

TEACHER GUIDE

Article – Oceans of Acid: How Fossil Fuels Could Destroy Marine Ecosystems

Time Required: Will vary depending on student reading abilities.

Structure: Reading and comprehension questions may be begun in class or assigned for homework.

Grade Level: 7-12

Common Core Standards Addressed:

English Language Arts

E1: Demonstrate independence in reading complex texts, writing and speaking about them

E2: Build a strong base of knowledge through content rich texts

E3: Obtain, synthesize, and report findings clearly and effectively in response to task and purpose

E5: Read, write and speak grounded in evidence

Materials Needed:

1. *Oceans of Acid: How Fossil Fuels Could Destroy Marine Ecosystems* article by Scott Doney. Posted at <http://www.pbs.org/wgbh/nova/next/earth/ocean-acidification/>
2. Devices for students to access article or hard copies of the article
3. **COMPREHENSION QUESTIONS** for *Oceans of Acid: How Fossil Fuels Could Destroy Marine Ecosystems*
4. Student notebooks or paper to answer comprehension questions
5. Computer with internet access and a projector

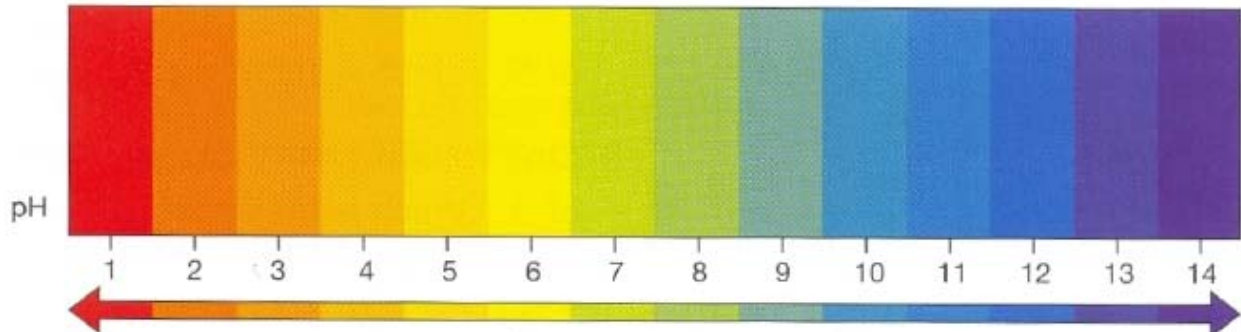
Advance Preparation:

1. Familiarize yourself with the article and comprehension questions. *Note: students may need to search other sources to answer some of the questions.*
2. Print a class set of **COMPREHENSION QUESTIONS** and the article, or use electronic versions of materials.

Instructional Procedures:

1. Pass out **COMPREHENSION QUESTIONS** (one per student). Have students answer the “Before you read” questions before distributing the article. Students should answer questions in their notebook, on paper, or electronically.
2. Have students read the article and complete the **COMPREHENSION QUESTIONS** in class or for homework.
3. Assessment – have students self assess their work or use your normal assessment method.
4. Follow up the reading by showing the short 4 minute video posted at http://www.ioos.noaa.gov/ocean_acidification/welcome.html Discussion connections between the video and key points of the article.
5. Please send any feedback or suggestions on the **COMPREHENSION QUESTIONS** to kits@soest.hawaii.edu

- Draw and label a picture that shows and describes how carbon dioxide dissolves in seawater.
- Draw the pH scale and indicate which side of the scale is considered basic and which side of the scale is acidic. Mark and label the pH of seawater, pure water, and carbonic acid. Using a different color, indicate the future pH of seawater.



- Ocean acidification has different effects on different organisms. Make a table listing how organisms mentioned in the article react to ocean acidification.
- Which organisms fare better in more acidic ocean conditions? Why?
- What happened to marine organisms tested under acidified conditions?
- How are nutrient run-off and ocean acidification connected?

After you read, pick four of the questions below to respond to:

- Select 10 words from the word cloud that best summarize the article. Using these 10 words, write a short summary of the article (1-3 sentences). Are there any changes in the words you selected now and the words you selected before reading the article? Explain how your thinking may have changed.
- Create an illustration and caption that summarizes each section of the article. You should have a total of 4 illustrations.
- Explain why ocean acidification is a global concern.
- The article mentioned that one oyster hatchery moved from the Pacific Northwest to Hawaii due to ocean acidification. What do you think are some of the ecological, social, and economic pros and cons of businesses moving due to ocean acidification?
- What is the projection for the future of our oceans? What does the acid future look like?
- What can you can do to reduce ocean acidification?

Name: _____

Date: _____

Concept or Vocabulary Word Map

