol=424&invol=1>; Sunstein 2000a, 2000b.
93. E.g., Bork 1997, p. 277.

#### CHAPTER II: HEALING A WORLD OF WOUNDS

1. Mander 2003, p. 110.
2. Holling et al. 2002.
3. Brown 2003, p. 18.
4. E.g., Bacevich 2002; Prestowitz 2003.
5. Mander 2003, p. 112.
6. Examples are drawn from Palast 2002 and from conversations with Argentinian and Mexican colleagues.
7. Monbiot 2003c; see also Douthwaite 1993.
8. Becker 2003b.
9. Stern 2002; International Bank for Reconstruction and Development/World Bank 2000, 2003.
10. Becker 2003c; data on contributions are from the Center for Responsive Politics (<http://www.opensecrets.org/>).
11. Forero 2003.
12. Palast 2002, p. 111.
13. Palast 2002, p. 112.
14. For example, the Clinton administration (the secretaries of energy and the treasury, and the Federal Energy Regulatory Commission) collaborated in an effort to find a solution before the blackouts occurred. Christopher Edmonds, California blackout? The pols and utilities are full of gas, *TheStreet.com*, 10 January 2001, <http://www.thestreet.com/pf/comment/christopheredmonds/1251217.html>. Unfortunately, the federal effort ended when George W. Bush took office as president.
15. Palast 2002, p. 112.
16. Palast 2002, p. 54.

17. Nicanor Apaza, quoted in Rohter 2003.
18. Rohter 2003.
19. There is a giant literature on the problems associated with globalization of corporate power. E.g., see Barnet and Cavanagh 1994; Barber 1995; Kortzen 1995; Mander and Goldsmith 1996; Steger 2001; Greider 1997; Hertz 2001; Stiglitz 2002. It is countered, of course, by another set expounding the advantages of free trade, e.g., Friedman 1999 and Lindsey 2001.
20. For many details, see Stiglitz 2002. There is increasing news coverage of the slowing of globalization because of its negative effects on the poor; e.g., see Leonhardt 2003; Cowell 2003; and Eviatar 2003.
21. E.g., Pincetl 1999, p. 241.
22. It's a development that deserves additional analysis. In the presence of highly mobile capital, specialization still leads to higher value added from production in each of the countries involved in trade, just as comparative advantage theory states. These gains may not accrue, however, to the *residents* of each country.
23. Hiss 1991.
24. Ostrom 1996.
25. Barnet and Cavanagh 1994, p. 22.
26. Birch and Paul 2003.
27. Ehrenreich 2001.
28. Assuming that minimum-wage workers average approximately \$15,000 per year, and using numbers cited in Phillips 2002, p. 129. Amazingly, Ehrenreich's straightforward book was attacked by Republican legislators when the University of North Carolina, Chapel Hill, selected it for its students to read. Among other things, the legislators called *Nickel and Dimed* "intellectual pornography" and "indoctrination" and said that its choice showed an overall "anti-Christian bigotry" on the part of the university! Jane Stancill, Lawmakers bash book choice, *Raleigh News and Observer*, 10 July 2003, <http://newsobserver.com/front/story/2682582p-2487126c.html>.
29. See, e.g., Saul 1997.
30. Stiglitz 2002, p. 214.
31. E.g., Hertz 2001, pp. 79–81; Hartmann 2002.
32. Anonymous 2003e.
33. Stiglitz 2002, pp. 219ff. For a very readable overview of markets, see McMillan 2002.
34. Swedberg 1994.
35. For interesting material on the role of information (and uncertainty) in markets, see Akerlof 1984, chap. 2.
36. Consult Stiglitz 2002, pp. 229ff., for details, and read between the lines to see why we're not optimistic. Monopoly can also hinder the efficient

functioning of markets, as it classically did in the Soviet Union, where huge state enterprises clogged the system nearly everywhere. But rapid and careless breaking up of those monopolies through privatization in formerly communist nations, without regulatory safeguards in place, often led to a loss of wealth, higher consumer prices, and a lot of people made more miserable. Individuals and societies are at the mercy of the way markets function. Markets can match supplies of gasoline to demands better than an international government could. On the other hand, the failure of the United States government (and many others) to take steps to internalize many of the externalities of gasoline consumption, such as global warming, are one cause of the human predicament.

37. Kelly 2001, p. 76.
38. See Nicholas Stein, Banana peel, *Columbia Journalism Review*, September–October 1998, <http://archives.cjr.org/year/98/5/chiquita3.asp>.
39. Hertz 2001, pp. 84–85.
40. Korten 1995, pp. 322–324.
41. Monbiot 2003d.
42. For some Utopian ideas, see Monbiot 2003a.
43. Charnovitz 1997.
44. Anderson and Lash 1999, p. 87.
45. As this book went to press, we received a copy of a fine new book by distinguished political scientist Dennis Pirages and a young colleague that gives their take on many of the issues we discuss (Pirages and DeGeest 2003).
46. Also in need of airing is the necessity for ample safety margins against unforeseen consequences, a topic of increasing concern and research among scientists interested in how complex ecological-economic systems work; e.g., see Holling et al. 2002.
47. National Security Council, *The National Security Strategy of the United States of America*, 20 September 2002, <http://www.whitehouse.gov/nsc/nss.html>.
48. French 2002.
49. Note that the calculations here reflect a percentage of the national budget, not GNP—which is roughly 4.5 times the budget. To view the results of the poll, see [http://www.globallearningnj.org/global\\_ata/Public\\_Opinion\\_Poll\\_Views\\_on\\_Foreign\\_Aid.htm#Questions](http://www.globallearningnj.org/global_ata/Public_Opinion_Poll_Views_on_Foreign_Aid.htm#Questions).
50. Rees 2003.
51. As historian Arthur Schlesinger Jr. put it, “who can doubt that there is an American empire?—an ‘informal’ empire not colonial in polity, but still richly equipped with imperial paraphernalia: troops, ships, planes, bases, proconsuls, local collaborators, all spread around the luckless planet.” Arthur M. Schlesinger Jr., *The Cycles of American History* (Houghton Mifflin, Boston), p. 141. Quoted in Bacevich 2002, p. 30.

Actually, American imperialism extending beyond North America traces to the Spanish-American War and the brutal conquest of the Philippines (Karnow 1989). Rudyard Kipling was one of the cheerleaders of that conquest in his racist poem “The White Man’s Burden,” urging “the United States, with special reference to the Philippines, to join Britain in the pursuit of the racial responsibilities of empire: ‘Your new-caught sullen peoples, half devil and half child’” (Anonymous 2003h). In the poem, Kipling wrote of “The savage wars of peace,” one of which may be what the Bush administration thought it was waging in Iraq.

52. Ehrlich 2000, pp. 329–330.

53. CNN, 20 January 2003. A transcript of the speech is available at [http://www.stanford.edu/group/King/publications/speeches/address\\_at\\_march\\_on\\_washington.pdf](http://www.stanford.edu/group/King/publications/speeches/address_at_march_on_washington.pdf).

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Among his many scientific honors, Ehrlich is a Fellow of the American Association for the Advancement of Science (AAAS) and the American Academy of Arts and Sciences, an honorary member of the British Ecological Society, and a member of the United States National Academy of Sciences and the American Philosophical Society. He was awarded the first AAAS/Scientific American Prize for Science in the Service of Humanity, and he received the Crafoord Prize in Population Biology and the Conservation of Biological Diversity, an explicit substitute for the Nobel Prize in fields of science for which the latter is not given. Ehrlich has also received a MacArthur Fellowship, the Volvo Environment Prize, the International Center for Tropical Ecology's World Ecology Medal, the International Ecology Institute's ECI Prize, the Dr. A.H. Heineken Prize for Environmental Sciences, and the Blue Planet Prize, and he was the first recipient of the Roger Tory Peterson Memorial Medal.

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## ABOUT THE CENTER FOR CONSERVATION BIOLOGY

In 1984, Paul R. Ehrlich founded Stanford University's Center for Conservation Biology to develop the science of conservation biology and to help devise ways and means to protect Earth's life-support systems.

In pursuit of its mission, the Center for Conservation Biology designs experiments to address specific and general questions in conservation biology. It also conducts research on broad-scale policy issues, including human population growth, overconsumption, environmental deterioration, and ecological economics. Among its major goals are to communicate the results of this scientific and policy research to conservation biologists, reserve managers, planners, non-governmental organizations, decision makers, and the public; to educate students and professionals; and to foster collaboration with other scientists and conservation groups around the world.

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