Food Webs

Summary

In this activity, students will work in small groups to research and build a mobile representing an oceanic food web.

Objectives

At the conclusion of the lesson, students will be able to:

- explain the main concepts of food webs and food chains
- describe the role of animals, plants, and other organisms in cycling energy and matter through a food web
- demonstrate this energy cycle by constructing model food chains and food webs
- predict what might happen if one organism is removed from a food web

Time

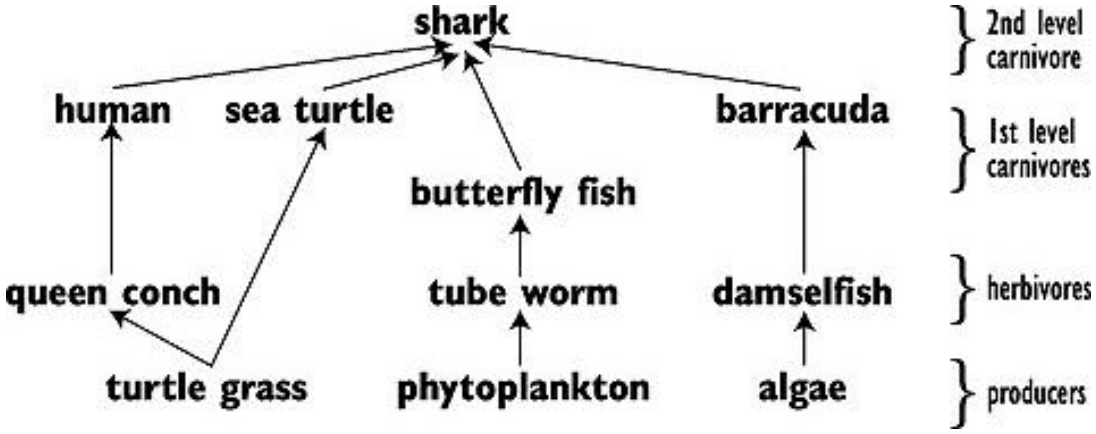
2 periods

Background

A food web describes the flowing cycle of energy within an ecosystem. In turn, each food web is made up of many food chains. While food webs consist of multiple interwoven feeding relationships, involving many animals eating more than one kind of food, a food chain is a simple line of feeding relationships between organisms, with each organism generally eating only one other in the chain.

Each step in a food chain is known as a trophic (or "feeding") level. The first trophic level consists of producers, such as seaweed and algae, that capture the sun's energy through photosynthesis, converting it into nutrients that can be used by themselves and other organisms. The second trophic level consists of primary consumers, like damselfish and queen conch, that gain energy (nutrients) by feeding on producers. Primary consumers are also known as herbivores, because they eat only plants. At the next trophic level are secondary consumers, like sea stars and grouper, which feed on primary consumers. Tertiary consumers can be found even further up the food chain and consist of larger consumers, like sharks or barracuda, that eat secondary consumers. Many secondary and tertiary consumers are carnivores, meaning that they eat only meat. However, some, like hawksbill turtles or hairy clinging crabs, are omnivores, meaning that they eat both plants and animals. Depending on the number of organisms in an ecosystem, and their food preferences, there can be varying numbers of further trophic levels, including both carnivores and omnivores in their ranks.

Scavengers and decomposers are two other important kinds of organisms, located at the base of every food web. Scavengers, including such organisms as spiny lobsters and shrimp, are essentially garbage collectors, feeding on others' leftovers and bits of dead organisms. Decomposers, including certain bacteria and fungi, break down nonliving organic matter into nutrients that can then reenter the food web, beginning the cycle of energy all over again.



Teacher s Notes

This is an engaging hands-on lesson that encourages cooperative work among students. In order for the activity to run smoothly, it is important for the teacher to gather the necessary resources and materials ahead of time to ensure that students have a wide variety of aquatic images to choose from.

Elementary: Depending on the age of your students, you may want to have a model prepared to help them understand the goal of the finished project.
Middle School and High School: To make the activity more challenging, consider giving each group of students an "incident" card—for example, one depicting overfishing or an oil spill—then asking the group to present a hypothesis about how that incident would affect the food web depicted in their mobile.

Vocabulary

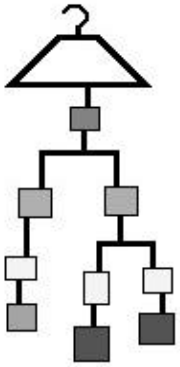
Carnivore, decomposer, food web, herbivore, omnivore, photosynthesis, scavenger, trophic level

Materials

Prepared photos of reef animals or marine wildlife magazines from which students can cut out their own images, reference books, scissors, wire hangers, yarn, straws or popsicle sticks, colored construction paper, scissors, hole-punchers; **Optional** "incident" cards (see Teacher's Notes for further information)

Procedure

1. As a class, discuss the various levels in a food chain from producer to top-level consumer. Use the information and the Eleutheran food chain diagram in the Background section, along with some of the suggested sources in the Resources section, to help provide your students with a basic understanding of food chains and food webs.
2. Divide students into food chain research teams and provide each team either with a prepared collection of pictures of organisms or several marine wildlife magazines from which to cut out images of underwater life.
3. Instruct students to sort the pictures into groups according to trophic level: producers, herbivores (primary consumers), carnivores (secondary and tertiary consumers), scavengers and decomposers.
4. Have students cut out and glue the images onto color-coded squares of construction paper. For example, glue producers on yellow paper, herbivores on green paper, carnivores on red paper, scavengers on orange paper, and decomposers on blue paper.
5. Provide each team of students with a wire hanger, yarn, straws or popsicle sticks, scissors and a hole-puncher, then have them construct a hanging mobile to show the food web relationships between their chosen organisms. Have students first punch holes in the top of each square, then link the squares together with yarn according to the corresponding organisms' trophic levels. Tertiary consumers should be at the top of the mobile, nearest to the hanger, while producers and decomposers should be at the bottom. If students have more than one organism at the same trophic level (e.g., a shark eats both barracuda and butterfly fish), they can use straws or popsicle sticks to "branch" the web, attaching one square to each end of the straw/stick and the yarn to the middle section.



Extend the Experience

Ask students to write a paragraph explaining what would happen to the other organisms if disease were to kill off one of the second-level carnivores in your food web. Which organisms would increase in population? Why? Which organisms would decrease in population? Why? What might happen over time if one species increases too much? (Think about how the population will obtain food.)