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## **Ocean Acidification**

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### **Abstract**

Ocean acidification is a growing problem in our environment. This poster aims to explain what ocean acidification is, how it happens and the effects it has on ocean wildlife.

### **Keywords**

biological and life sciences, environmental sciences, One Health Creating Solutions

### **Comments**

This research is part of the One Health Creating Solutions project.



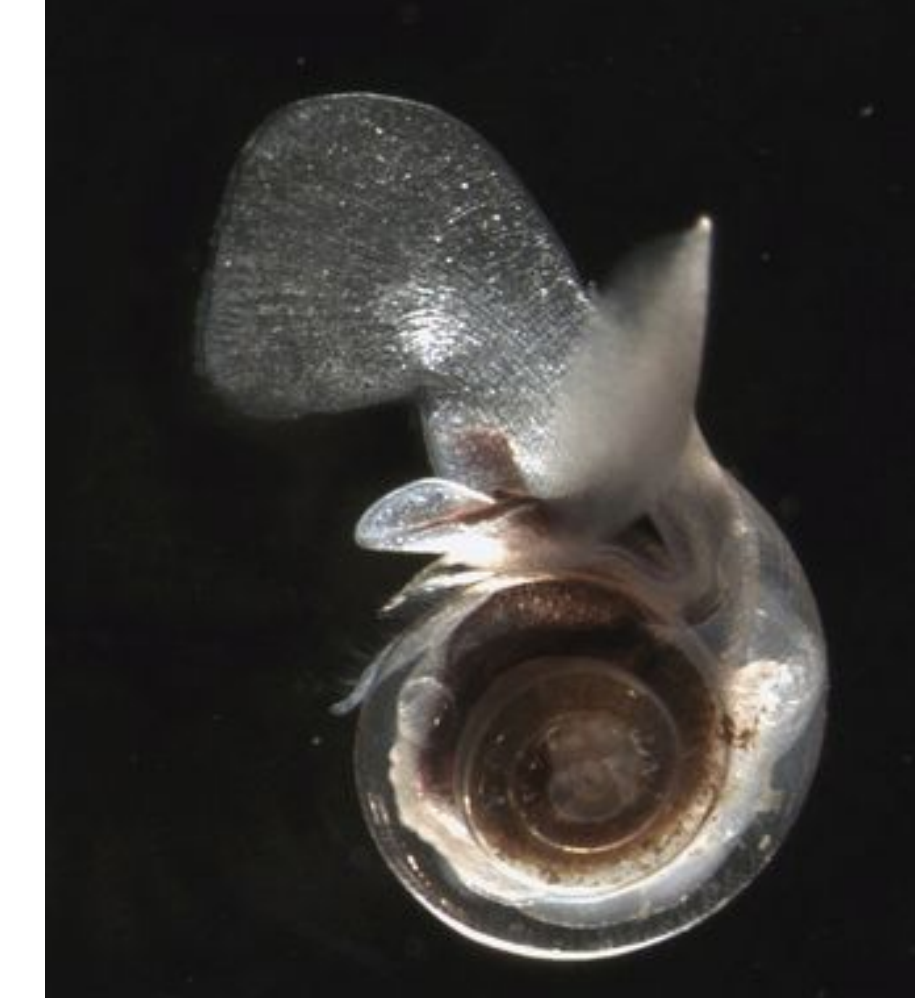
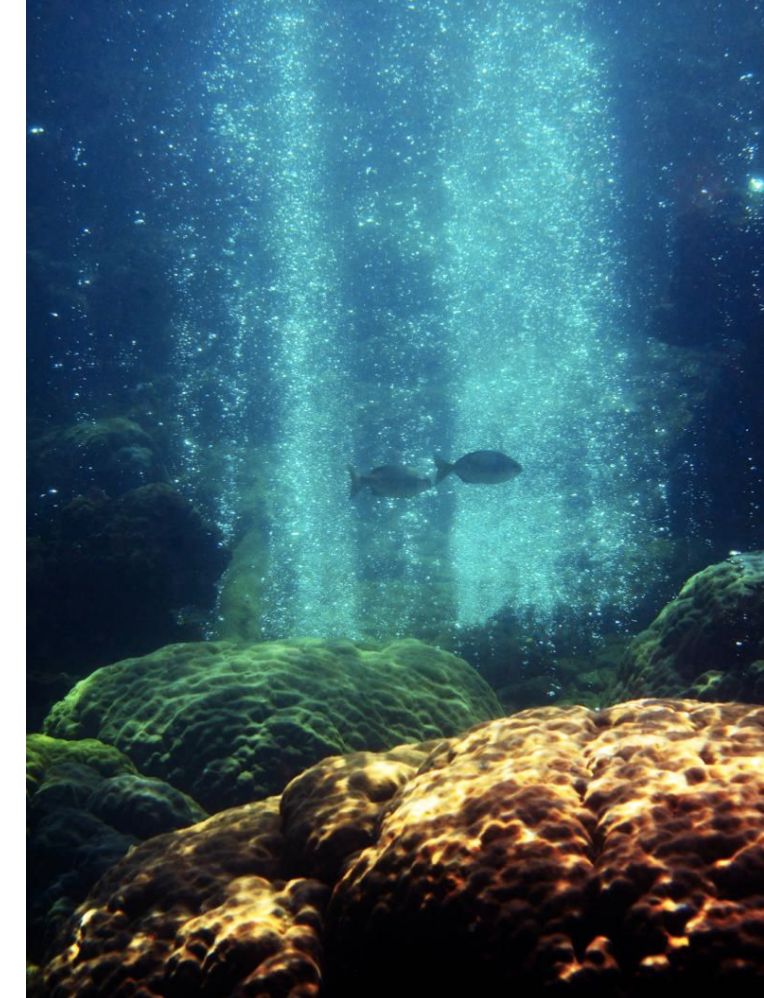
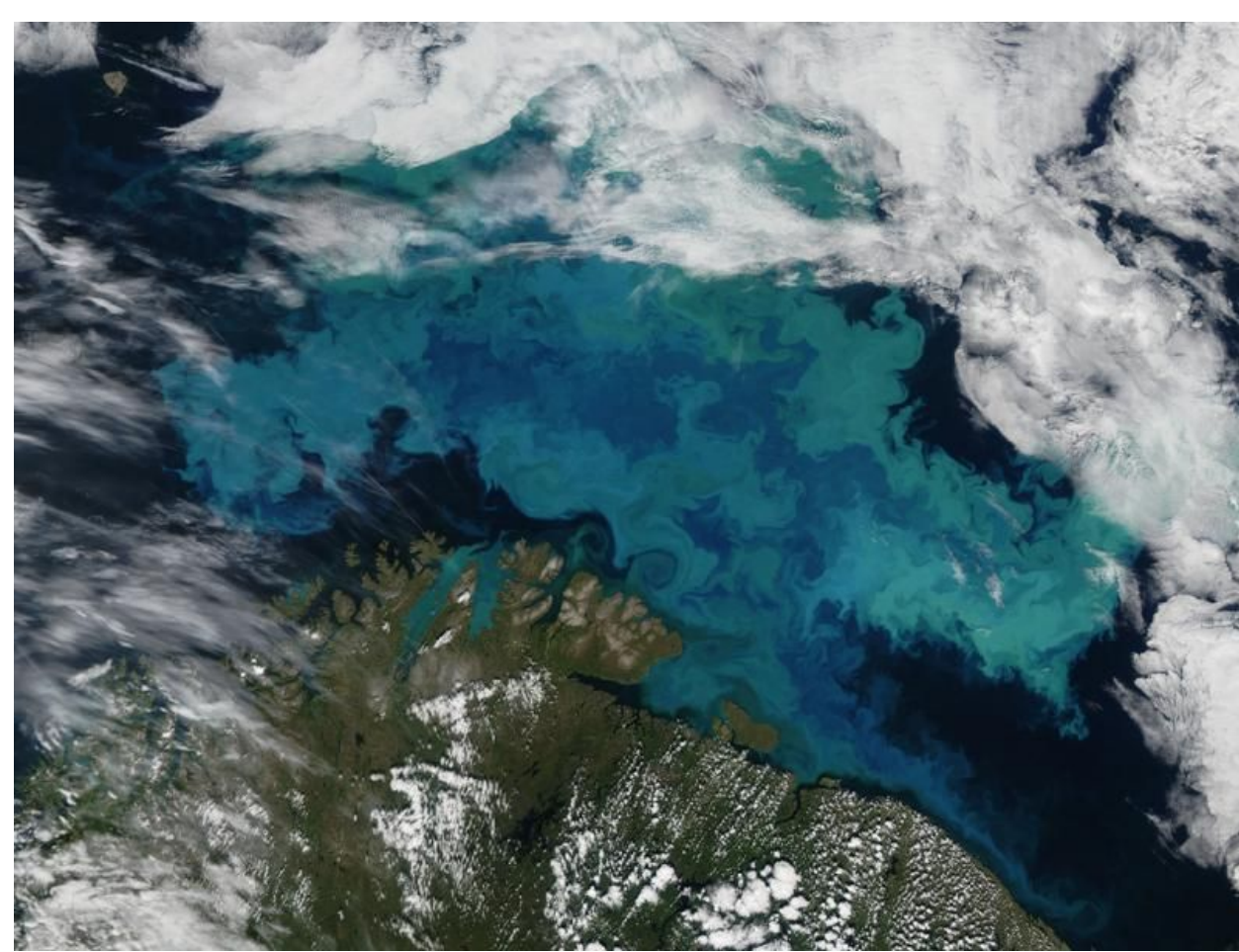
# OCEAN ACIDIFICATION

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## One Health



<https://ocean.si.edu/ocean-life/invertebrates/ocean-acidification>

## Ocean Acidification: The Other Carbon Issue

Since the industrial revolution began back in the 1700s approximately 525 billion tons of carbon dioxide have been absorbed into the ocean. Currently, the ocean absorbs about 22 million tons of carbon dioxide per day. This has led to a 30% increase in the acidity of the ocean. The pH of the ocean has dropped by .1. This may not seem like a lot but to put it into perspective a drop of .2-.3 in the pH of human blood can cause a person to experience comas, seizures and death. Most people only think of carbon dioxide as effecting the atmosphere in the form of global warming but the continuous burning of fossil fuels is also harming our sea life. Scientists haven't paid much attention to this issue until recently. It was originally thought that the absorption of carbon dioxide into the ocean was a good thing because that meant less emissions in the atmosphere. However, recent discoveries have shown that the effect of emissions on the ocean are far more serious than was previously believed

## How Do Carbon Dioxide Emissions Cause Acidification?

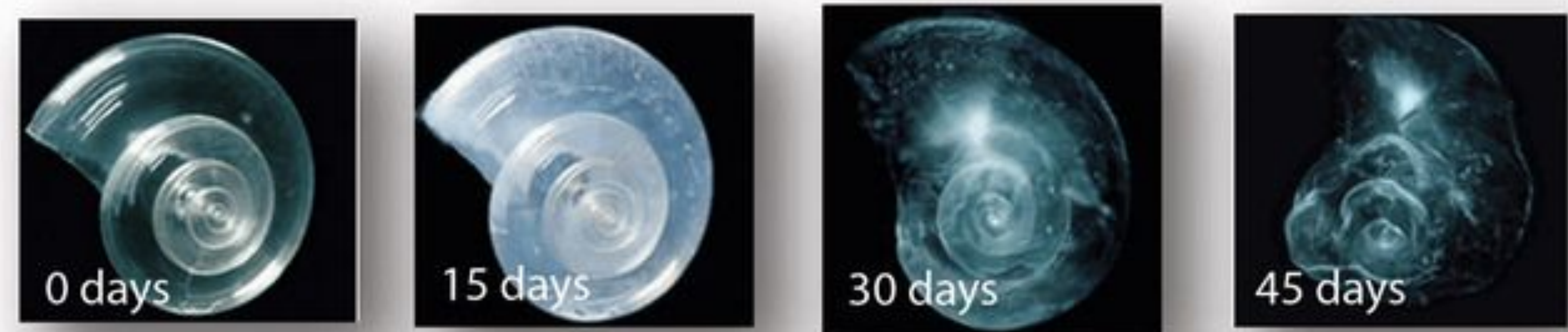
One question that needs to be answered in order to understand the true effects of CO<sub>2</sub> emissions on ocean life is how exactly acidification happens. Carbon dioxide is a water soluble compound just like salt or sugar. The carbon dioxide in the atmosphere dissolves into the ocean water and causes chemical reactions. The chemical reaction between carbon dioxide and hydrogen oxide (H<sub>2</sub>O) produces the compound carbonic acid. This

is the compound that is lowering the pH of the ocean. Carbonic acid can dissociate into carbonate and bicarbonate which are natural to the oceans chemical makeup. However, the increasing acidity is causing the natural balance of these ions to change.

## Effects on Wildlife

The effect of carbon dioxide pollution on ocean life is dynamic. First off, the increasing acidity of the ocean is already starting to dissolve the shells of pteropods which are a main food source for krill, whales and salmon.

Without their shells these creatures cannot survive. The upset balance of carbonate and bicarbonate also has an effect on the wildlife of the ocean. Hydrogen is very attracted both of these compounds and tends to want to create bonds with them. However, many organisms need carbonate to form their shells and exoskeletons. These organisms include coral and mollusks. The lack of available carbonate is causing these organisms to decrease in numbers. There has been a noticeable effect on different fishery businesses that farm oysters and other mollusks.



(This image is from an experiment exploring what will happen if the acidity increases at a continuous rate)

<https://www.pmel.noaa.gov/co2/story/What+is+Ocean+Acidification%3F>

## Effect on the Economy

In 2016, the fisheries across the United States alone made 212 billion USD in sales. These fisheries not only sell fish but also mollusks as one of their main forms of revenue. If the ocean continues to become more acidic we can expect to see a decrease in this business. Not only will the mollusk population decrease and cause less oysters and other mollusks to be sold but the fish population that depends on these creatures as a food source will also decrease. This could cause a significant hit to the economy and fishing business. Not to mention the amount of jobs that would be lost.



<https://www.pmel.noaa.gov/co2/story/What+is+Ocean+Acidification%3F>

## The Solution

If carbon dioxide emissions continue at the same rate the ocean is expected to drop another 120% by the end of this century. The solution to the problem of ocean acidification is reducing CO<sub>2</sub> emissions. This can be done in a series of ways. One of them is reducing the emissions produced by cars by switching over to electric or hybrid cars. Another is reducing the amount of cattle farming that's happening. The solution to ocean acidification is essentially the same as that of global warming. CO<sub>2</sub> emissions need to be reduced by taking action, lowering personal emissions, planting trees and reducing the demand for dairy products.

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