Characteristics of Terrestrial Ecosystems

Terrestrial ecosystems are land-based ecosystems. Rainforests, deciduous forests, and grasslands are all examples of terrestrial ecosystems.

The Earth has many different kinds of ecosystems. These include **terrestrial**, or land-based, ecosystems, and **aquatic**, or water-based, ecosystems. Three major terrestrial ecosystems are rainforests, deciduous forests, and grasslands. Each of these ecosystems has specific characteristics that can be used to identify them.

Rainforest

The climate of a rainforest is usually hot and wet. Heavy rainfall (around 150 cm per year) and year-round warm temperatures make it very humid. Many rainforests are found near the equator. A rainforest is very dense with lots of large trees that block out sunlight. Very little sunlight reaches the rainforest floor.

Rainforests are very hot and wet.

Monkeys, panthers, capybaras, snakes, spiders, tree frogs, ferns, vines, toucans, parrots, and jaguars are some of the organisms that live in rainforests.

Deciduous Forest

The climate of a deciduous forest is temperate with four distinct seasons (spring, summer, fall, and winter). Deciduous forests have warm summers and cold winters. They have moderate precipitation throughout the year. During winter months, however, the precipitation is usually frozen, so the plants that live there cannot use this precipitation as a water source. Trees in a deciduous forest usually lose their leaves during the winter and have thick bark to save water and protect them from the cold.

Deciduous forests have four distinct seasons.

Black bears, deer, red foxes, voles, rabbits, cardinals, squirrels, owls, mice, and raccoons are some of the kinds of animals that live in deciduous forests.

Grassland

Grasslands receive enough rainfall to support grasses, but they get less rainfall than forests receive. There is not enough water to support the growth of many large trees, though a few may be found growing alongside streams or rivers. Drought and wildfire in grassland ecosystems are common. Temperatures in grasslands are often warm in the summer and cold in the winter.

Drought and wildfire are common in grasslands.

Some of the animals that can be found in a grassland ecosystem include grasshoppers, prairie dogs, and bison.

Characteristics of Aquatic Ecosystems

Aquatic ecosystems are water-based ecosystems. Lakes, ponds, estuaries, saltwater marshes, oceans, and thermal vents are all examples of aquatic ecosystems, but each has different characteristics

The Earth has many different kinds of ecosystems. These include terrestrial, or land-based, ecosystems, and aquatic, or water-based, ecosystems. Some of the major aquatic ecosystems on Earth are lakes, ponds, estuaries, saltwater marshes, oceans, and thermal vents. Each of these ecosystems has specific characteristics that can be used to identify them.

Lake

Lakes are large bodies of water that are surrounded by land. Lakes are usually freshwater ecosystems.

Lakes can be large, but they are often still small enough to see the other side.

Algae, aquatic plants, freshwater fish, amphibians, ducks, slider turtles, and beavers are some of the organisms that live in lakes.

Pond

Ponds are small bodies of freshwater that are surrounded by land. Ponds are smaller and shallower than lakes, which means that the temperature of the water usually stays the same from top to bottom.

Ponds are smaller than lakes. They are not usually large enough to use a motorboat in.

Like lakes, the organisms that can be found in ponds include aquatic plants, algae, fish, amphibians, ducks, and slider turtles.

Estuary

An estuary is an area in which fresh water and salty ocean water mixes together. These areas may include bays, mouths of rivers, and lagoons. Estuaries have water that is saltier than the water found in lakes and ponds, but not as salty as the water that is found in the ocean.

In estuaries, ocean water provides nutrients needed for plants to grow well. These plants provide shelter and food for birds and other kinds of animals. Often, sea animals go to estuaries to breed and produce their young. The young sea animals live in estuaries during the first parts of their lives, until they are strong enough to survive in the open ocean.

Estuaries provide a place where young animals can grow up.

The plants in estuaries are marsh grasses and other plants that are adapted to water levels that change with the tides. Muskrats, sea birds (such as herons and egrets), shellfish (such as shrimp and crabs) and saltwater crocodiles are animals often found in estuaries.

Estuaries are valuable resources for humans. Many of the fish species that are caught by commercial fishermen spend at least part of their lives in estuaries. Estuary ecosystems are very fragile, and they can be easily harmed by pollution and erosion.

Saltwater Marsh

Saltwater marshes are marshy areas found near estuaries. They receive water daily from the ocean tides. The water in saltwater marshes is similar to that found in estuaries, but it often has more variety in salinity. The organisms that live in saltwater marshes must be able to live in salt water.

Saltwater marshes have water that is saltier than freshwater, but not as salty as ocean water.

The plants found in saltwater marshes include marsh grasses and mangrove trees. Saltwater crocodiles, crustaceans, and migratory water birds are a few of the kinds of animals that may live in salt marsh ecosystems.

Ocean

Oceans are large bodies of saltwater divided by continents. Oceans have many types of ecosystems depending on the characteristics (such as available sunlight, temperature, depth, and salinity) of that part of the ocean.

More organisms live in the shallow part of the ocean, which reaches from the coast to the continental slope, than in any other part of the ocean because sunlight can reach deep and the water is warm. This makes food easy to find. Some examples of organisms that live in the shallow ocean are jellyfish, seaweed, starfish, crabs, corals, and saltwater fish (such as tuna).

Some organisms are able to live in the open ocean. Many of these organisms need to come to the surface frequently for air or to find food, but can also dive deep into the ocean. These organisms include plankton (which float in the upper regions of the water and provide food for many different animals), whales, sea turtles, dolphins, octopuses and sharks.

The ocean ecosystem is the largest on Earth.

Thermal Vent

In some places under the ocean where the Earth's crust is very thin, very hot water can come out of the holes called hydrothermal vents. Some animals, such as tube worms, live near these vents at the bottom of the ocean. The animals that live near these vents must have the ability to live in high temperatures. They also must be able to live without energy from the Sun. Tube worms, for example, have billions of tiny bacteria that live inside of them and help them use the chemical energy from the vents to make food.

Animals that live in thermal vents must be able to stand high temperatures.

Image courtesy of NOAA.

Matter & Energy in Ecosystems

The energy in most ecosystems is provided by the Sun.

Producers absorb energy directly from the Sun to make food. This energy is transferred to consumers when they eat producers. Decomposers get their energy by feeding on dead plant and animal material.

Producers

Producers are organisms that use the Sun's energy to make their own food. Green plants are producers. They make their own food using energy from the Sun in a process called *photosynthesis*.

Green plants, such as grass and trees, are producers that use energy from the Sun to make food.

Other producers include algae and some kinds of bacteria and protists. All of the other organisms in an ecosystem depend on producers for energy. This is because animals, including humans, cannot make their own food.

Consumers

Consumers are organisms that cannot produce their own food. So, they must eat other organisms to get energy and nutrients.

Consumers eat other organisms. Deer and wolves are both consumers.

All animals are consumers. Some consumers eat plants, some eat other animals, and some can eat both plants and animals.

Decomposers

Decomposers are organisms that get energy from feeding on wastes and dead plants and animals. Fungi, such as mushrooms, are examples of decomposers. Some kinds of bacteria and insects are also decomposers.

Fungi and some insects, such as this dung beetle, are decomposers.

The role that decomposers play in an ecosystem is very important. Decomposers "clean" the environment by returning matter and nutrients that were contained in the bodies of dead plants and animals back to the soil. The nutrients that decomposers release into the soil are used by producers for growth.

Decomposers are also important for helping to recycle matter in the ecosystem through the water, carbon, nitrogen, and oxygen cycles.

The video below tells more about how decomposers break down once-living materials to release the matter and energy they contained. Click on the video to watch.

Food Chains & Webs

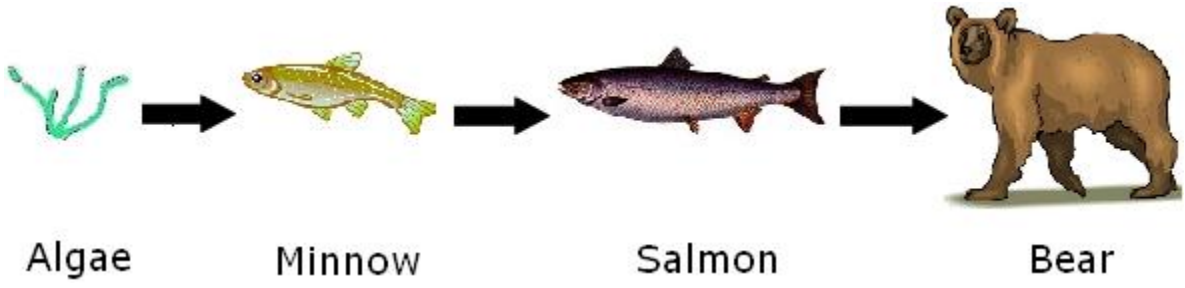
*A **food chain** shows which organisms eat, or are eaten by, other organisms. It shows the way energy flows between the species in an ecosystem. A **food web** is a group of food chains that involve at least some of the same organisms.*

Food Chains

The energy in ecosystems comes from the Sun. Producers, such as plants, use energy from the Sun to make food. Producers are the beginning of a food chain.

The next organisms in the food chain are consumers that eat producers. Cows are good examples of these kinds of consumers. They eat only plants (producers).

Next come consumers that eat other consumers. Lions, bears, people, and any animal that eats other animals are this kind of consumer.



The food chain above shows the flow of energy from a producer, algae, to the consumers in the ecosystem.

All organisms in the food chain are eventually broken down by decomposers, such as worms, bacteria, and fungi.

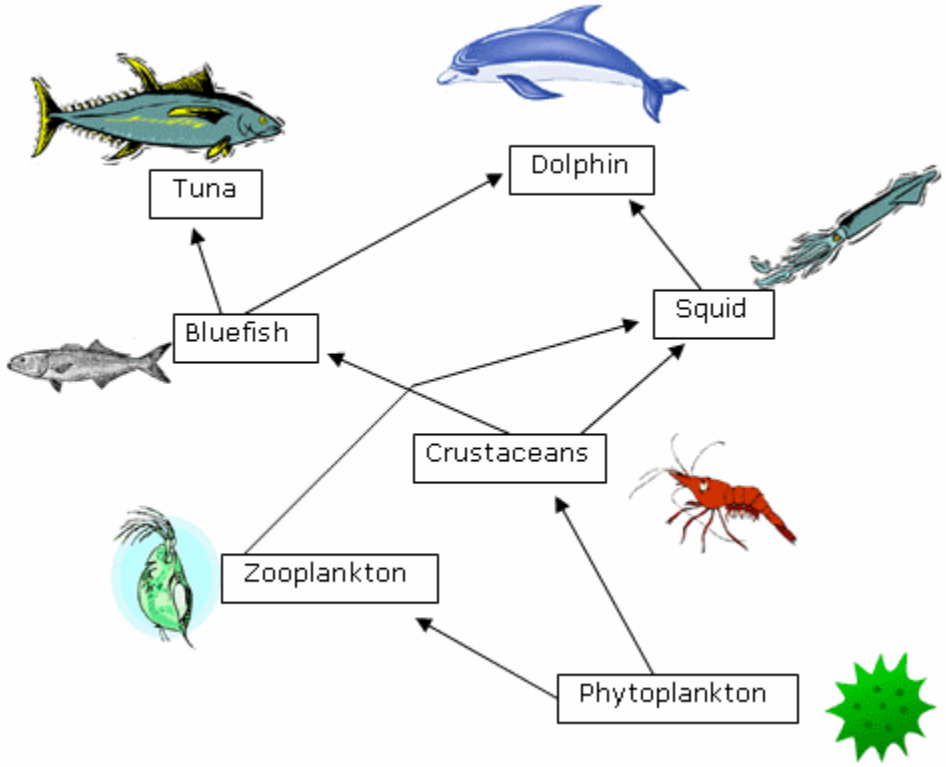
The arrows in a food chain or a food web show the direction of energy flow. The arrows point from the organisms that are being consumed—or eaten—to the organisms that are getting energy. For example, in the food chain above, an arrow points from the algae to the minnow. This means that the minnow is eating the algae and getting energy from it.

Most of the stored energy in an ecosystem is in plants and other producers. This is because most of the energy in a food chain is used or lost as it moves up the chain. In fact, only about 10% of the energy produced at each level is available to the one above it. For this reason, the higher up in the food chain an organism is, the smaller the size of its population.

Food Webs

Most animals eat more than one thing, and many plants and animals are eaten by more than one kind of animal. If several food chains that include some of the same organisms are combined, they make a food web.

A food web shows related food chains for an ecosystem. For example, in the food web below, crustaceans are consumers that eat plankton. Crustaceans are eaten by both squid and bluefish. Bluefish are eaten by both tuna and dolphins. It would take three separate food chains to show those relationships alone.

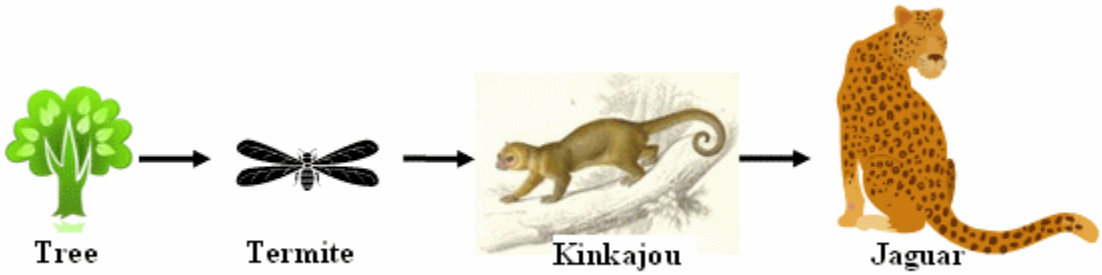


An ocean food web is shown in the picture above.

Effects on Food Chains

Organisms in an ecosystem affect each other. A change in the number of one kind of organism will cause a change in the number of other kinds of organisms.

Energy in a food chain flows from producers to first level consumers, second level consumers, and finally top predators



If producer populations become smaller, populations of all the consumers in the community will also shrink. This is because the animals will have to compete more for food.

Predators rely on other animals for food. If there aren't enough prey (like termites) for the predators (like kinkajous) to eat, there will not be as many predators.

Predators also keep populations of other animals at the right size. But if there are not enough predators (jaguars), there will be too many prey (kinkajous).

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