

## Teachers' Activity

### Who Dirtied the Water?

(Courtesy of the National Marine Educators Association)

Purpose: To graphically illustrate what has happened to Great Bay, New Hampshire and other estuaries. Note: This activity can easily be adjusted to any body of water, fresh or salt, with a little background research (have your students do this) and ingenuity.

Grade Level: Elementary, however, we have seen it work at all levels

Integration: Science, environmental science, social studies, language arts

Materials: Clear container, stirrer, small labeled film canisters or Baggies containing the pollutants below.

Pollution Supplies:

- Shells (any kind, ground)
- Soil
- Fertilizers (green drink powder)
- Flour
- Chemicals (red drink powder)
- Bark, wood, sawdust
- Pesticides (baking soda)
- Dead fish (Goldfish crackers)
- Sewage (raisins and toilet paper)
- Phosphate soap (dishwashing soap)
- Trash
- Rubber bands
- Oil (cocoa and vegetable oil)

Procedure: Hand out clearly labeled canisters to students. As the moderator tells the story of the body of water, students listen for the pollutant labeled on their canister. When theirs is mentioned, the moderator pauses and the students dump the pollutant into the clear container of water and stirs.

#### The Story of "Between Land"

This is the story of an estuary that was named "Between Land" by the Native Americans. They lived along its shores and hunted and fished. Sometimes the **shells of the oysters** they ate washed into the water; but it wasn't much.

The Native Americans built their camps on higher ground next to the estuary because they knew that even in a heavy rain storm the salt marsh grasses would soak up the runoff like a sponge and keep their camp from flooding. They cleared small plots of land for gardens.

Then European settlers came. They cut down the trees along the shoreline to open up land for farming. **Soil** washed into the bay because there were no longer trees to hold it back.

Farmers grew crops along the shoreline and used **fertilizers** to help grow corn, potatoes, strawberries, etc.

Along the banks of a stream that flowed into the estuary, a miller built a dam to harness water power to turn the water wheel in his mill. He and his workers used the energy of the water to power machinery to grind corn. Some of the **flour** got into the water.

Nearby, a tanner used strong **chemicals** to turn hides into leather. Some of the chemicals washed into the bay.

A shipbuilder used the water to carry logs to a sawmill and a boatyard to build ships. Some of the **bark, wood, and sawdust** sank to the bottom and decayed.

Bacteria that attached the wood and sawdust used up a lot of oxygen in the water that the fish needed. Many of the **fish** died and floated in the water.

Soon other residents built houses along the shore. They dumped their **sewage** into the water.

At first the bacteria in the mud could absorb and clean up the sewage. But before long, too much sewage overloaded the estuary's ability to break it down into nutrients that plants could use to grow.

One of the residents was a gardener who was very proud of her roses and large lawn stretching to the water's edge. She used **pesticides** to keep the bugs and weeds away.

Next door whenever a driver washed his car, he didn't notice that all the **phosphate soap** ran down his driveway and into the water.

Some picnickers were enjoying watching hawks circle on air currents above the Great Bay. A sudden storm came up and some of the **trash** from their picnic was carried out over the mudflats.

A lobsterman was hauling traps aboard his boat. A box of **rubber bands** that he used to peg the claws of his catch blew overboard into the water.

In Portsmouth, a tanker captain was unloading fuel oil. He failed to notice that some of the oil spilled into the harbor. Tides and currents carried the **oil** up the Piscataqua River and into Great Bay.

Then one day a sailor went out on the estuary in his sailboat and discovered that it wasn't clean and clear anymore.

"Who polluted this water?!" he cried. Students answer, "We all did!"



## **Teachers Activity...cont'd from pg. 7**

### **Extensions**

- Brainstorm other pollution not mentioned in this story. Examples: Gasoline, plastic fishing lines, helium balloons, overflow from sewage treatment plants, phantom lobster traps, tires, etc.
- Discuss point and nonpoint pollution. Have students graph by category the different types of pollution in the story.
- Discuss phosphorus pollution and eutrophication. Decide which types of pollution added to nutrient charge and effects.
- Have students write a newsletter about their local body of water. Research its health and decide what measures need to be taken to keep it health or clean it up. Bring community decision-makers into the classroom for discussion of responsible action.

*This activity was adapted from the Gulf of Maine Aquarium's Keep it Clean program and the Great Bay Estuarine Research Reserve's It's All Connected integrated elementary curriculum.*

*Contributors: Mary Cerullo, Jeanne Meggison, Peter Wellenberger.*