

Inside **Ecosystems and Biomes**



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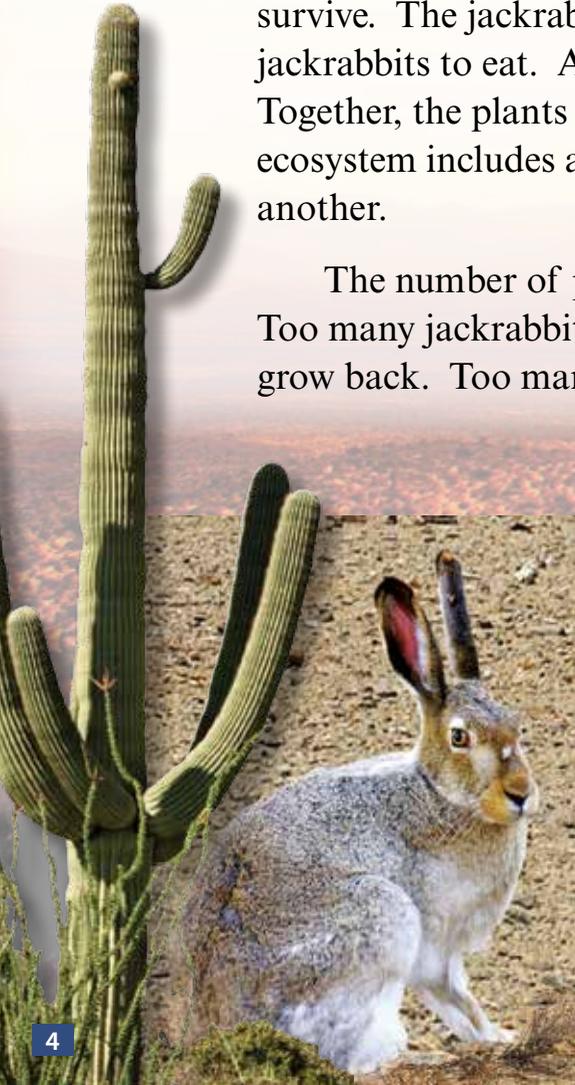


What Is an Ecosystem?

Jackrabbits live in the Mojave Desert. You might think that there isn't much life in the middle of the desert. The jackrabbit knows better. Every day, the jackrabbit finds plants to eat. It eats sagebrush, mesquite, and even cactus! It also has to watch out for **predators**. Coyotes and eagles eat jackrabbits.

There is a lot of life in the jackrabbit's world. All the living things in the Mojave Desert depend on one another to survive. The jackrabbit needs the plants. The coyotes need jackrabbits to eat. And even the plants need the animals. Together, the plants and animals form an **ecosystem**. An ecosystem includes all the plants and animals that need one another.

The number of plants and animals must stay balanced. Too many jackrabbits will eat the plants faster than they can grow back. Too many coyotes will run out of food as well.



← jackrabbit

Scientists observed what happened when a pair of moose swam out to an island called Isle Royale. Within 10 years, there were 3,000 moose! But there weren't enough plants to eat, so they started to die. Then a pair of wolves arrived. Eating the moose made their numbers grow. But soon there were too many wolves, and they starved. At last, 600 moose and 20 wolves lived on the island. This was just enough to keep them both from starving.



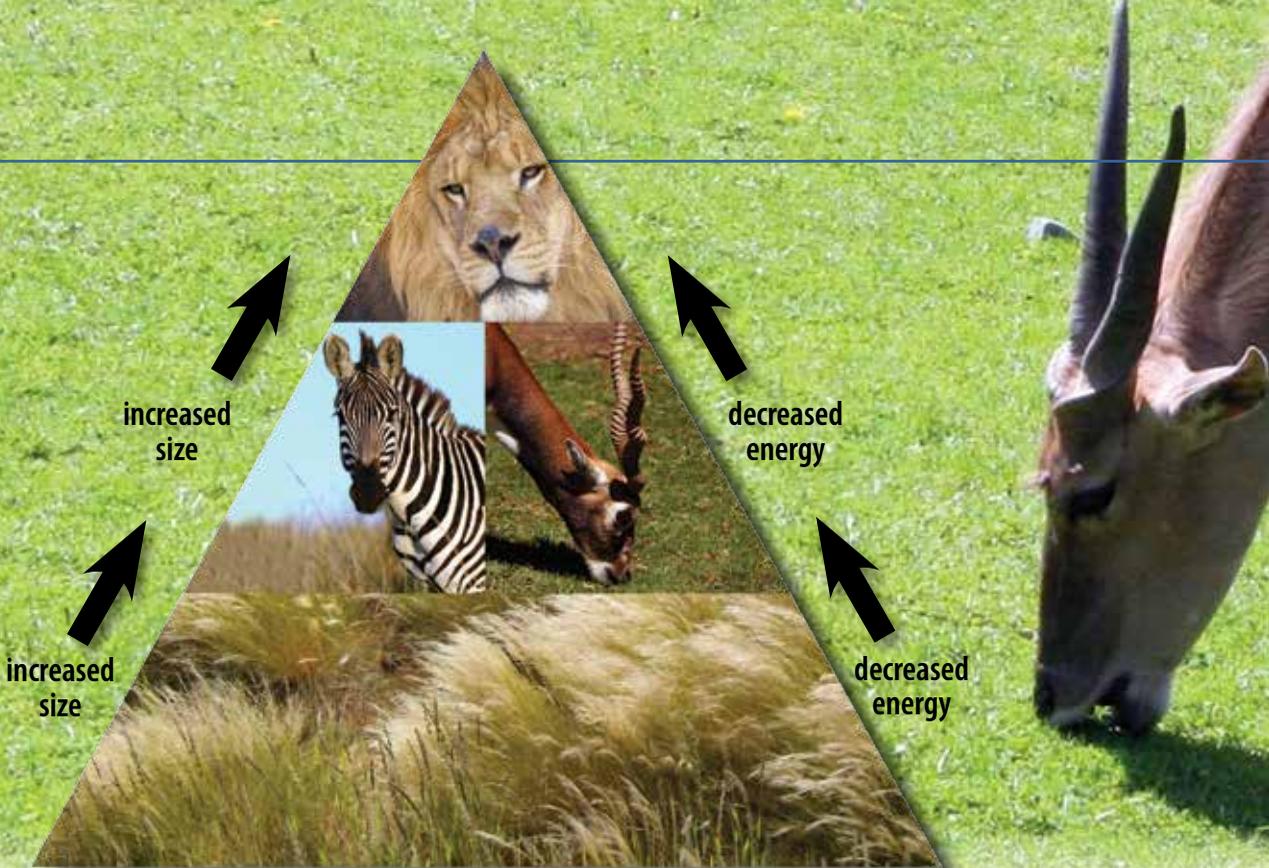
Isle Royale



moose



wolves



All ecosystems have energy pyramids within them. One energy pyramid is illustrated above. It shows the exchange of energy from one food source to another.

Plants are at the bottom of most energy pyramids. In fact, without plants, there would be no life on Earth as we know it. Plants use light from the sun for **photosynthesis**. This lets them make and store energy. They also use nutrients from the soil.

Animals are **consumers**. A gazelle and a zebra eat some grass. They take the energy and nutrients from the grass and use it to run, eat, and mate. Later, a lion eats the gazelle and zebra. It will use the energy and nutrients in them. The gazelle and zebra had already used some of the energy, and the lion takes the rest. As you can see, the overall energy drops as the size of the consumer increases.



Eventually, the lion dies. **Decomposers** break down the lion's remains. These worms, bacteria, and fungi use the energy and return the nutrients to the soil. When plants use these nutrients, a new energy pyramid begins.

Most of the energy is lost at each step in the pyramid. Just a fraction of the sunlight that reaches plants is turned into energy. Animal consumers use only 10 to 20 percent of the energy in their food.

Omnivores Are Common

Not long ago, scientists learned a new fact: many animals are omnivores. Most animals were once called herbivores or carnivores. Herbivores eat plants. Carnivores eat meat. Omnivores eat both. In fact, it's hard to think of an animal that only eats plants. Mice, ostriches, grasshoppers, and even deer sometimes eat meat!

This also shows that ecosystems are more complex than scientists had thought. An animal that you might think of as a herbivore may also sometimes eat meat. We once thought of ecosystems having food chains, but that is usually too simple. Most ecosystems have food webs, with most organisms eating many different things.





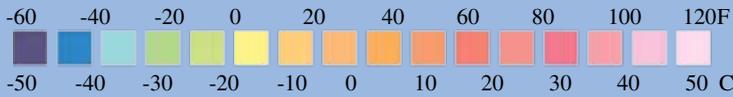
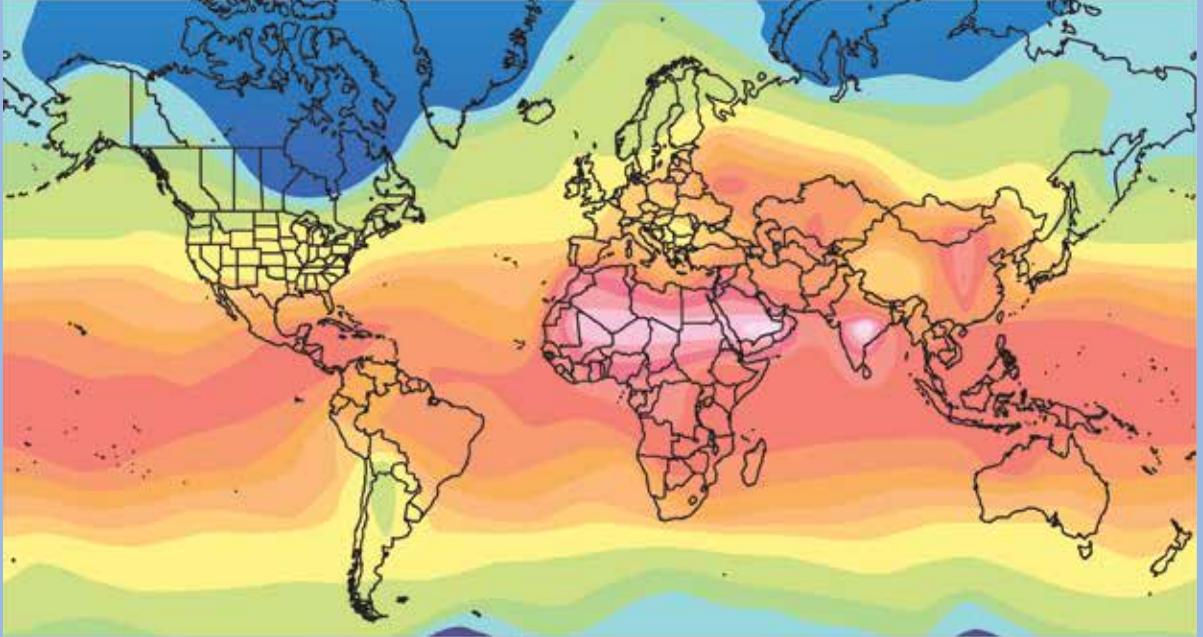
Earth has different areas called **biomes**. Each biome has its own **climate**. For example, a desert has dry weather and sand or rocks instead of soil. This affects the kinds of plants and animals that can live there.

Altitude and **latitude** determine biome boundaries. Altitude measures how high a place is. Latitude helps determine how hot a place is.

Altitude measures the height above sea level. It affects what can grow. For example, trees will only grow up to the tree line on a mountain. Above that, it is too windy and cold. Most of the soil has blown away, leaving only rocks. Only short plants can grow in this alpine biome. Sheep, elk, chinchillas, and birds live here and eat these plants.

Latitude measures the distance from the **equator**. The equator is an invisible line around the middle of Earth. The closer a place is to the equator, the hotter the weather. The farther away from the equator, the cooler the weather gets.

← The plant life and climate of an area can tell you something about its altitude and latitude.



↑ You can see how the different biomes look like they are stacked on top of each other, shown as stripes around the planet. The closer to the equator, the warmer it gets. Warm biomes are close to the equator. Colder biomes are near the poles.

In the far north, summers are too short and cool for trees. Only short grass, lichens, and mosses grow in the tundra biome. These plants can do photosynthesis at low temperatures with long spells of daylight. Caribou eat the grasses and polar bears may eat the caribou.

↓ polar bears





Earth's Land Biomes

Tundra

At the top of the world, the weather is very cold. This biome is called **tundra**.

Strong, cold winds sweep across the flat tundra. The top layer of soil freezes in winter and thaws in the summer. Below that is a layer called **permafrost**. This soil is frozen all year round. Permafrost keeps water from draining. This creates ponds and bogs.

Trees cannot grow in the tundra. Their roots cannot get past the permafrost. Instead, tundra regions grow grasses, lichens, and mosses. Tundra animals include voles, caribou, wolves, polar bears, and snowy owls.

Few people live on the tundra. But those who do, need heat. When heat escapes from buildings, roads, and pipelines, it can thaw the permafrost. **Global warming** also melts permafrost, creating more bogs than there should be. During the past 100 years, the permafrost has retreated about 50 miles north.

