

RESOURCE LIBRARY
ACTIVITY : 45 MINS

Coral Reefs: Ecosystems Full of Life

Students learn about reef ecology with a focus on biodiversity and symbiotic relationships in the coral reef ecosystem. They play a matching game to identify reef organisms and roles and they discuss human threats to coral reef health.

GRADES

3 - 5

SUBJECTS

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

CONTENTS

3 Images, 1 Video, 2 PDFs

OVERVIEW

Students learn about reef ecology with a focus on biodiversity and symbiotic relationships in the coral reef ecosystem. They play a matching game to identify reef organisms and roles and they discuss human threats to coral reef health.

For the complete activity with media resources, visit:

<http://www.nationalgeographic.org/activity/coral-reefs-ecosystems-full-of-life/>

DIRECTIONS

1. Activate students' prior knowledge.

Ask: *Have you ever heard the term biodiversity? If so, used in what context, or way? If not, what do you think it means?* Write the term on the board and model how to break the word into parts to understand its meaning. Explain that *bio* means "life" and *diversity* means "different types." Therefore, *biodiversity* means "different types of life." Tell students that

ecosystems with high biodiversity also show a high number of symbiotic relationships between the organisms that live there. Ask: *Have you ever heard the term symbiosis? If so, can you give an example? If not, what do you think it means?* Write the term on the board and model how to break the word into parts to understand its meaning, as you did with *biodiversity*. Explain that *sym* means "together" and *bio* means "life," so *symbiosis* means "life together," or "living together." To illustrate the concept of symbiosis, show students the two images in the Symbiotic Relationships photo gallery. If students have difficulty with the concept, give the example of students working together in a group to complete a task. Ask: *Can you think of any ecosystems that have high biodiversity and a lot of symbiotic relationships?* If students don't think of it on their own, prompt them to think of ocean ecosystems. Tell students they will watch a brief video about coral reef ecosystems.

2. Have students watch the National Geographic video "Coral Reefs."

Before the video, ask students to pay close attention to the number and variety of animals they see on the reef and the relationships between the animals. After the video, check students' comprehension. Ask:

- *Do coral reef ecosystems have high biodiversity? Explain.*
- *Do they show a lot of symbiotic relationships? Explain.*
- *What organisms did you see in the video?*
- *What examples of symbiotic relationships did you see in the video?*

3. Have students play a game to match reef creatures and reef roles.

Have students arrange their desks in four separate groups with room for eight to ten students in each group. Project the Coral Reef Ecosystem illustration on the board so all students can see it. Place one Coral Reef Illustration Key face down at each of the four locations. If there is an odd number of students, you will need to participate or have two students work as a buddy pair that counts as one student.

- First, randomly distribute a set of Reef Creature and Reef Role cards to each student in a group. Do this for all four groups. Explain that the "creature" cards name and describe different animals living on the coral reef. The "role" cards describe the roles and symbiotic relationships of different animals living on the reef.
- Ask students to carefully read the information provided on their cards. Ask them to re-read to make sure they know the content of their cards.

- Have students circulate the room in an organized manner. Students must share their card information with each classmate until they find the student that has the card that matches their own. Each creature card matches only one role card.
- Each time two students think they have matched their cards correctly, confirm their match. If they are not a match, have them rejoin the group until they find the correct match. If they are a match, instruct them to stay together as a pair and go to one of the four locations and sit until the rest of the class is finished. While they wait, have them look at the Coral Reef Ecosystem illustration and its key, identify their reef creature, and practice describing the role the organism plays in the reef ecosystem.
- Allow students to continue circulating until all pairs have correctly matched their cards and the pairs are in four different groups of approximately 8-10 students, or 4-5 pairs, each. Help students group themselves so that each location has a variety of creatures, not fish or invertebrates only.

4. Have students use the Coral Reef Ecosystem illustration to identify and discuss their reef creatures and roles.

If needed, give the pairs that finished last some additional time to look at the Coral Reef Ecosystem illustration and find their reef creature. Then have student pairs take turns identifying their reef creature on the projected illustration and describing to the rest of the class the role it plays in the coral reef ecosystem. To check for understanding, ask a non-presenting pair to draw a line connecting the presenting pair's reef creature to the place or creature on the diagram that represents the role, or symbiotic relationship, the presenting pair just described. Have students discuss reasons the reef creature's role is or is not an example of symbiosis. Support students with the discussion, as needed. Then revisit some of the same questions students discussed after the video. Ask: *Do coral reefs have high biodiversity? Do they show a lot of symbiotic relationships? Explain.* Ask students to support their answers with specific examples from the matching game.

5. Have students discuss human impacts to coral reefs.

Replay the video. Afterward, restate the narrator's conclusion:

"Coral reefs have been evolving for about 500 million years. But these days they are under threat. Global warming, pollution, and overfishing have contributed to their decline. Earnest efforts are under way to protect the world's reefs and restore them. Artificial reefs created from sunken ships and other manmade objects have shown some short-term promise, but man's impact on the environment continues to make the future of coral reefs uncertain."

Have a whole-class discussion about how humans may negatively affect coral reef ecosystems in terms of reef biodiversity and symbiotic relationships. Ask:

- *In the video, what were three ways humans harmed coral reefs?* (global warming, pollution, and overfishing)
- *What other ways could humans threaten the survival of coral reefs and the creatures living there?* (Responses will vary but may include different types of pollution such as trash, plastic, chemicals, or sediment; damage caused by snorkelers/divers; damage, such as anchors or groundings, caused by ships; and impacts from the aquarium trade.)

Informal Assessment

Assess students' ability to match their cards correctly and locate their creatures and their roles on the diagram. Check students' understanding by asking them to discuss their creatures' role in the ecosystem.

Extending the Learning

Review with students the vocabulary terms *vertebrate* and *invertebrate*. Have students identify and classify the coral reef organisms as vertebrates or invertebrates and discuss their characteristics in terms of structure and function.

OBJECTIVES

Subjects & Disciplines

Biology

- Ecology

Earth Science

- Oceanography
- English Language Arts

Geography

- Human Geography

Learning Objectives

Students will:

- define the vocabulary terms biodiversity and symbiosis
- identify several reef creatures and explain the role of each in coral reef ecosystems
- describe coral reef biodiversity and symbiosis and how human actions can threaten the health of coral reefs

Teaching Approach

- Learning-for-use

Teaching Methods

- Brainstorming
- Cooperative learning
- Discussions
- Reading

Skills Summary

This activity targets the following skills:

- 21st Century Student Outcomes
 - Learning and Innovation Skills
 - Communication and Collaboration
- Critical Thinking Skills
 - Applying
 - Understanding

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 8:**

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

NATIONAL SCIENCE EDUCATION STANDARDS

- **(5-8) Standard C-4:**

Populations and ecosystems

- **(5-8) Standard C-5:**

Diversity and adaptations of organisms

- **(K-4) Standard C-1:**

The characteristics of organisms

- **(K-4) Standard C-3:**

Organisms and environments

OCEAN LITERACY ESSENTIAL PRINCIPLES AND FUNDAMENTAL CONCEPTS

- **Principle 5d:**

Ocean biology provides many unique examples of life cycles, adaptations and important relationships among organisms (such as symbiosis, predator-prey dynamics and energy transfer) that do not occur on land.

Preparation

What You'll Need

MATERIALS YOU PROVIDE

- Paper
- Pencils
- Scissors

REQUIRED TECHNOLOGY

- Internet Access: Required
- Tech Setup: 1 computer per classroom, Projector, Speakers

PHYSICAL SPACE

- Classroom

SETUP

- Open space for movement

GROUPING

- Large-group instruction

OTHER NOTES

Before starting the activity, cut apart one set of Reef Creature and Reef Role Matching cards for each of the four groups.

BACKGROUND & VOCABULARY

Background Information

Coral reef ecosystems are amongst the most diverse and complex ecosystems on Earth. High biodiversity and interconnected relationships between reef organisms make these ecosystems vulnerable to threats caused by humans.

Prior Knowledge

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Recommended Prior Activities

- None

Vocabulary

Term	Part of Speech	Definition
biodiversity	<i>noun</i>	all the different kinds of living organisms within a given area.
coral reef	<i>noun</i>	rocky ocean features made up of millions of coral skeletons.
ecosystem	<i>noun</i>	community and interactions of living and nonliving things in an area.
global warming	<i>noun</i>	increase in the average temperature of the Earth's air and oceans.
invertebrate	<i>noun</i>	animal without a spine.
ocean	<i>noun</i>	large body of salt water that covers most of the Earth.
pollution	<i>noun</i>	introduction of harmful materials into the environment.
symbiosis	<i>noun</i>	two or more distinct organisms living together for the benefit of one or both.
vertebrate	<i>noun</i>	organism with a backbone or spine.

For Further Exploration

Websites

- [MarineBio: Marine Species Search Engine](#)
- [Encyclopedia of Life](#)
- [NOAA Coral Reef Conservation Program: Coral Facts](#)

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