# Corals and Mangroves

## What are corals?

Coral reefs are large underwater structures composed of the skeletons of colonial marine invertebrates called coral. The coral species that build reefs are known as hermatypic, or "hard," corals because they extract calcium carbonate from seawater to create a hard, durable exoskeleton that protects their soft, sac-like bodies. Other species of corals that are not involved in reef building are known as “soft” corals. These types of corals are flexible organisms often resembling plants and trees and include species such as sea fans and sea whips.

Each individual coral is referred to as a polyp. Coral polyps live on the calcium carbonate exoskeletons of their ancestors, adding their own exoskeleton to the existing coral structure. As the centuries pass, the coral reef gradually grows, one tiny exoskeleton at a time, until they become massive features of the marine environment.

Corals are found all over the world's oceans, from the Aleutian Islands off the coast of Alaska to the warm tropical waters of the Caribbean Sea. The biggest coral reefs are found in the clear, shallow waters of the tropics and subtropics. The largest of these coral reef systems, the Great Barrier Reef in Australia, is more than 1,500 miles long (2,400 kilometers).

## The lives of coral

There are hundreds of different species of coral and they have a dazzling array of shapes and colors, from round, folded brain corals (named for their resemblance to a human brain) to tall, elegant sea whips and sea fans that look like intricate, vibrantly colored trees or plants.

Corals belong to the phylum cnidaria (pronounced ni-DAR-ee-uh), a group that includes jellyfish, anemones,

Corals feed by one of two ways. Some species catch small marine life, like fish and plankton, by using the stinging tentacles on the outer edges of their bodies. Most corals, however, depend on algae called zooxanthellae to provide energy via photosynthesis.

The corals have a symbiotic, or mutually beneficial, relationship with the zooxanthellae.These algae live inside the coral polyp's body where they photosynthesize to produce energy for themselves and the polyps. The polyps, in turn, provide a home and carbon dioxide for the algae. Additionally, the zooxanthellae provide the coral with their lively colors — most coral polyp bodies are clear and colorless without zooxanthellae.

## Coral reef diversity

Because of the diversity of life found in the habitats created by corals, reefs are often called the "rainforests of the sea." About 25% of the ocean's fish depend on healthy coral reefs. Fishes and other organisms shelter, find food, reproduce, and rear their young in the many nooks and crannies formed by corals. The Northwest Hawaiian Island coral reefs, which are part of the Papahānaumokuākea National Marine Monument, provide an example of the diversity of life associated with shallow-water reef ecosystems. This area supports more than 7,000 species of fishes, invertebrates, plants, sea turtles,

birds, and marine mammals. Deep water reefs or mounds are less well known, but also support a wide array of sea life in a comparatively barren world.

## Threats to coral reef ecosystems

Unfortunately, coral reef ecosystems are severely threatened. Some threats are natural, such as diseases, predators, and storms. Other threats are caused by people, including pollution, sedimentation, unsustainable fishing practices, and climate change, which is raising ocean temperatures and causing ocean acidification. Many of these threats can stress corals, leading to coral bleaching and possible death, while others cause physical damage to these delicate ecosystems. During the 2014-2017 coral bleaching event, unusually warm waters (partially associated with a strong El Niño) affected 70% of coral reef ecosystems

worldwide. Some areas were hit particularly hard, like the Great Barrier Reef in Australia, where hundreds of miles of coral were bleached.

Corals are able to recover from bleaching events if conditions improve before they die, though it can take many years for the ecosystems to fully heal. Scientists are also testing new ways to help coral reef ecosystems, such as growing coral in a nursery and then transplanting it to damaged areas.

## In what types of water do corals live?

Reef-building corals cannot tolerate water temperatures below 64° Fahrenheit (18° Celsius). Many grow optimally in water temperatures between 73° and 84° Fahrenheit (23°–29°Celsius), but some can tolerate temperatures as high as 104° Fahrenheit (40° Celsius) for short periods.

Most reef-building corals also require very saline (salty) water ranging from 32 to 42 parts per thousand.

The water must also be clear so that a maximum amount of light penetrates it. This is because most reef-building corals contain photosynthetic algae, called zooxanthellae, which live in their tissues. The corals and algae have a unique relationship. The coral provides the algae with a protected environment and compounds they need for photosynthesis. In return, the algae produce oxygen and help the coral to remove wastes. Most importantly, zooxanthellae supply the coral with food. The algae need light in order to produce food via photosynthesis.

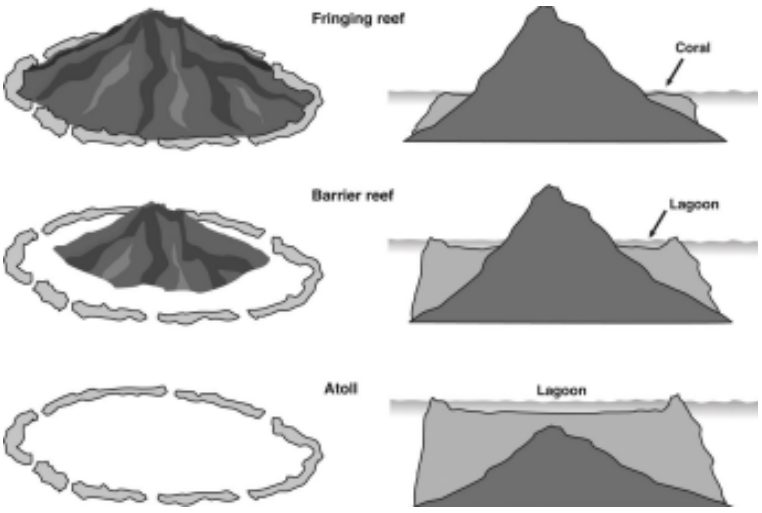
## Water Circulation

Corals also require water circulation around them, as this helps maintain a replenishing food source and keeps the water a steady temperature. If allowed to sit stagnant, the environment could heat up to an unbearable temperature or the water's overall alkalinity could fluctuate—threatening the coral's longevity.

For saltwater aquarium owners looking to keep these beautiful organisms in their homes, look no further than World Wide Corals. Our supply of vibrant and colorful live corals is grown to withstand the stressors of tank living, making them durable enough to handle shipping across the country.

## Quality Water Conditions

Corals are extremely sensitive to pollution and sediments in their environment. These things can either poison the living organisms or significantly diminish their access to sunlight. Both conditions can be fatal to the coral and slow the generation of new coral specimens. As such, you must provide your coral with clean, clear, and warm saltwater.



# Mangrove forest

There are about 80 different species of mangrove trees. All of these trees grow in areas with low-oxygen soil, where slow-moving waters allow fine sediments to accumulate. Mangrove forests only grow at tropical and subtropical latitudes near the equator because they cannot withstand freezing temperatures.

Many mangrove forests can be recognized by their dense tangle of prop roots that make the trees appear to be standing on stilts above the water. This tangle of roots allows the trees to handle the daily rise and fall of tides, which means that most mangroves get flooded at least twice per day. The roots also slow the movement of tidal waters, causing sediments to settle out of the water and build up the muddy bottom.

Mangrove forests stabilize the coastline, reducing erosion from storm surges, currents, waves, and tides. The intricate root system of mangroves also makes these forests attractive to fish and other organisms seeking food and shelter from predators.

Mangroves are some of the only coastal plants that can live in saltwater, and when conditions are favorable, they cover the coastline in dense patches known as mangrove forests or swamps. As the primary species involved in forming mangrove forests prefer very warm, wet conditions, they are restricted to tropical and warm temperate latitudes around the world. Indonesia, Thailand, and Mexico are some places with particularly large areas of mangrove forest.

Like reef-building corals, mangroves are ecosystem engineers – they form their own ecosystem and provide habitat for several other species. Mangroves' root systems trap huge amounts of soft sediments, and in some areas where dense mangrove forests become established, they can be responsible for creating entire islands. Importantly, networks of these sediment-trapping forests buffer the coastline against wave-induced erosion and provide coastal ecosystems and coastal communities a vital line of defense against strong, tropical storms. Mangrove forests also provide important nursery habitat for many species of fishes and invertebrates, including those that are commercially important fisheries species, which later move to coral reefs and other ecosystems as they mature.

Notes provided by Diya Vakada