

RESOURCE LIBRARY
ACTIVITY : 50 MINS

Ecological Relationships

Students watch videos and discuss ecological relationships with a focus on observing symbiosis. Then they classify the ecological relationships they observe as mutualism, commensalism, and parasitism.

GRADES

9 - 12+

SUBJECTS

Earth Science, Oceanography, Geography, Physical Geography

CONTENTS

4 Videos, 1 Image, 1 PDF

OVERVIEW

Students watch videos and discuss ecological relationships with a focus on observing symbiosis. Then they classify the ecological relationships they observe as mutualism, commensalism, and parasitism.

For the complete activity with media resources, visit:

<http://www.nationalgeographic.org/activity/ecological-relationships/>

DIRECTIONS

1. Introduce vocabulary terms related to ecological interactions and symbiosis.

Explain that in this activity students will use a series of videos, images, and scenarios to identify and discuss examples of ecological and symbiotic relationships in the ocean. Write the following terms on the board: *competition*, *predation*, *symbiosis*, *mutualism*, *commensalism*, and *parasitism*. Do not include the definitions yet. First, ask students to identify the root

words and brainstorm what types of ecological and symbiotic relationships the terms describe. Then, review the definitions of the terms. Point out that the term *symbiosis* is an overarching term for mutualism, commensalism, and parasitism and that the ecological relationships *predation* and *competition* are not generally considered to be symbiotic.

- **competition**—when two or more organisms rely on the same environmental resource
- **predation**—behavior of one animal feeding on another
- **symbiosis**—the close relationship of two dissimilar organisms
- **mutualism**—a symbiotic relationship where both organisms benefit
- **commensalism**—a symbiotic relationship where one organism benefits and one does not benefit but is unharmed
- **parasitism**—a symbiotic relationship where one organism benefits and one is harmed

2. Build background about National Geographic Crittercam.

Explain to students that they will watch footage from a National Geographic project called Crittercam. Crittercam's goal is to help researchers understand the day-to-day lives and ecological relationships of different species. Scientists fit wild animals with a GPS tracker and a combination video and audio recorder with environmental data instruments to measure such things as depth, temperature, and acceleration—which allow the study of animal behavior without interference by human observers. Ask students to think about the benefits of studying animal behavior and ecological interactions without interference by human observers.

3. Have students use a Crittercam video to identify ecological relationships.

Show students the National Geographic video “Fish Thieves Take Rare Seals’ Prey” (3.5 minutes), in which an endangered Hawaiian monk seal preys upon and competes for fish and invertebrates on the seafloor at 80 meters (262 feet) deep. Ask: *What is the ecological relationship between the monk seal and the octopus/eel/trigger fish? (predator/prey)* Ask: *What is the ecological relationship between the monk seal and the jacks/sharks? (competition)* Ask students to again think about and discuss the benefits of studying animal behavior and ecological interactions without interference by human observers. Elicit from students that Crittercam allows researchers to examine the behavior and interactions of marine species that they normally would be unable to observe.

4. Have students view videos to identify symbiotic relationships.

Show students the three videos of different marine species interactions. After each video, have the class identify and discuss the symbiotic relationships they observed.

- “Caribbean Cleaners” (2.5 minutes)—mutualism
- “Giving Fish a Bath” (5.5 minutes)—parasitism
- “Clownfish and Sea Anemone Partnership” (1.5 minutes)—mutualism

Ask: *What type of symbiotic relationship was not shown in the videos?* (commensalism)

5. Use a National Geographic image to explore commensalism and discuss the origins of Crittercam.

Display the image “lemon shark” in the resource carousel and have students observe it closely.

Ask: *Other than the shark, are there any other organisms you see?* Elicit from students that the shark and the remoras, the smaller fish below the shark, have a symbiotic relationship called *commensalism*, where the remoras benefit from holding onto the shark, but neither species is harmed. Tell students that this commensal relationship is why Greg Marshall, marine biologist and filmmaker, invented Crittercam. In 1986, a shark approached him during a dive near Belize. Marshall noticed a remora clinging to a shark, and as he watched the shark disappear, it occurred to him that if he could put a camera in the place of the remora, he could see the shark's behavior unfold without disturbing the shark. Explain that with Crittercam, Marshall learned that remoras attach themselves to predatory fish like sharks for two reasons: a free ride and protection due to hanging onto a feared predator. The shark is not affected in the process since remoras eat only leftover food from the shark.

6. Have students read statements and identify types of ecological interactions.

Give each student a copy of the Symbiotic Interactions worksheet. Read aloud the directions. Tell them that they should be able to provide reasons for their choices. Discuss the answers as a class. Have students explain why they classified the different scenarios as one type of symbiosis and not the others. Ask: *How do ecological relationships shape the marine ecosystem? Why is it important to identify and understand these relationships?*

Informal Assessment

Use the provided answer key to check students' completed worksheet for accuracy. Ask students to orally explain why they labeled each *mutualism*, *commensalism*, or *parasitism*.

Extending the Learning

Have students identify one new marine-related example for each of the ecological relationships discussed in this activity: *predation*, *competition*, *mutualism*, *commensalism*, and *parasitism*. Discuss the examples as a class.

OBJECTIVES

Subjects & Disciplines

Earth Science

- Oceanography

Geography

- Physical Geography

Learning Objectives

Students will:

- describe possible ecological relationships between species that live in close proximity to each other
- define symbiotic relationships as mutualistic, parasitic, or commensalistic
- classify symbiotic relationships

Teaching Approach

- Learning-for-use

Teaching Methods

- Discussions
- Hands-on learning
- Visual instruction

Skills Summary

This activity targets the following skills:

- Critical Thinking Skills
 - Analyzing
 - Applying
 - Remembering
 - Understanding
- Geographic Skills
 - Analyzing Geographic Information
 - Answering Geographic Questions

National Standards, Principles, and Practices

NATIONAL GEOGRAPHY STANDARDS

- 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 C-5:

Matter, energy, and organization in living systems

- (9-12) Standard C-6:

Behavior of organisms

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.

- 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.

- **Principle 5g:**

There are deep ocean ecosystems that are independent of energy from sunlight and photosynthetic organisms. Hydrothermal vents, submarine hot springs, and methane cold seeps rely only on chemical energy and chemosynthetic organisms to support life.

Preparation

What You’ll Need

MATERIALS YOU PROVIDE

- Pencils

REQUIRED TECHNOLOGY

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

PHYSICAL SPACE

- Classroom

GROUPING

- Large-group instruction

OTHER NOTES

Before starting the activity, download and queue up all of the videos.

BACKGROUND & VOCABULARY

Background Information

Symbiosis is an ecological relationship between two species that live in close proximity to each other. Organisms in symbiotic relationships have evolved to exploit a unique niche that another organism provides. These relationships are based on the advantages that can be gained by finding and using a previously unexploited niche. Competition and predation are ecological relationships but are not symbiotic. Predation does not occur over a long period of time, and competition is an indirect interaction over resources.

Prior Knowledge

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Recommended Prior Activities

- [Create an Imaginary Marine Ecosystem](#)
- [Marine Ecology Video Scavenger Hunt](#)

Vocabulary

Term	Part of Speech	Definition
commensalism	noun	relationship between organisms where one organism benefits from the association while not harming the other.
mutualism	noun	relationship between organisms of different species, in which both organisms benefit from the association.
parasitism	noun	relationship between organisms where one organism (a parasite) lives or feeds on the other, usually causing harm.
predator	noun	animal that hunts other animals for food.
prey	noun	animal that is hunted and eaten by other animals.
symbiosis	noun	two or more distinct organisms living together for the benefit of one or both.

For Further Exploration

Websites

- [National Geographic Education: National Teacher Leadership Academy \(NTLA\)](#)

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