

The Cold desert biome

Cold deserts are found in the Antarctic, Greenland, Northern and Western China, Turkestan, Iran and the Nearctic area. Many nomads have settled on farms in the Gobi Desert and it was crossed as early as the 13th century by Genghis Khan. Cold deserts can also be found in certain mountainous areas, such as the Great Basin area of western United States.

Deserts in this category have the following characteristics:

Large amount of snowfall in winter (and sometimes in summer), plus a high average of rainfall (15-26 cm.) occurring mainly in April and May or autumn, depending upon the area

Short, wet moderately warm summers

Mean average winter temperature -2 to 4°C

Mean average summer temperature 21-26°

Heavy, relatively porous soil with a lot of silt and salt

Good drainage to leach out most of the salt

Animal Adaptations

Deer inhabit some of these areas only in winter, having grown a thick fur coat, and then migrate in the summer season, after shedding this coat.

Small mammals such as kangaroo rats, kangaroo mice, pocket mice, grasshopper mice, antelope ground squirrels, badger, kit fox and coyote, as well as several lizards, all dig burrows to wait out the cold weather.

Gazelles, jack rabbits, gerbils, saiga antelope, wolves, sidewinder and viper snakes desert tortoises, lizards are but a few examples of animals who are active in the early morning (fossorial) and who seek shelter during the hottest part of the day, either in burrows or in the shade of plants.

Plant Adaptations

Two examples of heavy salt concentrations are the Great Salt Lake of the western United States and Iran, Afghanistan and Pakistan.

Plants can vary from heights between 15 cm and 122 cm, depending upon the area. Most shed their leaves (deciduous) and have spiny leaves. Ground cover such as lichens, are found in areas such as Torgerson Island, Antarctica and cover much of the ground, whereas in other areas the plants are found quite apart from each other.

Some examples of plants found in cold deserts include grasses, shadscale and camel's thorn.

Hot desert

Desert biomes have very high temperatures because of the little vegetative cover, less cloud cover, low atmospheric moisture and the land's exposure to the sun. Humidity is very low, with a few events of very little rain in a year.

Soil cover is shallow and rocky, and supports only a few plant types. Soils have very little or no organic matter, and very low in salt content.

Plants that survive here are short shrubs and cacti, which have the ability to conserve water. Plants are also less leafy, using their stems for photosynthesis. Examples of plants are the yuccas and the sotol.

Animals here tend to burrow, or stay in hideaways till dusk to avoid the heat. They are mainly small carnivores, birds, insects, snakes and lizards, and are adapted to survive with very little water. Examples of the Hot and Dry Desert biomes include the Sahara of North Africa and the Chihuahuan of Southern USA and parts of Mexico.

The Tundra biome

This is known to be the coldest of all the terrestrial (land) biomes, with the least biodiversity capacity. This biome has very little rain and extremely freezing temperatures, and covers about a fifth of the earth's land surface.

There are two major tundra biomes: **The Arctic Tundra and the Alpine Tundra**. The Arctic tundra is located around the north-pole in the northern hemisphere. This biome has temperatures of about $2-3^{\circ}\text{C}$ in the summer and about -35°C in the winter. Bogs and ponds are common as a result of constantly frozen surface moisture and melted permafrost.

Plants in the Arctic Tundra are short and grow closely to each other. Examples include mosses, heaths and lichen. They are adapted to perform photosynthesis even in the freezing conditions. Animals here include herbivores like hares and squirrels. Carnivores include polar bears and arctic foxes. It also has lots of birds, insects and fish like cod and salmon.

The Alpine Tundra is very cold, located on top of high mountains, often with very few trees and very little vegetative cover. They are icy for a larger part of the year. Animals in this biome include some birds, mountain goats and marmots. There are also beetles and butterflies.

The Grassland biome

As the name suggests, these are massive areas dominated by one or a few species of grass, with a few sparsely distributed trees. There are two main types of grassland biomes: the **Savanna Grasslands and the Temperate Grasslands**. One major savanna is located in Africa, and takes up more than a third of the continent's land area. Others can be found in India, South America and Australia. Temperate grasslands can be found in South Africa, Argentina, and some plains in Central North America.

Soils in savanna are thin layered and do not hold water. The soils contain some organic matter from dead grass, which is the main source of nutrients for plants.

Rainfall is moderate, and not enough to cause major floods. Animals in the savannas include large mammals such as lions, hyenas, snakes, giraffes, buffaloes with lots of insects.

Temperatures in the Temperate grasslands are extreme, with high summer and freezing winter temperatures. Animals here include hawks, owls, deer, mice, foxes, rabbits and spiders. Temperate grasslands with short grasses are called 'steppes' and those with tall grasses are called 'prairies'

The Forest Biome

Forests make up about 30% of the total land cover on earth, and are of incredible value to life on earth. They are a store of carbon and play a very important role in climate control. They have a watershed role, and are a source of many raw materials that humans depend on. It is believed that forests have the most bio-diversity. A small portion of the Rainforests, for example, may be home to millions of insects, birds, animals and plants. There are three main biomes that make up Forest Biomes. These are the **Tropical Rainforest, Temperate and Boreal Forests** (also called the Taiga)

Temperatures of forests biomes (especially the tropical rainforest) are generally high all year though, but a lot cooler at the surface. This is because there is very little sunlight reaching the forest floors as a result of the heavy vegetative cover.

Humidity is extremely high with lots of rainfall, exceeding 200cm all year though.

Plant types of the Tropical Rainforests are usually huge trees with buttress roots, lots of large Green leaves and shallow roots. Ferns and palms are also common. Plants in the Temperate forests are less dense with a bit of sunlight reaching the floors. Tree types include the willow, basswood and elm. Plants of the Boreal are mostly conifers with needle-like leaves. There is very little understory and lots of light at the floors. Trees like fir and spruce are common.

Small mammals, birds, insects and bats are common in the tropical rainforests, as they either can fly up for sunlight or do not need sunlight. However all the forest biomes have lots of skunks, deer, squirrels, foxes, birds and reptiles.

An example of the Tropical Rainforest is the Amazon. Other examples are the Scandinavian forest (boreal) and those in the North East of America.

The Steppe biome

The Steppe biome is a dry, cold, grassland that is found in all of the continents except Australia and Antarctica. It is mostly found in the USA, Mongolia, Siberia, Tibet and China. There isn't much humidity in the air because Steppe is located away from the ocean and close to mountain barriers.

The Steppe biome is usually found between the desert and the forest. If it got more rain, it would become a forest. If it got less rain, it would become a desert. The average rainfall is 10-30 inches per year. But in May, June, and August, the Steppe can get up to 4-5 inches a month.

There are many plants in Steppe. The main ones are different grasses. The grasses are separated into 3 different groups, depending on how much rain they get. The tall grasses grow up to 4 1/2 feet because they live closer to the forest. The short grasses can be less than 1 1/2 feet. They are closer to the desert. 1 1/2 feet is a small amount, considering that people don't cut the grasses. The last group is the mixed grasses. They grow 2-3 feet high and get 15-20 inches of rain per year.

Steppe has warm summers and really cold winters. There is often a lot of snow in the northern Steppes. All the Steppes experience long droughts and violent winds. Sometimes the summers are so hot that the grasses catch on fire. That is more dangerous than usual because the grass is so dry that it spreads quickly.

A lot of the animals that live in Steppe are grazing animals, such as rabbits, mice, antelopes, horses, etc. Smaller animals have little defense from predators. Since it is such an open environment and predators can find animals fast, they either form herds or make burrows. There are many endangered animals on the Steppe. More and more people are trying to protect them.

A true natural grassland is becoming harder and harder to find because people are taking them over. They are plowing the grass for farming and digging holes in search of oil. The Steppe biome is becoming endangered, just like the animals.

Tropical Dry Forest

Climate

Temperatures are high all year, but there is a better-developed dry season than in the tropical rain forest. Evapotranspiration exceeds precipitation for enough of the year to have a significant effect on the vegetation. Edaphic conditions (drier, better-drained soil) may produce this vegetation type in the rain-forest zone.

Soils

Soils are essentially like those of tropical rain forests, with the same processes.

Vegetation

The deciduousness of most tree species is a significant difference from the tropical rain forest. Many evergreen tree species of the rain forest become deciduous in this zone. Growing conditions are not so optimal, thus the tree canopy is lower (10-30m) than in the tropical rain forest and the trees less dense where drought is more extreme. The undergrowth is often dense and tangled because of greater light penetration. Lianas are much less common than in the rain forest, not such an important growth form where light is less limiting and also perhaps highly susceptible to desiccation. Drought-resistant epiphytes (orchids, bromeliads and cacti) may be abundant. The trees have thicker, more ridged, bark; deeper roots without buttresses; much more variable leaves, including many compound-leaved legumes; and more species with thorns.

Diversity

Species diversity is invariably lower than in nearby tropical rain forests. Environmental stress increases with instability (seasonality) of the environment, and fewer plants and animals can generate homeostatic mechanisms (for internal stability) to cope. There is still relatively high diversity on a world scale, but most of the taxonomic groups in the dry forest are less diverse than in the rain forest. Dry forest is important as habitat for migratory birds in their nonbreeding season (Central America, India).

Plant Adaptations

Trees have thicker bark (antifire adaptation), thicker and smaller leaves (antidesiccation adaptation), thorns (antiherbivore adaptation), longer roots (to reach deeper water table), and other features along a gradient toward the well-developed drought adaptations of woody plants of the savanna and desert zones (which see).

Animal Adaptations

With more spaces between trees, larger mammals are more prominent in this environment. There is more seasonality in reproductive cycles, timed with rains in most groups. In motile species, migration may occur in the dry season to wetter environments, including nearby rain forest, gallery forest, and wet bottomlands.

Human Effects

The high productivity during the rainy season, coupled with relief from rains during the dry season, makes this a favorable environment for humans and domestic stock, so much of the zone has been cleared and developed for pastureland as well as agriculture. Dry forests vary from largely extirpated to still extensive, depending on the geographic region, but in some regions they are more endangered than rain forests.

Mediterranean forest

Mediterranean Chaparral biome is localized in the coastal areas surrounding the Mediterranean Sea including parts of Europe, North Africa, and Asia Minor.

Most of the plant growth is leafy and relatively short, less than eight feet tall. It is important for plants to be drought resistant, to survive the short wet winters and long dry summers. The climate in this area is unique with the wet season occurring in winter. Many plants that do well in other European areas are unable to thrive in this Mediterranean biome due to the summer drought, with annual rainfall of only 15-40 inches. Temperatures are affected by cold ocean currents and fog, limiting the growing season.

Shrubs and low growing vegetation are the main components of this biome. In some areas the growth extends to larger trees and hard leaf forests, as well as aromatic plants. The vegetation must be hardy and drought resistant and will include evergreens, cacti, olive and fruit trees, and cork oak, among others. Small hard needles are an asset in this environment, as well as plants with small leathery leaves. Aromatic plants and herbs, such as rosemary, thyme, sage, and oregano do well in this biome. These aromatics do contain highly flammable oils which could contribute to forest fires.

The Mediterranean biome houses many forms of wildlife such as wild goats, sheep, cattle, mouflon, and horses. The land supports lynx, wild boar, rabbits, vultures and three types of eagles. Many small mammals, reptiles and insects inhabit this region. Local people graze goats, sheep, cattle, donkeys, and horses on this rugged land. This area is also known for the breeding of the famous bullfighting bulls.