

Human societies derive many essential goods from forest ecosystems, including food, game, fuelwood, timber, and pharmaceutical products. These goods are generally recognized by society as important and familiar parts of the economy. However, less appreciated is that forest ecosystems also perform fundamental life-support services without which human civilizations would cease to exist as we know them today (Daily et al., 1997). For example, forests purify air and water, mitigate droughts and floods, preserve soils and soil fertility, cycle and retain nutrients, maintain biodiversity, and provide aesthetic beauty and spiritual values (see list below: Holdren and Ehrlich, 1974; Ehrlich and Ehrlich, 1981).

These services arise from a complex interplay of natural cycles operating at wide range of space and time scales. The mitigation of floods and soil erosion by forest ecosystems, for example, involves microscopic to landscape scales; the infiltration of water into porous soils occurs at the microscopic scale, while prevention of siltation in downstream waterways happens at a watershed scale. Eliminating this service, by clearing the forest, can lead to impaired water quality downstream of the forest, siltation of navigable river channels and harbors, increased frequency and severity of floods, and decreased potential for hydroelectric power generation (Pimentel et al., 1995). Worldwide, the replacement cost of reservoir capacity lost to siltation is estimated at \$6 billion per year (Daily et al., 1997).

Although not readily apparent to most people, the human economy depends

upon the services performed without cost by forest ecosystems. The ecosystem services supplied annually by forests are worth trillions of dollars, and yet when economic development impairs these services the costs are hidden from traditional economic accounting. Unfortunately, a short

term focus in land-use decisions often cause great costs to be borne by future generations. These costs suggest a need for policies that achieve a balance between sustaining forest ecosystem services and pursuing the short term goals of economic development (Daily et al., 1997).

Examples of Ecosystem Services

Function	Example:
Atmospheric Gas Reg.	CO ₂ , O ₃ , SO _x levels
Climate Regulation	CO ₂ , NO _x , methane, CFC level
Disturbance Regulation	Storm protection, flood control
Waste Treatment	Pollution control
Soil Erosion Control	Topsoil, lake siltation
Nutrient Cycling	N,P,K,C, etc.
Water supply	Clean reservoirs and lakes
Mutualisms	Source pollen & pollinators, seed dispersal
Biological control	Pest population regulation
Refugia	Habitat for wildlife, increasing biodiversity
Food production	Fruits, nuts, mushrooms, etc.
Raw materials	Fuel, timber, pulp, furniture, housing
Genetic Resources	Medicines, genes for plant resistance
Recreation	Eco-tourism, hiking, birding, nature walks
Cultural	Aesthetic value, Education
Restoration Ecology	Source for community members, succession

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