

 Elementary School: Grades 3-5

* Description:

 Students will first learn about four major pollutants of the Chesapeake Bay which include toxic, sediment, nutrient and bacterial pollution. The teacher will write these four types on the board and discuss with students the major causes of each type of pollution such as runoff, pesticides from farms or gas from boats. Students will then write down how they think pollution affects others. Oyster shells will then be passed around the class for students to touch, and they will learn that species such as oysters help to filter the bay and keep it clean.

* This lesson will address the following standards of learning:

*Science:*

*3.1j; 3.7.d; 4.1.a; 4.5.f; 4.8.a; 4.8.b; 5.7.f; 6.5.g; 6.7.a; 6.7.f*

Objectives:
Students will:

* Learn the difference between the four types of water pollutants
* Create examples of pollution
* Infer how humans pollute water
* Understand how pollution affects others
* Learn about oysters and how they clean the bay

Duration: 30 minutes

* One piece of paper and a writing utensil for each student
* Oyster shells that are provided
* One Chesapeake Bay animal themed coloring sheet per student

 Teacher Background:

 Pollution can be put into four major types which include-

Toxic: This form of pollution consists of chemicals that poison organisms in the water. High toxic pollution can often cause fishing for human consumption to be banned as fish that have taken in these toxins can be eaten and cause sickness. Toxic pollution comes in many forms including pesticides, gasoline and oil, cleaning products, industrial waste chemicals, and car exhaust.

Sediment: This pollution consists of dirt, minerals and silt being eroded from land and washing into the water and comes from areas lacking vegetation to prevent runoff. Sediment is seen in particles floating on top of the water and causes cloudiness in rivers and in the bay. This is problematic because underwater plants can’t get enough sunlight so they can’t provide food and oxygen for underwater animals. These sedimentary particles also clog the gills of crabs and fish and bury fish eggs so they cannot hatch, along with covering oyster beds.

Nutrient: Nutrient pollution results from too much nitrogen and phosphorus in the water. Living things need nutrients but an overabundance causes overgrowth of algae and other vascular plants. This algae also clouds the water so plants can’t get sunlight, and when these plants die the bacteria that decomposes them uses up all of the dissolved oxygen. Sources of this pollution include sewage overflow, factory discharge, car exhaust, animal manure, household detergents, boat toilet discharge and fertilizers.

Bacterial: This form of pollution occurs with an excess of harmful bacteria, there is good bacteria in the water, but bad bacteria in great amounts can cause illness or kill organisms such as fish and even humans when ingested. These harmful bacteria come from sewage treatment plants, leakage from septic tanks, and animal manure from farm.

Lesson:

1. Write the four types of pollution on the board in columns and explain each one to students. Talk about the causes of each type of pollution.
2. Ask the students to repeat to you the causes of each type of pollution and write the answers of the students in the corresponding columns on the board. Ask them if they can brainstorm any other causes and write them up.
3. Have the students get out a piece of paper and spend 5 to 10 minutes writing about how pollution is bad and how it affects people. Examples might include beaches closing, people getting sick, or fisherman losing their jobs because of poisoned fish.
4. Allow students to share their thoughts with the class.
5. Once the discussion has ended, pass around oyster shells to the class.
6. Explain how oysters help to filter the water, by each eating 50 gallons of plankton, algae and other pollutants and nutrients a day. After the oysters consume the particles in the water, they release the water in a cleaner form. More oysters equal a better filtered and cleaner bay.
7. Pass out the coloring sheets to students, and if time permits, allow the students to color the different Chesapeake Bay animals that are affected by pollution.
8. What are the four main causes of pollution in the Chesapeake Bay?
9. What types of wastes add to these pollutants of the water? (Some examples would be sewage overflow and fertilizers.)
10. How does polluted water affect the bay’s inhabitants, fish and humans?
11. How to oysters help to clean the bay?

