

RESOURCE LIBRARY
LESSON

Human Impacts on the World Ocean

Students are introduced to the idea that humans have enormous impacts on marine ecosystems and resources, and explore the stakeholders involved.

GRADES

9 - 12+

SUBJECTS

Biology, Ecology, Earth Science, Oceanography, Geography, Human Geography, Physical Geography

CONTENTS

2 Activities

ACTIVITY 1: HUMAN IMPACTS ON MARINE ECOSYSTEMS | 50 MINS

DIRECTIONS

1. Activate students' prior knowledge.

Tell students that they will learn about human-related impacts that threaten the ocean. Give each student a copy of the "Ocean Priorities" Anticipation/Reaction Guide. Read aloud the directions. Explain that students will decide if they agree or disagree with a series of statements both before and after listening to the National Public Radio "Ocean Priorities" podcast. Have students read and respond to the statements in the "response before the podcast" column.

2. Have students listen to the NPR podcast "Ocean Priorities."

Distribute copies of the worksheet Ocean Priorities Notetaking. As students listen to the NPR podcast (8 minutes), have them take notes about the ocean priorities/threats and ocean

management and research priorities discussed in the interview. After the podcast, have students respond again to the seven statements on the Anticipation/Reaction Guide. Discuss student responses to the guide and ask which of their responses changed after listening to the podcast. Use the Notetaking Answer Key to summarize the main points of the podcast. Ask:

- *What is meant by the podcast's title, "Ocean Priorities?"* (Ocean priorities are the greatest threats to ocean health and are the top priorities for ocean management.)
- *What do the guests mean when they say "The ocean is not a luxury item?"*

3. Have students analyze the global map of human impacts to marine ecosystems.

Display the map of human impacts to marine ecosystems. Briefly discuss the meaning of the choropleth map key. Ask:

- *What color represents marine ecosystems with very low human impact?* (blue)
- *What color represents marine ecosystems with very high human impact?* (red)
- *What color appears to dominate throughout the World Ocean?* (orange; medium high impact)
- *Which areas appear to have the lowest human impact?* (Central Pacific, Antarctic/Southern, and Arctic Oceans, and northern Australia and the Torres Strait)
- *Select one area that has low or very low human impact. Why do you think that is?*
- *Select one area that has high or very high human impact. Why do you think that is?*

4. Show students the NOAA animation "Humans Impact the Ocean."

Display the NOAA animation. Read aloud the text as students watch the animation. Ask:

- *What percentage of the world's ocean is unaffected by human impacts?* (about 4%)
- *What region has the highest concentration of Marine Protected Areas in the world?* (the northern coast of Australia near Papua New Guinea)
- *Discuss as a class the ending statement "Imagine if these protected areas were as common in the rest of the ocean." What would need to change? What areas would you protect first?*

Modification

For students who need help with listening comprehension, use the printed transcript of the NPR "Ocean Priorities" podcast.

Informal Assessment

Use students' notes and responses to the podcast's Anticipation/Reaction Guide to assess their misconceptions and comprehension of how humans impact the ocean.

Extending the Learning

Assign each student one of the five [L.A. Times Altered Oceans](#) articles to read at home. Have students take notes using the *L.A. Times: Altered Oceans Series* worksheet. Invite volunteers to share their findings with the class. After one volunteer has presented on each article, discuss as a class how the ocean issues are related to one another.

OBJECTIVES

Subjects & Disciplines

Biology

- [Ecology](#)

Earth Science

- [Oceanography](#)

Geography

- [Human Geography](#)
- [Physical Geography](#)

Learning Objectives

Students will:

- describe the relationship humans have with marine resources and habitats
- explain how human-related impacts affect the abiotic and biotic components of various marine ecosystems
- identify and discuss the major threats and management priorities for the world ocean

Teaching Approach

- Learning-for-use

Teaching Methods

- Discussions
- Guided listening
- Information organization
- Multimedia instruction

Skills Summary

This activity targets the following skills:

- 21st Century Student Outcomes
 - Information, Media, and Technology Skills
 - Information Literacy
 - Media Literacy
- 21st Century Themes
 - Global Awareness
- Critical Thinking Skills
 - Analyzing
 - Understanding
- Geographic Skills
 - Analyzing Geographic Information
 - Answering Geographic Questions

National Standards, Principles, and Practices

NATIONAL GEOGRAPHY STANDARDS

- **Standard 1:**

How to use maps and other geographic representations, geospatial technologies, and spatial thinking to understand and communicate information

- **Standard 14:**

How human actions modify the physical environment

- **Standard 18:**

How to apply geography to interpret the present and plan for the future.

- **Standard 8:**

The characteristics and spatial distribution of ecosystems and biomes on Earth's surface;

NATIONAL SCIENCE EDUCATION STANDARDS

- **(9-12) Standard C-4:**

Interdependence of organisms

- **(9-12) Standard F-3:**

Natural resources

- **(9-12) Standard F-4:**

Environmental quality

- **(9-12) Standard F-5:**

Natural and human-induced hazards

OCEAN LITERACY ESSENTIAL PRINCIPLES AND FUNDAMENTAL CONCEPTS

- **Principle 1f:**

The ocean is an integral part of the water cycle and is connected to all of the earth's water reservoirs via evaporation and precipitation processes.

- **Principle 1g:**

The ocean is connected to major lakes, watersheds and waterways because all major watersheds on Earth drain to the ocean. Rivers and streams transport nutrients, salts, sediments and pollutants from watersheds to estuaries and to the ocean.

- **Principle 1h:**

Although the ocean is large, it is finite and resources are limited.

- **Principle 2c:**

Erosion—the wearing away of rock, soil and other biotic and abiotic earth materials—occurs in coastal areas as wind, waves, and currents in rivers and the ocean move sediments.

- **Principle 5i:**

Estuaries provide important and productive nursery areas for many marine and aquatic species.

- **Principle 6a:**

The ocean affects every human life. It supplies freshwater (most rain comes from the ocean) and nearly all Earth's oxygen. It moderates the Earth's climate, influences our weather, and affects human health.

- **Principle 6b:**

From the ocean we get foods, medicines, and mineral and energy resources. In addition, it provides jobs, supports our nation's economy, serves as a highway for transportation of goods and people, and plays a role in national security.

- **Principle 6d:**

Much of the world's population lives in coastal areas.

- **Principle 6e:**

Humans affect the ocean in a variety of ways. Laws, regulations and resource management affect what is taken out and put into the ocean. Human development and activity leads to pollution (such as point source, non-point source, and noise pollution) and physical modifications (such as changes to beaches, shores and rivers). In addition, humans have removed most of the large vertebrates from the ocean.

- **Principle 6g:**

Everyone is responsible for caring for the ocean. The ocean sustains life on Earth and humans must live in ways that sustain the ocean. Individual and collective actions are needed to effectively manage ocean resources for all.

Preparation

BACKGROUND & VOCABULARY

Background Information

Human exploitation of the ocean's resources and destruction of marine habitats are driving species extinction, destroying fisheries, generating pollution, and creating ecological imbalances throughout the world. The ocean, once thought to be a limitless and resilient reservoir, is showing signs of irreparable damage. The creation of Marine Protected Areas (MPAs) is one strategy for preserving marine habitats.

Prior Knowledge

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Recommended Prior Activities

- [An Imbalance in our Ocean](#)

Vocabulary

Term	Part of Speech	Definition
choropleth map	noun	representation of statistical data, such as population, over a specific area using colors or patterns to represent types or intensity of data.
marine ecosystem	noun	community of living and nonliving things in the ocean.

FUNDER

ORACLE

ACTIVITY 2: AN IMBALANCE IN OUR OCEAN | 50 MINS

DIRECTIONS

1. Have students brainstorm a list of human threats to marine ecosystems.

Have students brainstorm a list of human behaviors that threaten the stability of marine ecosystems. Write students' ideas on the board. Prompt them to include behaviors such as pollution, overfishing or overharvesting, and boating. Remind students that many human activities not associated with the marine environment can also affect ocean ecosystems. For example, agricultural runoff and coastal development can cause marine pollution. Ask students to generate more examples.

2. Have students watch three videos about human activities that threaten the world ocean.

Show students the following videos: "EcoTipping Point Success Stories: Apo Island" (stop after 3 minutes and 38 seconds), "Arabian 'Sea Cows' Going Hungry?" (5 minutes), and "Coral Reefs" (3.5 minutes). Ask students to take a few notes as they watch each video. Tell them to pay close attention to the ocean threats and actions people are taking to address those threats. After viewing each video ask:

- *What is the main ocean threat discussed in this video?* (Video 1: overfishing and destructive fishing practices; Video 2: coastal development; Video 3: pollution)
- *What actions are people taking to address those threats?* (Video 1: establish Marine Protected Areas, educate local fisherman and young people, impose limits on tourism; Video 2: research dugong populations, establish Marine Protected Area, regulate boat

speeds and fishing nets, educate students; Video 3: establish artificial reefs, increase reef protection and restoration)

3. Have small groups generate lists of stakeholders for each threat.

Explain to students that stakeholders are individuals, groups, or organizations that stand to gain or lose from the success or failure of a project. Divide students into three groups—one for each threat listed above. Give each group time to brainstorm a list of stakeholders who may be involved in the issue. Provide some examples, if needed, such as:

- citizen, consumer, land owner, recreational user
- scientist, conservationist, environmentalist
- industry representative, coastal developer
- government organization, policymaker, economist
- journalist, historian

Have each group share their list. Compile the class list on the board.

4. Ask students to generate questions about the threats with stakeholders in mind.

Have students think about and list questions they have about ocean threats, stakeholders, and the relationship between threats and stakeholders. Have students share some of their questions and discuss them as a class. Ask:

- *Which stakeholders may share the same perspective on a threat?*
- *Which stakeholders are likely to have opposite perspectives on a threat?*
- *How can one stakeholder influence an environmental management decision or debate?*
- *Which stakeholder is likely to have a similar perspective to your own?*
- *What are your primary questions or concerns about the threat you explored?*

Informal Assessment

Use students' video notes and stakeholder questions to assess their comprehension and participation.

Extending the Learning

Have students investigate the effects of human activities in their local community. Ask students to create a scrapbook of one local environmental issue using newspaper and magazine articles, brochures, and other resources. Ask them to identify both the direct and

the indirect impacts of human actions, including stories of local environmental stewardship projects or other human actions that have helped the local area.

OBJECTIVES

Subjects & Disciplines

Earth Science

- [Oceanography](#)

Geography

- [Human Geography](#)
- [Physical Geography](#)

Learning Objectives

Students will:

- identify human threats to marine ecosystems
- identify stakeholders for each threat
- ask relevant questions about the relationships between human threats and stakeholders

Teaching Approach

- Learning-for-use

Teaching Methods

- Brainstorming
- Cooperative learning
- Discussions
- Visual instruction

Skills Summary

This activity targets the following skills:

- Critical Thinking Skills
 - Analyzing
 - Understanding
- Geographic Skills
 - Acquiring Geographic Information
 - Asking Geographic Questions

National Standards, Principles, and Practices

NATIONAL COUNCIL FOR SOCIAL STUDIES CURRICULUM STANDARDS

- Theme 3:

People, Places, and Environments

NATIONAL GEOGRAPHY STANDARDS

- Standard 14:

How human actions modify the physical environment

NATIONAL SCIENCE EDUCATION STANDARDS

- (9-12) Standard F-4:

Environmental quality

- (9-12) Standard F-5:

Natural and human-induced hazards

OCEAN LITERACY ESSENTIAL PRINCIPLES AND FUNDAMENTAL CONCEPTS

- Principle 6a:

The ocean affects every human life. It supplies freshwater (most rain comes from the ocean) and nearly all Earth's oxygen. It moderates the Earth's climate, influences our weather, and affects human health.

- Principle 6b:

From the ocean we get foods, medicines, and mineral and energy resources. In addition, it provides jobs, supports our nation's economy, serves as a highway for transportation of goods and people, and plays a role in national security.

- **Principle 6d:**

Much of the world's population lives in coastal areas.

- **Principle 6e:**

Humans affect the ocean in a variety of ways. Laws, regulations and resource management affect what is taken out and put into the ocean. Human development and activity leads to pollution (such as point source, non-point source, and noise pollution) and physical modifications (such as changes to beaches, shores and rivers). In addition, humans have removed most of the large vertebrates from the ocean.

- **Principle 6g:**

Everyone is responsible for caring for the ocean. The ocean sustains life on Earth and humans must live in ways that sustain the ocean. Individual and collective actions are needed to effectively manage ocean resources for all.

- **Principle 7c:**

Over the last 40 years, use of ocean resources has increased significantly, therefore the future sustainability of ocean resources depends on our understanding of those resources and their potential and limitations.

Preparation

BACKGROUND & VOCABULARY

Background Information

Human well-being is highly dependent on marine ecosystems and the resources and benefits they provide, such as food, recreation, and livelihoods. However, humans are causing a negative impact on marine environments due to pollution, overfishing, and development. Stakeholders are individuals or organizations who stand to gain or lose from the success or failure of a project. Their perspectives need to be taken into account in order for a resolution to be successful.

Prior Knowledge

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Recommended Prior Activities

- [Human Impacts on Marine Ecosystems](#)
- [Marine Migration](#)

Vocabulary

Term	Part of Speech	Definition
marine ecosystem	<i>noun</i>	community of living and nonliving things in the ocean.
stakeholder	<i>noun</i>	person or organization that has an interest or investment in a place, situation, or company.

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