

Section 3.2.

How Humans Influence Ecosystems.

Textbook pages 122 to 137.

Before You Read.

What do you think of when you hear or read the term sustainability? What does this term refer to?

How does land and resource use affect sustainability?

Sustainability refers to the ability of an ecosystem to sustain ecological processes. We make many demands on nature through our use of land and resources. **Land use** refers to the ways we use the land around us—for cities, roads, industry, agriculture, and recreation. **Resource use** refers to the ways we obtain and use resources—naturally occurring materials, such as soil, wood, water, and minerals. Resource use is also referred to as **resource exploitation**. One example of resource use affecting sustainability is deforestation in China. The result is that less bamboo is available as food for China's giant pandas. In another example, whaling in the Pacific Ocean decreased numbers of whales—the orcas' primary food source. Orcas turned to eating other prey, such as sea otters. But sea otters eat sea urchins and when the numbers of sea otters went down, the numbers of sea urchins exploded.

How can First Nations' knowledge improve resource management?

First Nations' thorough understanding of the plants, animals, and natural occurrences in their environment is referred to as **traditional ecological knowledge**. It reflects knowledge—about local climate and resources, biotic and abiotic characteristics, and animal and plant life cycles—that was gained over centuries. It provides researchers with valuable data with regard to management practices that enhance the productivity and health of ecosystems.

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How can resource exploitation affect ecosystems?

Certain effects of resource exploitation, such as those described in the table below, can affect the biodiversity and health of ecosystems.

Habitat loss.

- Humans take over natural space in the creation of cities and agriculture.
- Habitats are destroyed and can no longer support the species that lived there.

Habitat fragmentation.

- Agriculture, roads, and cities divide natural ecosystems into smaller, isolated fragments.
- Plant pollination, seed dispersal, wildlife movement, and reproduction are adversely affected.

Deforestation.

- Forests are logged or cleared for human use and never replanted.
- The number of plants and animals living in an ecosystem are reduced.

Soil degradation.

- Deforestation and land clearance leave land bare so water and wind erosion remove topsoil.
- Organic matter, water, and nutrients are removed along with the topsoil, reducing plant growth.

Soil compaction.

- Agricultural farm vehicles and grazing animals squeeze soil particles together.
- Reduces the movement of air, water, and soil organisms in soil, hindering the growth of plants and increasing run-off of fertilizer and pesticides.

Contamination.

- By-products of resource exploitation, such as mining, introduce toxins.
- Toxins are introduced into the environment in harmful concentrations and kill plants and animals.

Overexploitation.

- A resource—like fish or forests—is used or extracted until it is depleted.
- Food web interactions are affected. Organisms become less resistant to disease and less able to adapt to environmental change. Extinction, the dying out of a species, can result.

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