

Coral Conservation

Teacher Resource

Plant or animal?

A common misconception surrounding the topic of coral is the belief that corals are plants. However, **corals are animals**, not plants. Corals are **invertebrates** and do not have a backbone. Corals do have a **hard calcium carbonate skeleton** that is formed through the extraction of carbon from surrounding sea water (NOAA, 2018). Coral cells, or “tissues”, can then grow on top of the skeleton to form the structure of what humans recognize as the beautiful corals decorating the ocean floor. Each individual coral animal is referred to as a **polyp**, with multiple polyps living together to form a coral. Like all other living organisms, corals must breathe and make energy to survive. Corals **breathe in oxygen** through their tissues and **breathe out carbon dioxide**. This process of gas exchange is referred to as *cellular respiration* (NOAA, 2018).

Coral Bleaching

The mutualism between corals and zooxanthellae (zo·zan·thel·ee; microscopic algae) supports the blossoming of the colorful reefs that provide habitat and food for a variety of sea life. Unfortunately, this symbiotic relationship is quite fragile. Environmental changes may result in *coral bleaching*:

- If the temperature of the ocean is too hot or too cold the zooxanthellae giving coral polyps life perish or are expelled.
- Without zooxanthellae, the corals turn white.
- Bleached corals are not dead, but extremely fragile. A coral may recover from short term stress, but corals living under stressful conditions on a long-term scale can rarely be restored.

Zooxanthellae: The Creatures Inside

As an animal, corals consume food to make the energy necessary to support physiological activities. Corals are **heterotrophs**, not **autotrophs** (NOAA, 2018). Microscopic algae known as **zooxanthellae** living inside the tissue of a coral polyp **photosynthesize sunlight**. The photosynthesizing zooxanthellae convert light to sugars, or extra energy that can be utilized by the corals. In addition to the energy gained through **corals' symbiotic relationship with zooxanthellae**, many corals are capable of catching and consuming microscopic organisms called **zooplankton**. Corals contain stinging cells known as **nematocysts** to stun and kill zooplankton. The nematocysts of a coral are nearly identical to those of a stinging jellyfish.



A coral reef blooming in the waters of Hawaii. Photo collected by NOAA (2018).

Ocean Acidification

In addition to coral bleaching, a large proportion of the world's reefs are battling *ocean acidification*.

- Ocean **temperatures are rising**, ocean **salinities are changing**, and the ocean is becoming **increasingly acidic**.
- Carbon dioxide (CO₂) absorbed by the ocean reacts with seawater to form carbonic acid.
- Increases in global carbon emissions have **increased CO₂ entering the oceans**.
- The increase in CO₂ absorbed by the oceans results in **higher concentrations of carbonic acid in the water** (NOAA, 2018).
- The more acidic seawater becomes, the **less calcium carbonate the water can hold**.
- **Without calcium carbonate, coral reefs cannot build protective exoskeletons**. Coral become breakable, erode, and even disappear completely (NOAA, 2018).
- The **disappearance of coral reefs catalyzes the extinction** of a plethora of marine species who rely upon coral reefs for shelter and food.

Sea Chat

- **Cellular respiration** - process of breaking sugar into a form of energy the cell can use
- **Polyp** - tiny, soft-bodied animals that form coral
- **Heterotrophs** - an organism that cannot produce its own food; animal that derives its food from external sources
- **Autotrophs** - an organism that produces its own food
- **Zooxanthellae** - microscopic algae living on coral. Provide energy for the coral, and give coral its colors.
- **Zooplankton** - plankton consisting of small animals and the juvenile stages of larger animals
- **Nematocysts** - a specialized cell in a coral polyp responsible for stinging prey and predators
- **Symbiotic relationship** - an intimate relationship between two organisms
- **Coral bleaching** - process by which color colonies lose their colors as result of zooxanthellae expulsion
- **Ocean acidification** - ongoing process in which the pH of the ocean is lowering

Coral Heroes

According to the National Oceanic and Atmospheric Association, **over 50% of the world's coral has become bleached** in the past five years (2018). **Pollution, chemical runoff, destructive fishing practices, and inattentive tourists** all cause damage to coral reefs. On a large scale, a **reduction in the amount of land and air pollution** produced by people can reduce the amount of coral-harming chemicals in the ocean. On an individual level, **everyone can increase their usage of reusable materials and wear only reef-safe sunscreen** that is free from harmful chemicals. Even the smallest changes in the day-to-day lifestyle of an aware



citizen can make a positive impact on the world's coral reefs.

Sources: <https://oceanservice.noaa.gov/facts/coral.html>

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