

## Encyclopedic Entry

# ecosystem

For the complete encyclopedic entry with media resources, visit:  
<http://education.nationalgeographic.com/encyclopedia/ecosystem/>

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 shrank, 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.

## VOCABULARY

Term	Part of Speech	Definition
<b>abiotic</b>	<i>adjective</i>	lacking or absent of life.
<b>adapt</b>	<i>verb</i>	to adjust to new surroundings or a new situation.
<b>agribusiness</b>	<i>noun</i>	the strategy of applying profit-making practices to the operation of farms and ranches.
<b>algae</b>	<i>plural noun</i>	(singular: alga) diverse group of aquatic organisms, the largest of which are seaweeds.
<b>animal</b>	<i>noun</i>	organisms that have a well-defined shape and limited growth, can move voluntarily, acquire food and digest it internally, and can respond rapidly to stimuli.
<b>aquatic</b>	<i>adjective</i>	having to do with water.
<b>arid</b>	<i>adjective</i>	dry.
<b>biome</b>	<i>noun</i>	area of the planet which can be classified according to the plant and animal life in it.
<b>biotic factor</b>	<i>noun</i>	effect or impact of an organism on its environment.
<b>bison</b>	<i>noun</i>	large mammal native to North America. Also called American buffalo.
<b>butterfly</b>	<i>noun</i>	type of flying insect with large, colorful wings.
<b>canopy</b>	<i>noun</i>	one of the top layers of a forest, formed by the thick leaves of very tall trees.
<b>carnivore</b>	<i>noun</i>	organism that eats meat.
<b>characterize</b>	<i>verb</i>	to describe the characteristics of something.
<b>climate</b>	<i>noun</i>	all weather conditions for a given location over a period of time.
<b>complex</b>	<i>adjective</i>	complicated.
<b>constitution</b>	<i>noun</i>	system of ideas and general laws that guide a nation, state, or other organization.
<b>continent</b>	<i>noun</i>	one of the seven main land masses on Earth.
<b>coral reef</b>	<i>noun</i>	rocky ocean features made up of millions of coral skeletons.
<b>corn</b>	<i>noun, adjective</i>	tall cereal plant with large seeds (kernels) cultivated for food and industry. Also called maize.
<b>crocodile</b>	<i>noun</i>	reptile native to parts of Africa, Asia, and the Americas.
<b>crop</b>	<i>noun</i>	agricultural produce.

<b>culture</b>	<i>noun</i>	learned behavior of people, including their languages, belief systems, social structures, institutions, and material goods.
<b>curare</b>	<i>noun</i>	resin obtained from South American trees, often dried and used as an ingredient in muscle relaxants.
<b>date palm</b>	<i>noun</i>	type of fruit tree.
<b>delicate</b>	<i>adjective</i>	fragile or easily damaged.
<b>desert</b>	<i>noun</i>	area of land that receives no more than 25 centimeters (10 inches) of precipitation a year.
<b>destruction</b>	<i>noun</i>	ruin.
<b>determine</b>	<i>verb</i>	to decide.
<b>distinct</b>	<i>adjective</i>	unique or identifiable.
<b>dune</b>	<i>noun</i>	a mound or ridge of loose sand that has been deposited by wind.
<b>ecocide</b>	<i>noun</i>	total destruction of an ecosystem.
<b>ecology</b>	<i>noun</i>	branch of biology that studies the relationship between living organisms and their environment.
<b>economics</b>	<i>noun</i>	study of monetary systems, or the creation, buying, and selling of goods and services.
<b>ecosystem</b>	<i>noun</i>	community and interactions of living and nonliving things in an area.
<b>endangered species</b>	<i>noun</i>	organism threatened with extinction.
<b>epiphyte</b>	<i>noun</i>	plant that grows on the branches or trunk of another plant or object.
<b>evolution</b>	<i>noun</i>	process of how present types of organisms developed from earlier forms of life.
<b>farmland</b>	<i>noun</i>	area used for agriculture.
<b>fig</b>	<i>noun</i>	fruit and tree native to Asia.
<b>flower</b>	<i>noun</i>	blossom or reproductive organs of a plant.
<b>fog</b>	<i>noun</i>	clouds at ground level.
<b>food</b>	<i>noun</i>	material, usually of plant or animal origin, that living organisms use to obtain nutrients.
<b>food web</b>	<i>noun</i>	all related food chains in an ecosystem. Also called a food cycle.
<b>forest</b>	<i>noun</i>	ecosystem filled with trees and underbrush.
<b>frequent</b>	<i>adjective</i>	often.
<b>freshwater</b>	<i>noun</i>	water that is not salty.
<b>Galapagos Islands</b>	<i>noun</i>	archipelago in the Pacific Ocean, off the coast of Ecuador.
<b>gazelle</b>	<i>noun</i>	small antelope native to Africa and Asia.
<b>geographic</b>	<i>adjective</i>	having to do with places and the relationships between people and their environments.

<b>geography</b>	<i>noun</i>	study of places and the relationships between people and their environments.
<b>goat</b>	<i>noun</i>	hoofed mammal domesticated for its milk, coat, and flesh.
<b>government</b>	<i>noun</i>	system or order of a nation, state, or other political unit.
<b>grass</b>	<i>noun</i>	type of plant with narrow leaves.
<b>grazing animal</b>	<i>noun</i>	animal that feeds on grasses, trees, and shrubs.
<b>Great Plains</b>	<i>noun</i>	grassland region of North America, between the Rocky Mountains and the Mississippi River.
<b>health care</b>	<i>noun</i>	system for addressing the physical health of a population.
<b>herbivore</b>	<i>noun</i>	organism that eats mainly plants.
<b>herd</b>	<i>noun</i>	group of animals.
<b>hermit crab</b>	<i>noun</i>	type of marine animal (crustacean) that uses found materials, such as other creatures' shells, as its shell.
<b>hide</b>	<i>noun</i>	leather skin of an animal.
<b>history</b>	<i>noun</i>	study of the past.
<b>human ecosystem</b>	<i>noun</i>	environment constructed or adapted to by people and culture.
<b>humidity</b>	<i>noun</i>	amount of water vapor in the air.
<b>ice sheet</b>	<i>noun</i>	thick layer of glacial ice that covers a large area of land.
<b>income</b>	<i>noun</i>	wages, salary, or amount of money earned.
<b>industry</b>	<i>noun</i>	activity that produces goods and services.
<b>insect</b>	<i>noun</i>	type of animal that breathes air and has a body divided into three segments, with six legs and usually wings.
<b>Kiowa</b>	<i>noun</i>	people and culture native to the Great Plains of North America.
<b>Lakota</b>	<i>noun</i>	people and culture of seven Sioux tribes native to the Great Plains.
<b>landscape</b>	<i>noun</i>	the geographic features of a region.
<b>maintain</b>	<i>verb</i>	to continue, keep up, or support.
<b>malaria</b>	<i>noun</i>	infectious disease caused by a parasite carried by mosquitoes.
<b>marine</b>	<i>adjective</i>	having to do with the ocean.
<b>medicine</b>	<i>noun</i>	substance used for treating illness or disease.
<b>monkey</b>	<i>noun</i>	mammal considered to be highly intelligent, with four limbs and, usually, a tail.
<b>moss</b>	<i>noun</i>	tiny plant usually found in moist, shady areas.
<b>mussel</b>	<i>noun</i>	aquatic animal with two shells that can open and close for food or defense.
<b>nutrient</b>	<i>noun</i>	substance an organism needs for energy, growth, and life.
<b>oasis</b>	<i>noun</i>	area made fertile by a source of fresh water in an otherwise arid region.
<b>ocean</b>	<i>noun</i>	large body of salt water that covers most of the Earth.
<b>organism</b>	<i>noun</i>	living or once-living thing.

<b>Pachamama</b>	<i>noun</i>	goddess of the Earth recognized by many cultures of the Andes Mountains.
<b>perish</b>	<i>verb</i>	to die or be destroyed.
<b>persist</b>	<i>verb</i>	to endure or continue.
<b>photosynthesis</b>	<i>noun</i>	process by which plants turn water, sunlight, and carbon dioxide into water, oxygen, and simple sugars.
<b>plain</b>	<i>noun</i>	flat, smooth area at a low elevation.
<b>plant</b>	<i>noun</i>	organism that produces its own food through photosynthesis and whose cells have walls.
<b>politics</b>	<i>noun</i>	art and science of public policy.
<b>pond</b>	<i>noun</i>	small body of water surrounded by land.
<b>preserve</b>	<i>verb</i>	to maintain and keep safe from damage.
<b>public</b>	<i>adjective</i>	available to an entire community, not limited to paying members.
<b>quinine</b>	<i>noun</i>	drug used to treat malaria.
<b>rain forest</b>	<i>noun</i>	area of tall, mostly evergreen trees and a high amount of rainfall.
<b>reef</b>	<i>noun</i>	a ridge of rocks, coral, or sand rising from the ocean floor all the way to or near the ocean's surface.
<b>reliable</b>	<i>adjective</i>	dependable or consistent.
<b>remarkable</b>	<i>adjective</i>	unusual and dramatic.
<b>resource</b>	<i>noun</i>	available supply of materials, goods, or services. Resources can be natural or human.
<b>river</b>	<i>noun</i>	large stream of flowing fresh water.
<b>rock</b>	<i>noun</i>	natural substance composed of solid mineral matter.
<b>Sahara Desert</b>	<i>noun</i>	world's largest desert, in north Africa.
<b>salinity</b>	<i>noun</i>	saltiness.
<b>sand</b>	<i>noun</i>	small, loose grains of disintegrated rocks.
<b>scorpion</b>	<i>noun</i>	animal related to a spider with a poisonous sting in its tail.
<b>seagrass</b>	<i>noun</i>	type of plant that grows in the ocean.
<b>sea star</b>	<i>noun</i>	marine animal (echinoderm) with many arms radiating from its body. Also called a starfish.
<b>seaweed</b>	<i>noun</i>	marine algae. Seaweed can be composed of brown, green, or red algae, as well as "blue-green algae," which is actually bacteria.
<b>shelter</b>	<i>noun</i>	structure that protects people or other organisms from weather and other dangers.
<b>shrimp</b>	<i>noun</i>	animal that lives near the bottom of oceans and lakes.
<b>shrub</b>	<i>noun</i>	type of plant, smaller than a tree but having woody branches.
<b>skua</b>	<i>noun</i>	bird related to the seagull.
<b>snake</b>	<i>noun</i>	reptile with scales and no limbs.

<b>snowfall</b>	<i>noun</i>	amount of snow at a specific place over a specific period of time.
<b>soil</b>	<i>noun</i>	top layer of the Earth's surface where plants can grow.
<b>soy</b>	<i>noun</i>	beans, or fruit, of the soybean plant, native to Asia.
<b>spider</b>	<i>noun</i>	eight-legged animal (arachnid) that usually spins webs to catch food.
<b>survive</b>	<i>verb</i>	to live.
<b>takhi</b>	<i>noun</i>	endangered species of wild horse native to Central Asia. Also called Przewalski's horse.
<b>tallgrass prairie</b>	<i>noun</i>	plain where grasses grow up to 2 meters (6 feet) tall.
<b>technology</b>	<i>noun</i>	the science of using tools and complex machines to make human life easier or more profitable.
<b>temperature</b>	<i>noun</i>	degree of hotness or coldness measured by a thermometer with a numerical scale.
<b>tide</b>	<i>noun</i>	rise and fall of the ocean's waters, caused by the gravitational pull of the moon and sun.
<b>tide pool</b>	<i>noun</i>	small pond created by an ebb tide and submerged by a high tide.
<b>tropical</b>	<i>adjective</i>	existing in the tropics, the latitudes between the Tropic of Cancer in the north and the Tropic of Capricorn in the south.
<b>tundra</b>	<i>noun</i>	cold, treeless region in Arctic and Antarctic climates.
<b>underdeveloped country</b>	<i>noun</i>	country that has fallen behind on goals of industrialization, infrastructure, and income.
<b>understory</b>	<i>noun</i>	ecosystem between the canopy and floor of a forest.
<b>urban ecosystem</b>	<i>noun</i>	environment of cities, towns, and suburbs.
<b>vast</b>	<i>adjective</i>	huge and spread out.
<b>vital</b>	<i>adjective</i>	necessary or very important.
<b>weather</b>	<i>noun</i>	state of the atmosphere, including temperature, atmospheric pressure, wind, humidity, precipitation, and cloudiness.
<b>wind</b>	<i>noun</i>	movement of air (from a high pressure zone to a low pressure zone) caused by the uneven heating of the Earth by the sun.

## For Further Exploration

### Articles & Profiles

- National Geographic News: Ice Shelf Collapses Reveal New Species, Ecosystem Changes
- National Geographic Magazine: Tallgrass Prairie Preserve

### Websites

- New Hampshire Public Television: Natureworks—Ecosystems



© 1996–2015 National Geographic Society. All rights reserved.