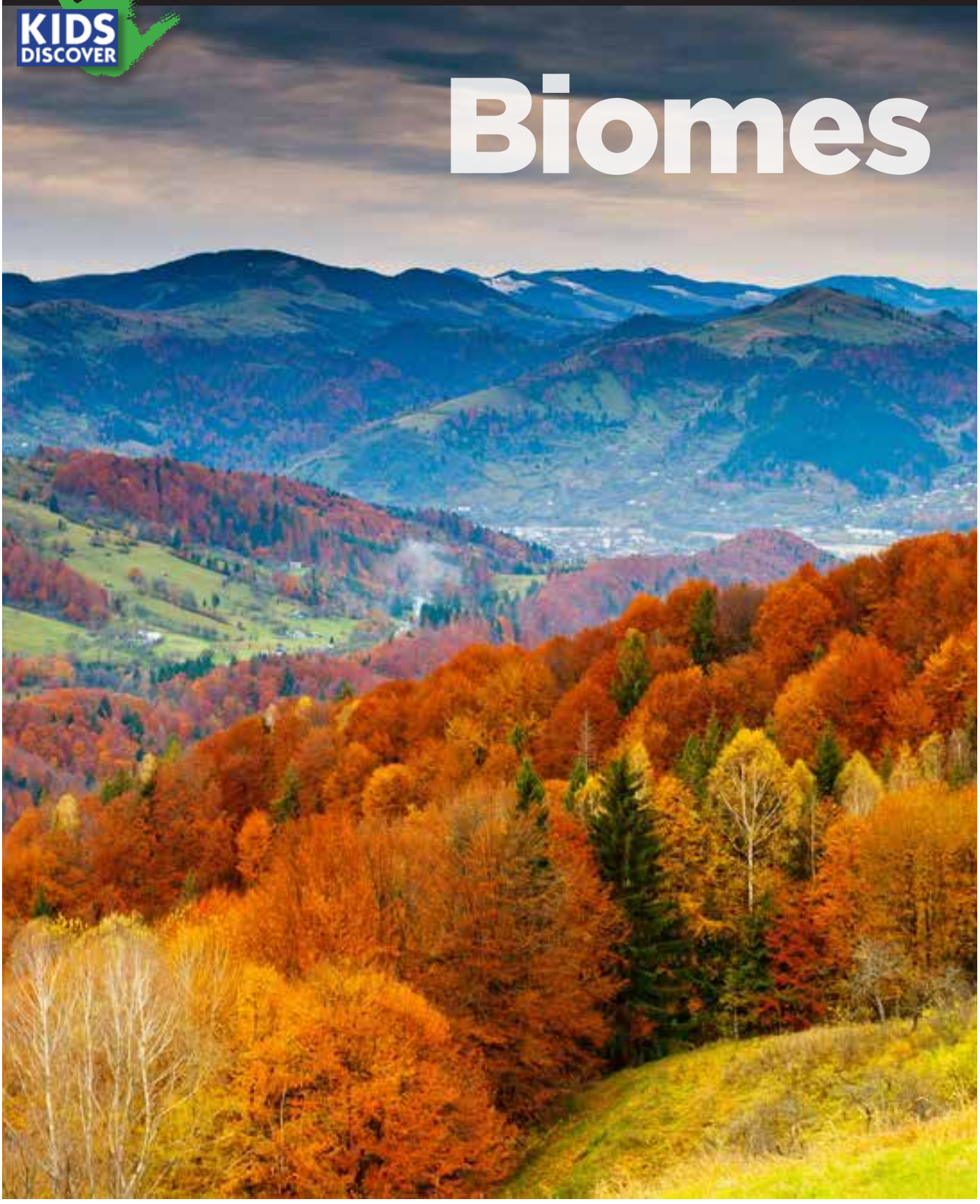
SPOTLIGHT

KIDS DISCOVER

# Biomes

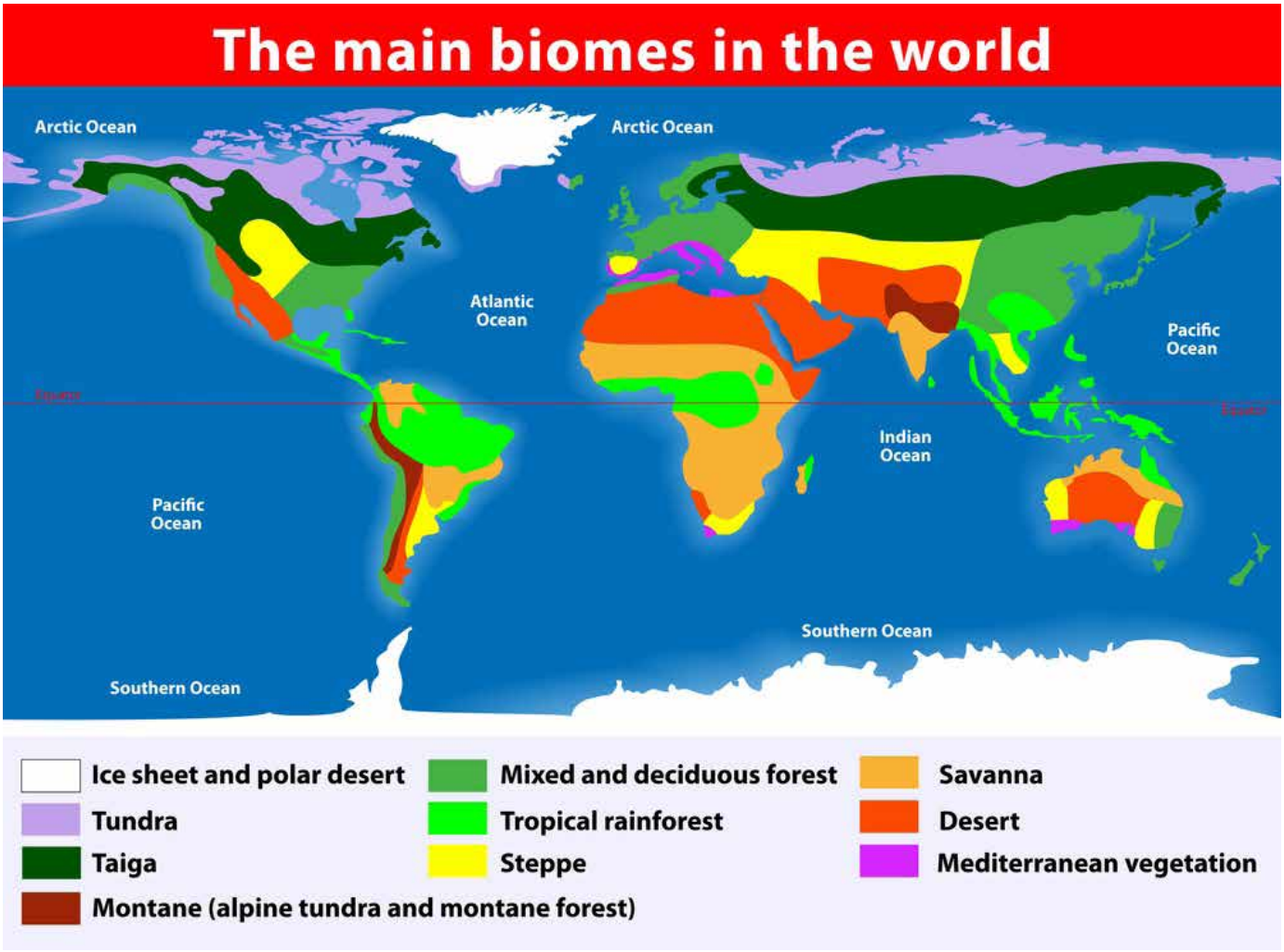


# SPOTLIGHT: BIOMES

Scientists divide the world into large natural areas called biomes. Desert and rainforest biomes are two that you've probably heard of. Each biome is known for certain kinds of plants and animals. But what's really at the heart of a biome is its climate. How hot or cold is it? How much rain and snow fall every year?

Climate is critical because it determines the types of plants and animals—the ecosystem—that can survive in a biome. Polar bears can't live in the Sahara Desert. Rain forest trees won't grow in grasslands or the arctic tundra.

Humans have invented ways to deal with extreme climates and live in every biome. We




Let's say you flew in a plane from the North Pole to the South Pole, zigzagging over all the continents—and let's say there were no clouds blocking your view. You would see lots of cities and human developments, but you would also see huge natural areas. Some biomes, such as the tundra (light purple) and taiga (dark green) cover large bands of territory that encircle the Earth and correspond to their latitude. (Designua/ Shutterstock)

have air conditioning and water-supply systems, so that we can build cities in deserts. We have underground malls and central heating so we can live in very cold climates. However, some of our human activities are changing the world's biomes.

The land areas of the Earth can be divided into eight major biomes: tundra, taiga, temperate deciduous forest, temperate grassland (steppe), Mediterranean (chaparral), desert, tropical savanna, and tropical rain forest. But there are no firm rules about the exact number of biomes. In fact, scientists divide the world's biomes into anywhere from six to seventeen categories. (No one way is better than another—it's just that some classification systems are more general and others are more specific.)

## Tundra

It is crazy cold in the Arctic tundra. It's so cold that the ground is frozen most of the year, and a deep layer of soil below the surface—called the permafrost—never melts at all. However, for two months during the summer, the temperature rises above freezing. The snow and surface soil melt, creating vast pools of water and bogs.

During this brief summer season, plants have a chance to grow. But due to the harsh conditions and high winds, tundra plants grow very low to the ground. In fact, the tundra is a treeless landscape.

Historically, the tundra covered about 15 percent of the Earth's land surface. However, scientists estimate that the tundra has shrunk by almost 20 percent over the last 20 years due to climate change. In the southern part of the tundra, parts of the permafrost have melted. Trees now dot the landscape, and animals from warmer climates are moving in.

TOP: The tundra is a rocky landscape. Lichen—a combination of fungi and algae—grow on the rocks and are favorite food of reindeer that migrate across the tundra. (Incredible Arctic/ Shutterstock)

BOTTOM: Taiga trees have many adaptations for surviving harsh winters, a short growing season, and nutrient- poor soil. Their shape allows snow to slip off easily, and their needle-shaped leaves have waxy, protective coatings to lock in moisture. The needles don't fall off in autumn which means they don't need to use energy to grow a set of new leaves and can capture energy from the sun throughout the year. (Pi_Lens/ Shutterstock)

# SPOTLIGHT: BIOMES

## Taiga

The taiga is the world's biggest biome. It covers nearly one-fifth of the Earth's land surface and stretches across northern Canada and northern Eurasia in an almost unbroken belt for 7,000 miles. The main features of the taiga are its evergreen forests of needle-leafed trees, including pine, spruce, hemlock, and fir. Although this biome is not as harsh as the tundra, all its plants and animals have evolved to survive the taiga's long, snowy winters.

TOP: Deciduous forests have at least three layers. The tallest trees make up the canopy. Saplings and shrubs are found in the understory. Ferns, moss, and wildflowers grow on the forest floor. (Natalia Bratslavsky/ Shutterstock)

BOTTOM: Every year, 300,000 zebra and 1 million wildebeest in Africa's Serengeti Plain embark on an extended migration. To find water and green grass, they must cross the Mara River. But the crossing is dangerous, with some animals swept away by strong currents and a few attacked by crocodiles. (GTS Production/ Shutterstock)

## Temperate Deciduous Forest

This biome is defined by its four distinct seasons and its forests of trees that drop their leaves in autumn. (The word "deciduous" [dih-SID-yoo-uhss] comes from a Latin word meaning "to fall.") Located in the eastern United States, all over Europe, Japan, and parts of Russia and China, temperate deciduous forests are home to deer, wolves, hawks and owls, songbirds, and many other species.

Temperate deciduous forests change dramatically with the seasons. During spring, each tree produces thousands of new leaves filled with green chlorophyll. The chlorophyll traps sunlight and converts it into fuel for the tree's growth. Unlike the trees of the taiga which are evergreens, these trees prepare for winter by breaking down the chlorophyll in their leaves, storing some of the nutrients, and then dropping their leaves. A by-product of the breakdown of the chlorophyll is the exposure of yellow, orange, and red pigments that are normally masked. That means that in fall, the trees in these forests are alight with fiery colors.

## Tropical Savanna

Tropical savannas are vast grasslands dotted with trees that spread across Africa, northern Australia, and parts of South America and India. With wide open spaces and so much grass to graze on, savannas are home to large herds of plant-eating animals (herbivores). They are also usually home to large predators that stalk the herds. In the African savanna, the plant-eaters include zebras, antelopes, wildebeest, giraffes, elephants, and rhinos. Predators include lions, leopards, cheetahs, and hyenas. In the Australian savanna, kangaroos are the primary plant-eaters.

Many of Africa's savanna herbivores have long, powerful legs to help them travel long distances and run away from predators. Some, like the ostrich and giraffe, have VERY long legs—and they can even use

them to kick predators. In the Australian savanna, kangaroos have a slightly different strategy for getting around: They don't run, but hop—as far as 30 feet in a single leap and can speed-hop at 35 mph.

The weather in the savanna is warm year-round, and there are basically two seasons—wet and dry. To survive the dry season, many savanna animals must migrate in search of water.

## Temperate Grassland

Temperate grasslands include the prairie in North America and the steppes of Europe and Asia. They are characterized by vast stretches of high grasses and wildflowers. Summers are very hot and winters are very cold. These regions are subject to droughts—periods without rain—as well as regular wildfires. The wildfires are set off by lightning strikes in the dry grasses. The fires prevent trees from growing and they also return nutrients to the soil. Because the soil below the surface doesn't heat up much during a typical grassland fire, the mat-like roots of the grasses survive and send up shoots the following spring.

Because grasslands have amazingly rich soil, many areas that were once natural grasslands have been taken over for farming.

## Desert

The desert is the driest biome. Some deserts, such as the Sahara, get less than an inch of rainfall in an entire year. The flora and fauna that survive there have to be tough. Desert plants have evolved strategies to save water. In wet biomes, plants can have very large leaves—and they use them to catch as many rays as possible—but large leaves also lead to water loss. To conserve water, desert plants have very tiny leaves, or no leaves at all, transferring the work of photosynthesis to their trunks or stems. That's why cacti have green "trunks."

Desert animals also have to deal with high temperatures and minimal water supplies. Typically, they are nocturnal, hiding out in burrows during the day to beat the heat. Some animals, such as the desert tortoise, go into "estivation" in their burrows during the hottest part of the year. Estivation is the desert version of hibernation—the animal's pulse and breathing slow down dramatically—so that they don't need to use much water or energy.

TOP:The saguaro [suh-WAHR-oh] cactus grows in the deserts of the southwestern United States. When it rains, the trunk of the saguaro can expand to hold water. Sharp spines defend it from animals who might try to break open the saguaro and take a drink. (Nelson Sirlin/ Shutterstock)

BOTTOM: Groups of prairie dogs live together in extensive underground burrows, called "towns." When they come out to eat, one prairie dog stands guard and makes warning whistles if it senses danger. (Henk Bentlage/ Shutterstock)

# SPOTLIGHT: BIOMES

## Mediterranean

This is one of the world's smallest biomes, occurring on the west coast of the United States (particularly in California), along the coast of the Mediterranean Sea, and in coastal patches of South Africa, Australia, and Chile. Winters are mild in this biome, and what little rain there is, falls in that season. Summers are dry and hot. But it's not a desert.

The plants of the Mediterranean biome are evergreen and shrubby, and they grow very densely. Many have thick, leathery leaves that seal in moisture or leaves with small surface areas to limit water loss. The plants also have adapted to survive occasional wildfires. Some, such as chamise, can grow new shoots from underground roots, even though everything above ground has burned.

The Mediterranean biome is highly aromatic—with many plants emitting strong, spicy smells. Many herbs used for cooking—including rosemary, thyme, sage, and oregano—all grow wild in the coastal shrubbery surrounding the Mediterranean Sea.

## Tropical Rain Forest

Located in a belt around the equator, rain forests are a riot of life, with plants growing non-stop year-round. The hot, wet climate supports a jungle of plants and wildlife, from the towering trees that make up the canopy down to the dark forest floor where sunlight barely penetrates due to the thickness of the foliage above. Rain forests get drenched by as much as 180 inches of rain annually.

The rain forest has more species than any other biome. Trees in the rain forest grow as high as 200 feet, and each tree may be home to hundreds of species, from vines and bromeliads, to butterflies, monkeys, birds, and frogs.

Rain forests once covered about 14 percent of the Earth's land surface, but now account for only about 6 percent. Rain forest habitats continue to be cut down for their wood products and to create land for farming. Every year about 9,000 square miles of rain forest is cut down—that's an area about the size of New Jersey.

TOP: Growing up to nine feet high in Southern California, this tower of flowers emerges from the low-growing plant known as Spanish bayonet (for its bladelike leaves). The gray-green color of Spanish bayonet is typical of many plants in the Mediterranean zone. The light-colored leaves reflect heat better than darker colors, and that helps plants conserve water in this dry environment. (Mariusz S. Jurgielewicz/ Shutterstock)

BOTTOM: Plants grow everywhere in the rainforest—even on other plants. This tree trunk in Panama's rain forest is home to several bromeliads. The mop-top leaves of each bromeliad form a bowl-shape that catches rainwater—and these tiny ponds in the sky are home to insects and frogs. (Alfredo Maiquez/ Shutterstock)

## Spotlight: Biomes Quiz

**1. What best defines the tundra?**
a. most animals live in trees and it is warm year-round
b. it is very hot during the day and cold at night
c. the ground is frozen most of the year and the landscape is treeless
d. the nutrient-rich soil is good for farming

**2. What is the world's largest biome?**
a. the grassy plains of the savanna
b. the evergreen forests of the taiga
c. the jungles of the rain forest
d. the coastal shrubs of the Mediterranean biome

**3. Why do wildebeest and zebra need to migrate in the African savanna?**
a. to escape sub-zero temperatures
b. because of annual flash floods
c. because they are chased by predators
d. to find water and green grass

**4. What is one way the saguaro cactus has adapted to the desert environment?**
a. It grows underground where the temperature is cooler.
b. Its spikes are poisonous.
c. When it rains, its trunk can expand to hold water.
d. It has tiny bowl-shaped leaves that capture dew and rainwater.

**5. Why do leaves in the temperate deciduous forest turn red, yellow, and orange in the fall?**
a. the breakdown of green chlorophyll in the leaves exposes other colors
b. the red, yellow, and orange leaves attract bees and other pollinators
c. the fiery-colored forests are easy to see from the sky and help migrating birds find their way
d. the red, yellow, and orange leaves are best at capturing autumn sunlight and turning it into energy for the trees to store through the winter

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