

Chapter 6 Humans in the Biosphere**Summary****6–1 A Changing Landscape**

All organisms on Earth share limited resources. They also depend on ecological processes, such as the water cycle, that sustain the resources. To protect these resources and processes, we must know how humans interact with the biosphere. Humans have become the most important source of environmental change. They affect the biosphere through hunting and gathering, agriculture, industry, and urban development.

Prehistoric hunters and gatherers changed their environments by hunting some species of animals to extinction. When humans began the practice of farming, or agriculture, they could produce more food. More food enabled the development of cities, and cities produced wastes. Advances in agriculture occurred later. These advances included the development of pesticides and monoculture—the planting of large fields with the same crop year after year. Advances such as these dramatically increased the world’s food supply, an event called the green revolution. Agricultural advances also created problems, such as pollution from pesticides. After the Industrial Revolution, machines and factories increased the human impact on the biosphere. Industry used more resources and produced more pollution than ever before.

6–2 Renewable and Nonrenewable Resources

Environmental resources may be renewable or nonrenewable. Renewable resources, such as forests or water, can regrow if they are alive or be replaced by biochemical cycles if they are nonliving. Nonrenewable resources, such as fossil fuels, cannot be replaced by natural processes. Environmental resources are threatened by human activities. Sustainable development of renewable resources means using the resources without using them up.

Plowing removes roots that hold soil in place. This causes soil erosion. Soil erosion is the wearing away of surface soil by water and wind. In some areas, plowing and other factors have turned good soils into deserts. This process is called desertification. Sustainable development of soils includes contour plowing, which reduces soil erosion.

Forests provide wood, oxygen, and other important resources. Forests are being used up rapidly. Loss of forests is called deforestation. Sustainable development of forests includes planting trees to replace those that are cut down. Fish populations are declining because of overfishing. Aquaculture is the raising of aquatic animals for food. It is helping to sustain fish resources.

Smog is a mixture of chemicals that forms a gray-brown haze in the air. It is mainly due to car exhausts and industrial emissions. Smog is considered a pollutant. A pollutant is a harmful material that can enter the biosphere through land, air, or water. Burning fossil fuels also releases compounds that combine with water vapor in air and produce acid rain. Acid rain kills plants and causes other damage. Emission controls have improved air quality and reduced acid rain.

Water supplies can be polluted by sewage or discarded chemicals. Sustainable development of water includes protecting the water cycle. Wetlands play an important role in the water cycle. Thus, protecting wetlands is one way to sustain water resources.

6–3 Biodiversity

Biological diversity, or biodiversity, is the sum of the genetically based variety of all organisms in the biosphere. Ecosystem diversity is the variety of habitats, communities, and ecological processes in ecosystems. Species diversity is the number of different species in the biosphere.

Genetic diversity refers to all the different forms of genetic information carried by all organisms living on Earth today. Biodiversity is one of Earth's greatest natural resources. Diverse species have provided humans with foods, industrial products, and medicines.

Humans reduce biodiversity by destroying habitats, hunting species to extinction, introducing toxic compounds into food webs, and introducing foreign species into new environments. Extinction occurs when a species disappears from all or part of its range. An endangered species is a species whose population size is declining in a way that places it in danger of extinction. As humans destroy habitats, the species that once lived in the habitats die out. Development often splits habitats into separate pieces. This process is called habitat fragmentation. The smaller the pieces of habitat, the less likely that their species will be able to survive.

Pollution can seriously threaten biodiversity. Toxic compounds build up in the tissues of organisms. Concentrations of toxins increase in organisms at higher trophic levels in a food chain or food web. This is called biological magnification.

Plants and animals introduced from other areas are an important threat to biodiversity. Introduced organisms often become invasive species.

Invasive species increase rapidly because their new habitat lacks the parasites and predators that control their population "back home."

Conservation is the wise management of natural resources. Conservation focuses on protecting entire ecosystems as well as single species. Protecting entire ecosystems ensures that many species are preserved.

6-4 Charting a Course for the Future

The ozone layer is an area of relatively great concentration of ozone gas high in the atmosphere. The layer protects Earth from harmful radiation. The ozone layer has been damaged by compounds in certain products. The compounds have now been banned.

Global warming refers to the increase in average temperature of the biosphere. It is mainly due to humans burning fossil fuels. Burning adds gases to the atmosphere, causing the atmosphere to retain more heat. Continued global warming may lead to rising sea levels and coastal flooding, among other environmental changes.

People can help maintain the health of the biosphere by conserving resources. For example, they can avoid using more water than necessary. They can also reuse or recycle trash.