

# Coral Reef Ecosystems

## A Garden Under the Sea

Corals are living organisms that form coral reefs, delicate ecosystems that look like colourful gardens under the sea. Coral reefs are some of the most biodiverse ecosystems in the world, supporting 25% of all marine species, including fish, sea sponges, starfish and crabs. The largest coral reef, the Great Barrier Reef, is off the coast of Queensland, Australia. It covers over 133 000 square miles, an area equivalent to over 64 million football pitches. Corals have microscopic algae living inside their tissues, which gives the coral reef its beautiful colours. The biggest coral reefs are found in tropical waters because the warm, clear, shallow water provides an ideal environment for the algae to photosynthesise.



The Great Barrier Reef

## A Symbiotic Relationship

The relationship between algae and corals is an example of symbiosis - each organism depends on the other for survival. Corals are animals so they rely on the photosynthesising algae for food. Corals provide the algae with a safe environment and their waste supplies the compounds needed for photosynthesis. In return, the algae supply the corals with glucose and oxygen produced through photosynthesis. The corals use the glucose and oxygen for respiration and for making other molecules such as proteins and calcium carbonate. The calcium carbonate is used to build skeletons which form the foundation of the reef.



A colourful coral reef ecosystem

## Help! Coral Reefs Are at Risk

Due to the increased burning of fossil fuels by humans, the concentration of carbon dioxide in the atmosphere is increasing. The extra carbon dioxide dissolves into the oceans, which can cause major problems for the coral reefs. Carbon dioxide causes ocean acidification, in which the water becomes more acidic. The increase in acidity makes it harder for the corals to build the calcium carbonate skeletons.

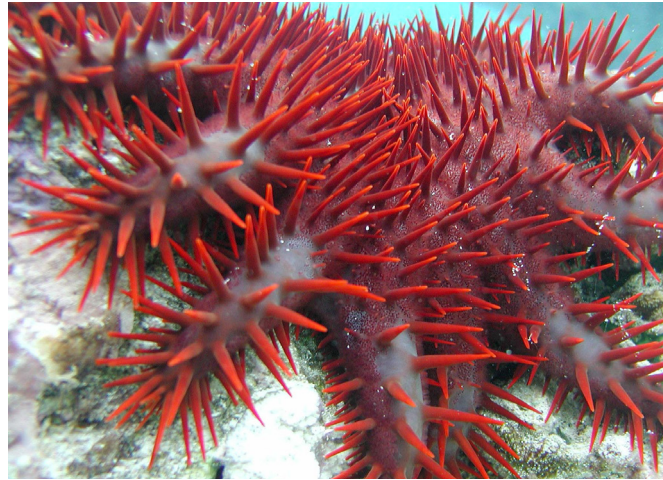
The increase in atmospheric carbon dioxide is also linked to global warming. Global warming causes increase in ocean temperatures, which can lead to coral bleaching: the corals expel the tiny algae that live within them and the corals turn white. If this continues for too long, the corals cannot survive and therefore die. Coral bleaching can also result from water pollution caused by harmful chemicals entering the oceans. For example, sun cream contains toxic chemicals that can wash off our skin and accumulate in corals.

Wildfires, development of surrounding land and increased traffic can cause an increase in runoff turbidity. The additional sediment in the runoff can smother the reef, reducing the amount of sunlight that can reach the photosynthetic organisms that live there. Coral reefs are also damaged by the huge numbers of divers visiting the reefs, either by accidentally touching the reef or by taking a piece for a souvenir. Coral reefs can take up to ten years to recover after a negative event such as coral bleaching, water pollution, ocean acidification or oil spills.

It is not only humans that cause problems for coral reefs. Warmer sea temperatures and water pollution have led to population outbreaks of crown-of-thorns starfish, which feed on corals and cause extensive damage to the reefs. Unfortunately, the starfish feed on the corals at a faster rate than the corals can reproduce.



**Coral reef after a bleaching event**



**Crown-of-thorns starfish foraging on coral reefs**

### Why Are Coral Reefs Important?

As well as being areas of natural beauty and tourism hotspots, coral reefs protect the adjacent shorelines from damage caused by waves, storms and hurricanes. Local communities also rely on coral reefs for a supply of fresh fish and seafood.

Coral reefs are an important factor in reducing carbon dioxide in the atmosphere. When the algae photosynthesise, the dissolved carbon dioxide from the atmosphere is fixed in compounds that are used for the growth of both the algae and the coral. Algae are producers, so other organisms in the ecosystem depend on them for food.

Many of the organisms that make up coral reefs are important for the development of drugs. Some of these drugs are used to treat different types of cancer, leukaemia and HIV.

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#### What Can You Do to Help?

Everybody can help to protect coral reefs even if they do not live near them. You can help to decrease the concentration of carbon dioxide in the atmosphere by recycling paper and plastics and by reducing the burning of fossil fuels, for example by using public transport, walking or cycling instead of driving a car.

Using coral reef friendly sun cream that does not contain toxic chemicals and eating sustainably sourced fish and seafood is also important for protecting coral reefs. If you visit, remembering not to touch the corals or take pieces as souvenirs will also help to protect the reefs. Together we can help save coral reefs around the world.