

Chapter 10: Sustaining Biodiversity: Saving Ecosystems and Ecosystem Services Forests Provide Important Economic and Ecosystem Services

Book Title: Living in the Environment

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Forests Provide Important Economic and Ecosystem Services

Forests provide highly valuable economic and ecosystem services (Figure 10.2 and Concept 10.1A - Forest ecosystems provide ecosystem services far greater in economic value than the value of wood and other raw materials they provide.). Through photosynthesis, forests remove CO₂ from the atmosphere and store it in organic compounds as part of the global carbon cycle (see Figure 3.20). By performing this ecosystem service, forests help stabilize average atmospheric temperatures and moderate the earth's climate. Forests also produce oxygen, purify water, and reduce runoff and flooding by storing water and releasing it slowly.

Figure 10.2

Forests provide important ecosystem and economic services (Concept 10.1A - Forest ecosystems provide ecosystem services far greater in economic value than the value of wood and other raw materials they provide.). **Critical thinking:** Which two ecosystem services and which two economic services do you think are the most important?

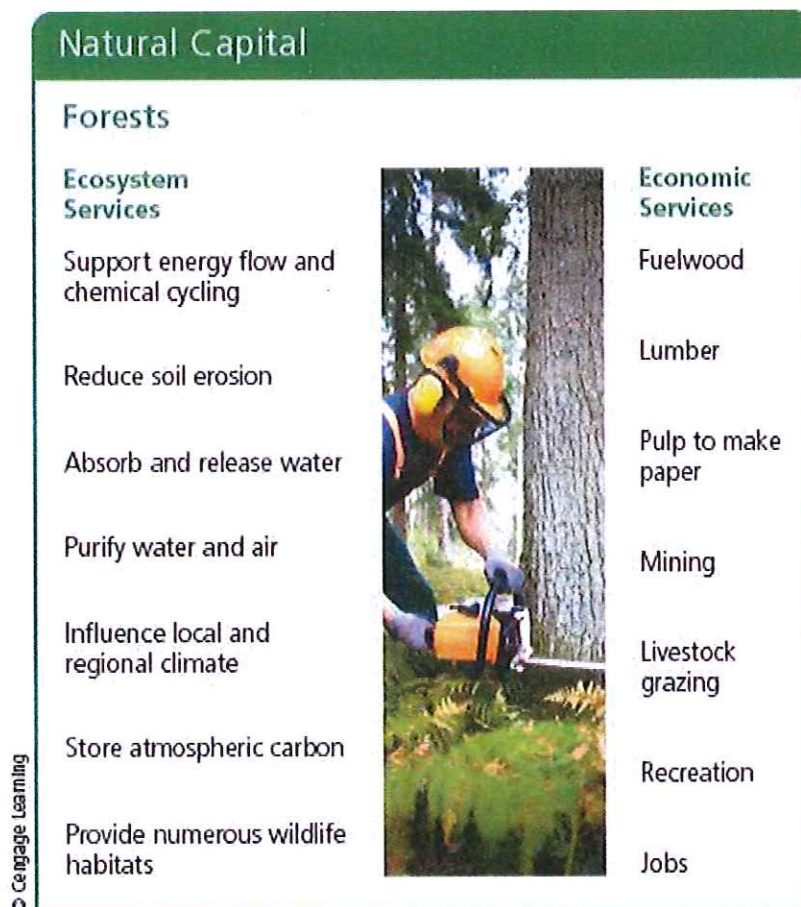


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Forests support biodiversity by providing habitats for about two-thirds of the earth's terrestrial species. They are also home for more than 300 million people and about 1 billion people living in extreme poverty depend on forests for their survival.

Along with highly valuable ecosystem services, forests provide us with raw materials, especially wood. More than half of the wood removed from the earth's forests is used as *biofuel* for cooking and heating. The remainder of the harvest, called *industrial wood*, is used primarily to make lumber and paper.

Forests play a role in maintaining human health. Traditional medicines, used by 80% of the world's people, are derived mostly from plant species native to forests. Certain chemicals found in tropical forest plants are used as blueprints for making most prescription drugs ([Figure 9.5](#)). Forests also remove air pollutants, including 13% of U.S. emissions of climate-changing carbon dioxide (CO₂) from the burning of fossil fuels.

Scientists and economists have estimated the economic value of major ecosystem services that the world's forests and other ecosystems provide ([Science Focus 10.1](#)).

Science Focus 10.1

Putting a Price Tag on Nature's Ecosystem Services

Currently, forests and other ecosystems are valued mostly for their economic services ([Figure 10.2](#), right). Ecologists and ecological economists have estimated the monetary value of the ecosystem services that forests and other ecosystems provide. This information can be used to apply the full-cost pricing **principle of sustainability** to forest ecosystem services and increase our beneficial environmental impact.



In 2014 a team of ecologists, economists, and geographers, led by ecological economist Robert Costanza, estimated the monetary worth of 17 ecosystem services provided by 16 of the earth's biomes. Examples are waste treatment, erosion control, climate regulation, nutrient cycling, habitat, food production, and recreation.

Their conservative estimate was that the global monetary value of these services is at least \$125 trillion per year—much more than the \$76 trillion that the entire world spent on goods and services in 2014. This means that every year, the earth provides you and every other person in the world with ecosystem services worth at least \$17,123, on average. On a global basis, the top five ecosystem services are waste treatment (\$22.5 trillion per year), recreation (\$20.6 trillion), erosion control (\$16.2 trillion), food production (\$14.8 trillion), and nutrient cycling (\$11.1 trillion).

The researchers also estimated that since 1997 the world has been losing ecosystem services with an estimated value of about \$20.2 trillion a year. This

annual loss is more than the \$16.5 trillion gross national product (GNP) of the United States in 2014.

According to their research, the world's forests provide us with ecosystem services worth at least \$15.6 trillion per year. This is hundreds of times more than the economic value of lumber, paper, and other wood products that forests provide us (Concept 10.1A - Forest ecosystems provide ecosystem services far greater in economic value than the value of wood and other raw materials they provide.). About 71% of the total value of ecosystem services from forests comes from climate regulation, genetic resources, and recreation.

We can draw four important conclusions from this and related studies:

1. the earth's ecosystem services are essential for all humans and their economies;
2. the economic value of these services is huge;
3. these ecosystem services will be an ongoing source of ecological income, as long as the ecosystems that provide these services are used sustainably; and
4. we need to use *full-cost pricing* to include the huge economic value of these irreplaceable ecosystem services in the prices of goods and services provided by forests.

Critical Thinking

Some people believe that we should not try to put economic values on the world's irreplaceable ecosystem services because their value is infinite. Do you agree with this view? Explain. What is the alternative?

\$125 Trillion

Conservative estimate of the annual value of nature's ecosystem services

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