

RESOURCE LIBRARY
ACTIVITY : 1 HR

Mapping Marine Ecosystems

Students investigate types of marine ecosystems, identify examples of these ecosystems and their characteristics, and locate the ecosystems on a map of the world's oceans.

GRADES

9 - 12+

SUBJECTS

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

CONTENTS

2 Videos, 2 PDFs, 15 Links, 12 Images

OVERVIEW

Students investigate types of marine ecosystems, identify examples of these ecosystems and their characteristics, and locate the ecosystems on a map of the world's oceans.

For the complete activity with media resources, visit:

<http://www.nationalgeographic.org/activity/mapping-marine-ecosystems/>

DIRECTIONS

1. Have students investigate twelve marine ecosystems.

Have students watch the Census of Marine Life background video, "A Journey Through Habitats" (2 minutes, 21 seconds). The video is found under the "Background" tab on the Census of Marine Life link provided. As they watch, ask students to note the wide diversity of ocean ecosystems. Divide students into small groups and assign each group one ecosystem from the list:

- [Abyssal Plain](#) (communities include deep sea corals, whale fall, brine pool)

- Antarctic
- Arctic
- Coral Reef
- Deep Sea (abyssal water column)
- Hydrothermal Vent
- Kelp Forest
- Mangrove
- Open Ocean
- Rocky Shore
- Salt Marsh and Mudflat
- Sandy Shore

Give each group a copy of the Marine Ecosystems handout and the Marine Ecosystems Notetaking worksheet. Have students use the handout and provided websites to research and record the following information about their ecosystems: location of one or more real-world examples of their ecosystems, the different marine organisms found there, and the unique characteristics that set the ecosystem apart from other marine ecosystems. Each group should then transcribe its research from the Marine Ecosystem Notetaking worksheet to a large piece of butcher paper so the information can be shared with the class.

2. Have students map real-world ecosystems.

Ask one student from each group to present their ecosystem research to the class. After presenting, have each group use the World Physical MapMaker Kit, to locate and label at least one location where its ecosystem can be found. Once all of the ecosystems are labeled on the Mega Map, ask students to discuss their findings. Ask: *Are there any links between these ecosystems?* Prompt students to think of links such as hydrologic cycle, currents, organisms, or other connections. Then ask: *Do the ecosystems share any physical features or significant abiotic factors?* Prompt students to consider geology, depth, salinity, and water temperature.

3. Have students look at illustrations of real-world ecosystems.

List the 12 ecosystems on the board as a word bank. Display the gallery of ecosystem illustrations and have students analyze them. While scrolling through the illustrations, pause after each one and have students write which ecosystem they think it is and where in the world it might be located (Answers: abyssal plain [deep sea coral, whale fall, brine pool], Antarctic, Arctic, coral reef, deep sea [abyssal water column], hydrothermal vent, kelp forest, mangrove, open ocean, rocky shore, salt marsh and mudflat, sandy shore). Conclude the activity by emphasizing how many different and unique ecosystems are found throughout the ocean.

Modification

As an alternative, provide small groups with printouts of the ecosystem illustrations and have them work together to discuss and match the names and locations of the 12 ecosystems.

Informal Assessment

Have students return to the illustrations and ask them to explain their reasoning for identifying each illustration as a particular ecosystem. Their reasoning should include the unique characteristics of the ecosystems and how the ecosystems' physical features relate to their locations throughout the world.

Extending the Learning

Have students use [Google Earth: Oceans](#) to find as many of their marine ecosystem locations as possible. Then have them find these additional features:

- The Dead Sea—the lowest point on land in the world at 422 meters (1,385 feet) below sea level
- The Arabian Peninsula (Arabia)—the largest peninsula in the world; it is surrounded by the Red Sea, the Arabian Sea, the Gulf of Oman, and the Persian Gulf.
- Mariana Trench—the lowest point in the sea at about 11,000 meters (36,000 feet) deep

OBJECTIVES

Subjects & Disciplines

Biology

- [Ecology](#)

Earth Science

- [Oceanography](#)

Geography

- [Physical Geography](#)

Learning Objectives

Students will:

- differentiate between different types of marine ecosystems
- locate real-world examples of different marine ecosystems on a world map
- analyze clues to identify a particular marine ecosystem

Teaching Approach

- Learning-for-use

Teaching Methods

- Cooperative learning
- Information organization
- Research
- Simulations and games

Skills Summary

This activity targets the following skills:

- 21st Century Student Outcomes
 - Learning and Innovation Skills
 - Communication and Collaboration
- 21st Century Themes
 - Global Awareness
- Critical Thinking Skills
 - Analyzing
 - Understanding
- Geographic Skills
 - Acquiring Geographic Information
 - Analyzing Geographic Information
 - Organizing Geographic Information

National Standards, Principles, and Practices

- **Standard 1:**

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

- **Standard 8:**

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

NATIONAL SCIENCE EDUCATION STANDARDS

- **(9-12) Standard A-1:**

Abilities necessary to do scientific inquiry

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

Matter, energy, and organization in living systems

OCEAN LITERACY ESSENTIAL PRINCIPLES AND FUNDAMENTAL CONCEPTS

- **Principle 5e:**

The ocean is three-dimensional, offering vast living space and diverse habitats from the surface through the water column to the seafloor. Most of the living space on Earth is in the ocean.

- **Principle 5f:**

Ocean habitats are defined by environmental factors. Due to interactions of abiotic factors such as salinity, temperature, oxygen, pH, light, nutrients, pressure, substrate and circulation, ocean life is not evenly distributed temporally or spatially, i.e., it is "patchy". Some regions of the ocean support more diverse and abundant life than anywhere on Earth, while much of the ocean is considered a desert.

Preparation

What You'll Need

MATERIALS YOU PROVIDE

- Butcher paper
- Markers
- Pencils

REQUIRED TECHNOLOGY

- Internet Access: Required
- Tech Setup: 1 computer per small group, Projector, Speakers
- Plug-Ins: Flash

PHYSICAL SPACE

- Classroom
- Computer lab

GROUPING

- Small-group instruction

OTHER NOTES

Using the MapMaker Kit Assembly video as a guide, print, laminate, and assemble the Water Planet Mega Map before starting this activity.

BACKGROUND & VOCABULARY

Background Information

The ocean supports a great diversity of marine ecosystems, including abyssal plain (deep sea coral, whale fall, brine pool), Antarctic, Arctic, coral reef, deep sea (abyssal water column), hydrothermal vent, kelp forest, mangrove, open ocean, rocky shore, salt marsh, mudflat, and sandy shore. Each ecosystem is comprised of unique physical characteristics and organisms specifically adapted to them. These features distinguish marine ecosystems from one another and determine their distribution throughout the oceans of the world.

Prior Knowledge

Recommended Prior Activities

- [Marine Food Chains and Biodiversity](#)
- [Marine Food Webs](#)

Vocabulary

Term	Part of Speech	Definition
abyssal plain	<i>noun</i>	extensive, featureless region of the deep ocean floor.
Antarctic	<i>noun</i>	region at Earth's extreme south, encompassed by the Antarctic Circle.
Arctic	<i>noun</i>	region at Earth's extreme north, encompassed by the Arctic Circle.
coral reef	<i>noun</i>	rocky ocean feature made up of millions of coral skeletons.
kelp forest	<i>noun</i>	underwater habitat filled with tall seaweeds known as kelp.
mangrove swamp	<i>noun</i>	coastal wetland dominated by mangrove trees, which have roots that can survive in salty water.
marine ecosystem	<i>noun</i>	community of living and nonliving things in the ocean.
mudflat	<i>noun</i>	coastal wetland formed as rivers or tides deposit sediment.
open ocean	<i>noun</i>	area of the ocean that does not border land.
salinity	<i>noun</i>	saltiness.
salt marsh	<i>noun</i>	coastal wetland that is flooded with seawater, often by tides.

For Further Exploration

Websites

- [U.S. Environmental Protection Agency: Oceans, Coasts, Estuaries, and Beaches](#)
- [Census of Marine Life: Investigating Marine Life](#)
- [National Geographic Education: National Teacher Leadership Academy \(NTLA\)](#)

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