

Environmental Science Institute Hot Science – Cool Talks
Learning Module for “Brave New Ocean”

What is all this fuss about Coral Bleaching?

In 1998, the high sea surface temperatures had caused massive coral bleaching and mortality in the world’s reefs. The bleaching and mortality rate was unprecedented in relation to geography, depth, and severity, with only some parts of the central Pacific being spared. Mortality was as high as 90% in the Indian Ocean.¹ According to the Australian Academy of Science, “in 2002, the Great Barrier Reef experienced its worst case of coral bleaching on record.”² Why are corals affected by high sea surface temperatures? Because corals live on the upper edge of their temperature tolerance, and are sensitive to environmental change, only a slight increase of about 2 degrees Celsius in surface ocean temperature would pose a serious threat (Intergovernmental Panel on Climate Change).

Coral bleaching, or the bleached white coloration of coral reefs, is the first stage in complete coral death. The bleaching serves as a warning that corals are on the decline. Corals live in a mutual relationship with microscopic algae called zooxanthellae. The algae engulf the nitrogenous waste of the corals, and the corals provide a safe habitat for the algae. The algae also photosynthesize and produce sugars that the corals can use as food (98% of a corals’ diet consists of these sugars!²). When surface water temperatures rise, a blockage of the photosynthetic reaction of CO₂ conversion into sugar occurs, and the algae are poisoned by the products of this blockage. To save itself, coral releases the algae and thusly turn a bleached white (due to lack of photosynthetic pigments from the alga) and begin to starve for nutrients. Bleached corals can recover only if cooler water temperatures return and the algae can grow again.² Other causes of coral bleaching include: exposure to chemicals, excess UV radiation, excess nutrients, and increased sedimentation of dirt or sand.

Global surface ocean warming is of great issue as a major cause of coral bleaching. It has been well researched that anthropomorphic carbon emissions have a direct correlation to global climate change.

¹ National Oceanic and Atmospheric Administration, NOAA News: “Nations around the world express concern about coral bleaching,”

<http://www.noaanews.noaa.gov/stories/s93.htm>

² Australian Institute of Marine Science, NOVA Science in the News: “Coral bleaching: will global warming kill the reefs?” <http://www.science.org.au/nova/076/076key.htm>