

## Lesson 24

# Unidentified Sources

What is the difference between point source pollution and non-point source pollution?  
How can non-point source pollution be prevented from flowing into the waterways?

**GOAL** To understand that non-point source pollution is not easily identifiable

**OBJECTIVES** Students will:

- ✓ examine potential sources of non-point source pollution
- ✓ read “pollution” scenarios
- ✓ determine the source of “pollution”

**MATERIALS** scenarios, paper, pencils

### CORE CURRICULUM CONTENT STANDARDS

- Language Arts 1(13), 2(2,4), 3(3)
- Science 1(1,2,5,6), 6(4), 7(5,6,7), 8(2-4,6), 14(1)
- Social Studies 3(5), 6(3-5), 8(3), 9(5), 11(1,4), 12(3,5), 13(2,4)

**VOCABULARY** point source pollution, non-point source pollution, pollution, improper disposal, leakage, acid deposition, sediment, hazardous

### PROCEDURES

1. Begin by asking students if they know the difference between point source pollution and non point source pollution. ( *point source - identifiable source of pollution; non-point source pollution - non-identifiable source of pollution* )
2. Ask for examples of each. (*point source – factory, oil spill; non-point – see list below*)
3. Explain that rain or precipitation that falls to the ground, runs-off over the soil to the waterways. Pollution can mix with the run-off and potentially seep into the soil, surface and ground waters.
4. Examples of non-point source pollution to be discussed with students:
  - a. **motor oil** – improper disposal or leakage of motor oil can seriously pollute ground water and surface waters. It can kill plants, smother animals and contaminate fish and drinking water.
  - b. **acid rain or deposition** – when rain, snow or dry particles from the atmosphere is more acidic than normal (normal is usually a pH of 5.6). Carbon dioxide combines with the water droplets to form carbonic acid. Sources can stem from the burning of fossil fuels, such as oil, and emissions from industry and cars. Acid rain can contribute to the depletion of nutrients in the soil and the addition of metals into the water.
  - c. **animal wastes** – livestock, pets and concentrated populations of wildlife can cause diseases in the water.
  - d. **excessive nutrients** – oversupply of nitrogen and phosphorous can come from leaking septic tanks, fertilizers or manure from farms and lawns, sewage, laundry detergents and some grass clippings and leaves.

- e. **household hazardous waste** – toxic or poisonous substances in the home, such as gasoline, nail polish remover, paints, and oven cleaners should not be dumped down sinks or drains.
  - f. **litter** – roadside trash, unswept parking lots, and wind blown trash can cause hazards to wildlife and contamination of waterways.
  - g. **pesticides** – these substances contain chemicals that are used agriculturally (farms) and on lawns. The chemicals harm both the environment (soil) and can also impact human health.
  - h. **road salts** – used to de-ice highway surfaces, parking lot pavements and other road surfaces and paved areas. Too much going into waterways can change the salinity of water that support certain animals and plants.
  - i. **sediment** – tiny soil and rock particles are carried away by rain into the waterways, increasing turbidity and reducing light penetration; sedimentation can occur as a result of erosion.
  - j. **toxic metals** – metals such as mercury, nickel, zinc and lead are toxic to human organisms because they can accumulate and become concentrated in the body. The metals can originate from cars, industry and pesticide misuse.
5. Have students read the following scenarios and determine potential sources of pollution in the waterway. Sources of pollution may be point or non-point source pollution.
- a. The area in the watershed is not very developed. Woodland stretches over much of this area and covers the hills that rise up from the valley. The river meanders around forested land, farms and pastures. Several of the towns in this section have had increases in populations because of the desire to relocate to such a scenic area. When the river was last monitored, higher levels of turbidity were recorded. The amount of macroinvertebrates declined and a noticeable amount of sediment run-off in the stream was prevalent

Have students answer the following questions:

What can account for the changes in water quality and why?  
What is happening in this section of the watershed?  
What is happening in the town(s)?

- b. The area is developing into a prosperous business district. Business entrepreneurs have created a hub of retail stores, restaurants, and theaters for the public to patronize. The new stores are situated in what was formerly known as the old warehouse district. Located on the river, patrons can enjoy the view of the boats from the renovated factories. Upstream from this center is an old sewage treatment plant and a state of the art trash to energy facility. When the water was last monitored, there was an increase in nitrates and phosphorous in the water as well as a lower pH, indicating increases in water acidity.

Ask students the following questions:

What can account for the changes in water quality and why?  
What is happening in this area and what impact is it having on the watershed?  
Is there more than one source of pollution?

## EXTENSIONS

1. Simulate “polluting” a river or stream by filling up canisters with “sources of pollution”. Have students pour water into a large plastic container. Then, have each student group “pollute” the waters with different items, such as green food coloring symbolizing fertilizer. Other examples consist of balsamic vinegar for oil, vegetable oil for pollution, mustard for factory wastes, sand for sediments, etc. Discuss when contaminants are thrown into the river the concentration is higher, when there is more than one polluter or type of pollution.

## RESOURCES

Haskin, Kathleen M., *The Ways of the Watersheds: An Educators Guide to the Environmental and Cultural Dynamics of New York City's Water Supplies*, 1995, Claryville, NY: The Frost Valley YMCA

## GLOSSARY

**acid deposition** - acidic pollutants that can be deposited from the atmosphere where industrial gas emissions combine with water

**hazardous** - a substance, such as an industrial byproduct, that is potentially damaging to the environment and harmful to humans and other living organisms

**improper disposal** - the act or process of getting rid of something and not conforming to legality, moral law or social convention

**leakage** - the unwanted discharge of a fluid from some container

**non-point source pollution** - pollution caused by rainfall or snowmelt moving over and through the ground; as the runoff moves, it picks up and carries away natural and human-made pollutants; finally depositing them into lakes, rivers, wetlands, coastal waters, and even our underground sources of drinking water

**point source pollution** - pollution from industrial and sewage treatment plants with an identifiable source

**pollution** - the state of being contaminated with harmful substances

**sediment** - fine soil or mineral particles, resulting from the run-off from the land, which either settle to the bottom of a water body or are suspended in the water