

Biodiversity and Conservation

section 2 Threats to Biodiversity

MAIN Idea

Some human activities destroy biodiversity in ecosystems.

What You'll Learn

- factors that threaten biodiversity
- how the decline of one species can impact an ecosystem

● Before You Read

You have probably read or heard about environmental issues in the news. On the lines below, list some environmental problems. Then read to learn about the possible consequences of human activities on the environment.

Mark the Text

Identify Threats to Biodiversity Highlight or underline the threats to biodiversity that you read about in this section.


● Read to Learn

Extinction Rates

Many species have become extinct during Earth's long history. Scientists have learned a lot about life on Earth by studying the fossils of extinct species. The gradual process of species becoming extinct is known as **background extinction**. This low level of extinction is always present. It is caused by natural processes, such as the activity of other organisms, climate changes, or natural disasters.

Many scientists worry about a recent increase in the rate of extinction. Some scientists estimate that today's rate of extinction is about 1000 times the normal background extinction rate.

Some scientists predict that as many as two-thirds of all plant and animal species will become extinct during the second half of this century. Most of these extinctions will occur near the equator.

Some scientists believe we are in a period of a mass extinction. During a **mass extinction** a large percentage of all living species become extinct in a relatively short period of time. The last mass extinction, in which the dinosaurs became extinct, occurred about 65 million years ago. 

✓ Reading Check

1. Define *mass extinction*.

How many species have become extinct?

The table below shows the high rate of extinctions since the year 1600. Many extinctions have occurred on islands. For example, 73 percent of mammals that have become extinct in the last 500 years were island species.

Species on islands are vulnerable to extinction for several reasons. Many island species evolved without natural predators. As a result, they do not have the ability to protect themselves. When a cat, dog, or other predator is introduced to the population, it can harm populations of native species. Nonnative species also harm native species by bringing diseases. The native population often does not have resistance to the disease and dies.

Picture This

2. Identify What two groups of living things have the highest rate of extinction?

Estimated Number of Extinctions Since 1600						
Group	Mainland	Island	Ocean	Total	Estimated Number of Species	Percent of Group Extinct
Mammals	30	51	4	85	4000	2.1
Birds	21	92	0	113	9000	1.3
Reptiles	1	20	0	21	6300	0.3
Amphibians	2	0	0	2	4200	0.05
Fish	22	1	0	23	19,100	0.1
Invertebrates	49	48	1	98	1,000,000+	0.01
Flowering plants	245	139	0	384	250,000	0.2

Factors that Threaten Biodiversity

The high extinction rate today is due to the activities of a single species—*Homo sapiens*. Humans are changing conditions on Earth faster than new traits can evolve to cope with the new conditions. Evolving species might not have the natural resources they need. **Natural resources** are all materials and organisms found in the biosphere. Natural resources include minerals, fossil fuels, plants, animals, soil, clean water, clean air, and solar energy.

How does overexploitation harm a species?

One factor that is increasing the current rate of extinction is overexploitation. **Overexploitation** is the excessive use of a species that has economic value. For example, at one time, about 50 million bison roamed the central plains of North America. The bison nearly became extinct because of overhunting. By 1889, there were fewer than 1000 bison left.

Reading Check

3. Define What is overexploitation?

Reading Check

- 4. Identify** What caused passenger pigeons to become extinct? (Circle your answer.)
- a. pollution
 - b. overhunting
 - c. climate change

How has overexploitation caused extinction?

At one time, passenger pigeons were numerous in North America. Large flocks of the birds would darken the skies. Passenger pigeons were overhunted and forced from their habitats. By the early 1900s, the birds had become extinct. Animals today that suffer from overexploitation include the ocelot and the white rhinoceros. People kill ocelots for their fur and white rhinoceroses for their horns.

Why is habitat loss a problem?

Overexploitation was once the main cause of extinction. Today, the main cause is the loss or destruction of habitat. When a habitat is destroyed, the native species might have to move or they will die.

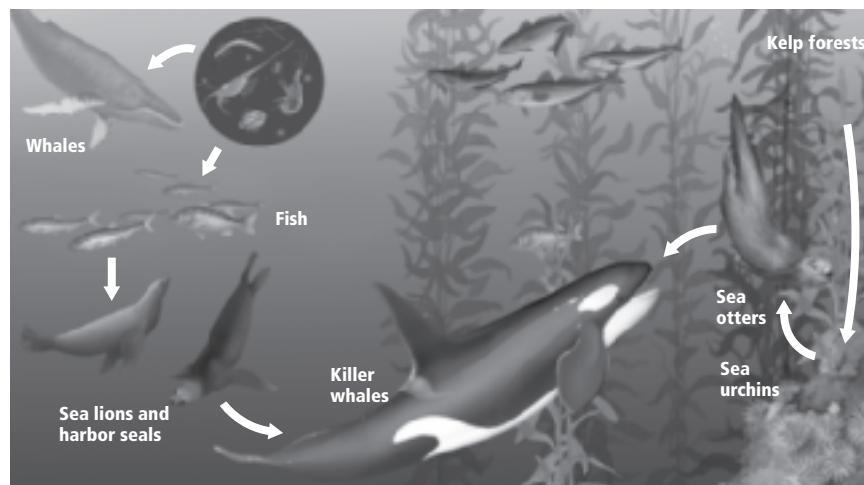
An example of habitat destruction occurs in tropical rain forests. Clearing of tropical rain forests is a serious threat to biodiversity. Remember that tropical areas have high levels of biodiversity. More than half of the world's plants and animals live in tropical rain forests. Removal of these forests would cause high numbers of extinction.

How can habitat disruption affect biodiversity?

Changing one thing in a habitat can also lead to loss of biodiversity. The figure below shows an example of how the decline of one species can affect an entire ecosystem. This chain of events occurred off the coast of Alaska in the 1970s when plankton-eating whales began to disappear. This caused the number of plankton to increase and began a chain reaction that affected many species, disrupting their habitat.

Picture This

- 5. Explain** What caused the decline in the number of sea otters?



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Can biodiversity be preserved in small areas?

Another source of habitat disruption is **habitat fragmentation**, the separation of an ecosystem into small areas. Species stay within the small areas because they are unable or unwilling to cross the human-made barrier. This causes several problems for the survival of species.

First, small areas of land cannot support large numbers of species. Second, individuals in one area cannot reproduce with individuals in another area, causing genetic diversity to decrease. Less genetically diverse populations are less able to resist disease and adjust to environmental changes.

Third, several small areas have more edges than one large area. Environmental conditions along the boundaries of an ecosystem are different, a factor known as the **edge effect**. Temperature, humidity, and wind are often different along the edge of a habitat than they are at its center. Some species are better adapted to living in the edge environment, but other species might find it difficult to survive there.

How does pollution impact biodiversity?

Pollution damages ecosystems and decreases biodiversity by releasing harmful substances into the environment. Pesticides and industrial chemicals are examples of pollutants that are in food webs. Organisms ingest these substances in their food or water.

Some pollutants accumulate in the tissues of these organisms. Animals that eat other animals are most affected by the buildup of pollutants. **Biological magnification** happens when pollutants build up to high levels in bodily tissues of carnivores. The amount of pollutants might be relatively low when it enters the food web, but it increases as it spreads to a higher trophic level.

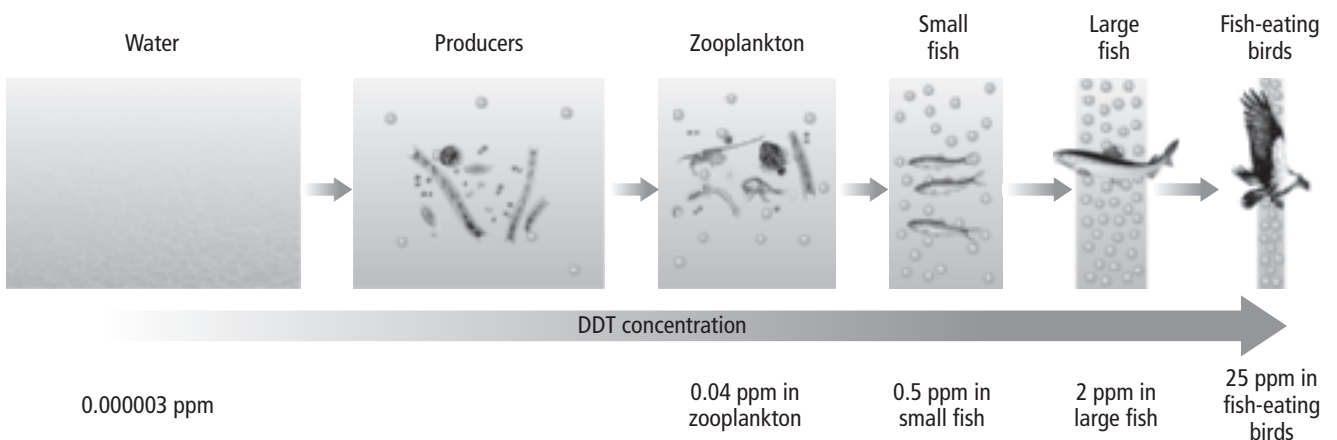


Think it Over

6. Apply How might edge effect impact a group of organisms in a state park?

Picture This

7. Identify Circle the animal below that would be most affected by biological magnification.



What effects did DDT have on some species of birds?

Some pollutants might disrupt normal bodily functions. The pesticide DDT causes eggshells of birds to be fragile and thin, leading to the death of developing birds. From the 1940s to the 1970s, DDT use caused populations of the American bald eagle and the peregrine falcon to become nearly extinct. DDT is now banned in some parts of the world.

How does acid precipitation affect ecosystems?

Acid precipitation is another pollutant. When fossil fuels are burned, compounds that form sulfuric acid and nitric acid are released into the environment. These acids fall back to Earth in rain, sleet, snow, or fog.

Acid precipitation removes nutrients from the soil. It damages plants and slows their growth. It pollutes lakes, rivers, and streams, killing fish and other organisms.

What is eutrophication?

Water pollution can destroy habitats for fish and other species. **Eutrophication** (yoo troh fih KAY shun) occurs when fertilizers, animal waste, and sewage flow into waterways. These substances are rich in nitrogen and phosphorus, and they cause algae to grow. The algae use up the oxygen, causing other organisms in the water to suffocate. Sometimes the algae release toxins that poison the water.

How do nonnative species change ecosystems?

Organisms that have been moved to a new habitat are known as **introduced species**. In their native habitat, these organisms are kept in balance by predators, parasites, and competition with other species. When they are introduced into a new area, these controlling factors are not in place. Introduced species often reproduce in large numbers and become invasive species in their new habitat.

An example is the imported fire ant, which is native to South America. These ants were introduced to the United States in the 1920s. They have spread throughout many parts of the southern and southwestern United States and have caused damage by feeding on native wildlife.

About 40 percent of the extinctions in the last few hundred years might have been caused by introduced species. Billions of dollars are spent each year to control the damage caused by introduced species.

Reading Check

8. **Name** two effects of acid precipitation.

Reading Check

9. **Identify** three factors that keep biodiversity in balance.
