Lesson Overview

Impacts of ocean acidification on shellfish and the communities that rely on them in the Pacific Northwest

Audience: Undergraduate introductory geoscience/environmental courses (100-200 level course)

Graphic courtesy of Northwest Indian Fisheries Commission

Lesson author

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Lesson description

Students are invited to learn about the importance of shellfish aquaculture in the Pacific Northwest and how changing ocean conditions are threatening the success of the industry and the communities that rely on them as a resource.

This exercise is a case study that, if used in full, takes students through the entire learning cycle from invitation to reflection. Pieces of the exercise can be used as appropriate for the instructor goals.

The environmental justice component is integrated into the Invitation and Reflection phases of the learning cycle and can be used as a hook to engage students in the case study.

Context for use: This activity is applicable to lower and upper division courses. In lower division courses, this activity can be used to introduce basic concepts of ocean circulation and ocean acidification. For upper level courses, this activity could include a more in depth discussion of ocean circulation, climate, heat budgets, and how ocean acidification affects shellfish aquaculture industries.

Prior knowledge: Before completing this activity, students should be familiar with pH, the dissolution of gases in water, and the basic concept of upwelling and Ekman transport. Preferably, students will have some background on buffers, shellfish life cycles, meroplanktonic vs. holoplanktonic life histories, and aquaculture, although this information can be provided during the activity as needed.

Technology requirement: Parts of this activity requires internet access on computers or tablets, preferably with no more than two students per device. If computer access is not available the graphs and activity questions may be printed ahead of time and students can use smart phones for internet research.

Lesson objectives

- 1. Explain the relationship between wind direction and pH on the west coast, using data and relevant oceanographic concepts to support their conclusions. (Exploration in learning cycle)
  2. Identify oceanographic conditions that negatively impact shellfish populations and determine when those conditions are occurring. (Application in learning cycle)
  3. Identify the communities that rely on shellfish as a resource and explain why. (Reflection to Invitation in learning cycle)
  4. Increase the visibility and understanding of ocean acidification across the Pacific Northwest and the communities it is currently negatively impacting through targeted use of outreach education and social marketing. (Reflection to Invitation in learning cycle)

Module components

- 1. Lesson Overview (this page)
  2. Instructor Guide: Instructions on preparing the content for this case with suggested activities and assessments.
  3. Environmental Justice Hook: How to structure the course time and flow of class sessions for environmental justice hook.