

Wild Reef

HIGH SCHOOL TEACHER'S GUIDE



Grade: HIGH SCHOOL

Objectives:

Define biodiversity and identify examples of it in the Wild Reef exhibit.

Determine how humans depend on coral reefs and the effects we have on reef ecosystems.

Define how human impacts pose problems for coral reefs and how that affects humans.

Timing: 30 minutes at Shedd Aquarium

Materials: Printed activity sheet for each student

Introduction

Coral reefs are oases of life in the vast open ocean. They provide habitats to many types of organisms and are considered the most biodiverse ecosystems in the world. Unfortunately, due to many causes, corals are dying at an alarming rate. Conservation of these precious resources is vital to a healthy and thriving ocean. Corals are an important part of ocean life, and humans depend on them as well. Whether directly, for fishing, or indirectly, for climate stabilization, we need the corals and they need our protection.

Working toward these Next Generation Science Standards

HS-LS4.D. Biodiversity and humans: Biodiversity is increased by formation of new species and reduced by extinction. Humans depend on biodiversity but also have adverse impacts on it. Sustaining biodiversity is essential to supporting life on Earth.

HS-ESS3.C Human impacts on Earth's systems: Sustainability of human societies and the biodiversity that supports them requires responsible management of natural resources, including the development of technologies.

CCC Cause and effect: Changes in systems may have various causes that may not have equal effects.

SEP Asking questions and defining problems: Ask questions that arise from examining models or a theory to clarify and/or seek additional information and relationships.

Background information

Contrary to popular belief, corals are animals, not plants. What makes corals unique is that, unlike most animals, they make up the foundation level of food webs (this role is filled by plants in other ecosystems). Energy and matter are cycled through ecosystems when animals eat, produce waste, die and decompose. These processes can be represented by an energy pyramid or a food web. Every organism in an ecosystem plays an important role in keeping the ecosystem healthy, although organisms toward the bottom of the pyramid can have larger impacts on their ecosystem because they form the foundation.

Additional resources

<https://www.sheddaquarium.org/blog/2018/january/Night-Diving-for-Coral-Colonies-with-SECORE/>

Lesson Outline

Know before you go

- Energy and matter are cycled through ecosystems when animals eat, produce waste, die and decompose. This can be represented by an energy pyramid or a food web.
- Every organism in an ecosystem plays an important role in keeping the ecosystem healthy, although organisms toward the bottom of the pyramid can have larger impacts on their ecosystem because they form the foundation.

Explore at Shedd!

Humans need biodiversity to survive. We depend on many types of organisms for everything from food to clothing to building materials for shelter. Unfortunately, humans can have negative effects on biodiversity. Today we are going to investigate one of the most diverse and most ancient ecosystems in the world: the coral reef. We are going to determine three things: how humans benefit from healthy corals, what impacts humans have on them and what conservation efforts are being taken to protect these organisms.

- Read the information and use the Wild Reef exhibit to complete the table and reflection questions on page 1. (We recommend that students stop at this point and compare with a partner.)
- The reflection questions are where students really put it all together. We recommend that they share their thoughts with a partner or small group.

Optional classroom debrief questions

- How do humans benefit from corals? How do we harm them?
- All organisms are important components of their ecosystem, along with the energy and matter cycling between the two. But all species have different roles in an ecosystem. Based on the energy pyramid, why does decreasing the coral population have a larger effect on the ecosystem than reducing a specific species of fish?
- What questions do you have after today about the effects of coral reefs on ocean ecosystems?

Optional extension activities

- Option 1: Students research how the United States depends on corals, both for environmental stability and for economic resources. Students can use this information to ask additional questions and to clarify how coral reef ecosystems function.
- Option 2: Students perform an in-depth case study on coral reef food webs and energy pyramids. They can develop questions about how altering species' populations at different trophic levels affects the rest of the ecosystem.

Notes/considerations

Differentiation

- Eliminate answer choice A on the biodiversity question.
- Students are asked to find two ways humans have negatively impacted corals.

