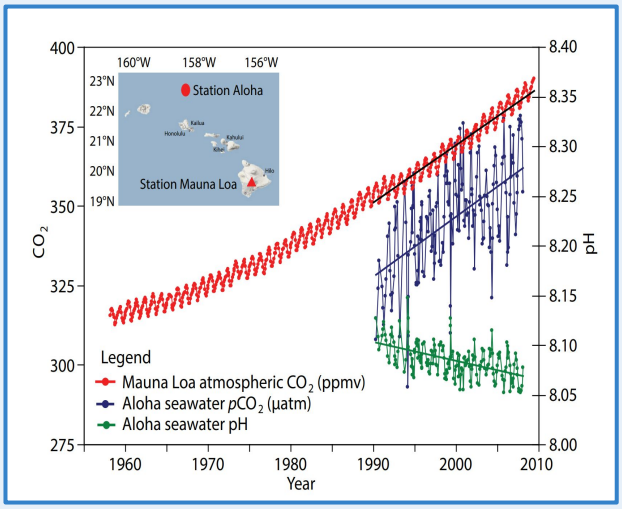
Impacts of Climate Change: Ocean Acidification

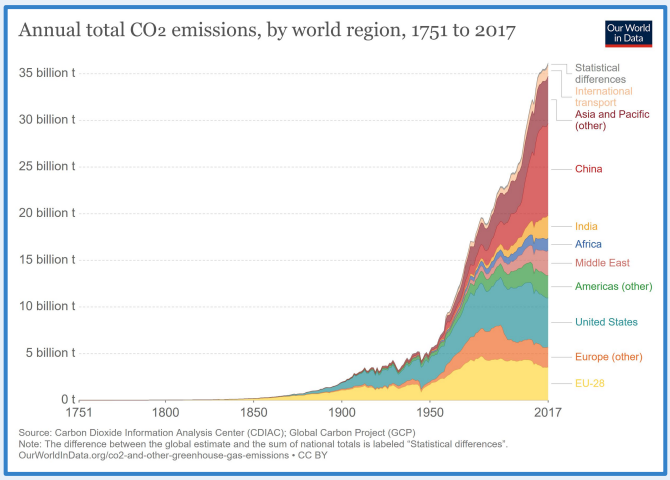
Introduction

The Earth consists of approximately 30% land and 70% water. Although humans primarily live on the 30%, that does not mean the rest of the world is devoid of life. The ocean ecosystem is extremely diverse and impactful to our lives. Ocean acidification is a product of climate change that makes the ocean environment less conducive for most ecosystems by increasing its natural pH.

- The carbon dioxide is absorbed by the water, causes increase in carbonate molecules and raises acidity



A graph showing the rise of oceanic CO_2 in comparison to the rise of atmospheric CO_2, along with increasing ocean acidification.[1]



CO_2 emissions have increased dramatically in recent centuries.[2]

How Current Global Change is Making This Worse

- Carbon dioxide (CO_2) emitted from burning coal, oil, and gas (fossil fuels) gets stored in our ozone, but not all of it remains there; "at least one-quarter of the CO_2 instead dissolves into the ocean."[3]
- The new CO_2 in the ocean changes the chemistry of the water, gradually turning it more acidic (ocean's pH drops).

CPSG101 Science & Global Change First Year Colloquium II, Spring 2020
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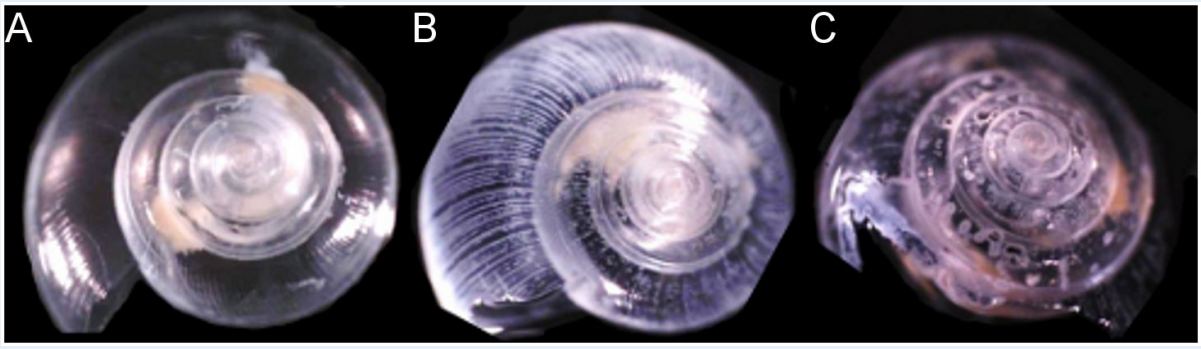
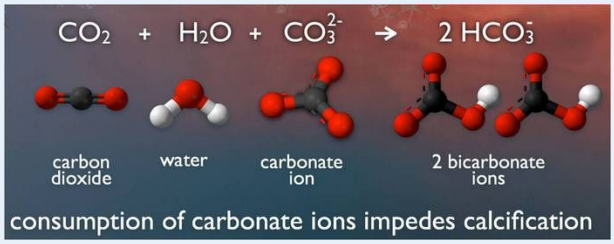
How will this change impact wildlife in the near future?

The carbonate necessary for carbon-reliant aquatic species cannot be extracted from bicarbonate formed by ocean acidification. This issue will make creating strong shells/strong skeletons essential for these creatures' survival very difficult.



Three pteropod shells after exposure to water of different acidity levels. Shell B was exposed to acidity comparable to that around the west coast of the United States, and shell C was exposed to acidity that we could see in the future.[4]



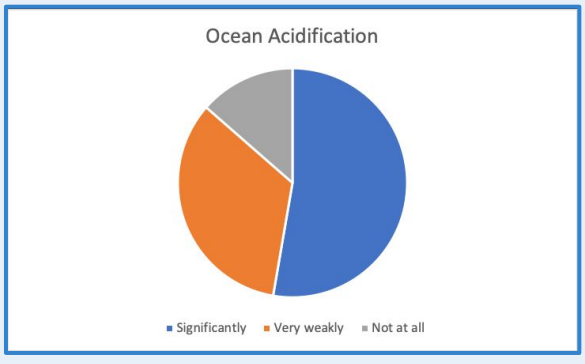
Organisms that rely on calcification are hit the hardest by ocean acidification.[5]

Extended Radius of Effect

Ocean acidification has a chain effect on the marine environment:

- Weaker shells/skeletons lead to a higher aquatic mortality rate
- Coral reefs will slowly die out due to the lack of necessary resources, leaving all of their inhabitants homeless and exposed
- Humans will start to lose/notice a steady decrease in quality of many major sources of food

Public Perception of Ocean Acidification



Results of 333 respondents conducted in Spring 2020 to the query "Please indicate if in your opinion the degree to which this phenomenon is **affected** or **intensified** now or in the near future (within the next 30 years) by global climate change."

References

1. DONEY, S., BALCH, W., FABRY, V., & FEELY, R. 2009. OCEAN ACIDIFICATION: A CRITICAL EMERGING PROBLEM FOR THE OCEAN SCIENCES. Oceanography
2. Ritchie, H., M. Roser. 2020. CO_2 and Greenhouse Gas Emissions. *Our World in Data*
3. THE OCEAN PORTAL TEAM. April, 2018. "Ocean Acidification". NOAA. Accessed 21 April 2020.
4. Busch, D. S., M. Maher, P. Thibodeau, P. McElhany. Shell Condition and Survival of Puget Sound Pteropods Are Impaired by Ocean Acidification Conditions. PLoS ONE: https://doi.org/10.1371/journal.pone.0105884
5. *Anonymous, What is Ocean Acidification, PMEL NOAA, Accessed April*