from national forests. These rivers are productive fisheries that are threatened by the runoff from clearcuts and road building. Forests provide recreational opportunities. They help nourish the diversity of life on which all living things are dependent, help maintain soil fertility, recycle nutrients, produce oxygen and absorb carbon dioxide, filter water, and provide new products for medicine and agriculture. Old-growth forests are particularly important in promoting biodiversity, but most of the nation's old growth forests have been cut down. Only small pockets remain and one large area in the Pacific Northwest and Alaska. Scientists working on the Clinton administration's forest plan for Oregon and Washington concluded that "old-growth forests in the Pacific Northwest may be unique ecosystems that developed under climatic and disturbance regimes that may never be duplicated." While some old-growth forests can regenerate over centuries, their loss will result in the extinction of some species.[68]

Forests cover about one-fourth of the world's land surface. About one-half of that area forms intact forest ecosystems. Forests are renewable resources if carefully managed and cutting occurs at sustainable rates. Trees are a remarkably valuable economic resource. They produce nuts and fruits, chewing gum, ointments, perfumes, flavoring extracts, resins, adhesives, drugs, sugar and syrup, tannin, oils, dyes, veneer, turpentine, wood tar, pine oil, fuelwood, pulpwood, lumber, plywood, pressboard, poles, posts, and other products. A typical tree is worth about $590 if sold as timber. The value of trees increases dramatically when their ecological benefits are included: forests help produce oxygen, purify air, prevent soil erosion, recycle and purify water, help maintain humidity levels, and provide habitat for wildlife. Counting those benefits, one estimate of the value of a typical tree is $196,250. [69]

Whatever logging strategy is embraced in a national forest has a major impact on its health. But other threats to forests are important. Air pollution threatens forests. Some pollutants harm humans as well as plants and animals. Oxides of sulfur and nitrogen, for example, are transformed in the atmosphere to sulfate and nitrate particles, which fall to earth in dry form or as rain, making soils and water more acidic and killing some species, and damaging human lung tissue. Carbon dioxide does not directly cause ecological damage, but its increasing concentration in the atmosphere contributes to the threat of global climatic change. Low-level ozone can also harm trees and crops and damage fragile aquatic ecosystems. In the stratosphere, ozone provides a protective layer that absorbs most of the ultraviolet rays from the sun, thereby shielding life on earth from their harmful effects. Such radiation can, if it reaches the earth, damage trees and other living things.

Fire is another primary determinant of forest well-being. Surface fires burn the undergrowth and litter on the forest floor, release nutrients stored in the undergrowth, stimulate the release and germination of the seeds of some species such as the giant sequoia and lodgepole pine, check the growth of pathogens and insects, produce vegetation that some wildlife feed on, and prevent more intense fires from occurring. If dead wood, leaves, and other material builds up over many years, crown fires sometimes result, intense conflagrations that destroy trees, threaten wildlife, and contribute to erosion. Prevention of surface and other fires tend to make more serious and damaging fires more likely. The National Park Service policy is to allow lightning-initiated fires to burn themselves out unless