

Sample Lesson #2

How Humans Benefit from Ecosystems

A highly diverse ecosystem supports all its inhabitants. This includes humans. Products and processes that benefit humans are called **ecosystem services**. There are four types:

Supplying the most basic needs of humans: Ecosystems provide living spaces. They provide oxygen, organic matter, and soil. The water cycle and nutrient cycles operate within ecosystems. These and other system processes move matter and energy through our world.

Maintaining the world humans live in: Wetland ecosystems purify water, recharge aquifers, and help prevent flooding. Forests clean the air and reduce water runoff. Coastal salt marshes act as buffers for extreme weather and erosion control.

Ecosystems control pest populations. Dragonflies get rid of mosquitoes. Owls help with rodent control. Spiders and birds prey on ticks. These pests carry harmful diseases. A balanced ecosystem keeps these pests in check.

Insects and other animals act as pollinators. Most flowering plants (75%) depend on pollinators. And humans depend on plants for food and raw materials.

Ecosystems take in carbon dioxide through photosynthesis. Mangroves and sequoia forests, and other trees are particularly effective at this. The ocean is home to tiny organisms called diatoms. These creatures absorb 10–20 billion metric tons of carbon dioxide each year. By removing CO₂, these organisms and ecosystems help regulate global warming.

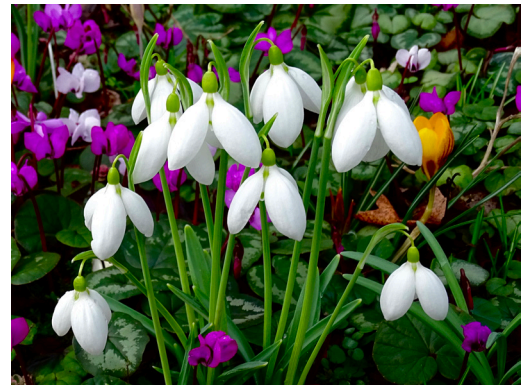
Providing the goods and materials humans need: Humans rely on natural resources for food. Our food comes from wild animals and plants. It comes from oceanic and freshwater fish, livestock, and crops. Crop fertilizer and livestock feed also come from natural resources.

Plants have medicinal properties that are very useful. Studies estimate that well over 50% of all prescription drugs originate in nature. Aspirin is a drug that reduces pain, fever, and swelling. It comes from the bark of willow trees. Taxol is a drug used to fight certain types of cancer. It originates from the bark of the Pacific yew tree. Recently, chemicals were discovered in tiny snowdrop flowers. These chemicals may reduce the symptoms of Alzheimer's disease.

Ecosystems provide raw materials. These include wood for building, fibers for clothing, and biofuels for transportation and heating.

Enriching the daily lives of humans: People enjoy being in nature. Hiking, fishing, and other outdoor activities help humans to be happier and healthier. People vacation in natural habitats. The natural world shapes our intellectual development and our well-being. For many people, the natural world is tied to cultural identity and spiritual meaning.

Like all living things, humans rely on the products and services ecosystems provide. Preserving biodiversity means securing these resources for ourselves and for future generations.



These tiny spring flowers contain chemical compounds that may reduce the symptoms of Alzheimer's disease.

1. Humans rely on ecosystems for many services. Match each benefit with its description.

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|---------------------------|--|
| _____ basic needs | A) Tree roots purify water and prevent soil erosion. |
| _____ maintenance | B) Trees are a source of pleasure on hiking trails. |
| _____ goods and materials | C) Trees release oxygen that humans need to breathe. |
| _____ enrichment | D) Trees are a source of lumber used to build homes. |

2. True or False?

_____ The various species in an ecosystem are not interdependent. Each can survive on its own without relying on others.

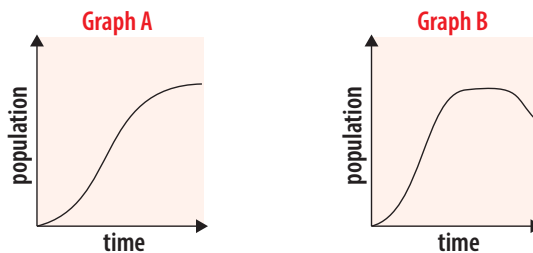
3. Why might the gray wolf be considered a keystone species? Check all that apply.

- _____ Elk behave differently when the gray wolf is present.
- _____ The gray wolf was the first organism to live in Yellowstone.
- _____ The gray wolf is at the bottom of the energy pyramid.
- _____ Beavers, fish, and bears were affected by the loss of the gray wolf.
- _____ The loss of the gray wolf caused biodiversity to decrease.

4. The way that badgers interact with the living and nonliving parts of their ecosystem describes their _____.

- population community niche habitat

5. If the resources in an ecosystem decrease, the carrying capacity of the ecosystem will drop. Fewer individuals will reproduce. There will be more illness and death. Individuals will migrate out of the ecosystem. The population will decline.



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| Which graph shows an ecosystem at carrying capacity? | graph A | graph B |
| Which graph shows a population declining? | graph A | graph B |