

## Who Polluted the River?

**Science SOLs Addressed:** K.5, K.10, 1.8, 2.8, 3.6, 3.8, 3.9, 3.10, 3.11, 4.5, 4.8, 5.7, 6.5, 6.7, 6.9, LS11, LS.12, ES.7, ES.9

**Time Needed:** 30 Minutes

**Summary:** Using a model to represent the River, Bay or another local body of water, students participate in an interactive story dramatizing how, as populations increase and resource use changes, a water body becomes polluted. This graphic example demonstrates that we are all part of the pollution problem, and that we all must be a part of the solution. Students will discuss ways to conserve our valuable resources and how each of us can reduce pollution, trash and waste each day.

### Objectives

Students will:

- List the principle pollutions in our nation's waterways and identify sources of pollution
- Draw connections between individual actions and results at the community level
- Discuss the positive actions that can be taken to help conserve resources and prevent pollution.
- Realize that protecting the environment is not a one-time event, but requires ongoing changes in some daily habits.

### Materials:

- 1 clear container of water for every 10 - 15 students
- 1 labeled black plastic film canister per student
- Canister ingredients (all are safe for students to handle)

CANISTER LABEL	CANISTER INGREDIENT
Trees	Oregano or Parsley Flakes
Construction Site	Soil (dry, clayish) or cocoa or cinnamon
Person Fishing	Fishing line or dental floss
Farmers	Baking Soda
Gardeners	Baking Soda
Beach Party	Assorted Litter
Family Picnic	Assorted Litter
Barnyard	Cat Litter
Washing the Car	Soapy Water
Antifreeze	Water with Blue-Green Kool-aid
Mystery Liquid	Water and Soy Sauce
Homeowner	Water, Orange Kool-Aid and Toilet Paper/Tissues
Electricity Plant	Vinegar
Commuters	Vinegar and Vegetable Oil
Motorboat	Vinegar and Vegetable Oil

Dry Ingredients: Fill canister halfway full with dry ingredients listed above

Liquid Ingredients: Fill canister 2/3 full with liquid ingredients listed above

**Procedure:**

1. Prepare and label the canisters as described in the materials section, enough for each student to have one canister. For each 15 students, fill one clear container with water nearly to the top.
2. Distribute one canister to each student. Instruct them to keep the canister closed and upright. The students should also be told not to reveal the identities of their canisters at this point.
3. Explain that you will tell a story about the river (water body) and that each one of them will play a part in the story. When they hear the name of the character listed on their canister in the story, they should open their canister, and empty its contents into the container (representing the water body).
4. Read the story on the next pages. Pause after each question to give students time to think and respond. After the story has been read, use the following questions for a follow up discussion.

**Discussion Questions:**

1. Who polluted the river or whatever water body you are describing? (everyone one played a role)
2. What effect did the increasing population have on the water quality? (More people meant less wetlands and trees – which filter water, there were more vehicles, there was less open space, etc.)
3. Can you think of any ways that population increases have helped the bay? (Higher population densities led to more efficient use of resources, stronger environmental laws, public resources like sewage treatment plants, etc.)
4. Think about the pollution in your canister. Could something be done to prevent that type of pollutant from entering the water? How? (Go around the group and let each student address the pollutant in their canister.)
5. Challenge students to come up with ways to clean up the water in the container, after all, everything has to go somewhere. (Solids can be strained out. They may also find filters or absorbent cotton helpful.)
6. Once this type of pollution has entered the bay, how can we get it out? How can we clean up the river (bay)? Do they think it is easier to prevent pollution or to clean it up later? Have them explain their ideas.
7. What could each of us do to help improve the health of our bay (river) by preventing some of this pollution? (Possible answers include: biking or walking instead of driving, conserving water, picking up litter, pulling weeds instead of spraying them, install bat boxes to control insects instead of using insecticides, etc).

## Who Polluted the River?

For many thousands of years, people have lived on the banks of the River. They hunted in the forests, harvested foods from wetlands, and caught fish from the river.

- Imagine that a Native American took the container of water in front of you from the river 500 years ago. How does it look to you?
- Would you drink this water? Would you eat the fish from this water? Would you swim in this water?

One of the first explorers to visit the river kept a journal of his discoveries. He wrote about the Native American villages, the rivers and streams and the “sweet water”, and seeing so many fish that he and his crew tried to scoop them out with a frying pan.

Soon people began to arrive. They found fertile land for farming, forests full of wildlife, and a river that provided plenty of food. It was an outstanding environment for settlement, and the people prospered.

The river has changed a lot since it was first explored. This is a story of those changes. Listen for the name of the character printed on your canister. When you hear your character named, open the canister, and dump its contents into the river.

Years went by, and occasional storms drenched the area. High winds whipped through the **TREES** and blew leaves into the water.

Gradually, towns started to grow along the banks of the river. Developers cleared wetlands and forests to build houses and businesses. Rains washed loosened soil from **CONSTRUCTION SITES** into the river.

At first, towns were small. Upstream, **FARMERS** planted crops to feed the towns' growing population. Some of those crops grew right up to the river, and fertilizer washed off the land and into the water. Other farmers kept pigs, cows, and other animals in their **BARNYARDS**. As rainwater drained out of the barnyard, it carried some of the manure into a little creek behind the farm. The creek flows to the river.

As the towns grew, more and more people began to move to the nearby countryside. These country homes are not connected to the city sewer system. Wastewater (elaborate on wastewater) from these homes flows into the septic tanks under the ground. One **HOMEOWNER** has not maintained the septic tank, and poorly treated sewage seeped into the river.

To meet the electricity needs of the towns; area officials decided that they would need to generate more power. To burn coal and produce power, an **ELECTRIC POWER PLANT** was build along the river. Gases coming out of the smokestacks combine with moisture in the air to form acids. The pollution falls back to the earth as acid rain or smog.

Traffic congestion can also be a problem for **COMMUTERS** and truck drivers who drive to and from work. Exhaust fumes, just like power plant emissions, can cause acid rain. If a vehicle is not kept in good repair, it might also leak oil or other fluids, which will wash off the pavement and into the bay with the next rain.

And how do the residents of the town and surrounding areas spend their time? In one neighborhood, a lot of **GARDENERS** are out working in their yards. Some of them are using weed killer and insect spray to keep the lawns pretty. The next rain will wash some of these into a little creek nearby and into the river.

One father is teaching his daughter how to change the **ANTIFREEZE** in the family truck. They pour out the used antifreeze into the driveway. Antifreeze is sweet tasting and can poison animals in they drink it. It can also get into the nearby creek and poison fish.

Nearby, a boy is **WASHING THE CAR**. The soapy water rushes down into the driveway into the storm drain; the storm drain empties into the river. The grease and grime on a car contains asphalt from the roads, asbestos from the brakes, rubber particles from the tires, toxic metals, and rust. If the boy had gone to the local car wash, the water would have been treated before it returned to the river.

Next door, a family is cleaning out their garage. They find an old rusty can with a tattered skull and crossbones label still stuck on it. What could it be? It looks dangerous, and they want to get rid of it before someone gets hurt. But how? Junior gets an idea: "Let's pour it down the drain by the curb!" So the **MYSTERY LIQUID** goes down the storm drain. The poison is out of site, but it is headed to the river.

On nice days, many people head down to the river. Some zoom all around in **MOTORBOATS** and don't notice that a little oil leaks into the water. A group of friends have spread blankets on the shore for a **BEACH PARTY**. Lots of families are **PICNICING** in the parks too. Some of these people have left trash on the shore. With the next storm, that trash will wash into the river. One the shore, a **PERSON FISHING** snags a hook on a log and breaks off the nylon fishing line.

- Would you drink this water now?
- Would you swim or boat in it?
- Is it healthy for fish or other wildlife?