

Environmental Case Study

Measuring Sustainability and Ecological Footprints

Can the earth sustain our current lifestyles, and will there be adequate natural resources for future generations? These questions are among the most important in environmental science today. We depend on nature for food, water, energy, oxygen, waste disposal and other life-support services. Sustainability implies that we cannot turn our resources into waste faster than nature can recycle and replenish the supplies on which we depend. It also recognizes that degrading ecological systems ultimately threatens everyone's well-being. Although we may be able to overspend nature's budget temporarily, future generations will have to pay the debts we leave them. Living sustainably means meeting our own vital needs without compromising the ability of future generations to meet their own needs.

How can we evaluate our ecological impacts? Redefining Progress, a nongovernmental environmental organization, has developed a measure called the "ecological footprint" to compute the demands placed on nature by individuals and nations. A simple questionnaire of 16 items gives a rough estimate of our personal footprint. A more complex assessment of 60 categories involved in primary commodities (such as milk, wood, or metal ores), as well as the manufactured products derived from them, gives a measure of national consumption patterns.

Ecological footprint assessments are based on estimates of the biologically productive area (representing a supply of ecological services) needed for all the different human demands on nature. This isn't an easy calculation to make. There are vast differences between both the productive and absorptive capacity of diverse biomes as well as the varied impacts of human activities. Still, general estimates of the area required to provide essential services using current technology can give us a useful picture of how sustainably we're living.

According to Redefining Progress, the average world citizen has an ecological footprint of 2.3 global hectares (5.6 acres), while the biologically productive space available is only 1.9 global hectares (ha) per person. The unbalance is far more pronounced in some of the richer countries. The average resident of the United States, for example, lives at a consumption level that requires 9.6 ha of bioproductive land. If everyone in the world were to adopt this same U.S. lifestyle, we'd need about four more planets to support us all. Leaving room for the other species with which we share resources further reduces our available space. According to the World Commission on Environment and Development, at least 12 percent of all ecosystem types should be preserved for biodiversity protection. You can check your own ecological footprint by going to www.redefiningprogress.org/.

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Of course, not everyone lives at a U.S. level of consumption. Residents of Germany and Japan, for example, use about half as much resources as the average American, while people in Bangladesh use 16 times less. If all of us lived in the style of Bangladeshis, the earth could support four times as many people as it does now. On the other hand, we don't have to be deprived and miserable to live sustainably. Changing to renewable, nonpolluting energy sources such as solar or wind, reusing or recycling our wastes, and adopting conservation designs in housing, transportation, food production, and other areas could dramatically cut our ecological impacts without detracting from the quality of our lives. How we might make this transition is a challenge we hope you'll keep in mind as you read the rest of this book.