Global Ecosystems Under More Stress

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In 2005, the Millennium Ecosystem Assessment (MA)—a comprehensive analysis produced by 1,360 scientists after four years of consultations and research—determined that the health of the world's ecosystems was in significant decline.[1] Ecosystems provide essential services to people. Yet of the 24 ecosystem services examined in the MA—including provision of fresh water, food, and fiber and the regulation of climate and air quality—the scientists found that 15 (62.5 percent) are being degraded or used unsustainably, a trend that "could grow significantly worse during the first half of this century."[2] While the report noted that overexploitation of many of these services led to net gains in economic development, it also made clear that if the degradation is left unaddressed, the ability of ecosystems to provide these benefits in the future will be diminished.[3]

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Degradation of many of Earth's natural systems has been brought about by human activity, according to the report. As the MA outlines, approximately 40 percent of the world's coral reefs have been lost or degraded, water withdrawals from rivers and lakes have doubled since 1960, the atmospheric concentration of carbon dioxide has jumped 19 percent since 1959, and the global species extinction rate has increased as much as 1,000 times over the typical rate seen across Earth's history.[4]

Moreover, decline of these systems is also increasing the risk of "nonlinear change"—abrupt, disruptive, and potentially irreversible changes such as regional climate shifts, the collapse of fishery resources, the emergence of new diseases, and the formation of dead zones in coastal waters.[5] The weakening of these systems is also exacerbating poverty among some groups of people—a trend that could worsen dramatically if abrupt changes are unleashed.[6]

Indeed, the conclusions of the report were so dire that the MA Board of Directors noted in its own summary statement that "human activity is putting such strain on the natural functions of Earth that the ability of the planet's ecosystems to sustain future generations can no longer be taken for granted."[7]

Other indicators confirm that humans are exceeding the capacity of Earth's systems. According to the Living Planet Index—which measures the state of the world's biodiversity by tracking population trends for more than 1,100 species—biodiversity declined 40 percent between 1970 and 2000.[8]

The Ecological Wellbeing Index, an average of 51 environmental indicators, found that few countries are ecologically healthy.[9] None of the 180 countries looked at received a "good" rating; only 27 scored a "fair," while 81 were rated "medium," 68 "poor," and 4 "bad."[10]

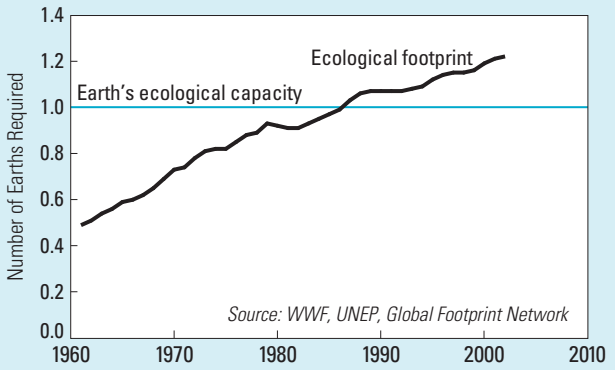
The Ecological Footprint, a conservative measure of natural resource consumption, also shows that humans are putting considerable pressure on Earth.[11] This indicator calculates the total amount of land the world's countries need to produce the resources they use (including food and fiber), to absorb the waste they generate from energy used, and to provide space for infrastructure.[12] In 2002, humanity used the equivalent of 13.7 billion "global hectares" of biocapacity—2.5 billion more than Earth's biologically productive area of 11.2 billion global hectares.[13] This translates into humanity overdrawing the natural capital it depends on by 23 percent in 2002.[14]

The Ecological Footprint shows that humanity has been living beyond its means since 1987 and thus drawing down the ecological capital that is the basis for the continued health of the planet.[15] (See Figure 1.)

Of course, some countries are using far more biocapacity than others. If all humans were to consume at high-income-country levels, another 2.5 planets would be needed.[16] Said another way, with everyone consuming at this level, Earth could sustain only 1.8 billion people—not today's population of 6.5 billion.[17] (See Table 1.) And worse, at U.S. consumption levels the planet could support just 1.2 billion people.[18]

With world population projected to hit 9.2 billion in 2050, with rapid economic growth in major developing economies such as China and India, and with continued high consumption rates in industrial countries, ecosystem degradation is likely to accelerate in coming decades.[19]

Figure 1. World Ecological Footprint, 1961–2002



But with aggressive policy responses, such as the elimination of harmful subsidies, significant investments in environmentally responsible technologies, and the creation of taxes on activities that have externalized ecological costs, it is possible to reverse some of the decline.[20] The world, however, has not come up with the political commitment to make the needed changes. According to the 2006 Global Governance Initiative report, the world's governments, businesses, and civil society received a score of 2 out of 10 in dealing with environmental issues, as there was only minimal success in addressing climate change, halting biodiversity decline, and providing clean water and sanitation.[21]

Table 1. Sustainable Population at Different Consumption Levels

Consumption Level	Biocapacity Used Per Person	Sustainable Population at this Level
	(global hectares)	(billion)
High income	6.4	1.8
Middle income	1.9	5.9
Low income	0.8	14.0
Global Average	2.2	5.1

Source: Global Footprint Network.

Yet another measure, the 2006 Environmental Performance Index, ranked the performance of the world's governments in achieving 16 crucial environmental goals.[22] The indicators chosen included those that play a key role in environmental health and ecosystem vitality, such as air pollution, water consumption, agricultural subsidies, energy efficiency, and wilderness protection.[23]

According to the Environmental Performance Index, only 6 of the 133 countries that researchers measured achieved 85 percent or higher in 2005 for their efforts, with New Zealand, Sweden, and Finland leading the way.[24] At the bottom of the list, 24 countries scored less than 50 percent; 16 of these countries were in sub-Saharan Africa, in large part because of health and sanitation deficiencies.[25]

Perhaps most useful is the Environmental Performance Index's categorization of countries by similarity, such as low-income, primarily desert, or high-population density.[26] Comparing similar countries shows that certain constraints do not have to prevent environmental success. For example, Japan—a high-population-density country—still scored 82 percent, suggesting, the authors note, that "demography is not destiny."[27] With the right policies, low-performing countries, whether impoverished, primarily desert, or densely populated, could improve environmental health and sustainability records if they make these their priorities.

25. International Commission on Intervention and State Sovereignty, *The Responsibility to Protect* (Ottawa, ON, Canada: 2001).
26. United Nations, Department of Peacekeeping Operations, "Fatalities by Year up to 29 Dec 2005," at www.un.org/Depts/dpko/fatalities/totals_annual.htm.
27. Renata Dwan and Sharon Wiharta, "Multilateral Peace Missions: Challenges of Peace-Building," in Stockholm International Peace Research Institute, *SIPRI Yearbook 2005* (New York: Oxford University Press, 2005), pp. 139–98; International Institute for Strategic Studies (IISS), "The 2005 Chart of Armed Conflict," wall chart distributed with IISS, *The Military Balance 2005–2006* (London: Oxford University Press, 2005); Worldwatch Institute database.
28. Worldwatch estimates, based primarily on data from Dwan and Wiharta, op. cit. note 27, and on IISS, "The 2005 Chart," op. cit. note 27.
29. Dwan and Wiharta, op. cit. note 27.
30. Aceh Monitoring Mission (AMM), at www.aceh-mm.org; AMM representatives, Sigli, Indonesia, discussions with author, 18 December 2005.

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1. Millennium Ecosystem Assessment (MA), *Ecosystems and Human Well-being: Synthesis* (Washington, DC: Island Press, 2005), p. viii.
2. Ibid., p. 1.
3. Ibid.
4. Ibid., pp. 2–5.
5. Ibid., p. 1.
6. Ibid.
7. MA, *Living Beyond Our Means: Natural Assets and Human Well-Being: Statement from the Board* (Washington, DC: World Resources Institute, 2005), p. 5.
8. World Wide Fund for Nature (WWF), U.N. Environment Programme's World Conservation Monitoring Centre (WCMC), and Global Footprint Network, *Living Planet Report 2004* (Gland, Switzerland: WWF, 2004).
9. Robert Prescott-Allen, *The Wellbeing of Nations* (Washington, DC: Island Press, 2001), pp. 303–06.
10. Ibid., p. 59.
11. WWF, WCMC, and Global Footprint Network, op. cit. note 8. The Ecological Footprint is a conservative estimate of human usage of resources as it only includes renewable resources and does not consider the effects of acid rain or the usage of heavy metals, radioactive materials, or persistent synthetic chemicals on Earth's biocapacity. The measure also does not set aside any biocapacity for wild species.
12. WWF, WCMC, and Global Footprint Network, op. cit. note 8.
13. Ibid., with 2002 update from Global Footprint Network, *National Footprint and Biocapacity Accounts, 2005 Edition* (Copenhagen: European Environment Agency, 2005). The productivity of "global hectares" is an average based on the productivity of ecosystems used by humans.
14. Global Footprint Network, op. cit. note 11.
15. WWF, WCMC, and Global Footprint Network, op. cit. note 8, and Global Footprint Network, op. cit. note 11.
16. Global Footprint Network, op. cit. note 11.
17. Calculations based on ibid.; U.S. Bureau of the Census, *International Data Base*, electronic database, Suitland, MD, updated August 2005.
18. Calculations based on Global Footprint Network, op. cit. note 11.
19. Population from Census Bureau, op. cit. note 15; economic growth from Christopher Flavin and Gary Gardner, "China, India, and the New World Order," in Worldwatch Institute, *State of the World 2006* (New York: W. W. Norton & Company, 2006), pp. 3–23; consumption from Gary Gardner, Erik Assadourian, and Radhika Sarin, "The State of Consumption Today," in Worldwatch Institute, *State of the World 2004* (New York: W. W. Norton & Company, 2004), pp. 3–21.
20. MA, op. cit. note 1, pp. 18–24.
21. World Economic Forum, *Global Governance Initiative Annual Report 2006* (Washington, DC: 2006).
22. Felicity Barringer, "United States Ranks 28th on Environment, a New Study Says," *New York Times*, 23 January 2006.
23. Yale Center for Environmental Law & Policy and Center for International Earth Science Information Network, *Pilot 2006 Environmental Performance Index Report* (New Haven, CT: Yale Center for Environmental Law & Policy, 2006), p. 10.
24. Ibid., p. 3.
25. Ibid., pp. 3, 21.
26. Ibid., p. 18.
27. Ibid., p. 20.

CORAL REEF LOSSES INCREASING (pages 94–95)

1. Clive Wilkinson, ed., *Status of Coral Reefs of the World: 2004. Volume 1* (Townsville, Queensland, Australia: Australian Institute of Marine Science/Global Coral Reef Monitoring Network, 2004), p. 9.
2. Ibid.
3. Reef area figures vary from data in *Vital Signs 2001* due to new reef discoveries and revised estimates.