

The Good, the Bad, the Algae

Activity Description

In this activity, students will learn about what algae are and their beneficial and detrimental characteristics, and play a game that will show how an excess of algae can cause trouble for a body of water and the other organisms that live in it.

Take Home Message

Algae can be good and bad for an ecosystem. When they are good, they have many different uses, and when they are blooming, they can negatively affect other organisms.

Massachusetts Frameworks

Life Science

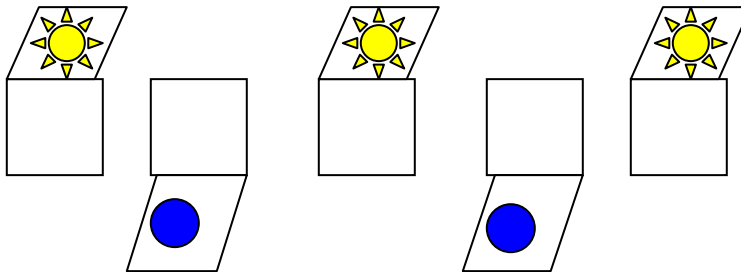
Adaptations of living things # 7 and #10

Supplies

- Enough chairs for a group (4-6)
- Plant/Animal placards for each student
- Suns and O's (O's for oxygen)

Set-Up

- Set up the chairs in a row with every other chair facing the opposite direction.



- Put a sun or an O on every chair

Script/Activity Procedure

- **Ask the students if they know what algae are and then if they think they're good, bad, or both.**
- **Discuss why they're good and how they can be bad:** (use as much or as little of the following information as you feel is suitable)
- Algae can sometimes be a problem: when they grow like a weed; or you may have heard of toxic blue-green algae, which can actually be lethal if an animal eats them. But did you know they also have many beneficial uses? Can anyone think what we use algae for?
 - Some people use seaweed as a garden mulch or plant fertilizer
 - Many people eat seaweed and other kinds of algae
 - Has anyone ever had sushi? It's wrapped in nori, a red algae
 - Many kinds of yogurts, ice cream and even some lunchmeat use a type of red algae called carrageenan as a thickener and stabilizer. (gelatinous extract of the Chondrus crispus seaweed)

- A really neat use is the creation of biofuel from algae. Can you imagine being able to run our cars or heat our homes with that? They are starting up companies right here on the Cape that are making algal biofuels.
- Algae also are an important part of the aquatic food chain. They provide a source of food for many fish and aquatic animals and make a nice home for them to hide and live in. **And there is one more VERY important thing that algae do: produce oxygen.**
- Do you know what photosynthesis is?
- Photosynthesis is the process that takes **sunlight**, CO₂, and water and transforms it into food for the plants, and oxygen.
 - Most algae are photosynthetic, so they make their own food. They also produce oxygen.
 - The fact that algae and aquatic plants produce oxygen is **very important** for other organisms that live in the water, like fish, because the oxygen that the plants produce is the oxygen that the fish breathe.
- **Now, we're going to play a game** to see what happens in a body of water where the ecosystem is balanced and everyone is happy. Give each student a picture card.
 - Four students: two students are algae, two minnows
 - Five Students: two algae, three minnows
 - Six Students: Three algae, three minnows
- Have the students circle around the chairs.
- The chairs should have as many sunlight chairs as there are algae, and as many oxygen chairs as there are minnows.
- Explain that all of the organisms need sunlight and oxygen to live, and so that's what the chairs represent in their pond. Algae need sunlight to live (photosynthesis) and minnows need oxygen to breathe, so algae have to get a sun chair and minnows must get an oxygen chair. Play the music, and when it stops everyone will get a seat. This is a healthy body of water: everyone has what they need.
- Now explain that there was a big storm, and a lot of fertilizer has washed into the pond from people's lawns. Ask them to predict what will happen. Then take away one of the minnow's seats (oxygen). The algae have started to bloom, so less sunlight is getting into the pond and oxygen is decreasing. (Can explain this stuff after letting them play one round, or now if you'd rather: information is below.)
- Play the music again. If one of the minnows is out, change them to algae because the algae are growing so much (although make it clear that when minnows die they don't turn into algae).
- **Now explain why fertilizer causes an algal bloom** and why that is bad (again, use as much or as little information as you see fit).
- Algae are very beneficial but too much algae can be harmful. Sometimes there is so much algae in a body of water that when the algae die, the decomposition processes use up so much oxygen that there is no more dissolved oxygen in the water. As more algae grow, the algae underneath them dies, and as they decompose they eat up more and more oxygen. (Can ask if they've been to D.O. the Limbo yet, and if so ask them if fish need more or less oxygen to live.) You can use your hands to illustrate this so they can see the layers. This constant cycle of more and more algae growing on top of the algae that are already there makes ponds look as thick as pea soup.
- Also explain that algae can take many forms, and sometimes they grow in mats along the surface of the water. As a result, **algae can share sunlight chairs**, because all the algae are at the top of the water, so they don't have to worry about diminished sunlight in the pond. (This can get confusing for the students, but the point is just that algae can share chairs.)

- **When there are too many algae, they can cause other plants' death by blocking sunlight from getting to the plants underneath the algae. Then, the plants die and decompose, and that decomposition process uses oxygen, furthering the oxygen depletion.**
- How does a water body get to the point where there is too much algae? What factors are making the algae grow?
- Has your group been to Fred the Fish or Enviroscope yet?
 - YES: So can you tell me something that commonly gets washed into the water from farms and yards? (**Fertilizer**)
 - NO: Well, a common substance that gets washed into the water from farms and yards is **fertilizer**
 - Just as fertilizer helps plants grow, it makes algae grow a lot too. (*Because algae is a plant*)
 - Explain that fertilizer is usually made of nitrogen and phosphorous, among other things. Plants use nitrogen to make plant proteins, and phosphorus for energy. When fertilizer washes into a body of water, the algae use it in the same way.
 - Phosphorous and nitrogen are two of the major causes of overgrowth of algae in ponds. They mostly come from fertilizer and detergents and are a huge problem in the United States.
- Some ecosystems can deal with an influx of nutrients like phosphorus and nitrogen. For example, in wetlands there are plants that can absorb nitrogen, so the water doesn't get overloaded with it. Nitrogen is always entering water, both naturally and from human sources like we just learned.
- **Now continue to play, removing an oxygen chair each round, until the algae take over.** There should be many algae in a few chairs, and one or no minnows left in the game.
- Explain that they have just witnessed an algal bloom. Because the algae grew so fast, the other organisms were not able to get enough sunlight or oxygen to live.
- Wrap up: what are ways we can prevent algal blooms?
 - Limit fertilizer use on your yard
 - Don't spread fertilizer before a big rainstorm
 - If you live on a body of water, plant some plants around it to help slow down run off/fix nitrogen
 - Plants that fix nitrogen include legumes
- **Stress the effects of fertilizer on algae and the water bodies.**
- *Make sure they understand that the algae don't use up all the oxygen, they actually produce oxygen. It's when the algae die and decompose, that's what uses up all the oxygen.

Clean Up

- Remember to collect organism cards
- Take suns and O's off of the chairs
- Return chairs to where they came from



September 01, 2010 2:00 AM

MASHPEE — For at least another year, the water in Santuit Pond is too green for swimming, health officials said.

This month, state environmental officials found that the water in Santuit Pond is too green for swimming. In previous cases, the algae can produce toxins that are below detectable levels.

The town is still urging people to stay out of the water until the water is clear. "You can't see the bottom," Harrington said.

Last week showed that the water in Santuit Pond is too green for swimming. The town has placed a swimming ban that has been in effect since last year.

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HER WYSOCKI

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September 01, 2010 2:00 AM

FALMOUTH — The water source of drinking water, has turned green because of an algae bloom. The water is not harmful and has not negatively impacted the quality of the water, but it is a nuisance. The state Department of Environmental Protection has issued a warning.

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