

Lesson Three - Ocean Acidification
Lesson Planning Tool for Climate Change

Title of Lesson: Ocean Acidification

Grade Level: 11th and 12th

Subject: Environmental Science

Source(s) of the lesson: Ocean Service NOAA lab manual on Ocean Acidification

Essential Question(s): How does an increase in CO₂ in the atmosphere affect the ocean?
How does an increase in ocean acidity affect sea life?

Massachusetts Curriculum Frameworks Science Standards:

HS-LS2-5 Use a model that illustrates the roles of photosynthesis, cellular respiration, decomposition, and combustion to explain the cycling of carbon in its various forms among the biosphere, atmosphere, hydrosphere, and geosphere.

Content Objectives	Practice Objectives	Language Objectives
SWBAT- complete a laboratory experiment investigating how the ocean becomes acidified and affects marine life.	1. Asking questions (for science) and defining problems (for engineering) 3. Planning and carrying out investigations 4. Analyzing and interpreting data 5. Using mathematics and computational thinking 6. Constructing explanations (for science) and designing solutions (for engineering) 8. Obtaining, evaluating, and communicating information	SWBAT- identify how ocean acidification harms marine life, and communicate this in the form of a lab report

Important Vocabulary:

Climate change, albedo, acidification, feedback loops, atmosphere, precipitation, carbonic acid, carbon dioxide, methane, ozone, greenhouse effect, mitigation, anthropogenic, urban heat island, permafrost

Materials Needed: See Handout

Other Resources: (websites, videos, books, etc.)

NASA global mapping of ocean acidification

<http://earthobservatory.nasa.gov/blogs/fromthefield/2014/04/15/sampling-the-global-ocean-and-a-note-on-ocean-acidification/>

Background Information for Teacher: Understand the process of ocean acidification, what causes this phenomenon, how it works, and how it affects marine life.

Background Information the Student Needs to Access the Lesson: What prerequisite knowledge should the students have?

Understand the basics of chemical reactions

Lesson Structure

Lesson Launch (Do Now)	Have students read the article “This is why the great barrier reef is dying” http://gizmodo.com/why-the-great-barrier-reef-is-dying-1770351739 Ask the students to share what they learned and debrief.
Background Instruction (pre-activity)	Introduce the basics of carbon in the atmosphere and the process of ocean acidification.
Activity	Ocean Service NOAA has an open source Ocean acidification laboratory experiment that can be found here. http://oceanservice.noaa.gov/education/pd/climate/teachingclimate/ocean_acidification_teacher.pdf
Discussion/ Debrief	Students should discuss findings of their laboratory experiment.
Formative Assessment	Students should submit laboratory report for grading.

Notes: