

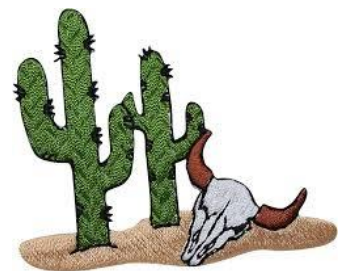
Desert Climate Zone

Deserts cover about 20-30 percent of the earth's land area. The desert is a harsh environment with very little rainfall and extreme temperatures; a desert is defined as a region that gets **less than 25cm of precipitation per year**. Some get no rain at all for many years in a row. Most desert or arid zones do not have seasons and they are hot and dry. Most deserts are located 30 degrees north or south of the equator, which is the line around the middle of the Earth.



Some deserts get both very hot (during the day) and very cold (during the night, when temperatures can drop well below freezing). Some deserts, however, are always cold (for example, the Gobi Desert in Asia, and the desert on the continent of Antarctica). **Temperatures in the desert can range from +54 degrees Celsius to -35 degrees**, depending on where you are.

There is limited plant life in deserts. Desert plants include scrub bushes, tumbleweed, grasses, different types of cactus, and sometimes trees that can handle less water (ex. palm trees, willow trees, acacia trees).



Different animals live in the different types of deserts. Check out this website for a list of animals in different desert regions:

<https://www.animalspot.net/desert-animals>.



Animals that live in the desert have adaptations to cope with the lack of water, the extreme temperatures, and the shortage of food. To avoid daytime heat, many desert animals are nocturnal; they burrow beneath the surface or hide in the shade during the day, emerging at night to eat. Many desert animals do not have to drink at all; they get all the water they need from their food. Most desert animals are small. Examples of desert animals include camels, reptiles, snakes, wild cats, foxes, coyotes, birds, and more!

Desert Extremes: The biggest desert is northern Africa's Sahara Desert; it covers roughly 9 million square kilometers. The driest deserts are the Atacama desert of northern Chile, and the Lut Desert in eastern Iran; these extreme deserts get less than half an inch (about 1 centimeter) of precipitation each year - and it is from condensed fog, and not from rain.



Houses in desert regions are designed to stay cool and often have thick walls, covered patios, courtyards, and stone or tile floors. Traditional homes were often built with adobe bricks made from clay, sand, straw and water. Some desert people also made homes in caves or lived in tents. During the day desert people often prefer to spend time in the shade.

Desert people prefer to wear loose fitting **clothes** such as robes to stay cool. Robes and headcloths are also worn to protect from dust storms, sun, and hot winds. Specific clothes and face coverings vary depending on the culture.

Physical adaptation: humans have adapted to live in dry desert climate zones over many thousands of years. People in the desert must be able to stand hot, dry daytime temperatures as well as cold at night. They often have increased metabolic activity to warm the body during sleep when it is colder. The desert-adapted person can sweat freely to help cool down. They are typically thin with long arms and legs – this increases the surface area of the body allowing them to cool off more quickly. Skin pigment is darker to help protect from the sun.



Tropical Climate Zone

The tropics account for 36 percent of Earth's landmass and are home to about a third of the world's people. The tropics are warm all year, averaging 25 to 30 degrees Celsius, not usually more than 40 degrees Celsius. There is no winter season and rainfall is typically high.

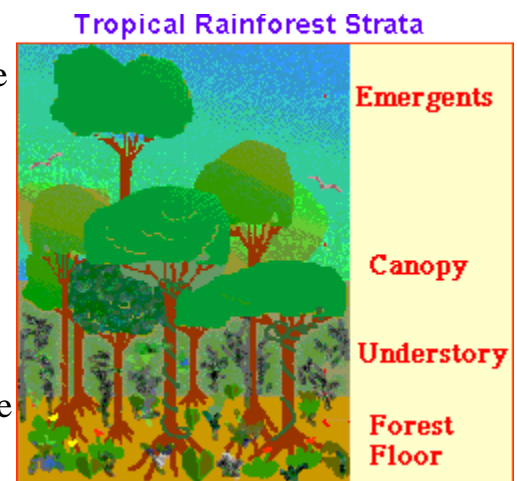
The tropical climate zone includes rainforests, which are very dense, warm, wet forests. Some places receive up to 9 meters of rain per year. (Note: the tropics also includes dry, hot places like the Sahara, but we will focus on the hot and humid areas). Tropical zones are often characterized by rainforests, which are dense jungles, and are havens for millions of plants and animals.

Where are Rainforests? Tropical rainforests are located in a band around the equator, mostly in the area between the Tropic of Cancer (23.5° N latitude) and the Tropic of Capricorn (23.5° S latitude). This 4800 km wide band is called the "tropics." Tropical rainforests are found in South America, West Africa, Australia, southern India, and Southeast Asia.



Different animals and plants live in different parts of the rainforest. Scientists divide the rainforest into strata (zones) based on the living environment. Starting at the top, the strata are:

- **EMERGENTS:** Giant trees that are much higher than the average canopy height. It houses many birds and insects.
- **CANOPY:** The upper parts of the trees. This leafy environment is full of life in a tropical rainforest and includes: insects, birds, reptiles, mammals, and more.
- **UNDERSTORY:** A dark, cool environment under the leaves but over the ground.
- **FOREST FLOOR:** Teeming with animal life, especially insects. The largest animals in the rainforest generally live here.



Rainforests are extremely important in the ecology of the Earth. The plants of the rainforest generate much of the Earth's oxygen. These plants are also very important to people in other ways; many are used in new drugs that fight disease and illness.

Animals that Live in Rainforests: A huge number of animals live in rainforests, including microscopic animals, invertebrates (like insects and worms), fish, reptiles, amphibians, birds, and mammals. The different rainforests of the world support different populations of animals.



Plants: There are more than 20 000 different types of plants and trees in the tropical zone – too many to list! Some examples are palm trees, rubber trees, mahogany trees, banana and lemon trees, brazil nut trees, coffee plants, vanilla plants, cocoa bean plants, orchids, vines, lilies, and a plant called Hot Lips plant! People in places like the Amazon rainforest learned to cultivate plants like plantains, cassava, tubers, corn (maize), and other vegetables.

Houses: Traditional homes in the rainforest are made from wood, bamboo and straw. These homes often have a fire in them and people often sleep in hammocks. The roof of such homes are often thatched with vines and leaves.

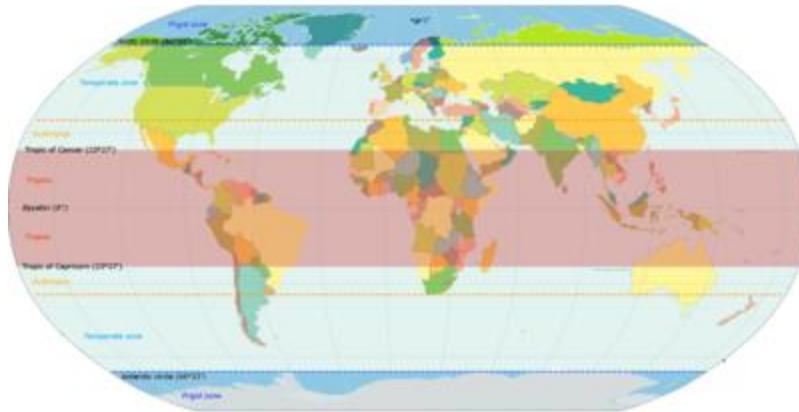
Physical Adaptations: People in hot and humid climates are usually tall and thin which help them stay cool. They typically have little body fat. They often have a wide nose since the warming of air in the nasal passages is not desirable, and they usually have dark skin to protect from the sun and to potentially lower the sweating threshold to help stay cool.

Clothing: In many traditional rainforest cultures clothing was made from tree bark or leaves. Clothing was designed to keep them cool, and many people wore just shorts or loincloths, or skirts and loose clothing.




Temperate Climate Zone

The temperate zone lies between the middle latitudes: 40 to 60 north and south of the equator (between the Tropic of Cancer and the Arctic Circle in the Northern Hemisphere and between the Tropic of Capricorn and the Antarctic Circle in the Southern Hemisphere). Canada is in the temperate zone.



There are four seasons: winter, spring, summer and fall. Average temperatures are between 0 and 20 degrees Celsius, but these zones can experience temperatures as low as -40 degrees Celsius and high as +40 degrees. Forests higher in the mountains or farther north are colder. Forests can receive from 0.5 to 1.5 meters of precipitation (both rain and snow) each year.

 **Fall Colors:** In the Fall, the number of hours of daylight decreases. This causes some plants and trees (called deciduous) to stop producing chlorophyll (a green pigment that converts sunlight into chemical energy) and eventually lose their leaves. During this time, these leaves turn brilliant colors, ranging from red to orange to yellow to brown. The growing season in these forests is about 6 months long.

Soil: The soil in the deciduous forests is quite fertile, since it is often enriched with falling leaves, twigs, logs, and dead organisms.

Layers of the Temperate Deciduous Forest: There are five layers (also called zones or strata) in the temperate deciduous forest. These include the:

- **Tree stratum**, the tallest layer, 60 -100 feet high, with large oak, maple, beech, chestnut, hickory, elm, basswood, linden, walnut, or sweet gum trees.
- **Small tree or sapling layer** - short tree species and young trees.
- **Shrub layer** - shrubs like rhododendrons, azaleas, mountain laurels, and huckleberries.
- **Herb layer** - short plants.
- **Ground layer** - lichens, clubmosses, and true mosses.

Plants and trees – many different types of plants and trees grow in this zone, and people have learned over many years to grow many types of vegetables and fruits in their gardens and on farms.

Animals – you will be familiar with many of the animals of the temperate zone. Some examples are bear, cougar, coyote, wolf, birds, fish, deer, elk, moose, etc. People are also able to raise and keep animals outside, such as sheep, cows, horses, etc.



Houses – because of the temperature differences, people in the temperate zone need to be able to protect themselves from hot and cold temperatures, as well as snow and rain. Houses are not open to the weather. They need a heating source (furnace, fireplace, stove) and usually a cooling system as well (air conditioner, fan, etc.).



Physical Adaptations – people living in the temperate zone for a long time have adapted to moderate cold conditions. This zone favors people who are tall but stocky, with moderate body fat and a narrow nose (which helps warm air coming into the nose in the winter).

Clothing – it depends where you live, but obviously you need to stay warm in the winter and cool in the summer. In summer people wear shorts, sleeveless tops, lightweight clothing, sandals, etc. In winter people wear heavy sweaters, jackets, jeans or pants, long-sleeved shirts, shoes, boots.



Arctic Climate Zone

The Arctic:

The Arctic is a very cold, windy, and often snowy climate zone located around the North Pole. When referring to the Arctic, people usually mean the part of the earth within the Arctic Circle (an imaginary circle around the Earth, parallel to the Equator and 23 degrees 28 minutes from the North Pole, that is, above about 75 degrees North Latitude). In winter the temperature is usually below -40 degrees Celsius, and the days are long and dark. It can get as cold as -65! In the summer the long days of summer sunshine bring the average temperature above 10 degrees Celsius.

There is also a lot of land within the Arctic Circle (northern parts of Asia, Europe, and North America). Land within the Arctic Circle is tundra, and it supports less life most other biomes because of the cold temperatures, strong, dry winds, and permafrost (permanently-frozen soil). Long periods of darkness (in the winter) and light (in the summer) also affect Arctic life.

Arctic Land Zones:

The most extreme Arctic land (the closest to the North Pole) is called the **High Arctic Zone**; this polar desert supports very little animal or plant life (less than 5 percent of the land area is covered with vegetation) due to a very short, dry growing season, dry air, permafrost, poor soils, and a lack of pollinating insects. The warmer Arctic region is called the **Low Arctic Zone**. This area supports more life, with more than 90 percent of the land area covered with hardy, cold-and-dry-adapted vegetation.

Arctic Animals:

Animals that live in the Arctic are adapted to extreme conditions. Many animals who overwinter in the Arctic (like the Arctic fox and the ermine) have a coat that thickens and changes color to white during the winter as camouflage in the snow (blending into the background is called cryptic coloration). Some animals hibernate during the cold season; they go into a very deep, sleep-like state in which their heartbeat slows down. These animals often hibernate in an underground burrow or pit. Some hibernators include skunks, chipmunks, and some bears (but these bears are not true hibernators, they go into a state that is closer to a normal deep sleep).

Many animals (like the Arctic tern) spend the summer months in the Arctic, but leave as the weather turns frigid and food becomes scarce (these animals return again the next summer, repeating this pattern year after year). This behavior is called migrating.

The Arctic ocean is teeming with marine life, ranging from the very small (zooplankton) to the very large (whales). In addition to several species of whales there are also fish, walrus, seals, and sea lions.



Human physical adaptations: the extreme cold of the Arctic climate zone favors people who are round and short, have an extra layer of body fat, have short arms and legs, and have flat faces with fat pads over the sinuses and a more narrow nose. These adaptations help them be protected from heat loss and frostbite and protect their lungs from cold air. In Canada the diet of the Inuit is high in fat which provides them with the reserves they need to stay warm.



Clothing: In northern Canada, the Inuit are masters of creating warm and protective clothing. Traditional Inuit clothing consisted of a parka, pants and mittens made from caribou or sealskin (worn in one or two layers according to the season), and to four layers of footwear. Today the Inuit may choose to wear modern winter clothing, but many still prefer to wear the traditional clothing because it works so well.

Houses: traditionally the Inuit lived in igloos and tents. Oil lamps kept them warm.



Plants and Trees: approximately 1700 species of plants live in the Arctic tundra, including flowering plants, dwarf shrubs, herbs, grasses, mosses, and lichens. There are some trees in the north but are more rare the farther north you go into the tundra.

Like all cultures, people of the north came up with adaptations in **transportation**. The dog sled and the kayak are examples of innovations in transportation. Like all cultures they also created **tools and weapons** specific to their needs, such as harpoons, knives, ulus, and arrows.

