

# Algae: It Feeds, It Kills, It's Dying

**Subject:** Science

**Duration:** Several Class Periods

**Location:** Classroom / Outdoors

**Key Vocabulary:** Food chain, fertilizer, pyramid of numbers, mercury, periphyton, nutrients, biomagnification, contaminant

**Related Activities:** Alligator Hole Ecodrama; Create A Food Chain; Where Have Our Plants and Animals Gone?

**Florida Sunshine State Standards:** SC.4.L.17, SC.5.L.15, SC.6.L.14



**Objectives:** Students will be able to: 1) arrange an aquatic food chain in the Everglades, 2) explain how nutrients, in the form of fertilizer, can affect this food chain, and 3) demonstrate how contaminants, like mercury, can end up in our bodies.

**Method:** Students will learn about biomagnification up the food chain through a problem-solving activity that deals with mercury contamination.

**Background:** Periphyton (a combination of algae) is the base of the aquatic food chains in the Everglades. It is eaten by small animals, like insects and fish, that are, in turn, eaten by larger animals. The food chain is a flow of energy from the sun to the periphyton to plant eaters and ends with meat eaters.

Agricultural land to the north of Everglades National Park may be the source of pollution entering the park. High levels of nitrogen and phosphorus are believed to come from fertilizer run-off. High amounts of nitrogen and phosphorus can kill periphyton, which is adapted to low nutrient waters. In high nutrient waters the periphyton is replaced by green algae, which uses up all the dissolved oxygen in the water. The depletion of oxygen slowly kills the animals living in the water. Periphyton die-off will impact the rest of the food chain. Another pollutant that has been found in high concentrations in the Everglades is mercury. Although the source of the mercury has not been confirmed, it is found in things like paint, agricultural fungicides and in smoke from automobile exhaust and from garbage incinerators. Mercury finds its way through the food chain, causing problems for humans and other animals like the Florida panther. The amount of mercury in fish in the Everglades is so high now that people need to limit how many they eat.

## Materials

- Two one-gallon jars
- 3 x 5 cards
- 35 paper plates
- 35 marbles or stones
- Plant fertilizer
- Pond Life - Golden Guide Book, 1967, by Reid and Zim, New York: Golden Press.

## Suggested Procedure

### Activity 1:

1. Collect some periphyton (in an area where collecting is permitted) and put it into two one-gallon jars. Have the students examine it, looking for creatures living in it and feeding on it. The Pond Life book will help them identify critters.
2. Add a half cup of plant fertilizer to one jar and observe the results for several days. Discuss observations.

### Activity 2:

1. Review the definition of a food chain. Pass out 3 x 5 cards or pictures which are labeled - sun, algae, mosquito larva, mosquitofish, and alligator.
2. Ask the students to arrange the items in the order of an Everglades aquatic food chain. Review the concept of the pyramid of numbers in an ecosystem - that is, the idea that green plants, since they begin all food chains, make up the greatest mass in a habitat like a pond. They build the base of the pyramid and all other life survives from them. As you move up the pyramid, there are proportionally fewer numbers until you end up at the top.
3. Now explain to the students that they are going to help you set a banquet table for the Everglades aquatic food chain. They will be setting out the plates for the guests (food-chain members) arranged in the order of a pyramid of numbers.
4. Pass out 34 plates with no names labeled on them, but rather a color code to represent each organism, i.e. 18 green - algae, 9 red - mosquito larvae, 4 blue - mosquitofish, 2 yellow - bass, 1 black - alligator.
5. After the students have arranged the plates into a "food" pyramid, have them guess which plates represent which organisms. Ask them where the sun should fit at this banquet.
6. Finally, using marbles or stones, place two on each plate to symbolize the algae absorbing a trace amount of mercury from the water. Transfer the marbles up the pyramid to the top of the food chain. Who ends up with the highest accumulation of mercury?

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## Evaluation

What happened to the algae when fertilizer was added to it and why? Could this happen in the Everglades? How? What would this do to the Everglades food chains? Why did the alligator end up with a lot of mercury in his body? Could this happen to us? What could be done to prevent these problems? (Examples: recycle, reduce and reuse items so that we lessen our use of garbage incinerators; car pool, ride bicycles and walk to lessen the automobile exhaust; dispose of hazardous waste, like paints, properly) What can students do to help solve these problems? (Example: start a program to reduce the amount of garbage generated in your school.)



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