Ocean Acidity Demonstration

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Introduction

As an intern at the Aquarium of the Pacific in Long Beach, I was asked to develop an ocean acidity demonstration for school-aged children using sources supplied to me by Aquarium Staff.

Institution's Mission Statement
To instill a sense of wonder, respect, and stewardship for the Pacific Ocean, its inhabitants, and ecosystems.

Objective of demonstration
To teach observers that CO_2 emissions can lower ocean pH, resulting in the decay of coral reefs.

Why is ocean acidity important?

Current ocean pH levels hover around 8.1, but with rising levels of atmospheric CO_2, this is set to change. The rising level of CO_2 in the atmosphere is caused mostly by humans and the burning of fossil fuels.

When CO_2 dissolves in water it becomes carbonic acid, causing a drop in pH. As pH levels fall, there are fewer carbonate molecules available for corals to use to build their skeletons

At our current rate of production, atmospheric concentration of CO_2 could reach 800ppm by the end of the century. That concentration is enough to lower ocean pH by 0.4 points, reducing the concentration of carbonate ions in half.

Stone, R. (2007). A World without Corals? Science, 316 (5825), 678-681. doi: http://www.jstor.org/stable/20036151

Bleached Coral vs. Healthy Coral

Guests' Reception of Demonstration

- Observers of the demonstration varied in age as well focus.
- The guests' understanding of the demonstration increased in relation to their age, but only up to approximately 12 years.
- Although this demonstration was originally intended to be shown publicly, it is now clear that it would be much more effective in a classroom setting.

Discussion

- In a classroom, there is more time to explain the demonstration and what it means, as well as more control, so it is possible that the students may be able to do it for themselves, with minor modification to the procedure. Students at the summer camps also have more interest in science, and tend to pay attention to demonstrations more than the typical aquarium guest.
- I would also suggest modifying the goal of the demonstration to better fit the age of the students.

Age Group	Suggested Learning Target
5-7 years old	Adding vinegar or baking soda to cabbage juice changes its color
7-12 years old	Adding CO_2 to water makes it acidic, which harms coral
12+ years old	Humans should try to reduce our CO_2 emissions since it turns the ocean acidic, harming coral

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