



Forests

Forests contribute to the Earth's habitable conditions through maintenance of oxygen and carbon levels, water filtration, and nutrient cycling, among many other functions. Yet human harvesting of forest products and clearing of forests for roads, agriculture, and human settlements threaten the ecological services that forests provide.

Forests, which cover about one-third of the land area of the planet, hold an ambivalent place in the human imagination. People are dependent on intact forests for diverse ecosystem services, yet we clear forests for economic gain. In stories and legends, forests are depicted both as welcoming promised lands, rich in all varieties of natural resources, and as wild and untamed homes to dangerous beasts and threatening calamities. Reflecting these polyvalent attitudes, the U.S. philosopher Henry David Thoreau (1817–1862) wrote, “The West of which I speak is but another name for the Wild; and what I have been preparing to say is, that in Wildness is the preservation of the world. Every tree sends its fibers forth in search of the Wild. Cities import it at any price. Men plough and sail for it. From forest and wilderness come the tonics and barks that brace mankind” (Thoreau 1851 in Nash 1990, 38).

Benefits of Forests

People use forests as sources of raw materials for manufacturing processes or subsistence livelihoods. Forests are logged for timber and for wood pulp to make paper (more than 40 percent of all trees logged are turned into paper). Many human populations rely on forests for hunting, non-timber forest products (e.g., fruits, nuts, vegetables, spices, meats, oils, saps, dyes, rubber, medicines, and raw materials for traditional arts and crafts), and forage for livestock. In addition to their material benefits, forests often serve as sites of inspiration, rejuvenation, and epiphany.

While forests are home to uncounted wild species (only a small percentage of the world's tropical rain forest species have been identified), they also provide a diverse array of benefits to humans. Known as “the lungs of the world” because of their essential functions in producing oxygen and moderating the water and carbon cycles, forests provide a diverse array of ecosystem services, including water catchment and filtration, nutrient cycling, soil formation, biodiversity preservation, biomass generation and decomposition, and carbon sequestration that create and maintain habitable conditions on Earth.

With increasing concerns about climate change due to anthropogenic carbon emissions, the essential activity of forests as carbon sinks, which take up atmospheric carbon in their growing processes, has come to be seen as very important. Through the Clean Development Mechanism of the Kyoto Protocol (1997), developing countries are paid to plant and maintain forests in order to capture atmospheric carbon and offset the carbon emissions of the wealthier countries that have made commitments to reduce greenhouse gases.

Dangers of Forest Loss

Recognizing the importance of forests to human and planetary well-being, scientists have warned of the dangers of forest loss. In 1996, the World Resources Institute estimated that just over half (53.4 percent) of the original forest area (meaning the forest area on the Earth as it is estimated to have existed 8,000 years ago, assuming current climactic conditions) remained (WRI 1996). During the 1990s, the U.N. Food and Agriculture Organization reported a global loss of 0.22 percent of forest cover annually, with the most significant losses in the tropics. Forests are cleared for the economic value of their timber, to create agricultural fields,

and to expand human settlements. In addition, selective harvesting of timber or wild species, cattle grazing, and water diversion can degrade forests, decreasing soil fertility and biodiversity and lowering their productivity. Selective harvesting of timber that removes trees at the same pace at which they regenerate may be sustainable, and may, in some cases, enhance species diversity within forests by creating a wider variety of ecological niches. Such harvesting must be carefully monitored, through either scientific forest management or traditional taboos, to ensure that the pace of removal does not exceed the pace of regeneration.

Decreased quality or outright loss of forests causes a loss of the ecological goods and services that forests provide. Forest destruction is also a spiritual loss, as the richness of the living world is decreased and humans lose the opportunity to commune with various wild species. Meaningful relationships with the natural world may be necessary for optimum human functioning, according to the biophilia hypothesis proposed by the biologist Edward O. Wilson and the ecologist Stephen R. Kellert. Human well-being depends on the wholeness and coherence of living systems. The human species evolved in conjunction with natural processes that shaped human faculties and cognition. Only relatively recently, in evolutionary time, have humans begun living indoors. Because of our long co-evolution with other species, human beings are intrinsically dependent upon close relations with nature and natural processes for individual and general well-being.

In cultures throughout the world, forests have been places of refuge, contemplation and solace, where people could escape the hurly-burly of daily life to contemplate transcendent truths or interact with deities, spirits, and supranormal forces. The loss of forests reduces these opportunities, as well as opportunities for the aesthetic and uplifting appreciation of nature. In traditional and indigenous cultures, healing practices, spirituality, and worldview are often intertwined in systems that view illness as a spiritual imbalance or disruption. Forest loss also affects the ability to engage in these spiritual and traditional healing practices, as the necessary herbs for such practices are often only to be found in forests.

Scientists and policymakers in the developed countries have primarily been concerned with the loss of biological diversity, the loss of undeveloped wilderness, and the loss of recreational opportunities, while activists in the developing countries have been more concerned with the maintenance of rural livelihoods that depend on the extraction of timber and non-timber forest products for their subsistence, as well as preventing neocolonialist bio-prospecting and bio-piracy that would unfairly extract resources from the forests.

North America, South America, and Russia are home to the largest swaths of forests. Tropical rain forests, found in warm, low-elevation areas such as the Amazonian basin

of South America, are richest in biological diversity. The soil is relatively nutrient-poor, making it difficult to grow crops on the bare soil if the forest is cut down. If clearing the tropical rain forest continues at current rates, these forests will be gone by the end of the twenty-first century. Temperate forests are found in eastern North America and northeastern Asia. Because these forests are extremely productive, turning out 1,800 tons of vegetation per acre (as compared with 185 tons per acre in a tropical forest), most of the original temperate forest has long since been cleared. At the highest latitudes and altitudes of North America and Eurasia, the alpine and boreal forests are found, and they represent the largest terrestrial biome. Precipitation occurs mainly in the form of snow. Boreal forests are extensively logged and may vanish unless logging is limited. The boreal forests, circling the subarctic zone around the Northern Hemisphere, are estimated to constitute 25 percent of the world's remaining forest. Thus, although forested areas continue to exist in many climate zones of the Earth, forest resources are being depleted for human use, threatening overall sustainability of life on the planet.

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FURTHER READING

- Eisenberg, Sheryl. (2004, February). Taking trees personally. *This Green Life*. Retrieved March 29, 2009, from <http://www.nrdc.org/thisgreenlife/0402.asp>
- Food and Agriculture Organization of the United Nations. (2003). *State of the world's forests, 2003*. Rome: United Nations. Retrieved March 29, 2009, from <http://www.fao.org/DOCREP/005/Y7581E/Y7581E00.HTM>
- Kyoto Protocol: Mechanisms: Clean development mechanism. Retrieved May 22, 2009, from http://unfccc.int/kyoto_protocol/mechanisms/clean_development_mechanism/items/2718.php
- National Aeronautics and Space Administration (NASA). (1998). Tropical deforestation. *The Earth Science Enterprise Series*: FS-1998-11-120-GSFC. Retrieved March 29, 2009, from <http://www.iwokrama.org/library/pdfdownload/NASAdeforestation.pdf>
- Rosenzweig, M. L., & Daily, G. C. (2003, June 6). Win-win ecology: How the Earth's species can survive in the midst of human enterprise. *Science* 300(5625): 1508–1509.
- Thoreau, Henry David. (1851). Walking. Reprinted in Roderick F. Nash, (Ed.) (1990), *American environmentalism: Readings in conservation history* (3rd ed.), p. 38. New York: McGraw Hill.
- United Nations Framework Convention on Climate Change: Kyoto Protocol, Clean Development Mechanism. (Adopted 1997; entered into force 2005). Retrieved May 22, 2009, from <http://cdm.unfccc.int/index.html>
- Wilson, Edward O., & Kellert, Stephen R. (Eds.). (1993). *The biophilia hypothesis*. Washington, DC: Island Press.
- World Resources Institute. (2009). Earthtrends: Environmental information. Retrieved May 27, 2009, from <http://earthtrends.wri.org/>
- World Resources Institute. (1996). Forests, grasslands and drylands—Forest extent: Forest area (current) as a percent of original forest area. Retrieved August 6, 2009, from http://earthtrends.wri.org/searchable_db/index.php?theme=9&variable_ID=313&action=select_countries