

Ocean Literacy Principles

Seventy-two percent of the surface of our planet is water. Water is vitally important to life on both a cellular level and global scale. The ocean regulates our weather and climate. It supplies foods, medicines, minerals, and energy resources. Although the ocean is essential for life on Earth, by many measures, Earth's ocean is in dire straits. For example:

- Within three decades, 75 percent of humanity, or 6.4 billion, will reside in coastal areas, nearly a billion more people than the current global population. As a result, coastal waters are often horribly polluted with untreated (or partially treated) municipal, industrial and agricultural wastes. Rivers bring in more pollutants, including chemicals and heavy metals, along with increasing loads of erosion sediment torn from the hinterlands.
- Fisheries are in decline not only because of over-fishing. Critical coastal resources, such as mangroves and coral reefs -- among the most productive and biologically diverse ecosystems on earth -- are being plundered in the name of development.
- Of the 109 countries with significant coral communities, 93 are damaging them, according to a survey carried out under the auspices of the United Nations Environment Programme and the World Conservation Union (IUCN).
- In over 50 countries coral is being smothered by erosion sediment washed off the land; largely the result of massive deforestation. In nearly 70 countries, reefs have been badly affected by dredging and land reclamation, or the building of harbors, airports and tourist resorts.
- In much of Southeast Asia and East Africa reefs are being blasted apart by dynamite fishermen, in efforts to put food on the table, or mined for use as building material.

From *Coasts In Crisis*, by Don Hinrichsen, 1995, AAAS
<http://www.aaas.org/international/ehn/fisheries/hinrichs.htm>

A healthy ocean is required to maintain ecosystem function, economic stability, and social stability. However, broad public support is needed to bring about the action necessary to change human practices and help sustain and restore the ocean. Building public support requires generating not only an appreciation of the ocean, but also an awareness and knowledge of the processes of the ocean. Understanding the mutual influence of the ocean and humankind is a critical component of broader efforts to build scientific and global literacy for all citizens.

However, aquatic science is not taught in most science curricula in K-12 schools. As a result, many students who graduate from high school do not understand concepts essential for understanding ocean science and hold robust misconceptions that impact their ability to make informed decisions about marine resources (e.g. Brody and Koch 1989 and 1990, Brody 1996, Ballantyne 2004). *Exploring Our Fluid Earth* advocates that the wide range of scientific endeavors and concepts related to coastal and ocean

science fit well into any general science course, across the scientific disciplines and grade levels. The ocean is important across the globe, and tying the ocean into science courses is essential for students in all geographical areas, even those in land-locked regions. The ocean is also a captivating topic that can be used to initiate concepts and interpret conclusions.

The Ocean Literacy Principles (OLP) have been nationally vetted by scientists and educators and describe what high school graduates should know about the ocean and aquatic environments. These principles, and the associated OLP scope and sequence, constitute the knowledge needed by someone considered to be “ocean literate”.

According to the OLP, every ocean literate person should understand these principles:

1. Earth has one big ocean with many features
2. The ocean and life in the ocean shape the features of Earth
3. The ocean is a major influence on weather and climate
4. The ocean makes Earth habitable
5. The ocean supports a great diversity of life and ecosystems
6. The ocean and humans are inextricably interconnected
7. The ocean is largely unexplored

The OLP are available at: www.coexploration.org/oceanliteracy.

Activity: Ocean Literacy Principles Thought Swap

Share your ideas about ocean literacy and the Ocean Literacy Principles.

Materials

- One Ocean Literacy Principle per pair of students
- *Optional:* Ocean Literacy Principles brochures or computer to access Ocean Literacy Principles website: www.coexploration.org/oceanliteracy

Procedure

1. Form two lines of equal length, with each person standing across from a partner.
 - a. Your teacher will ask a question to the class. Discuss this question with your partner.
 - b. After a few minutes of discussion, your teacher will tap the shoulders of the two people at the head of the line, who will tap the shoulders of the next two people, etc. When your shoulder is tapped, stop talking and pay attention to your teacher.
 - c. After discussing each question, one or more groups may be called on to share their thoughts about the question. If you are called on, you must present your *partner's* thoughts on the question/OLP, not your own, so pay close attention to what your partner is saying!
 - d. After each question:
 - i. the person from the head of the first line will go to the end of the first line and the first line will shift. The second line will stay the same. Thus, for each new question, everyone will have a new partner and,
 - ii. people in the line that did not move will pass their OLP to their neighbor in the opposite direction of the moving line. Thus, for each question everyone will have a different OLP.
 - e. *Optional:* Write your partner's thoughts on a classroom board or in your science notebook.
2. Discussion questions:
 - a. What do you think you need to know about the ocean?
 - b. What concepts do you already know that apply to your Ocean Literacy Principle?
 - c. What topics do you want to learn that would relate to your Ocean Literacy Principle?
 - d. How can we tie class activities more closely to the ocean?
3. *Optional:* Look through an Ocean Literacy Principles brochure. Choose one of the OLP to learn more about and answer the following questions.
 - a. What is your OLP and why did you choose it?
 - b. What are the fundamental concepts for your OLP?
 - c. For your OLP, what fundamental concepts do you already know about? What fundamental concepts do you want to learn more about?

Teacher Guide: Ocean Literacy Principles Thought Swap

Material and Procedure Tips and Tricks

- Cut the Ocean Literacy Principles (OLP) into strips of paper so that each pair of students has one OLP. If you have more than 14 students, repeat principles.
- Initiate this activity by sharing some of the measures of ocean health or a current events story about the ocean. Lead students into a discussion of the importance of understanding the ocean's influence on them and their influence on the ocean.
- If it is a nice day, consider moving your class outside for this activity.
- Hand out one OLP strip of paper to each pair of students *after* the first discussion question. The first question is not tied to any particular OLP and should be answered before reading any of the OLP.
- Do not shuffle the OLP before passing them out, pass the OLP out in order. This will ensure each student pair gets a different OLP for each question.
- Consider calling on groups by OLP when it is time to share their responses to the questions. For example, have student pairs with OLP one and two answer discussion question 2b, pairs with OLP three and four answer question 2c, etc. Ask the students to read their OLP before answering the question. This way, all students are exposed to each OLP even if they do not get to discuss each OLP.

The Ocean Literacy Principles are not perfect. By necessity they are broad, because they each cover a lot of fundamental concepts. They are also skewed to biology. However, keep in mind that understanding physical and chemical oceanography is essential to understanding the biological and ecological processes of the ocean.