



Polar Bear

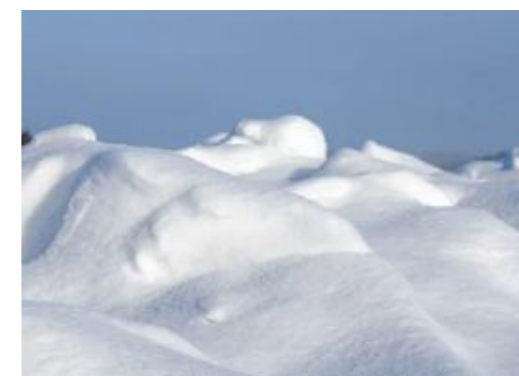


Biome- Arctic Tundra

The Arctic Tundra is an extremely cold, frozen landscape for most of the year. However, it has a short growing season, in which hardy plants can grow and provide food for the animals that live there. Due to the extremely harsh weather conditions and the lack of food for most of the year, the plants and animals here need special adaptations to survive.

Apart from a thin layer on top of the ground, the soil in the tundra is permanently frozen so plants cannot grow deep roots. The soil is also very nutrient poor and trees generally cannot grow here (tundra literally means 'treeless plain!') The plants that do grow here are small, like mosses, lichens and low-growing shrubs.

Mammals such as hares, lemmings and caribou hibernate or migrate to warmer areas during the harsh winters and return in the summer to feed on the plants. Carnivores such as polar bears and arctic wolves hunt these animals in the summer and traverse sea ice to hunt prey such as seals in the winter.



Polar bear adaptations

Polar bears spend most of their time on sea ice which freezes in the colder months. They use sea ice to hunt seals when they come up to breathing holes for air, or to stalk seals which are resting on the surface.

Seals are an important part of a polar bear's diet, as they have a lot of blubber which has a high fat content. Eating this allows polar bears to store fat themselves to keep warm and survive without eating for long periods of time. Polar bears have see-through fur which appears white in the snow, which they use to camouflage while hunting.

Polar bears are excellent swimmers; they can spend a long-time swimming between pieces of sea ice. Their large paws are specially adapted to help them swim, with their front paws acting like paddles and their back paws acting like rudders. Polar bears can swim for hours or even days at a time if they need to, however, this requires a huge amount of energy.

Female polar bears usually build their dens in snow drifts in the autumn and give birth to their cubs inside the den in winter.

The mother's body heat keeps the temperature in the den warm, and the cubs survive on their mother's milk. Neither the cubs or the mother will leave the den until spring, to protect the cub from the harsh winter conditions. This is also when seal pups are born, making hunting easier for the mothers and cubs.

What impact do you think climate change will have on polar bears?

How may this affect the ecosystem?



Saguaro Cactus



Biome- Hot Desert, the Sonoran Desert

The Sonoran Desert is a hot desert ecosystem which lies across northwestern Mexico and the southwestern USA. The Sonoran Desert is very hot and dry with temperatures regularly reaching up to 48°C in the summer. The Sonoran is different from other deserts in the region since it has 2 distinct rainy seasons which allows lots of plants to thrive.

Saguaros are important to the desert ecosystem as they provide food and shelter for many animals. Pollinators play a key role in the ecosystem with hummingbirds, bees, butterflies and bats being important pollinators; Saguaro flowers of are an important source of nectar for these desert pollinators.

Gila woodpeckers make nests in holes they have created in the tops of Saguaro. When they are done with it other birds use this hole for nesting or as a source of food. Other bird species such as hawks use the branching arms to build nests on, and other birds use the cactus as a hunting perch.



Saguaro Cactus adaptations

The Saguaro Cactus is only found in the Sonoran Desert as it requires the exact right balance of heat and rainfall to survive.

Although Saguaro Cacti can grow to be up to 50 feet tall, they grow very slowly. This is because they need to photosynthesise, using carbon dioxide to grow. Plants absorb carbon dioxide through tiny pores called stomata. However, due to the extreme heat in the desert, if cacti open their stomata during the day, water can evaporate from these pores. As

water is scarce in the desert, this would not be good for the cacti! Therefore, Saguaro Cacti have evolved to only open their stomata at night when it is cooler. This means that they absorb less CO₂ than other plants, and grow more slowly, but they can survive the extreme heat which other plants can't.

As it doesn't rain often in the desert, Saguaro Cacti have widespread root systems, so when it does rain, they can catch as much water as possible from the surrounding area. Cacti also have to store water for a long time, as it may not rain again for months. Saguaro Cacti therefore have pleats which expand like an accordion to accommodate large amounts of water (up to 5,000!), which can keep the plant alive without rainfall for over a year.

Saguaro Cacti must flower and be pollinated to reproduce- however, flowering cause a big challenge for the plant. A lot of water evaporates from the flower petals and the longer the plant flowers, the more water it will lose! Saguaro flowers open at night and stay open for less than a day, closing up the following afternoon. At night, they can be pollinated by bats and in the morning, they can be pollinated by insects and birds.

What impact do you think climate change will have on Saguaro Cacti?

How may this affect the ecosystem?



Staghorn Coral

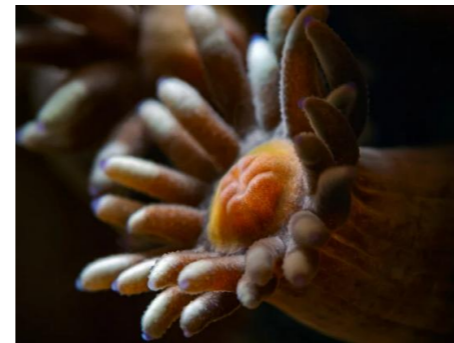


Biome- Tropical Coral Reef

Tropical Coral Reefs can be found in several parts of the world. Staghorn Corals are found in the Caribbean Sea and western Atlantic Ocean.; however. The Great Barrier Reef in Australia is also a tropical coral reef. For coral reefs to form, they require warm waters (between 22°C and 29°C) which are shallow and clean enough to let allow a lot of sunlight to reach the area.

A coral reef is made up of millions of coral polyps. These are tiny animals that build up hard shells out of calcium carbonate (the structures we probably picture when we think of coral reefs); it can take thousands of years for a coral reef to grow. Different corals have different structures, which provide shelter and breeding grounds for a wide variety of species, including fish, invertebrates, and algae, which in turn provide food for larger species. 25% of all marine life lives in coral reefs (despite coral reefs only making up 0.1% of the world's surface).

Corals are the foundation of this whole ecosystem, without which thousands of species would not have food, breeding grounds and shelter from ocean currents and predators.



Staghorn Coral adaptations

Staghorn Coral has a mutualistic relationship with a type of algae called zooxanthellae. These algae live inside the coral and capture sunlight to perform photosynthesis, producing oxygen and sugars that the coral polyp uses for energy and growth. In return, the coral provides the algae with a protected home and the carbon dioxide they need for photosynthesis. This allows staghorn coral to thrive in clear, shallow, nutrient-poor tropical waters where food is scarce. However, when the ocean gets too warm, this causes the coral to become stressed, and they expel the algae which gives them energy and their colour. The corals become white and more vulnerable to damage.

Staghorn coral is one of the fastest-growing hard corals in the ocean. Its branches can grow up to 20 cm per year under ideal conditions (the right temperature and amount of sunlight!) This fast growth makes Staghorn Coral competitive as it can outcompete slower-growing corals and algae for sunlight and space. It also means the coral can recover more quickly from physical damage, such as storms, ship groundings, or breakage caused by animals.

Staghorn Corals also have tiny stinging structures like tentacles. They can use this to inject venom into other small organisms, which can paralyze or kill them. This can help the coral to protect itself against predators and can also provide another food source at night when the algae are not able to provide it with energy.

What impact do you think climate change will have on Staghorn Coral?

How may this affect the ecosystem?

Chinook Salmon



Biome- Freshwater Stream and Marine Ocean

Salmon are interesting fish as they spend their lives in 2 very different biomes, and their impact reaches past the water that they live in. Salmon are born in freshwater, then migrate to the ocean to mature, and then return to freshwater to spawn (lay eggs). When they die after spawning, their bodies release nutrients like nitrogen and phosphorus into the surrounding environment. These nutrients feed aquatic plants and fertilize nearby forests, helping trees and other vegetation grow. This ocean-to-land nutrient cycle benefits entire ecosystems. Chinook Salmon live in cool waters between 10°C and 15°C. Because of their extensive range, Chinook Salmon provide a key food source for over 100 species, including bears, birds, marine mammals, and other fish. Their seasonal return to freshwater streams creates a feeding opportunity for animals that rely on them to survive and reproduce. In the ocean, adult salmon are important predators that help maintain balance in complex marine food webs. Chinook Salmon are considered a keystone species in their ecosystems.



Chinook Salmon adaptations

As Chinook salmon are anadromous (they hatch in freshwater, migrate to the ocean to grow, and return to freshwater to spawn), their bodies have to be adapted to handle this dramatic change in environment. As they move from freshwater to saltwater, their gills and kidneys adjust to regulate salt levels, a process called osmoregulation; this process reverses when they return to freshwater again.

Chinook salmon have to be powerful swimmers as they must travel huge distances and be able to swim against the water while swimming up stream, they can even swim up waterfalls!. They have evolved strong muscles and a torpedo-shaped bodies to allow this.

Chinook Salmon have adapted to spawn in cooler waters and female salmon use their tails to dig nests into the gravelly stream beds to lay their eggs into- this protects the eggs from predators and also allows a lot of oxygen-rich to flow over the eggs which is necessary for their survival. Cool waters hold more oxygen than warm waters.

Chinook Salmon feed in cold, nutrient-rich regions of the Pacific Ocean, where prey such as anchovies, squid, krill, and other small fish and invertebrates are available. Chinook Salmon must often travel long distances to find prey, which uses a lot of energy; the location of prey can change depending on water temperatures.

What impact do you think climate change will have on Chinook Salmon?

How may this affect the ecosystem?



Adélie Penguin



Biome- Antarctic Tundra

They Antarctic tundra is one of the harshest environments on Earth, with extremely cold temperatures, harsh winds and low precipitation. Most of the ground is frozen throughout the year and soil is very thin and nutrient poor. Very few species are able to survive here, which means the ecosystem is very specialised and delicately balanced.

There are only a few types of plants, such as mosses, liverworts, lichens which can grown here. However, a lot of species surround the Antarctic tundra within the ocean. Many fish, squid and invertebrate species live in the oceans here, providing a food source for sea birds, penguins, seals and whales. Many of these animals rely on the icy land of the Antarctic tundra to rest and breed.

One of the main sources of food in the Antarctic is krill, these are small shrimp-like creatures which feed on algae that grows in small cracks on the underside of the sea ice. Many creatures which feed in the Antarctic waters rely heavily on krill (and the other species which eat krill) as a food source.

Different parts of Antarctica are facing different types if climate change- some areas are becoming warmer, whereas some areas are becoming colder, some areas are also experiencing more precipitation.



Adélie Penguin adaptations

Adélie Penguins breed in large colonies. They lay their eggs on bare rock, where they build nests out of small pebbles; this keeps the eggs off the cold ground, keeping them at a warmer temperature and also stops them from rolling away. If a breeding site is covered in snow when the penguins arrive, they must lay their eggs in the snow or wait until it melts. If they lay their eggs in the snow, the eggs will be more damp and cold, which makes them less likely to survive.

Adélie Penguins spend a long-time hunting in the ocean for krill and other prey, and their bodies are streamlined for fast and efficient swimming. When the penguins need to rest or to escape from predators, they often use the sea ice that surrounds Antarctica in the winter.

Adélie Penguins need to be able to eat a lot of high-energy food which they can find in the cold water surrounding Antarctica. This food allows them to store fat, giving them a thick layer of blubber which allows them to survive the harsh temperatures.

What impact do you think climate change will have on the Adélie Penguin?

How may this affect the ecosystem?