

Let's Be Oral About Coral

When climate change is thought of in relation to animals, the archetypal image of a lone polar bear floating on a piece of melting ice in the middle of the ocean is often envisioned. While much support has been placed on the preservation of polar bears, the fact that *all* animals are being affected by climate change is often overlooked. This can be seen through coral reefs, which are often disregarded, perhaps because they seem like inanimate rocks rather than animals. In fact, corals are made up of tiny animals called polyps and play an essential role in the oceans, as they contain nearly a million species of plants and animals. Due to the effects of climate change, corals are suffering from coral bleaching, slowed skeleton growth, and even death. These effects will inevitably lead to drastic consequences for marine biology and humans.

In order to survive, coral reefs and zooxanthellae algae have a symbiotic relationship in which the coral provides shelter and compounds for photosynthesis, and the algae produces oxygen and removes waste from the reef (“Corals”, 2008). Coral bleaching is the process through which the algae within the coral die, leaving the rest of the coral to appear uncoloured, which is naturally detrimental to their health. This can be seen on Figure 1 below:



Figure 1: Bleached coral (left) compared to coral in its natural state (right) (Vevers & Bailhache, 2016)

In 1998, mass coral bleaching was reported at over 60 sites in the Pacific Ocean, Indian Ocean, Red Sea, Persian Gulf, and the Mediterranean and Caribbean Seas (“Early Warning Signs”, n.d.). This was the result of increased ocean temperatures, as the temperatures the corals experienced were the “highest in the modern record” (“Coral Bleaching”, 2010). Another major source of stress that can lead to coral bleaching is decreased salinity of seawater. Due to climate change, glaciers of freshwater have been melting, decreasing the concentration of salt in seawater. Corals generally thrive in salt concentrations of 32-40 PSU, but torrential rain and melting glaciers have decreased concentrations to the point that corals are unable to survive (“What Do Corals Need”, 2010). Due to the effects of climate change on sea water temperatures and salinity, it is evident that climate change significantly impacts the occurrences of coral bleaching.

Ocean acidification is a significant aspect of climate change that is severely affecting the skeleton growth of corals. Currently, the ocean absorbs about 22 million tons of carbon dioxide from the atmosphere daily, increasing acidity by 30% over the past 200 years alone (Ocean Portal Team, 2014). In the ocean, carbon dioxide reacts with carbonate ions to form bicarbonate, greatly decreasing the concentration of carbonate ions. A major component of the coral's skeletal composition is calcium carbonate CaCO_3 . The carbonate ions react more in acidic conditions, and has inhibited coral calcification by up to 40% (Hoegh-Guldberg et al., 2007). While it is still possible for corals to grow, they often experience reduced skeletal density, increasing their vulnerability to various threats such as storm damage and erosion. These dangers can diminish the reef's structural complexity, leading to degradation of habitat quality and thus biodiversity. Due to ocean acidification, corals develop much weaker skeletons, hindering both their lifespan and their vital role in the oceanic ecosystem.

It is clear that the effects of climate change are drastically disturbing the well-being of coral reefs, but what is not as well known is that this consequently affects countless other organisms as well – both in the ocean and on land. In particular, what is overlooked is the drastic effects that coral degradation has on humans. This effect is largely economic, as loss of coral reefs decreases the economical benefits of tourism for a community, as well as the income of people employed in the tourism sector. Perhaps more alarming, food security can decrease in many communities that rely on fish caught near coral reefs for their food.

Due to numerous detrimental effects of coral loss on humans and millions of other organisms, conservation strategies need to be implemented. I would start at local aquariums who could be convinced to place special emphasis on the importance of corals to the other organisms that they showcase. Furthermore, if they have the proper resources, aquariums could have a feature program for children and parents to learn about the current circumstances of the corals and touch dead, bleached corals, as they would feel more connected to an issue. Then, I would target fisheries, who contribute greatly to climate change and would suffer greatly from the disappearance of reefs as many juvenile fish spawn there. Starting with information, I would try and notify them of the effects on their revenue if corals continue to die. Then, I would present different methods of which they can help decrease the effects of climate change. Although this will not work on all fisheries, those with long-term business plans should be able to see the major problem. Inspired by current bee conservation initiatives, another idea to raise awareness is through the use of product arrangement in grocery stores. Rather than the way the products are currently organized, the seafood sections could instead be organized by products that would exist without reefs, and products that would not. Since most seafood products rely on the existence of coral reefs, the category of products that would exist without reefs would be almost empty,

sending a screaming message to all consumers about how their food resources would be if climate change continues. Similarly, grocery stores could have “Coral Reef Free days” in which they do not sell products that would not exist without reefs. This would allow consumers to understand the full extent of which they are currently dependent on them.

Corals are in dire need of the world's attention as they are deteriorating each passing day. The suggested conservation plans and several others need to be used to capture the focus required to stop the effects of climate change on coral reefs.

References

- Atmospheric warming altering ocean salinity. (2012, April 27). Retrieved April 09, 2017, from <https://phys.org/news/2012-04-rainfall.html>
- Corals. (2008, March 25). Retrieved April 10, 2017, from http://oceanservice.noaa.gov/education/kits/corals/coral02_zooxanthellae.html
- Coral Bleaching: What You Need to Know. (2010, October 2). Retrieved April 09, 2017, from <https://www.nature.org/ourinitiatives/habitats/coralreefs/coral-reefs-coral-bleaching-what-you-need-to-know.xml>
- Early Warning Signs of Global Warming: Coral Reef Bleaching. (n.d.). Retrieved April 10, 2017, from http://www.ucsus.org/global_warming/science_and_impacts/impacts/early-warning-signs-of-global-2.html#.WOUV8RLysxc
- Haw, J. (2013, August 06). The Effects of Climate Change on Coral Reef Health. Retrieved April 05, 2017, from <https://blogs.scientificamerican.com/expeditions/the-effects-of-climate-change-on-coral-reef-health/>
- Hoegh-Guldberg, O., Mumby, P. J., Hooten, A. J., Steneck, R. S., Greenfield, P., Gomez, E., . . . Hatzitolos, M. E. (2007). Coral Reefs Under Rapid Climate Change and Ocean Acidification. *Science*, *318*(5857), 1737-1742. doi:10.1126/science.1152509
- Ocean Portal Team. (2014, January 14). Ocean Acidification. Retrieved April 9, 2017, from <http://ocean.si.edu/ocean-acidification>
- Vevers, R., & Bailhache, C. (2016, May). *Before and After Coral Bleaching At Lizard Island* [Photograph]. The Ocean Agency.
- What Do Corals Need? (2010, April 17). Retrieved April 10, 2017, from <http://www.seos-project.eu/modules/coralreefs/coralreefs-c01-p03.html>