

Earth's Waters: Teacher's Guide

Grade Level: 5-8

Curriculum Focus: Earth Science

Lesson Duration: Two or three class periods

Program Description

Covering several different environments, this feature immerses students in the dynamics, ecology, and energy potential of water. *Exploring the Everglades* – Visits the diverse ecosystem in one of America's great national parks. *Hydroelectricity: Unleashing the Power of Water* – Analyzes the structure and importance of dams. *Understanding Ocean Motions* – Joins the Whitbread Around the World sailing race to study waves, currents, and tides. *The Ocean Floor* – Investigates the topography of the seafloor.

- I. Exploring the Everglades (5 min.)
 - II. Hydroelectricity (5 min.)
 - III. Understanding Ocean Motions (6 min.)
 - IV. The Ocean Floor (5 min.)
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Onscreen Questions

Segments I

- What are some distinctive characteristics of wetlands?
- Why are the Everglades an important habitat to preserve?

Segments II

- Why are dams built?
- How does the difference in water levels on both sides of the dam contribute to the amount of electricity generated?

Segments III

- What is the relationship between wind and waves?
- How is a wave different from a current?

Segments IV

- Why is the ocean floor a frontier?
 - What physical features are found on the ocean floor?
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Lesson Plan

Student Objectives

- Map the geography of the ocean floor.
- Describe the different topographic features of the ocean floor.
- Compare the topography of the ocean floor to the topography of Earth above sea level.

Materials

- *Earth's Waters* video and VCR, or DVD and DVD player
- Paper and pencils
- Fine-tip black markers
- Clay
- Toothpicks
- 8½ X 11-inch sheets of cardboard, 1 per student
- Newspaper or paper for covering desks
- Computer with Internet access (optional)
- Science texts with pictures and maps of the ocean floor

Procedures

1. Introduce the lesson by talking about the Earth's oceans. What is an ocean? Why are oceans important to life on Earth? Talk about the ocean floor. What does it look like? How is the topography at the bottom of the ocean similar to the topography above sea level? View the segment "The Ocean Floor" of *Earth's Waters* to introduce this topic.
2. After viewing, tell students they will pretend to be explorers of the ocean floor. They will make relief maps of the ocean floor and write a descriptive essay about their travels to the bottom of the ocean.
3. For the relief maps, give each student a ball of clay and a cardboard sheet. Have students flatten the clay on the cardboard. Using the information provided by maps and pictures from print or Internet resources, have students create their relief maps. Explain that it is not possible to map the entire ocean floor, so students will map the continental margin. Each map should include the continental shelf, continental slope, abyssal plain, and continental rise. Students should identify at least one trench and seamount. Have students create labels for each of the geographic features. The labels can be attached to toothpicks and inserted into the correct features.
4. Set the finished maps aside to dry for at least 24 hours and have students write their descriptive essays. Talk about the items students may include in their essays, such as plant and animal life they encountered in the ocean, adventures or mishaps, interesting observations, etc. Each essay



must include information about the major oceanographic and forms they identified and labeled on their maps, what these features look like, and how they formed. The following Web sites have maps of the ocean floor or descriptions of the ocean:

- <http://www.platetectonics.com/oceanfloors/index.asp>
- <http://www.intelecom.org/theendlessvoyage/tevlesson5/activities/activity5.2.htm>
- <http://www.divediscover.whoi.edu/about.html>
- <http://pubs.usgs.gov/publications/text/exploring.html>
- <http://oceanexplorer.noaa.gov>

5. Have students share their essays with the class. Discuss the features of the ocean floor and how they differ or are similar to the geography of land above sea level. Display the essays with their maps in the classroom so that students get a chance to see one another's work?

Assessment

Use the following three-point rubric to evaluate students' work during this lesson.

- **3 points:** Students actively participated in class discussions; used the research materials wisely and without teacher guidance; created relief maps that correctly identified the continental shelf, continental slope, abyssal plain, continental rise and at least one seamount and trench; wrote informative, well-written, and creative essays that correctly addressed the established criteria.
- **2 points:** Students somewhat participated in class discussions; used the research materials somewhat wisely with little teacher guidance; created relief maps that correctly identified most of the physical features of the ocean floor; wrote informative, somewhat-creative essays that correctly addressed most of the established criteria.
- **1 point:** Students somewhat participated in class discussions; were unable to use the research materials without teacher guidance; created unfinished relief maps or failed to identify most of the physical features of the ocean floor; wrote disorganized essays that did not meet the established criteria.

Vocabulary

hydrothermal vents

Definition: Underwater geysers that form when cold seawater rushing into cracks in the seafloor is heated by the magma below

Context: Water temperatures above 350° Celsius (662° Fahrenheit) have been recorded inside some hydrothermal vents.

seamount

Definition: A underwater mountain rising above the ocean floor

Context: Seamounts, or underwater mountains, dot the geography of the ocean floor.



sediment

Definition: Small pieces of rock and soil

Context: The abyssal plain appears featureless because a thick layer of sediment covers areas that were once hills and valleys.

subduction

Definition: The action or process of the edge of one tectonic plate descending below the edge of another plate

Context: Subduction takes place when two of Earth's plates collide, and the heavier plate plunges beneath the other.

trench

Definition: A long, narrow, and usually steep-sided depression or canyon in the ocean floor

Context: The Marianas Trench is the deepest spot in any ocean of the world.

Academic Standards

National Academy of Sciences

The National Science Education Standards provide guidelines for teaching science as well as a coherent vision of what it means to be scientifically literate for students in grades K-12. To view the standards, visit <http://books.nap.edu>.

This lesson plan addresses the following science standards:

- Earth and Space Science
- Unifying Concepts and Processes

Mid-continent Research for Education and Learning (McREL)

McREL's Content Knowledge: A Compendium of Standards and Benchmarks for K-12 Education addresses 14 content areas. To view the standards and benchmarks, visit link: <http://www.mcrel.org/compendium/browse.asp>

This lesson plan addresses the following national standards:

- Language Arts – Viewing: Uses viewing skills and strategies to understand and interpret visual media; Writing: Uses the general skills and strategies of the writing process, Gathers and uses information for research purposes
- Science – Earth and Space Sciences: Understands Earth's composition and structure; Physical Sciences: Understands the sources and properties of energy, Understands forces and motion



Support Materials

Develop custom worksheets, educational puzzles, online quizzes, and more with the free teaching tools offered on the Discoveryschool.com Web site. Create and print support materials, or save them to a Custom Classroom account for future use. To learn more, visit

- <http://school.discovery.com/teachingtools/teachingtools.html>
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DVD Content

This program is available in an interactive DVD format. The following information and activities are specific to the DVD version.

How To Use the DVD

The DVD starting screen has the following options:

Play Video – This plays the video from start to finish. There are no programmed stops, except by using a remote control. With a computer, depending on the particular software player, a pause button is included with the other video controls.

Video Index – Here the video is divided into four parts (see below), indicated by video thumbnail icons. Watching all parts in sequence is similar to watching the video from start to finish. Brief descriptions and total running times are noted for each part. To play a particular segment, press Enter on the remote for TV playback; on a computer, click once to highlight a thumbnail and read the accompanying text description and click again to start the video.

Curriculum Units – These are specially edited video segments pulled from different sections of the video (see below). These nonlinear segments align with key ideas in the unit of instruction. They include onscreen pre- and post-viewing questions, reproduced below in this Teacher's Guide. Total running times for these segments are noted. To play a particular segment, press Enter on the TV remote or click once on the Curriculum Unit title on a computer.

Standards Link – Selecting this option displays a single screen that lists the national academic standards the video addresses.

Teacher Resources – This screen gives the technical support number and Web site address.

Video Index

I. Exploring the Everglades (5 min.)

Learn about the plants and animals of the Florida Everglades and why preserving this ecosystem is crucial.

II. Hydroelectricity (5 min.)

Hydroelectric power plants provide nearly a third of the world's electricity. Explore the Hoover Dam to see hydroelectricity in action.



III. Understanding Ocean Motions (6 min.)

The forces of gravity, heat, and wind influence the movement of the Earth's waters. Learn how waves and currents affect life on our planet.

IV. The Ocean Floor (5 min.)

Oceans and seas cover almost three-fourths of the globe's surface. Explore the ocean floor, one of Earth's last great frontiers.

Curriculum Units

1. Vegetation of the Everglades

Pre-viewing question

Q: What kind of vegetation would you expect to see in a swampy region?

A: Answers will vary.

Post-viewing question

Q: What is the vegetation of the Everglades?

A: Saw grass and cypress trees grow over much of the Everglades, a vast swampy region. Other trees include mahogany, oak, red maple, and palm.

2. A Valuable Habitat

Pre-viewing question

Q: What is an estuary?

A: Answers will vary.

Post-viewing question

Q: How has human development damaged the Everglades' wetland?

A: Pesticide runoff from farms harms fish and animals in the Everglades. And the growing human population increases the demand for freshwater, so less water from Lake Okeechobee makes its way to the Everglades.

3. The Power of Water

Pre-viewing question

Q: Why is hydroelectricity an important source of power?

A: Answers will vary.

Post-viewing question

Q: How much power is provided by hydroelectric plants around the world?

A: Hydroelectric power plants generate about 24 percent of the world's electricity, supplying more than one billion people with power.

4. Building Hydroelectric Power Plants

Pre-viewing question

Q: What do you think is the most important source of electricity in the United States?

A: Answers will vary.



Post-viewing question

Q: Why is the Hoover Dam considered such a major engineering feat?

A: The Hoover Dam tamed the Colorado River and also provided badly needed electricity to the Western states. It also brought water to desert cities in the Southwest and throughout Southern California by pipeline. Today, it provides four billion kilowatt hours of power a year to more than one million people in Colorado, Arizona, and California.

5. Patterns of Motion*Pre-viewing question*

Q: What forces are responsible for moving water around the globe?

A: Wind, gravity, the Earth's rotation, and the sun's heat move the Earth's waters

Post-viewing question

Q: What is a current?

A: A current is a large stream flowing through the ocean. Currents operate vertically and horizontally at all depths of the ocean; those on the surface of the water move the fastest and are most affected by wind. In general, they circulate warmer water from the equator and cooler water from the poles.

6. Currents and Tides*Pre-viewing question*

Q: How do ocean currents and tides affect the planet?

A: Answers will vary.

Post-viewing question

Q: What is the relationship between water density and deep ocean currents?

A: Water density depends on pressure, saltiness, and temperature. Cold water, found hundreds of meters below the surface, is denser than surface water. As it sinks, it displaces other water, creating a deep current.

7. The Deep, Dark Depths*Pre-viewing question*

Q: What are the similarities and differences between dry land and the ocean floor?

A: Answers will vary.

Post-viewing question

Q: Do you think it will be possible to explore the entire ocean floor?

A: Answers will vary.

