

N

utrients: TOO MUCH OF A GOOD THING

ACTIVITY DESCRIPTION:

Observe how nutrient enrichment occurs in our sounds.

OBJECTIVE:

- To gain an understanding of what nutrients are.
- To learn why excessive amounts of nutrients are bad.
- To sharpen skills in science, vocabulary, and language arts.

AGE GROUP:

Grades 6-8

MATERIALS:

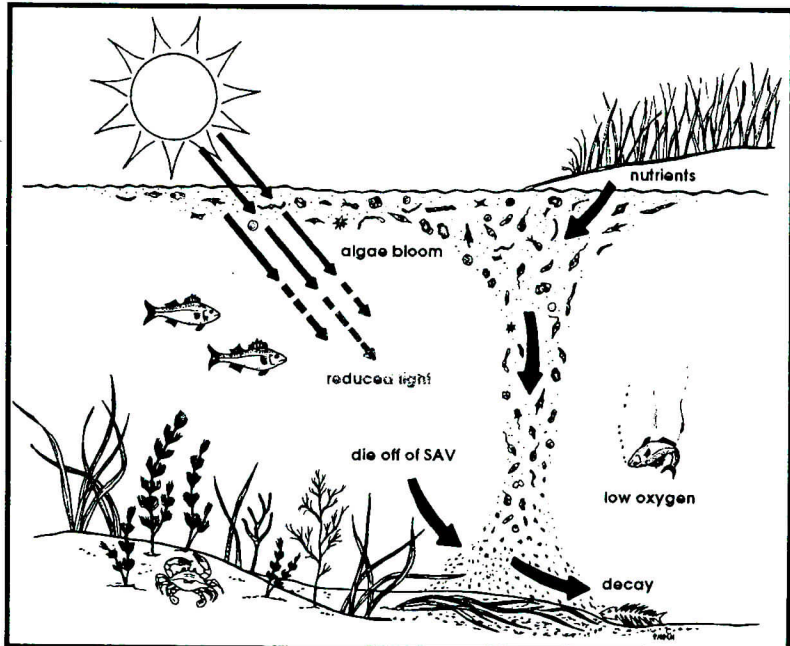
- 5 one-quart clear glass jars
 - plant food
- labels for the jars
 - 5 spoons
 - aluminum foil
- 1.5 gallons of water from a stream, pond, sound, or aquarium

Introduction:

Nutrients occur naturally in our soils and waters. They act as a fertilizer and are a necessity for plant growth. However like most things, they are harmful if they are present in excess amounts. Problems due to excessive amounts of nutrients occur in the Albemarle and Pamlico Sounds. The main purpose of this activity is to discuss and illustrate this problem.

Sound Soup!

The Albemarle-Pamlico Sound system is like a soup with many ingredients. The water has many chemicals dissolved in it, such as salt and nutrients. But just as too much pepper can turn a tasty soup into a terrible soup, too much of a particular chemical can harm our rivers and sounds. A current problem with the rivers is too many nutrients.



What Are Nutrients?

Nutrients are substances which help plants grow, much like vitamins help us grow. Two chemicals, nitrogen and phosphorus, are important to plant growth. Lawn and plant fertilizer and animal waste (including human sewage) contain nitrogen and phosphorus.

How Do Nutrients Get Into The Rivers?

Water which runs off the land into creeks and rivers can carry materials such as soil, toxic chemicals, and nutrients. When it rains, fertilizer and manure can be washed from fields and lawns into our streams.

Human waste is also a big problem. Some homes use septic systems to handle their sewage. But if the septic tank is not cared for, it can overflow with nutrient-rich sewage. In more populated areas, human waste is treated at sewage treatment plants to produce clean water. Some sewage treatment plants clean the water well before returning it to our rivers, but some do not. These rivers, often containing nutrients, eventually flow into the Sounds.

What Is Wrong With Nutrients?

Once the nutrients are in the Sounds, they help plants grow. But too many nutrients mean too much plant growth, especially of algae (microscopic floating plants). When there is too much algae,

the water becomes cloudy and blocks light to underwater grasses, which are called submerged aquatic vegetation (SAV). Algae can also grow on SAV leaves, like moss on a tree. However too much algae can further block light and kill the grasses. SAV is very important to many Sounds animals for food and shelter. Without SAV, the ducks, fish, crabs and other animals are in trouble.

All these algae cannot live forever. When they die and decompose, they use up a lot of oxygen in the water. This causes more problems for animals living in the water. They need oxygen just like we do to breathe. If too much oxygen is used, the animals can suffocate. You may have seen dead fish floating in green water during the summer.

Saving The Sounds!

People are now trying to save the Sounds by reducing the amount of nutrients which enter them. This involves responsible and limited use of fertilizers, proper treatment of sewage, and preventive measures to keep farm animal waste out of streams. There is still a lot of work ahead, but hopefully we can restore the health and wealth of the Albemarle and Pamlico Sounds.

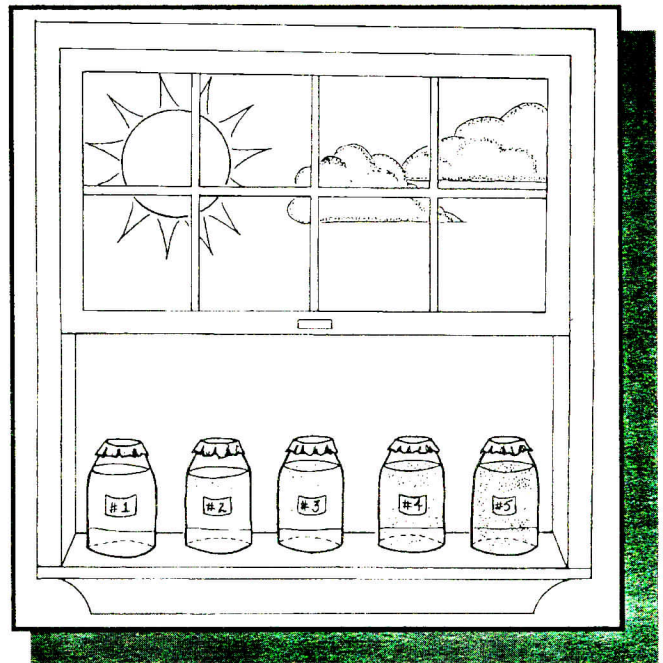
Algae Soup!

You can be a scientist and see what happens when there are too many nutrients in the water by creating Mini-Sounds in glass jars and testing the effects of different amounts of nutrients on algae growth.

Wash the jars, making sure to rinse them well. Fill a jar with tap water, label it "#1 - tap water" and set it aside. Fill the other jars with the water collected from a stream, pond, sound, or aquarium. Label one of these jars "#2 - no nutrients added" and set it aside.

Following the directions on the plant food label, mix enough fertilizer with the water in jar #3 to make a "regular solution" and label it as such. In jar #4, mix three times the regular amount of fertilizer and label it accordingly. In jar #5, mix a solution six times stronger than normal and correctly label it. Cover the jars lightly with foil to prevent water evaporation. Place all your jars in a sunny place at normal room temperature (but not in direct sunlight which will heat the water). Every

two days, stir the water and check for algae growth. Tip the jar so you can see if any algae is growing on the glass. It will look like a thin grey or green film. Be patient; if your sample had only a little algae in it, it may take weeks for the algae to become visible.



Do all five jars look the same? Which jar has more algae? Does the water look cloudy? What happens after 1 week? After several weeks? Does the amount of fertilizer seem to have an effect? These are good things to notice while you observe the jars. We would expect that there would be more algae in the jars with more nutrients. There may be a leveling off of algae density at the higher nutrient samples, since algae can only grow so fast. In nature, over-enriched bodies of water produce too much algae. As these algae die they use oxygen to decompose. This is unhealthy for fish, plants and other animals. Look at a drop of water from each jar under a microscope or magnifying glass. Do you see any small creatures? How do the numbers of animals differ with the varying amounts of nutrients in the jars?

Illustrations by Sandra Koch