

RESOURCE

ENCYCLOPEDIC ENTRY

# Ecosystem

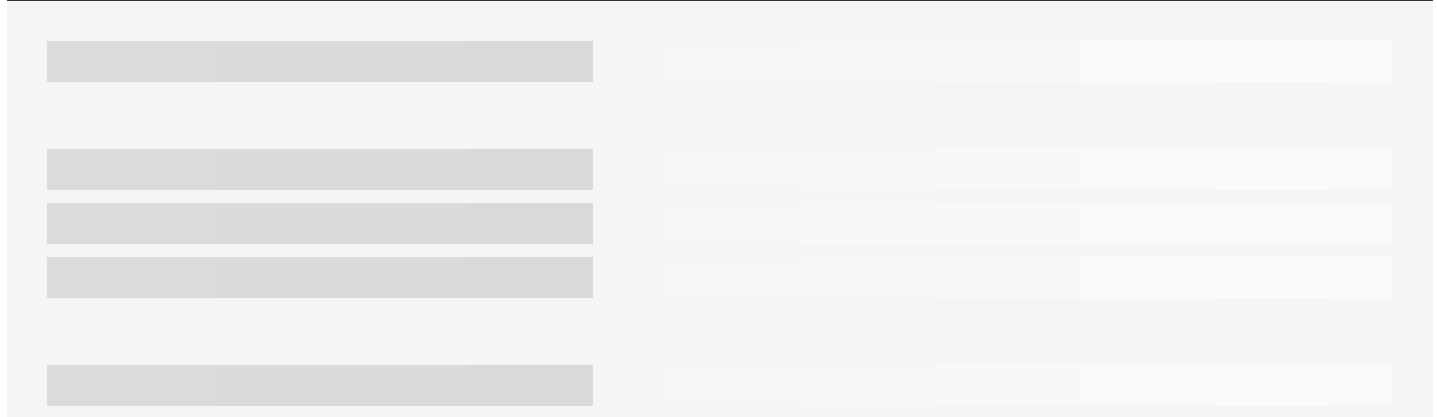
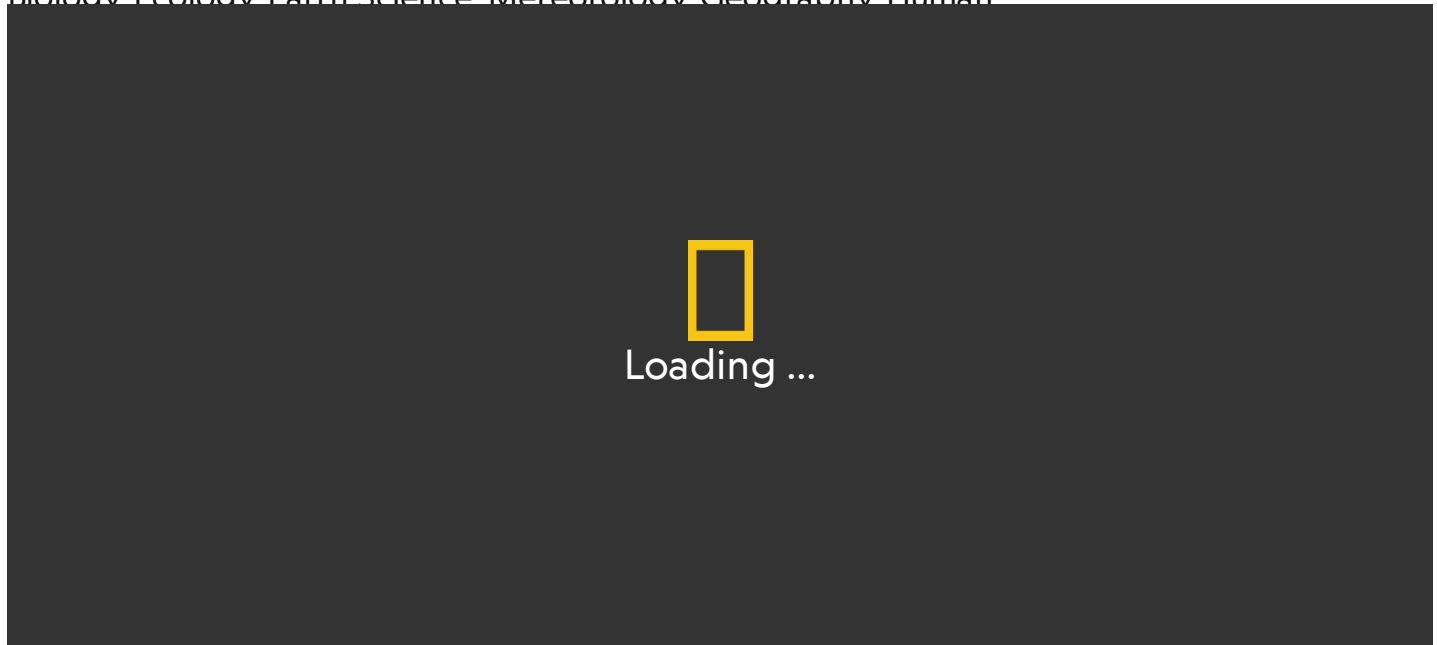
An ecosystem is a geographic area where plants, animals, and other organisms, as well as weather and landscapes, work together to form a bubble of life.

GRADES

4 - 12+

SUBJECTS

Biology Ecology Earth Science Meteorology Geography Human





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## ARTICLE

## VOCABULARY

An ecosystem is a geographic area where plants, animals, and other organisms, as well as weather and landscape, work together to form a bubble of life. Ecosystems contain biotic or living, parts, as well as abiotic factors, or nonliving parts. Biotic factors include plants, animals, and other organisms. Abiotic factors include rocks, temperature, and humidity.

Every factor in an ecosystem depends on every other factor, either directly or indirectly. A change in the temperature of an ecosystem will often affect what plants will grow there, for instance. Animals that depend on plants for food and shelter will have to adapt to the changes, move to another ecosystem, or perish.

Ecosystems can be very large or very small. Tide pools, the ponds left by the ocean as the tide goes out, are complete, tiny ecosystems. Tide pools contain

seaweed, a kind of algae, which uses photosynthesis to create food.

Herbivores such as abalone eat the seaweed. Carnivores such as sea stars eat other animals in the tide pool, such as clams or mussels. Tide pools depend on the changing level of ocean water. Some organisms, such as seaweed, thrive in an aquatic environment, when the tide is in and the pool is full. Other organisms, such as hermit crabs, cannot live underwater and depend on the shallow pools left by low tides. In this way, the biotic parts of the ecosystem depend on abiotic factors.

The whole surface of Earth is a series of connected ecosystems. Ecosystems are often connected in a larger biome. Biomes are large sections of land, sea, or atmosphere. Forests, ponds, reefs, and tundra are all types of biomes, for example. They're organized very generally, based on the types of plants and animals that live in them. Within each forest, each pond, each reef, or each section of tundra, you'll find many different ecosystems.

The biome of the Sahara Desert, for instance, includes a wide variety of ecosystems. The arid climate and hot weather characterize the biome. Within the Sahara are oasis ecosystems, which have date palm trees, freshwater, and animals such as crocodiles. The Sahara also has dune ecosystems, with the changing landscape determined by the wind. Organisms in these ecosystems, such as snakes or scorpions, must be able to survive in sand dunes for long periods of time. The Sahara even includes a marine environment, where the Atlantic Ocean creates cool fogs on the Northwest African coast. Shrubs and animals that feed on small trees, such as goats, live in this Sahara ecosystem.

Even similar-sounding biomes could have completely different ecosystems.

The biome of the Sahara Desert, for instance, is very different from the biome of the Gobi Desert in Mongolia and China. The Gobi is a cold desert, with frequent snowfall and freezing temperatures. Unlike the Sahara, the Gobi has ecosystems based not in sand, but kilometers of bare rock. Some grasses are able to grow in the cold, dry climate. As a result, these Gobi ecosystems have grazing animals such as gazelles and even takhi, an endangered species of wild horse.

Even the cold desert ecosystems of the Gobi are distinct from the freezing desert ecosystems of Antarctica. Antarctica's thick ice sheet covers a continent made almost entirely of dry, bare rock. Only a few mosses grow in this desert ecosystem, supporting only a few birds, such as skuas.

## Threats to Ecosystems

For thousands of years, people have interacted with ecosystems. Many cultures developed around nearby ecosystems. Many Native American tribes of North America's Great Plains developed a complex lifestyle based on the native plants and animals of plains ecosystems, for instance. Bison, a large grazing animal native to the Great Plains, became the most important biotic factor in many Plains Indians cultures, such as the Lakota or Kiowa. Bison are sometimes mistakenly called buffalo. These tribes used buffalo hides for shelter and clothing, buffalo meat for food, and buffalo horn for tools. The tallgrass prairie of the Great Plains supported bison herds, which tribes followed throughout the year.

As human populations have grown, however, people have overtaken many

ecosystems. The tallgrass prairie of the Great Plains, for instance, became farmland. As the ecosystem shrunk, fewer bison could survive. Today, a few herds survive in protected ecosystems such as Yellowstone National Park.

In the tropical rain forest ecosystems surrounding the Amazon River in South America, a similar situation is taking place. The Amazon rain forest includes hundreds of ecosystems, including canopies, understories, and forest floors. These ecosystems support vast food webs.

Canopies are ecosystems at the top of the rainforest, where tall, thin trees such as figs grow in search of sunlight. Canopy ecosystems also include other plants, called epiphytes, which grow directly on branches. Understory ecosystems exist under the canopy. They are darker and more humid than canopies. Animals such as monkeys live in understory ecosystems, eating fruits from trees as well as smaller animals like beetles. Forest floor ecosystems support a wide variety of flowers, which are fed on by insects like butterflies. Butterflies, in turn, provide food for animals such as spiders in forest floor ecosystems.

Human activity threatens all these rain forest ecosystems in the Amazon. Thousands of acres of land are cleared for farmland, housing, and industry. Countries of the Amazon rain forest, such as Brazil, Venezuela, and Ecuador, are underdeveloped. Cutting down trees to make room for crops such as soy and corn benefits many poor farmers. These resources give them a reliable source of income and food. Children may be able to attend school, and families are able to afford better health care.

However, the destruction of rain forest ecosystems has its costs. Many modern medicines have been developed from rain forest plants. Curare, a muscle relaxant, and quinine, used to treat malaria, are just two of these medicines. Many scientists worry that destroying the rain forest ecosystem may prevent more medicines from being developed.

The rain forest ecosystems also make poor farmland. Unlike the rich soils of the Great Plains, where people destroyed the tallgrass prairie ecosystem, Amazon rain forest soil is thin and has few nutrients. Only a few seasons of crops may grow before all the nutrients are absorbed. The farmer or agribusiness must move on to the next patch of land, leaving an empty ecosystem behind.

## Rebounding Ecosystems

Ecosystems can recover from destruction, however. The delicate coral reef ecosystems in the South Pacific are at risk due to rising ocean temperatures and decreased salinity. Corals bleach, or lose their bright colors, in water that is too warm. They die in water that isn't salty enough. Without the reef structure, the ecosystem collapses. Organisms such as algae, plants such as seagrass, and animals such as fish, snakes, and shrimp disappear.

Most coral reef ecosystems will bounce back from collapse. As ocean temperature cools and retains more salt, the brightly colored corals return. Slowly, they build reefs. Algae, plants, and animals also return.

Individual people, cultures, and governments are working to preserve ecosystems that are important to them. The government of Ecuador, for

instance, recognizes ecosystem rights in the countrys constitution. The so-called Rights of Nature says Nature or Pachamama [Earth], where life is reproduced and exists, has the right to exist, persist, maintain and regenerate its vital cycles, structure, functions and its processes in evolution. Every person, people, community or nationality, will be able to demand the recognitions of rights for nature before the public bodies. Ecuador is home not only to rain forest ecosystems, but also river ecosystems and the remarkable ecosystems on the Galapagos Islands.

#### FAST FACT

### **Bactrian and Dromedary**

Different desert ecosystems support different species of camels. The dromedary camel is tall and fast, with long legs. It is native to the hot, dry deserts of North Africa and the Arabian Peninsula. The Bactrian camel has a thicker coat, is shorter, and has more body fat than the dromedary. The Bactrian camel is native to the cold desert steppes of Central Asia.

It is easy to tell the two types of camels apart: Dromedaries have one hump, Bactrians have two.

#### FAST FACT

### **Coral Triangle**

The most diverse ecosystem in the world is the huge Coral Triangle in Southeast Asia. The Coral Triangle stretches from the Philippines in the

north to the Solomon Islands in the east to the islands of Indonesia and Papua in the west.

#### FAST FACT

### **Ecocide**

The destruction of entire ecosystems by human beings has been called ecocide, or murder of the environment.

#### FAST FACT

### **Human Ecosystem**

"Human ecosystem" is the term scientists use to study the way people interact with their ecosystems. The study of human ecosystems considers geography, ecology, technology, economics, politics, and history. The study of urban ecosystems focuses on cities and suburbs.

## **website**

New Hampshire Public Television: Natureworks—Ecosystems





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