

**CRS**

WWW.CRSCIENCE.ORG

COMMUNITY RESOURCES FOR SCIENCE

BASIS Lesson Plan

Lesson Name: Ocean Ecosystems & You!

Grade Level Connection(s)

NGSS Standards: Grade 5, Life Science; Grade 5, Physical Science

FOSS CA Edition: Grade 4, Life Science

**Note to teachers: Detailed standards connections can be found at the end of this lesson plan.*

Teaser/Overview

We are intricately connected to the oceans and the plants and animals that live within this ecosystem! In this hands-on lesson, students will first be introduced to food chains and food webs of the ocean and then use these concepts to explore how pollution and human activities can have negative impacts on these systems. We will end with a wrap-up discussion of positive steps we can take to ensure that our oceans stay healthy!

Lesson Objectives

- Students will discover the transfer of energy from the sun to plants and animals in the ocean through the concepts of food chains and food webs
- Students will learn about the importance of the sun, producers, and consumers in food chains and food webs
- Students will discover how some animals in the ocean are negatively impacted by trash and other pollution caused by humans

Vocabulary Words

- **Ecosystem:** the whole group of living and non-living things that make up an environment and affect each other
- **Food chain:** a series of organisms related by their feeding habits, the smallest being fed upon by a larger one, which in turn feeds a still larger one
- **Food web:** a group of multiple food chains in an ecosystem



- **Producer:** an organism that creates its own food using energy from the sun (i.e. plants)
- **Consumer:** an organism that eats another organism (plant or animal) to obtain energy
- **Conservation:** to protect, prevent waste, destruction, damage or neglect; planned management

Materials

Scientist Volunteers will bring:

Laminated cards with pictures of plants and animals of the ocean ecosystem (3 sets of 12 cards)

Yarn (3 spools)

Scissors (3 pairs)

Cups (model stomachs for students)

Black beans

Black beads

Tupperware containers (16 – one for each pair of students)

Small spoons (at least 16)

Laminated images of plastic bags, jellyfish, and plastic in bird stomachs

Materials teachers should provide:

Three areas in the classroom where one third of the class can each form a circle.

Classroom Set-Up

Students should be seated at their desks for the introduction to the lesson. Students should then be divided into three groups and each group will participate in the food web activity within these groups so if there are three somewhat cleared classroom spaces where one third of the class and a BASIS volunteer can comfortably fit, that would be ideal. Within these three groups, students will then work in pairs for the activity on plastics in the oceans. It would be helpful if students wear name tags during the lesson.

Classroom Visit

1. Introduction (10 minutes)

Role Model Introduction:

Being a role model for students is an important part of being a BASIS volunteer. Begin your lesson by introducing yourselves! Every team member should take a moment to explain who they are and what they study/do as a scientist. A bonus will be to tell your “story,” as if giving an elevator pitch to 10-year-olds: Why did you become a scientist? What made you interested in your topic? Why should students relate to you, or be interested in you? Feel free to draft a script of what you will say, here. And remember, you can also weave your story throughout your lesson through examples from your own life, and/or return to it with Q&A at the end.

Topic Introduction:

After you introduce yourselves as role models, take some time to introduce the topic of this lesson: *Ocean ecosystems and their connection to us and our daily lives*. It may be helpful to keep the suggested take-away in the back of your mind throughout the lesson: **Plants and animals (including humans!) are intricately connected to one another through food chains and food webs, where energy is transferred from one organism to another.**

Your topic introduction should follow the outline below. As much as possible, try to frame this information as questions posed to the class, rather than as a lecture. This helps activate students’ prior knowledge and facilitates student-guided discussion.

- Today we’re going to talk about how the oceans, plants, and animals rely on one another and are connected in different ways.
- First, turn to the person next to you and discuss what you ate for dinner last night [Think, pair, share].
- After a moment, gather a few answers from students.
- Take one example, write on the board, break down the meal into the simplest parts, and trace the pathway of the energy (e.g. If a student ate pizza, think about the sauce coming from tomatoes, the cheese comes from cows, and cows eat grass, grass gets energy from the sun)
- Why do we eat dinner? Or any food for that matter? [For energy!]
- We just traced the flow of energy that began with the sun and ultimately ended with you eating your dinner last night. Now we’re going to do an activity where we examine the flow of energy in an ocean ecosystem [define **ecosystem**]
- Do you think that humans are connected to the plants and animals in the oceans? Why or why not? Let’s do some science activities to figure it out!

2. Learning Experience (40 minutes)

Students will be split into three groups. Each group will participate in the same ecosystem food web activity that will be led by a BASIS volunteer. Staying in these groups, students should then for the “Plastic in the Ocean” activity. Remember that these activities are designed to address the take-away in a particular way: **Plants and animals (including humans!) are intricately connected to one another through food chains and food webs, where energy is transferred from one organism to another.**

Activity 1: Ocean Food webs

1. Designate an area for your “ecosystem” and have all students stand in a circle facing one another with their feet and shoulders touching (alternately, students can sit around their desks if arranged into clusters). Separate the three groups as much as possible from one another to minimize distractions.
2. Pass out plant and animal cards to each of the students in the group (each group should have the same set of cards). Have the students put the cards over their heads so they are hanging over their necks and facing outward so that their classmates can see all the cards.
3. Have students turn to their neighbor and think of one plant/animal in the circle that can eat them or that they can eat.
4. Then, starting from the sun (BASIS volunteer will play the role of the sun), holding a spool of yarn, help students pass the yarn from student to student, modeling a food chain. For example, the BASIS volunteer will hold the string, then pass the spool of yarn to the student with the phytoplankton card, who will hold onto the spool. The spool is then passed to the student with the zooplankton card, and so on. When the end of the food chain has been reached, cut the string. Emphasize that students must continue holding the string. Define **food chain** for students and discuss the roles of **producers** [define] and **consumers** [define].
5. Repeat the activity several times until each student is holding at least one string. Have the students hold the strings above their heads. What does this look like or remind them of? [Hopefully it should look somewhat like a web at this point] Lead a discussion about **food webs** [define] with the students.
6. Lead discussion with students about what would happen to the food chain and food webs if one of the species went extinct. Who is holding the most strings? Why? Who is holding the fewest strings? Why? Is the human connected to this ocean ecosystem? What role does he/she play?

Activity 2: Plastic in the Ocean

- In this activity students will understand what happens to plastics in the ocean and why they are harmful to these ecosystems
- The object of the activity is to collect as much “food” as possible in the time allotted. Because of the collection method and the short time allowed, some plastic will also be gathered.
- Students will work with the person sitting next to them.

- Students will have a container in front of them with black beans (“food”) and black plastic beads (“plastic garbage”) mixed into it. Students will “feed” for just 5 seconds, trying to get as much food as possible using small spoons and without spilling any. Each student should place the food into their cup (“stomach”). When time is up, students examine their cups to see how much real food vs plastic they “ate”.
- Next, students return all the plastic pieces to their cup (the “food” was released as excrement – collected by a BASIS volunteer), and repeat the feeding exercise. After 5 seconds, students will see that there is even more plastic than food in their model stomach.
- Repeat the activity a few more time (if time allows).
- Discuss what will happen to animals who encounter plastic alongside their food and show images. Make sure to leave time for discussion! What can students do to keep plastic out of our oceans?

3. Wrap Up: Review and Discuss the Learning Experience (5 minutes)

Have students rejoin you on the carpet for a wrap-up discussion.

- What is an ecosystem? What is a food chain vs a food web? What is a producer? What is a consumer?
- Where does the energy ultimately come from in each food chain and food web? Where is the source of all energy? [the sun!]
- What did we learn during the activities?

Prompt students to think about what other questions they would investigate in the future to understand ocean ecosystems and the human influence on those systems.

Make sure to discuss conservation efforts and what we can do to make a positive influence on our oceans!

4. Connections & Close (5 minutes)

If possible, tie lesson back into your research or role model story.

Close:

- Ask students if they have any questions about science or being a scientist
- Close with a good bye and a thank you, and encourage the kids to keep thinking about food chains, food webs, and our relationship with the ocean!
- Don’t forget to help clean up!

**CRS**

WWW.CRSCIENCE.ORG

COMMUNITY RESOURCES FOR SCIENCE

Follow Up: After the Presentation

Teachers who wish to extend the impact of this lesson may find the following CRS web pages useful:

- <http://www.crscience.org/educators/helpfulreports>
- <http://www.crscience.org/educators/treasuretrove>

Standards Connections

NGSS:

- Connections by topic
 - Life Science: 5. Matter and Energy in Organisms and Ecosystems
 - Physical Science: 5. Structure and Properties of Matter
- Connections by disciplinary core ideas
 - Life Science: 5-LS1. From Molecules to Organisms: Structure and Processes
 - Physical Science: 5-PS3. Energy
- Connections by scientific & engineering practices
 - 2. Developing and using models
 - 8. Obtaining, evaluating, and communicating information
- Connections by crosscutting concepts
 - 4. Systems and system models
 - 5. Energy and matter: flows, cycles, and conservation
- Connections by performance expectation
 - 5-LS2-1. Develop a model to describe the movement of matter among plants, animals, decomposers, and the environment.
 - 5-PS3-1. Use models to describe that energy in animals' food (used for body repair, growth, motion, and to maintain body warmth) was once energy from the sun.