

## 6-3 Biodiversity

### The Value of Biodiversity

Biological diversity, or **biodiversity**, is the sum total of the genetically based variety of all organisms in the biosphere.

**Ecosystem diversity** includes the variety of habitats, communities, and ecological processes in the living world.

**Species diversity** is the number of different species in the biosphere.

**Genetic diversity** is the sum total of all the different forms of genetic information carried by all organisms living on Earth today.

**Biodiversity is one of Earth's greatest natural resources.**

Species of many kinds have provided us with foods, industrial products, and medicines—including painkillers, antibiotics, heart drugs, antidepressants, and anticancer drugs.

### Threats to Biodiversity

**Human activity can reduce biodiversity by:**

- **altering habitats**
- **hunting species to extinction**
- **introducing toxic compounds into food webs**
- **introducing foreign species to new environments**

**Extinction** occurs when a species disappears from all or part of its range.

A species whose population size is declining in a way that places it in danger of extinction is called an **endangered species**.

As the population of an endangered species declines, the species loses genetic diversity.

### Habitat Alteration

When land is developed, natural habitats may be destroyed.

Development often splits ecosystems into pieces, a process called **habitat fragmentation**.

The smaller a species' habitat is, the more vulnerable the species is to further disturbance.

### Demand for Wildlife Products

Throughout history, humans have pushed some animal species to extinction by hunting them for food or other products. Today, in the U.S., endangered species are protected from hunting.

The Convention on International Trade in Endangered Species, CITES, bans international trade in products derived from endangered species.

### Pollution

Many forms of pollution can threaten biodiversity.

One of the most serious problems occurs when toxic compounds accumulate in the tissues of organisms.

DDT, one of the first pesticides, is a good example of this.

For a long time DDT was considered harmless, and it drained into rivers and streams in low concentrations.

However, DDT has two hazardous properties:

- It is nonbiodegradable, which means that it cannot be broken down by organisms.
- Once DDT is picked up by organisms, it cannot be eliminated from their bodies.

When DDT enters food webs, it undergoes biological magnification.

In **biological magnification**, concentrations of a harmful substance increase in organisms at higher trophic levels in a food chain or food web.

In 1962, biologist Rachel Carson wrote *Silent Spring*, which alerted people to the dangers of biological magnification.

In the process of biological magnification, the concentration of a pollutant such as DDT is multiplied as it passes up the food chain from producers to consumers. The widespread use of DDT threatened populations of many animals—especially fish-eating birds like the bald eagle—with extinction. By the early 1970s, DDT was banned in the U.S. and in most other industrialized countries; as a result, affected bird populations have recovered.

### Introduced Species

Another threat to biodiversity comes from plants and animals that humans transport around the world either accidentally or intentionally.

**Invasive species** are introduced species that reproduce rapidly because their new habitat lacks the predators that would control their population.

Hundreds of invasive species—including zebra mussels in the Great Lakes and the leafy spurge across the Northern Great Plains—are already causing ecological problems in the United States.

### **Conserving Biodiversity**

**Conservation** is the wise management of natural resources, including the preservation of habitats and wildlife.

### **Strategies for Conservation**

Many conservation efforts are aimed at managing individual species to keep them from becoming extinct.

Conservation efforts focus on protecting entire ecosystems as well as single species.

Protecting an ecosystem will ensure that the natural habitats and the interactions of many different species are preserved at the same time.

### **Conservation Challenges**

Protecting resources for the future can require people to change the way they earn their living today.

Conservation regulations must be informed by solid research and must try to maximize benefits while minimizing economic costs.