

## 6-2 Renewable and Nonrenewable Resources

### Classifying Resources

**Environmental goods and services may be classified as either renewable or nonrenewable.**

**Renewable resources** can regenerate if they are alive, or can be replenished by biochemical cycles if they are nonliving.

A tree is an example of a renewable resource because a new tree can be planted in place of an old tree that dies or is cut down.

A **nonrenewable resource** is one that cannot be replenished by natural processes.

Fossil fuels such as coal, oil, and natural gas are nonrenewable resources. Once these fuels are depleted, they are gone forever.

**Human activities can affect the quality and supply of renewable resources such as land, forests, fisheries, air, and fresh water.**

### Sustainable Development

**Sustainable development** is a way of using natural resources without depleting them, and of providing for human needs without causing long-term environmental harm.

### Land Resources

Land provides space for human communities and raw materials for industry. Land also includes the soils in which crops are grown.

If managed properly, soil is a renewable resource.

Food crops grow best in fertile soil—a mixture of sand, clay, rock particles, and humus (material from decayed organisms).

**Soil erosion** is the wearing away of surface soil by water and wind.

Plowing the land removes the roots that hold the soil in place, and therefore increases the rate of soil erosion.

**Desertification** is the process by which productive areas are turned into deserts.

Desertification is caused by a combination of farming, overgrazing, and drought.

A variety of sustainable-development practices can prevent problems such as soil erosion and desertification.

Sustainable-development practices include:

- contour plowing—fields are plowed across the slope of the land to reduce erosion
- leaving stems and roots of the previous year's crop in place to help hold the soil
- planting a field with rye rather than leaving it unprotected from erosion

### Forest Resources

Earth's forests are an important resource for the products they provide and for the ecological functions they perform.

Forests:

- provide wood for products and fuel.
- remove carbon dioxide and produce oxygen.
- store nutrients.
- provide habitats and food for organisms.
- moderate climate.
- limit soil erosion.
- protect freshwater supplies.

Whether a forest can be considered a renewable resource depends partly on the type of forest.

Temperate forests of the Northeast are renewable because they have been logged and have grown back naturally.

Old-growth forests, such as those in Alaska and the Pacific Northwest, are nonrenewable because it takes centuries to produce them.

### Deforestation

Loss of forests, or deforestation, has several effects:

- Erosion can wash away nutrients in the topsoil.
- Grazing or plowing can permanently change local soils and microclimates, which prevents the regrowth of trees.

## Forest Management

Mature trees can be harvested selectively to promote the growth of younger trees and preserve the forest ecosystem.

Tree geneticists are breeding new, faster-growing trees that produce high-quality wood.

## Fishery Resources

Fishes and other animals that live in water are a valuable source of food.

**Overfishing**, or harvesting fish faster than they can be replaced by reproduction, has greatly reduced the amount of fish in parts of the world's oceans.

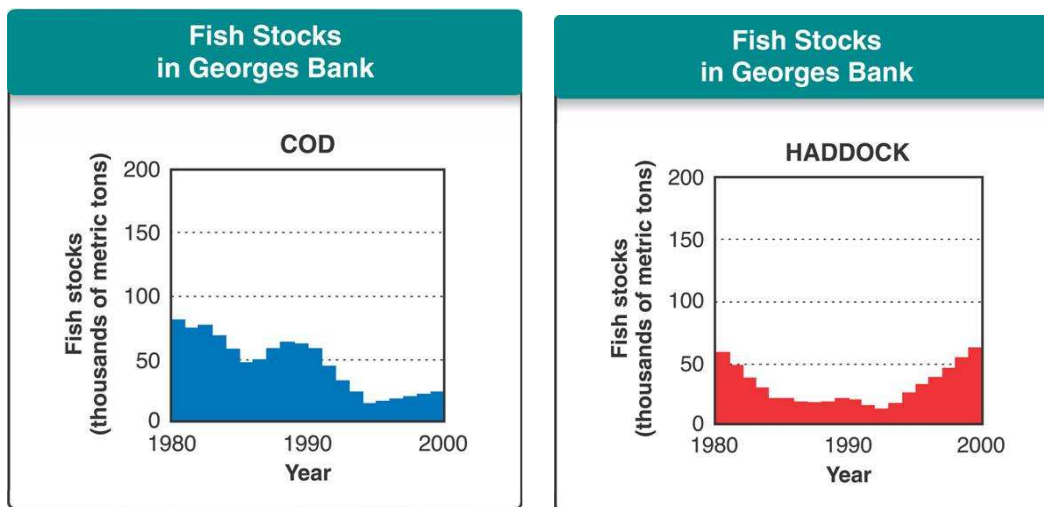
Until recently, fisheries seemed to be a renewable resource, but overfishing has limited that resource.

## Sustainable Development of Fish

The U.S. National Marine Fisheries Service has issued guidelines that specify how many fish, and of what size, can be caught in various parts of the oceans.

The regulations have helped fish populations recover.

These graphs show how the cod population and haddock population has changed in Georges Bank, a fishery off the New England coast. The fish population began to rise after regulations restricted commercial fishing. coast.



## Aquaculture

The raising of aquatic animals for human consumption, which is called **aquaculture**, is also helping to sustain fish resources.

## Air Resources

The condition of the air affects people's health.

**Smog** is a mixture of chemicals that occurs as a gray-brown haze in the atmosphere.

Smog is:

- due to automobile exhausts and industrial emissions.
- considered a pollutant because it threatens people's health.

A **pollutant** is a harmful material that can enter the biosphere through the land, air, or water.

The burning of fossil fuels can release pollutants that cause smog and other problems in the atmosphere.

Strict automobile emissions standards and clean-air regulations have improved air quality in many cities, but air pollution is still a problem.

Many combustion processes release nitrogen and sulfur compounds into the atmosphere.

These compounds combine with water vapor to form **acid rain**.

Acid rain results from the chemical transformation of nitrogen and sulfur products that come from human activities.

Acid rain kills plants by damaging their leaves and changing the chemistry of soils and standing-water ecosystems.

Acid rain may dissolve and releases toxic elements, such as mercury, from the soil, freeing the elements to enter other portions of the biosphere.

## **Freshwater Resources**

Americans use billions of liters of fresh water daily for everything from drinking and washing to watering crops and making steel.

Although water is a renewable resource, the total supply of fresh water is limited and is threatened by pollution.

Sources of pollution include:

- improperly discarded chemicals that enter streams and rivers.
- wastes discarded on land that seep through soil and enter underground water supplies.
- domestic sewage containing compounds that encourage growth of algae and bacteria.
- sewage containing microorganisms that spread disease.

## **Sustainable Use of Water**

One way to ensure the sustainable use of water is to protect the natural systems involved in the water cycle that help purify water.

These include:

- wetlands
- forests
- other vegetation

Also, by conserving water in:

- home
- industry
- agriculture