

RESOURCE LIBRARY
LESSON

The World Ocean

Students investigate the interconnectedness of the ocean and Earth's physical and human systems through videos, discussions, writing, and mapping. They make personal connections to their own lives and are introduced to the concept of Marine Protected Areas (MPAs).

GRADES

9 - 12+

SUBJECTS

Biology, Ecology, Earth Science, Oceanography, English Language Arts, Geography, Human Geography, Physical Geography

CONTENTS

4 Activities

ACTIVITY 1: YOUR OCEAN | 45 MINS

DIRECTIONS

1. Have students freewrite about the importance of the ocean and map their relationship to the ocean.

Tell students that for homework they will freewrite for five minutes in response to the following question: *What does the ocean mean to you?* Explain to students that they should write continuously about anything that comes to mind about the topic. Ask students not to make corrections or censor what they write. If students are struggling to make connections to the ocean because they live inland, ask them to write a story about a trip they have taken to the ocean or to write an imaginary story from the perspective of a fisherman or marine scientist. For the second part of their homework, have students view a world map. Ask them to do the following:

- Find their location.
- Find the closest ocean.
- Think about: *What moves from you to the ocean? What moves from the ocean to you?*

Then, for five minutes have students add to their freewriting pages in response to those same questions.

2. Have students review and discuss their freewriting homework assignments.

Using the Water Planet Mega Map, included in the World Physical MapMaker Kit, ask student volunteers to do the following:

- Label their location.
- Label the closest ocean.
- Use arrows, symbols, and labels to illustrate: *What moves from you to the ocean? What moves from the ocean to you?*

3. Have students read and discuss a famous quote about the ocean.

Write the following quote on the board: “Even if you never have the chance to see or touch the ocean, the ocean touches you with every breath you take, every drop of water you drink, every bite you consume. Everyone, everywhere is inextricably connected to and utterly dependent upon the existence of the sea.” Tell students the quote is by [oceanographer](#) Sylvia Earle, from her book *The World is Blue*. Explain that Sylvia Earle, called “Her Deepness,” has been one of the most influential ocean explorers, scientists, authors, lecturers, and conservationists over the past 40 years. She has led more than 60 undersea expeditions worldwide, logging more than 6,000 hours underwater. She was captain of the first all-female team to live in an underwater habitat and has started her own companies that design underwater vehicles, allowing scientists to explore and study depths of the ocean that were previously inaccessible to humans. In the early 1990s, Dr. Earle was chief scientist of the National Oceanic and Atmospheric Administration, and she is currently an explorer-in-residence at the National Geographic Society. She is a passionate and dedicated advocate for the world ocean and the creatures that it supports and sustains. Her work and lectures strive to educate the public about the vital role the ocean plays in supporting all life, including

humans. Read the quote one more time. Give students two minutes to think about the quote and what they know about the ocean. Then have a whole-class discussion about what they think the quote means and how all people are connected to the ocean.

4. Have students watch and discuss a video clip.

Distribute the handout Podcast Vocabulary List. Read aloud the directions. Clarify terms for students, as needed. As a class, watch the 18-minute video clip of oceanographer Sylvia Earle as she makes her TED (Technology, Entertainment, Design) Prize wish: to protect our oceans. Then have a whole-class discussion. Ask:

- *What does Sylvia Earle mean when she refers to the ocean as our “life support system?”*
- *Do you agree or disagree that “health to the ocean means health to us?” Explain.*
- *Which image or graphic shown by Sylvia Earle impressed you the most? Why?*
- *What new information did you learn from Sylvia Earle’s speech?*
- *Sylvia Earle’s goal is “to ignite public support for a global network of marine protected areas.” What do you think Marine Protected Areas (MPAs) are?*
- *Sylvia Earle’s wish is for humans to do everything we can to reach that goal. What can you do to help?*

Modification

Write Dr. Earle's quote on a poster board and display it in the classroom a couple of days before ocean instruction begins.

Informal Assessment

Use students' completed freewriting as a pre-assessment of their prior knowledge about the ocean and their understanding of their own connection to the ocean.

Extending the Learning

Show students the National Geographic video "Water: State of the Earth." Have a whole-class discussion about its contents, highlighting the concepts of sustainability and Marine Protected Areas. As homework, have students watch the Sylvia Earle TED video at home and discuss the ocean with their families.

OBJECTIVES

Subjects & Disciplines

Biology

- Ecology

Earth Science

- Oceanography

Geography

- Human Geography
- Physical Geography

Learning Objectives

Students will:

- describe and map how humans are connected to the ocean
- articulate why the ocean is important in writing

Teaching Approach

- Learning-for-use

Teaching Methods

- Discussions
- Hands-on learning
- Research
- Writing

Skills Summary

This activity targets the following skills:

- Critical Thinking Skills

- Understanding
- Geographic Skills
- [Acquiring Geographic Information](#)

National Standards, Principles, and Practices

NATIONAL GEOGRAPHY STANDARDS

- [Standard 14:](#)

How human actions modify the physical environment

- [Standard 8:](#)

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

Preparation

BACKGROUND & VOCABULARY

Background Information

Over 70 percent of planet Earth is covered with water. Although we have labels that separate names of different regions, the Earth ultimately has just one large, interconnected ocean. Human activities impact nearly all parts of the ocean. Oceanographer Sylvia Earle is working to protect the world's ocean from further harm.

Prior Knowledge

[]

Recommended Prior Activities

- [MPA Designation and Management](#)

Vocabulary

Term	Part of Speech	Definition
ocean	noun	large body of salt water that covers most of the Earth.
oceanographer	noun	person who studies the ocean.

FUNDER

ORACLE

ACTIVITY 2: OUR HYDROSPHERE | 45 MINS

DIRECTIONS

1. Build background on the concept of the hydrosphere.

Display the Water Planet Mega Map, from the World Physical MapMaker Kit, on the wall. Ask: *What is the hydrosphere?* Elicit from students that *sphere* means “range of something” and *hydro* means “water.” Using the Mega Map to demonstrate, have small groups of students use their World Physical Tabletop Maps, also from the World Physical MapMaker Kit, to locate and label the hydrosphere. Students will likely only label the surface water of oceans, lakes, and rivers. Explain that these areas where water is temporarily stored are called reservoirs. Ask: *Other than on the surface of Earth, where are other water reservoirs?* Explain to students that the hydrosphere also includes reservoirs of water below ground and in the atmosphere. Ask: *Even though the map shows one, is there an actual boundary between the ocean and land?* Elicit explanations from students and conclude that water connects the land, ocean, and atmosphere. Explain that in this activity they will be exploring this concept of “interconnectedness” by learning about the hydrosphere.

2. Introduce Earth as the “blue planet” and identify the major ocean basins.

Have students analyze their Tabletop Maps. Ask: *Why is Earth referred to as the “blue planet?”* Explain that the “blue” ocean is the dominant feature on Earth—covering 70 percent of the planet’s surface and holding 97 percent of the Earth’s water. On their Tabletop Maps, have students label and outline the six major ocean basins: North and South Pacific, North and South Atlantic, Indian, and Arctic. When combined with surface freshwater, nearly 80 percent of the planet is covered in water. Have students locate and label five large freshwater lakes, two glaciers, and three rivers.

3. Discuss the interconnectedness of the hydrosphere.

State that water molecules constantly move and change form. Ask: *What are some different forms of water? How does water “move?”* Elicit from students that forms of water include ice, gas (vapor), and liquid. Tell students to think about how liquid water moves across land. Have them imagine a large, flowing river. Define a *river* as a system that transports large amounts of water in a uniform direction. Ask: *What determines how or where a river flows?* Elicit from students that ultimately gravity—which is impacted by elevation, topography, and geology—determines where a river flows, and since the areas of lowest elevation are where the land meets the ocean, that’s where the rivers flow. Using their Tabletop Maps, have students select a nearby river and trace its path to the ocean. Ask: *Other than water molecules, what else do rivers carry to the ocean?* Elicit from students that other substances can be dissolved or suspended in the water and carried along with it—including pollution, chemicals, solid waste, salts, and sediment. Tell students that in addition to land-based rivers, there are “rivers” in the ocean, atmosphere, and even in the ground. These “rivers” transport water and substances throughout the globe. Show the Rivers in the Atmosphere animation and use the MapMaker Interactive’s surface currents layer to illustrate these processes.

4. Have students reflect on how humans are interconnected with the hydrosphere, especially the ocean.

In their small groups, have students identify ways they are connected to the hydrosphere, and the ocean in particular. Generate ideas by asking: *What are ways that humans use water (and the ocean)? What are ways that humans change the distribution of water or how it flows? What are things that humans put into water (and the ocean)?* Remind students that in Step 3 they traced the path of a nearby river to the ocean. Ask: *Are there human activities or products that could negatively affect your local sources of fresh water? What about negative human impacts on the ocean?* Facilitate class discussion and conclude that the hydrosphere (water) connects all humans to all other ecosystems and organisms on Earth.

Informal Assessment

As groups discuss their interconnectedness with the ocean, check student comprehension and facilitate discussion.

OBJECTIVES

Subjects & Disciplines

Earth Science

- Oceanography

Geography

- Physical Geography

Learning Objectives

Students will:

- explain how the ocean is the dominant physical feature on Earth
- identify water reservoirs, including major ocean basins and freshwater rivers and lakes
- describe how the hydrosphere connects the ocean, land, and atmosphere

Teaching Approach

- Learning-for-use

Teaching Methods

- Cooperative learning
- Discussions
- Hands-on learning
- Information organization

Skills Summary

This activity targets the following skills:

- 21st Century Themes
 - Global Awareness
- Critical Thinking Skills
 - Analyzing
 - Understanding
- Geographic Skills
 - Acquiring Geographic Information

- [Analyzing Geographic Information](#)

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 7:](#)

The physical processes that shape the patterns of Earth's surface

NATIONAL SCIENCE EDUCATION STANDARDS

- [\(9-12\) Standard B-2:](#)

Structure and properties of matter

- [\(9-12\) Standard B-4:](#)

Motions and forces

OCEAN LITERACY ESSENTIAL PRINCIPLES AND FUNDAMENTAL CONCEPTS

- [Principle 1a:](#)

The ocean is the dominant physical feature on our planet Earth—covering approximately 70% of the planet's surface. There is one ocean with many ocean basins, such as the North Pacific, South Pacific, North Atlantic, South Atlantic, Indian and Arctic.

- [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.

Preparation

BACKGROUND & VOCABULARY

Background Information

The reservoirs and processes comprising the hydrologic, or water, cycle are responsible for the movement of water and substances throughout and between the land, ocean, and atmosphere, known collectively as the hydrosphere. The ocean is the dominant feature on Earth, covering 70 percent of the planet's surface and holding 97 percent of the Earth's water. The hydrosphere connects humans to the ocean, land, and atmosphere, making life on Earth possible.

Prior Knowledge

[]

Recommended Prior Activities

- None

Vocabulary

Term	Part of Speech	Definition
atmosphere	<i>noun</i>	layers of gases surrounding a planet or other celestial body.
hydrosphere	<i>noun</i>	all the Earth's water in the ground, on the surface, and in the air.
ocean basin	<i>noun</i>	depression in the Earth's surface located entirely beneath the ocean.
ocean circulation	<i>noun</i>	worldwide movement of water (currents) in the ocean.
reservoir	<i>noun</i>	natural or man-made lake.

FUNDER

ORACLE

ACTIVITY 3: PROTECTING THE OCEAN | 45 MINS

DIRECTIONS

1. Build students' background about protected areas, both terrestrial and marine.

Ask: *What is a sanctuary?* Elicit from students that a sanctuary is a place of refuge and protection. Have students brainstorm examples of sanctuaries or protected land or water areas, such as national parks, nature reserves, wilderness areas, and marine protected areas.

Ask:

- *What are these areas used for?*
- *Who are the stakeholders, or users, of these areas?*
- *Do some of these uses conflict with one another? How? What are some examples?*

Provide students with the following examples: During certain seasons, hunters are allowed into parks to help regulate populations of deer, and during those times the park is closed to other uses like hiking and fishing. Or, mountain bikers and horseback riders have to use different trails from hikers. Ask: *Who protects these areas? What are they protected from?*

Elicit from students that various levels of government protect these areas from human development and impacts that may threaten species or destroy the habitat. Ask: *What is a MPA?* Elicit from students that it is a marine protected area, and like a sanctuary or park, it protects habitat and wildlife located within or bordering the ocean.

2. Have small groups discuss questions about ocean ownership and protection.

Explain that students will now focus on marine protected areas and will discuss issues of ocean ownership and protection. Read the MPA handout aloud to the class. Divide students into small groups and give each group one large sheet of paper. Write the following questions on the board:

- *Who owns the ocean?*
- *Who has the right to use the ocean? Why?*
- *Who protects the ocean? From whom? From what?*
- *Who makes and enforces rules about the ocean?*

Give each group approximately five minutes to discuss and write their answers. Then post all papers at the front of the room for a ten-minute class discussion.

3. Have students watch the NOAA video “Your National Marine Sanctuaries.”

Have students watch the video (4 minutes). Then check their comprehension. Ask:

- *How many U.S. National Marine Sanctuaries are there? (14 marine sanctuaries)*
- *Where are they located? (Great Lakes, East and West coasts, Gulf of Mexico, Hawaiian Islands, American Samoa)*
- *How many square miles do they cover? (150,000 square miles)*
- *Why did Congress begin establishing sanctuaries to protect the ocean in 1972? (to protect fragile marine resources)*
- *Why do you think these 14 specific locations were selected?*
- *Which sanctuary is one of the largest marine protected areas on Earth and was also the nation's first marine national monument? (Papahānaumokuākea Marine National Monument)*
- *Why is it important to establish sanctuaries or protected areas in the ocean?*

Ask if students have any questions about the video or the MPA fact sheet. Facilitate the discussion and elaborate as needed.

4. Have students watch the Chadwick School's MPA public service announcement.

Explain to students that marine biology students at Chadwick School in Palos Verdes Peninsula, California, created the public service announcement video to raise awareness on marine issues and the need for establishing a marine protected area near their school. Ask students to think about how they would carry out a similar project in an area that they think should be designated as a MPA. Tell students that their culminating assignment for this unit will be to design their own MPA so they need to keep MPAs and the different users of these environments in mind as they learn more about ocean ecosystems. Access the video by going to the CAL-SPAN web page. Click on the January 14, 2009, video and start the video at 04:03:50. Have students watch the video (5.5 minutes). Then check students' comprehension. Ask:

- *How did the students become interested in California's Marine Life Protection Act (MLPA) Initiative?*
- *What did they notice about the changes in the biodiversity and habitat of their study site?*
- *What were some of the anthropogenic, or human, threats affecting their study site?*

- *Who are some of the stakeholders involved in California's MLPA Initiative?*
- *What are some positive effects resulting from the establishment of MPAs?*

5. Have students reflect on what they have learned.

Remind students that, earlier in the class, they answered the question: Why is it important to establish sanctuaries or protected areas in the ocean? Ask: *Has your answer changed? How? Why?*

Informal Assessment

Assess students based on their participation in the small group and class discussions. Check students' understanding by asking them to orally restate the definitions of MPAs, marine reserves, marine sanctuaries, and marine parks.

Extending the Learning

Have students investigate a local marine, freshwater, or terrestrial protected area. Ask students to present their findings to the class.

OBJECTIVES

Subjects & Disciplines

Biology

- [Ecology](#)

Earth Science

- [Oceanography](#)
- English Language Arts

Geography

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

Learning Objectives

Students will:

- distinguish between different types of MPAs, including marine reserves, sanctuaries or conservation areas, and parks
- describe the importance of MPAs in terms of biological, cultural, social, and economic factors

Teaching Approach

- Learning-for-use

Teaching Methods

- Cooperative learning
- Discussions
- Multimedia instruction
- Reading

Skills Summary

This activity targets the following skills:

- 21st Century Student Outcomes
 - Information, Media, and Technology Skills
 - Media Literacy
 - Learning and Innovation Skills
 - Communication and Collaboration
- Critical Thinking Skills
 - Remembering
 - Understanding
- Geographic Skills
 - Acquiring Geographic Information
 - Analyzing Geographic Information

National Standards, Principles, and Practices

IRA/NCTE STANDARDS FOR THE ENGLISH LANGUAGE ARTS

- **Standard 12:**

Students use spoken, written, and visual language to accomplish their own purposes (e.g., for learning, enjoyment, persuasion, and the exchange of information).

NATIONAL GEOGRAPHY STANDARDS

- **Standard 14:**

How human actions modify the physical environment

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

OCEAN LITERACY ESSENTIAL PRINCIPLES AND FUNDAMENTAL CONCEPTS

- **Principle 5a:**

Ocean life ranges in size from the smallest virus to the largest animal that has lived on Earth, the blue whale.

- **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.

Preparation

BACKGROUND & VOCABULARY

Background Information

Marine Protected Areas (MPAs) are areas where natural and cultural resources are given greater protection than the surrounding waters. In the United States, MPAs span a range of habitats including the open ocean, coastal areas, intertidal zones, estuaries, and the Great Lakes. They also vary widely in purpose, legal authorities, agencies, management approaches, level of protection, and restrictions on human uses, thereby affecting a variety of stakeholders. MPAs help improve the sustainability of marine creatures, resources, and habitats and protect them from human impacts.

Prior Knowledge

[]

Recommended Prior Activities

- [Marine Critical Issues: Case Studies](#)
- [Marine Protected Areas](#)
- [Marine Protected Areas: Case Studies](#)
- [MPA Designation and Management](#)

Vocabulary

Term	Part of Speech	Definition
anthropogenic disturbance	<i>noun</i>	changes to the natural environment caused by human activity.
biodiversity	<i>noun</i>	all the different kinds of living organisms within a given area.
habitat	<i>noun</i>	environment where an organism lives throughout the year or for shorter periods of time.
Marine Life Protection Act (MLPA)	<i>noun</i>	(1999) California law passed to create a network of marine protected areas (MPAs) along the California coast.
marine park	<i>noun</i>	part of the ocean protected by the government to preserve a threatened ecosystem or habitat. Marine parks are often recreational areas.
marine protected area (MPA)	<i>noun</i>	area of the ocean where a government has placed limits on human activity.

Term	Part of Speech	Definition
marine reserve	noun	part of the ocean where no fishing, hunting, drilling, or other development is allowed.
marine sanctuary	noun	part of the ocean protected by the government to preserve its natural and cultural features while allowing people to use and enjoy it in a sustainable way.
stakeholder	noun	person or organization that has an interest or investment in a place, situation, or company.

FUNDER

ORACLE™

ACTIVITY 4: MPA DESIGNATION AND MANAGEMENT | 30 MINS

DIRECTIONS

1. Activate students' prior knowledge about Marine Protected Areas.

Activate students' prior knowledge about Marine Protected Areas, or MPAs. Remind students about the discussions they have recently had in class about the ocean. Talk about who owns the ocean, who makes decisions about it, and how the ocean is connected to students' lives. Refresh students' memories about what they have learned about Marine Protected Areas over the last few days. Ask: *How are all of these concepts related? Why are we talking about all of these topics in a biology class?* Discuss these questions as a class.

2. Introduce the MPA problem scenario and learning challenge.

Divide students into small groups of four. Distribute copies of the Problem Scenario: Gulf of Castellammare Fishery Reserve handout and Problem Scenario Notetaking worksheet to each student. Ask students to preview the problem scenario and the challenge they will be asked to resolve, as well as the notetaking worksheet. Have students brainstorm in small groups and list all of the questions they will need to research before proposing a solution to the challenge. Suggest writing questions that start with: *Who, What, When, Where, Why,* and

How. Make sure students understand that they are only expected to preview the handout and worksheet and familiarize themselves with the problem scenario. Let students know that it is fine not to know how to propose a solution for the problem at this point. As in real life, finding a solution will require research, collaboration with others, and thinking creatively. Explain that the main objective of this activity is to find out what they need to learn to be able to propose a solution to the problem.

3. Organize questions by category and set up priorities.

Elicit questions from the teams and write them on giant sticky notes. Stick them to a wall in the room. Accept all questions. Explain to students that at this point all questions are valid. Once all of the questions have been posted, instruct students to move the questions around organizing them into categories. Questions can be organized by: Who? What? When? Where? Why? and How? Encourage students to propose alternative categories for question organization.

4. Have students prioritize the questions and restate the problem.

Ask each team to prioritize the questions. Then ask teams to select and share three questions that they think should have the highest priority for finding a solution to the problem. Each team will likely select different questions and priorities. Allow students to have a short discussion about their priorities. Explain that there is no right or wrong order. Part of becoming a problem solver is to reevaluate priorities. Priorities will change as they dig deeper into the problem. Ask students to copy the questions in their notebooks and keep them available for reference. Explain that the goal of this unit is to learn important facts and concepts about the ocean, marine life, and conservation while practicing what it takes to work on solutions to real-world problems. Ask students to spend five minutes rewriting the problem in their own words for submission.

5. Revisit the questions periodically throughout the unit.

Make sure to preserve the list of student questions and post them in a visible place in your classroom. Remember to revisit the MPA problem scenario, the challenge, and students' lists of questions as you work through the unit. As learning progresses throughout the unit, allow students to restate the questions and reevaluate their priorities as they learn more about the marine environment. Explain to students that throughout this unit they will be building their content knowledge about marine ecosystems and human interactions. This knowledge will allow them to better understand the problem and challenge presented in this activity. Keep track of new questions that students formulate throughout the unit. Be sure to revisit the questions after completing MPA-focused lessons, specifically lesson 6, Ecosystem Imbalance in the World, and lesson 8, Introduction to Marine Protected Areas.

Informal Assessment

Check students' understanding by reviewing their restatements of the problem. Provide feedback, as needed.

Extending the Learning

Have students investigate a problem related to one of their local marine, freshwater, or terrestrial protected areas. Ask students to write questions they think need to be answered before they can propose possible solutions. Have students present their findings to the class.

OBJECTIVES

Subjects & Disciplines

Earth Science

- [Oceanography](#)
- English Language Arts

Geography

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

Learning Objectives

Students will:

- develop and prioritize questions that need to be researched in order to justify the designation of a Marine Protected Area and the development of a management plan
- restate the problem or challenge to be solved

Teaching Approach

- Learning-for-use
- Project-based learning

Teaching Methods

- Brainstorming
- Discussions
- Reading

Skills Summary

This activity targets the following skills:

- 21st Century Student Outcomes
 - Learning and Innovation Skills
 - Critical Thinking and Problem Solving
- 21st Century Themes
 - Global Awareness
- Critical Thinking Skills
 - Analyzing
 - Remembering
 - Understanding
- Geographic Skills
 - Acquiring Geographic Information
 - Analyzing Geographic Information
 - Asking Geographic Questions
 - Organizing Geographic Information

National Standards, Principles, and Practices

IRA/NCTE STANDARDS FOR THE ENGLISH LANGUAGE ARTS

- **Standard 12:**

Students use spoken, written, and visual language to accomplish their own purposes (e.g., for learning, enjoyment, persuasion, and the exchange of information).

NATIONAL GEOGRAPHY STANDARDS

- **Standard 14:**

How human actions modify the physical environment

- **Standard 16:**

The changes that occur in the meaning, use, distribution, and importance of resources

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

OCEAN LITERACY ESSENTIAL PRINCIPLES AND FUNDAMENTAL CONCEPTS

- **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 6c:**

The ocean is a source of inspiration, recreation, rejuvenation and discovery. It is also an important element in the heritage of many cultures.

- **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.

ISTE STANDARDS FOR STUDENTS (ISTE STANDARDS*S)

- **Standard 2:**

Communication and Collaboration

Preparation

BACKGROUND & VOCABULARY

Background Information

Marine Protected Areas are created to protect vulnerable habitats and species, increase biodiversity, prevent overfishing, conserve resources for future generations, and aid in scientific research. Successful MPAs include an enforcement program aimed at obtaining compliance, a coordinated public communication strategy, and broad-reaching outreach and long-term education initiatives, as well as analysis of the social and economic costs and benefits. Successful planning and designation of MPAs depends on cooperative stewardship and the involvement of all affected stakeholders.

Prior Knowledge

["Marine Protected Areas"]

Recommended Prior Activities

- [Marine Critical Issues: Case Studies](#)
- [Marine Protected Areas](#)
- [Marine Protected Areas: Case Studies](#)
- [Marine Protected Area: Stakeholder Debate](#)
- [Our Interconnected Ocean](#)
- [Protecting the Ocean](#)
- [Your Ocean](#)

Vocabulary

Term	Part of Speech	Definition
marine protected area (MPA)	<i>noun</i>	area of the ocean where a government has placed limits on human activity.

FUNDER

ORACLE®



© 1996-2023 National Geographic Society. All rights reserved.