

Intro to Ocean Acidification

To introduce the topic of ocean acidification and over-view how it intersects within the problem of climate change, this lesson seeks to familiarize the reader with what ocean acidification is, how it happens, and what it looks like. It connects ocean acidification to other issues that are related- such as coral bleaching, effects on oceanic ecosystems, and the impacts to coastal communities.

OBJECTIVES

1. Explain the pH scale
2. Discuss ocean acidification
3. Discuss how ocean acidification is related to other issues (coral bleaching, disruptions of marine ecosystems and to coastal communities)
4. Encourage participation through creative prompts
5. To address and relate to the problem and brainstorm solutions

DISCUSSION QUESTIONS

1. Perform Activity A and the info graphics accessible in the Resources section that describe the process of ocean acidification. After reviewing these materials, reflect on what you've learned by answering these questions:

- How do you read a pH scale?
- What does decreasing pH mean?
- What does increasing pH mean?
- How does climate change impact and drive ocean acidification?
- What is the process of carbon sequestration within the Earth's oceans? How does it work?
- How do fossil fuels contribute to ocean acidification?

1a. Following review from the questions above, in what ways do you think you impact the process of ocean acidification?

2. Perform Activity B and reflect on the effects of ocean acidification towards marine ecosystems and coastal communities. Then, use these discussion questions for further analysis:

- What is a food web? How are organisms affected by each other through interactions in an ecosystem?
- How does ocean acidification affect these relationships within ecosystems? How is the food web affected?
- Due to these disruptions of marine ecosystems, how would you think coastal communities would be affected?
- Give an example of problems a coastal community or island nation would have because of the consequences of ocean acidification.

2a. What personal actions could you take to help these communities? Are there ways to minimize the problem of ocean acidification within personal action?

3. Review Activity C. To get a head-start on the activity, here are some prompts below:

- Do you think you have a big carbon footprint? Why or why not?
- How often do you think you perform an activity that uses fossil fuels?
- How have you benefited from deforestation?
- Do you believe that it is possible to change these behaviours?

ACTIVITIES

Activity A: The Science Behind Ocean Acidification Watch the short videos linked below:

-Alliance for Climate Education ACE Science Short on Ocean Acidification: <https://youtu.be/6SMWGV-DBnk>

-CrashCourse on understanding pH and pOH: <https://www.youtube.com/watch?v=LS67vS10O5Y>

After reviewing those videos, look at the infographics in the Resources section detailing the Carbon Cycle and the Greenhouse Effect. The discussion questions will help you contextualize the information in terms of ocean acidification.

Activity B: The Delicate Balance of Ecosystems - Building a Food Web

To get a better sense of how ecosystems work, watch this short video:

-The Amoeba Sisters: Food Webs and Energy Pyramids Bedrocks of Biodiversity : <https://www.youtube.com/watch?v=-oVavgmveyY>

After watching, design your own marine ecosystem food web with the following organisms: phytoplankton, algae, krill, shrimp, minnows, jellyfish, tuna, sea turtles, great white shark, and a blue whale. How would they interact?

Now, cross off the animals first affected by ocean acidification. With decreasing pH levels, smaller organisms such as plankton and algae will be most affected. How does this impact the rest of the food web? Can the organisms continue to survive?

Activity C: Calculating Your Carbon Footprint + Weekly Journal

To calculate your carbon footprint, visit this website: <https://www.carbonfootprint.com/calculator.aspx>

Brainstorm on these questions:

- What was your score?
- Why do you think you got the score you did?
- How do you think your carbon footprint impacts ocean acidification?

Use the template found in Resources to set up a 1 week Journal to evaluate your living habits and how they impact the Earth's oceans.

OTHER RESOURCES

https://www.nrdc.org/stories/what-you-need-know-about-ocean-acidification?gclid=Cj0KCQiA3Y-ABhCnARIsAKYDH7vmvu1HQJsRPnfy2eBSvjcyL_QddEQ4yv_jOd-_y3Vi0F_apcj32YNIaAtJ3EALw_wcB

<https://www.epa.gov/ocean-acidification/introduction-ocean-and-coastal-acidification>

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