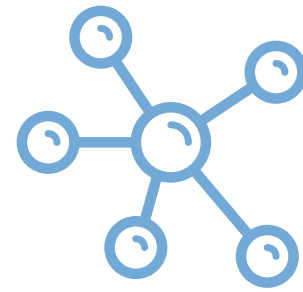
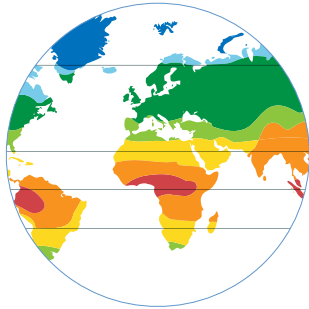


# Biomes and climate zones

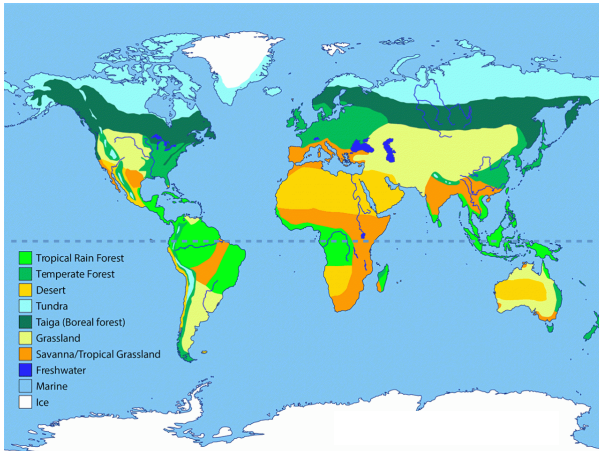


Quick summary

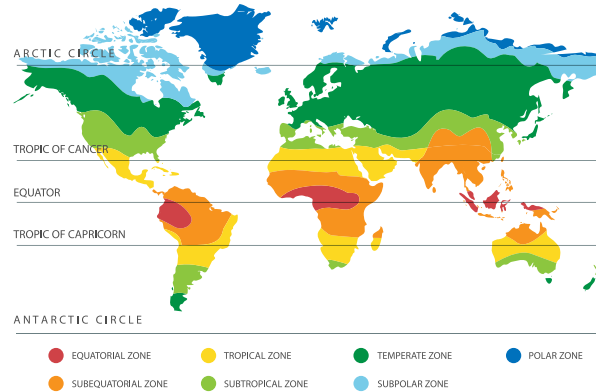


Biomes are a way to categorise the Earth's surface. These categories are based on climate patterns, soil types and the animals and plants that inhabit an area. There are terrestrial biomes and aquatic biomes. Every part of the Earth's surface is a part of one or more biomes. There are ten biomes: tropical rainforest, temperate deciduous forest, desert, tundra, taiga, grassland, savannah, marine, freshwater and ice. Climate is the average weather expected in a place (weather is the day-to-day conditions in a place). Earth has seven zones of expected climate: polar, sub-polar, temperate, tropical, sub-tropical, equatorial and sub-equatorial. Biomes are directly linked to climatic zones.

Location of Earth's biomes



Location of Earth's climate zones



Vocabulary

**categorise:** to put into groups (categories)  
**inhabit:** to live in  
**terrestrial:** on land  
**aquatic:** in water  
**climate:** the average expected weather in a place



Location



Physical features



Location



Physical features



Human features



Diversity



Physical processes



Human processes



Techniques

# Tropical rainforest



## Quick summary

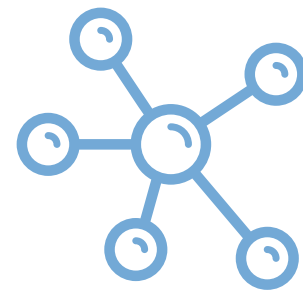


Tropical rainforests are rainforests that occur in the equatorial and sub-equatorial climate zones, which are in the tropics. They are hot, wet places with high levels of precipitation – sometimes up to 10 metres (33 ft) of rain can fall in a year.



## Vocabulary

**equatorial:** at the equator  
**sub-equatorial:** close to the equator  
**precipitation:** rain, snow, sleet or hail  
**canopy:** the thick layer of leaves covering a rainforest  
**emergents:** tall trees growing above the canopy  
**under canopy:** trees just below the canopy  
**shrubs:** small bushes near the floor of a rainforest.



## Location

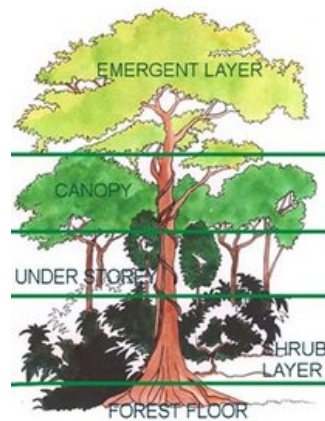


### The countries in which the top five largest rainforests are located:

- Brazil
- Democratic Republic of the Congo
- Indonesia
- Peru
- Colombia



## Physical features

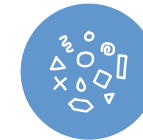


Of the animals and reptiles in the rainforest, 80 per cent live in the canopy.



## Human processes

We get many items of food such as bananas, chocolate, coffee, nuts, coconut, cinnamon and rubber from the rainforests. About 25 per cent of the medicines we use come from plants in the rainforest. Deforestation is a major problem for the world's climate.



## Diversity

**Animals and reptiles that live in rainforest habitats include:** boa constrictor, capybara, forest elephant, giant anteater, jaguar, macaw, marmoset, poison dart frog, sloth, spider monkey, tamarin, tapir, toucan and tree frog.

**Insects and bugs that live in rainforest habitats include:** clear winged butterfly, dragonfly, goliath bird eater spider, leaf insect, leafcutter ant and long-horned beetle.

**Trees and plants that live in rainforests include:** bromeliad, cacao tree, carnivorous plants, epiphytes, lianas (vines), orchid and rubber tree.



## Location



## Physical features



## Human features



## Diversity



## Physical processes



## Human processes



## Techniques

# Desert



Quick summary



The desert biome is an ecosystem that forms due to the low level of rainfall it receives each year. Deserts cover about 20 per cent of the Earth. There are four major types of desert in this biome: hot and dry, semi-arid, coastal, and cold. They all have plant and animal life that have adapted to survive there. The desert biome is a big tourist attraction. People enjoy rock climbing, cycling and hiking in the desert.



Vocabulary

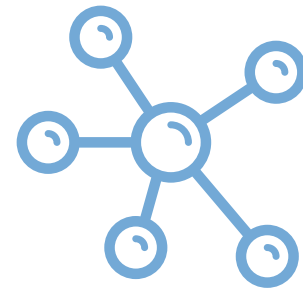
**ecosystem:** all the conditions, plants and animals that exist in a particular area

**arid:** dry

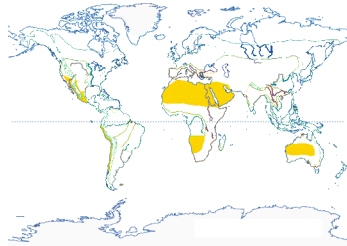
**evaporates:** turns from a liquid into a gas

**vegetation:** plants and trees

**nocturnal:** being active at night



Location



The Sahara Desert is the largest desert in the desert biome. It covers over 300 million square miles (776 square km). The desert biome can be found on every continent except Europe.



Physical features

Daytime temperatures in the desert biome are very high, but can be very low at night. Dust storms occur when the wind picks up dust from the surface. These storms can be up to 1 mile (1.6 km) high and travel over 100 miles (160 km). Some deserts are so hot that when it rains, the water evaporates in the air before hitting the ground. Some deserts in Antarctica are cold deserts. They are considered deserts because of the small amount of vegetation that grows. The driest desert on Earth gets on average 1 cm



Diversity

Desert animals tend to be nocturnal, sleeping during the day and coming out at night when the temperatures are more tolerable. Because there is hardly any standing water in the desert biome, animals either store water in their bodies or get their water needs met by the foods they eat. The plants that are able to grow in the desert biome store water in their stem. Because body fat retains heat, most desert animals have an adaptation that allows them to store all their body fat in one area of their body. The camel stores all its body fat in its hump. Cacti have many adaptations to survive in the desert. Their spines protect them from being eaten by animals and their waxy outer covering prevents moisture from escaping.



Location



Physical features



Human features



Diversity



Physical processes



Human processes



Techniques

# Tundra



Quick summary

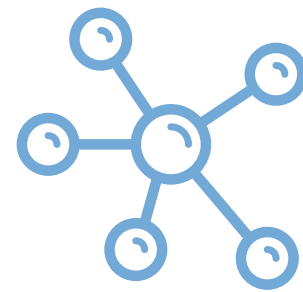


The tundra biome is a cold and treeless area where harsh conditions make it hard for plants and animals to survive. The word 'tundra' comes from the Finnish word *tunturia*, which means treeless land. There are two types of tundra: arctic and alpine. The arctic tundra is located within the Arctic Circle, while the alpine tundra is the area high in the mountains above trees. Around 20 per cent of the Earth's land surface is tundra.



Vocabulary

**permafrost:** soil that is permanently frozen  
**fragmentation:** splitting into pieces  
**ecosystems:** all the conditions, plants and animals that exist in a particular area  
**hibernate:** lie dormant (asleep) through winter  
**migrate:** travel to another area



Location



The arctic biome is the land to the south of the Arctic Ocean in the northern hemisphere. This biome stretches across northern Canada and Alaska, Siberia and northern Scandinavia. Alpine tundra can be found in mountainous areas such as the Rockies, Sierra and Cascade mountains in North America, the Andes in South America, the Himalayas in Asia, the Alps and Pyrenees in Europe, and the Rift mountains of Africa.



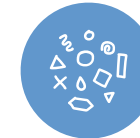
Physical features

The tundra biome mainly consists of grassy, flat plains. It cannot support trees because of its cold climate and harsh growing conditions. The winters are extremely cold with temperatures typically below  $-34^{\circ}\text{C}$ . The summers last only about two months and the temperatures are still very cold, ranging from  $3^{\circ}$  to  $12^{\circ}\text{C}$ . Permafrost means very few species can survive in this biome.



Human processes

Oil spills can kill wildlife and damage tundra ecosystems. Buildings and roads put heat and pressure on the permafrost, causing it to melt.



Diversity

This biome sustains life even though it experiences extremely low temperatures. There are about 400 varieties of flowers and 48 different animals. Animal populations fluctuate throughout the seasons in the tundra biome. Some animals hibernate during the winter and others migrate to warmer temperatures. The largest animal living in the tundra biome is the polar bear. They eat fatty meats to give them enough energy to live through the harsh winters. Other animals include the arctic fox, caribou and snowy owl. The plants that grow in the tundra biome often grow in clusters to help protect themselves from the severe winter winds.



Location



Physical features



Human features



Diversity



Physical processes



Human processes



Techniques

# Taiga



Quick summary

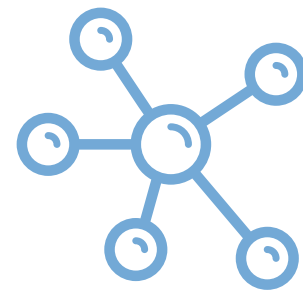


Taiga, also known as *coniferous* or *boreal* forest, is the largest **terrestrial** biome on Earth. The origin of the name 'taiga' is Russian and means land of the little sticks. The Taiga biome is popular with tourists for activities such as cycling, hiking and canoeing.

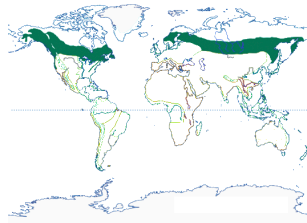


Vocabulary

**terrestrial:** on land  
**situated:** positioned  
**favourable:** helpful  
**uninhabited:** not lived in by people  
**nutrients:** substances that help living things grow  
**migrate:** travel to another area  
**hibernate:** lie dormant (asleep) through winter



Location



The taiga biome is the largest terrestrial biome. It is **situated** south of the arctic tundra biome. In North America, it covers most of Canada and Alaska; in Europe, it covers most of Sweden, Finland, Norway and Estonia, some of the Scottish Highlands and some areas of Iceland; in Asia, it covers most of Russia and areas of northern Kazakhstan, northern Mongolia and northern Japan.



Physical features

This biome has short, wet summers and long, cold winters. Precipitation is moderate in the taiga with snow in winter and rain in summer. For six months of the year, the temperature is below 0°C. Plants can only grow during the summer when temperatures are **favourable**. This growing season only lasts about three months.



Human processes

Although two major cities, Toronto and Moscow, are located in the taiga biome, most of it is **uninhabited**. The taiga forests are endangered due to logging and mining by humans. When trees are cut down in the taiga, it takes a long time new trees to grow because of the short growing season.



Diversity

There is little variety in terms of plants. The majority of trees are conifers, which is why the taiga is referred to as the coniferous forest. Conifers are evergreen and don't drop their leaves in autumn. This means there are few **nutrients** in the soil, which is why there is not much variety in the vegetation. Many animals of the taiga **migrate** to warmer areas or **hibernate** during the long, cold winters. Others have special adaptations including thick fur or feathers and the ability to change colour according to the season. Although there are not many animals in the taiga, there are millions of insects. Birds migrate there to feed off



Location



Physical features



Human features



Diversity



Physical processes

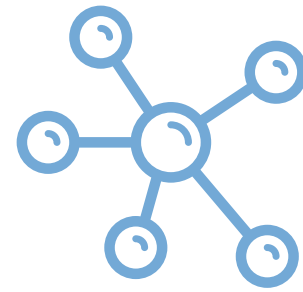


Human processes



Techniques

# Grassland



Quick summary



Grasslands are wide expanses of land filled with low-growing plants such as grasses and wildflowers. The amount of precipitation is not enough to grow tall trees and produce a forest. Across the world, 25 per cent of land is in the grassland biome.

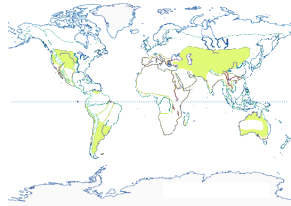


Vocabulary

**expanses:** large areas  
**precipitation:** rain, snow, sleet or hail  
**fertile:** supports growth well



Location



Grasslands are found north of the tropic of Cancer and south of the tropic of Capricorn. They are known by different names in different parts of the world: steppes in **Asia**; prairies in **North America**; pampas, llanos and cerrados in **South America**; and rangelands in **Australia**.



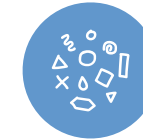
Physical features

The soil in the grasslands is deep and dark. It is also very fertile and so it is good farm land. In northern areas, the grass stays short because these areas have cold winters and dry, hot summers. In southern climates, the grass grows tall because these areas have warmer weather and periods of very wet weather.



Human processes

Most of the world's food is grown in areas that were once grasslands.



Diversity

There are many grasses and flowers in all areas of grassland. The **Asian steppes** are home to the the Saiga antelope, Przewalski horse, the Bactrian camel, the Goitered gazelle and the Ustyard urial – a wild sheep. In the **North American prairies**, the animals are bison, antelope, birds, gophers, prairie dogs, coyotes and insects. In the **South American pampas**, the animals are foxes, skunks, small herds of guanaco, viscachas and bush dogs. In the **Australian rangelands** there are bison, elk, pronghorn and deer.



Location



Physical features



Human features



Diversity



Physical processes



Human processes



Techniques

# Savannah



Quick summary

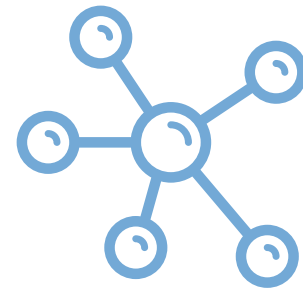


A savannah is a rolling grassland scattered with shrubs and isolated trees. The savannah biome is an area that has a very dry season and then a very wet season. (In British English it is spelled 'savannah' but in most other English-speaking countries it is spelled 'savanna'.) Tourism is popular, especially in areas such as the Serengeti National Park in Tanzania.

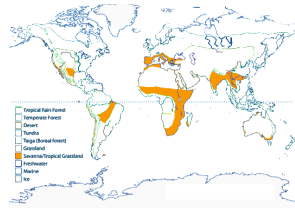


Vocabulary

**sporadic:** only in a few places  
**roaming:** wandering around  
**grazing:** grass-eating  
**desertification:** becoming like a desert  
**abundant:** more than enough  
**carnivorous:** meat-eating  
**predators:** animals that hunt other animals



Location



The largest part of the savannah biome is located in **Africa**. The Serengeti plains of Tanzania in Africa are probably the best known African savannah. Other areas are found in **North America** and the North and East of **South America** (Brazil).



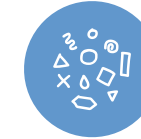
Physical features

The savannah is warm all year long. It is mostly made up of grass but there are sporadic trees. Although there are various types of soil in the savannah biome, it is not suitable for farming. Water holes provide drinking water for roaming animals.



Human processes

Savannah areas are popular with nomads, e.g. the Maasai tribe of Kenya. This method of farming can be beneficial to the environment. Grazing animals are moved from place to place, allowing vegetation to recover. However, desertification can result from poorly managed farming in the savannah. Areas of desert are created by the destruction of natural vegetation. Causes of desertification include: removal of vegetation cover by overgrazing and uncontrolled wood collection for fuel.



Diversity

Because of the availability of grass in the savannah, there are many herbivores, such as elephants, zebras, gazelles and buffalo, who take advantage of this abundant food supply. Herbivores have developed traits, such as being fast, large or tall, which help them escape carnivorous predators, e.g. lions. The savannah biome has a long dry season so plants there have adapted to this climate.



Location



Physical features



Human features



Diversity



Physical processes

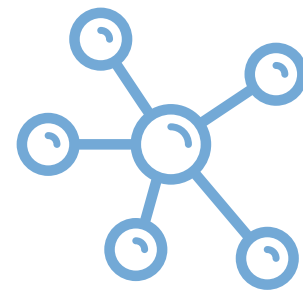


Human processes



Techniques

# Marine



Quick summary



The marine biome is the biggest biome in the world. It covers about 70 per cent of the Earth. Marine regions are saline and contain millions of species of plants and animals. The amount of light in the marine biome gives it three zones. Coral reefs are part of the marine biome but some see them as a separate biome. (See Australia: Great Barrier Reef for more information on coral reefs.)

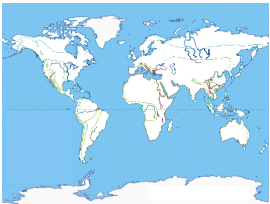


Vocabulary

**saline:** containing salt  
**vertical:** with the top directly above the bottom  
**detected:** found  
**significant:** large enough to be important  
**photosynthesis:** the way that green plants make their food using sunlight



Location

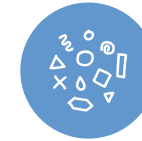
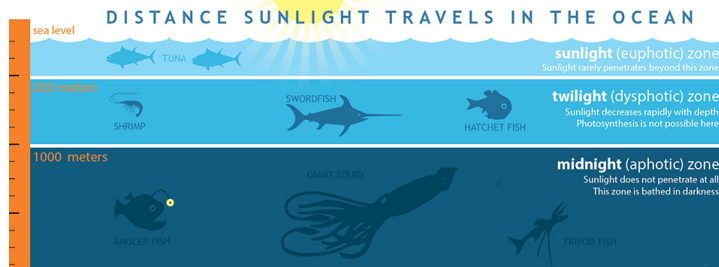


The marine biome includes the five main oceans: the **Pacific, Atlantic, Indian, Arctic and Southern**, as well as many smaller gulfs and bays.



Physical features

The ocean is divided into three vertical zones based on depth and light level. Although some sea creatures depend on light to live, others can survive without it. Light may be detected as far as 1000 metres (3,280 ft) down in the ocean, but there is rarely any significant light beyond 200 metres (656 ft).



Diversity

Over 1 million species of plants and animals have been discovered in the oceans; there are also an estimated 9 million undiscovered species. Through photosynthesis, marine plants and algae provide much of the world's oxygen supply and take in huge amounts of carbon dioxide. This absorption of carbon dioxide may be a useful tool in reducing the severity of climate change. One type of marine algae is kelp, which provides food for many sea creatures. Another important marine plant is **phytoplankton**, which are tiny plants that serve as food for many of the ocean creatures, from the smallest of fish to large whales. Some scientists estimate that phytoplankton provide the Earth with almost half of its oxygen. Marine plants live in the euphotic zone (closest to the surface) of the ocean because they need energy from the sun for photosynthesis.



Location



Physical features



Human features



Diversity



Physical processes



Human processes



Techniques



# Freshwater



Quick summary

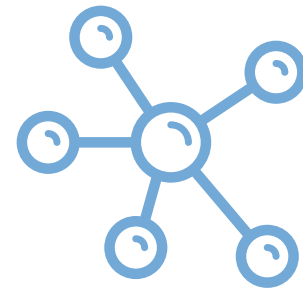


The freshwater biome is an ecosystem made up of any body of fresh water (containing less than 1 per cent salt), such as lakes, ponds, streams and rivers. These cover approximately 20 per cent of the Earth's surface and are in various locations spread out all over the world. Most freshwater biomes consist of moving water and contain many types of fish.

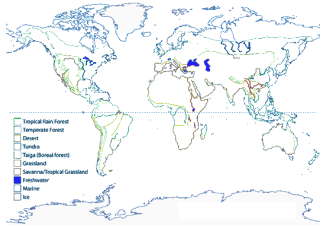


Vocabulary

**ecosystem:** all the conditions, plants and animals that exist in a particular area  
**aquifer:** an underground area of rock that absorbs and holds water  
**habitats:** the places where plants and animals live  
**migration:** movement from one country or area to another



Location



There are freshwater biomes on every continent. Some of the largest are: the Florida Everglades and the great lakes in **North America**; the two longest rivers – the Nile in **Africa** and the Amazon in **South America**; and the largest lake in **Asia** – the Caspian Sea.



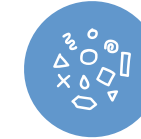
Physical features

Of all the freshwater in the world, 99 per cent is either in the form of ice or located in an aquifer. Freshwater biomes are subdivided into three groups: lakes and ponds, streams and rivers, and wetlands. Smaller bodies of water, such as ditches and puddles, are also considered freshwater biomes because they help some forms of life to survive.



Human processes

Freshwater biomes are very important to human survival because they supply people with more than half of their drinking water. However, water withdrawal for human use shrinks and damages habitats. Other threats to the biome include: pollution from agricultural and urban areas, and the creation of dams and water-diversion systems which block migration routes for fish and disrupt habitats.



Diversity

There are over 700 different species of fish that live in freshwater biomes. Many animals besides fish live in freshwater biomes, including crocodiles, hippopotamus, turtles and frogs. Many of the insects that live in freshwater biomes are considered by some to be pests, such as mosquitos and flies. These insects are very important, however, in that they are a food source for many mammals, birds and amphibians.



Location



Physical features



Human features



Diversity



Physical processes



Human processes



Techniques