

# Name That Source

**Adapted from:** “Name That Source” in Environmental Resource Guide: Nonpoint Source Pollution Prevention. Air & Waste Management Association, 1992.

**Grade Level:** Basic

**Duration:** 30 minutes

**Setting:** classroom

**Summary:** Student teams race to determine if a photo shows point or nonpoint source pollution.

**Objectives:** Students will be able to differentiate between point and nonpoint sources.

**Vocabulary:** water pollution, point source pollution, nonpoint source pollution

**Related Module Resources:**

Additional Module Resources Fact Sheets:

- “Nonpoint Source Water Pollution (Nemo Project Fact Sheet)”
- “Nonpoint Source Pollution: The Nation’s Largest Water Quality Problem”
- “What is Nonpoint Source (NPS) Pollution? Questions and Answers”
- “A Pervasive Problem”
- “Nonpoint Source Pollution Publications and Projects”
- “More Examples of What You Can Do to Prevent Nonpoint Source Pollution”
- “Opportunities for Public Involvement in Nonpoint Source Pollution Control”
- “Programs for Nonpoint Source Control”

**Materials (Included in Module):**

- 33 Pollution Source photos [Name That Source Module Activity Envelope]
- 6 Point Source and 6 Nonpoint Source cards [Name That Source Module Activity Envelope]
- Point/Non-Point Source Photos on CD-ROM [Name That Source Module Activity Envelope]

**Additional Materials (NOT Included in Module):**

- Chalkboard / whiteboard
- Computer / projection unit / screen

**ACADEMIC STANDARDS:** (ENVIRONMENT AND ECOLOGY)

7<sup>th</sup> Grade

4.3.7.B Describe how human actions affect the health of the environment.

- Identify land use practices and their relation to environmental health.
- Identify residential and industrial sources of pollution and their effects on environmental health.
- Explain the difference between point and nonpoint pollution.
- Explain how nonpoint source pollution can affect the water supply and air quality.

10<sup>th</sup> Grade

4.1.10.E Identify and describe natural and human events on watershed and wetlands.

- Identify the effects of humans and human events on watersheds.
- 4.3.10.B Explain how multiple variables determine the effects of pollution on environmental health, natural processes and human practices.
- Explain how human practices affect the quality of the water and soil.

**BACKGROUND:**

**Water pollution** is an undesirable change in the physical, chemical, or biological characteristics of a body of water that can negatively affect the health, survival, or activities of humans and other living organisms. Water pollution may be classified in two different ways: as either point or nonpoint. These terms refer to the nature of the source of the pollution.

**Point source pollution** comes from a single, identifiable source. That is, point source pollutants can be traced to a distinct “point,” like a pipe discharging sewage or industrial waste. Sewage problems may result from improperly treated sewage being emitted from a wastewater treatment plant. These discharges may include nutrients, solids, heat, other organic wastes, or chlorine, which is used in cleaning the water. Industrial sources of pollution include

- steel mills (acids, cyanide, phenol, heated water, metals, and oil);
- paper mills (lignin, cellulose fibers, acids, caustic bases, sulfites, metals, heat, and chlorine);
- tanneries (organic compounds, acids, bases, and metals);
- slaughterhouses and food processing plants (blood, fat, meat juices);
- power plants (heat, silt, chlorine, and radioactivity);
- laundromats and car washes (silt, detergents, and organic wastes).

Point sources of pollution are those that could be eliminated by capping a pipe or by building a small barrier.

**Nonpoint sources** of pollution are more difficult to trace since they may be carried far from their original source by rain, melting snow, or groundwater. This type of pollution enters water from a widespread area and may be thought of as “polluted runoff.” In Pennsylvania, over 78% of water pollution comes from nonpoint sources. Examples of nonpoint sources include:

- coal mining and the resulting abandoned mine drainage (sulfuric acid, iron, aluminum, manganese, sulfates, and silt)
- oil and gas extraction (oily wastes, saltwater, high or low pH, phenols, metals, and silt)
- agriculture (fertilizers and pesticides sprayed on crops, sediment from eroded areas, bacteria and nutrients from livestock)
- waste disposal (leaking landfills, metals, litter)
- acid deposition from acid rain (low pH and metals)
- residential area (fertilizers, pesticides, sediment from construction sites, discarded oil, grease and toxic chemicals, pet wastes, and leaking septic systems)

In addition to being difficult to trace, nonpoint sources of pollution are challenging to control. Because of their widespread nature, nonpoint sources of pollution are generally best eliminated by more complex strategies (as opposed to capping a pipe or building a small barrier). These strategies include or maintaining restoring riparian (streamside) buffers and wetlands.

Nonpoint source pollution is also the number one cause of water quality problems the rest of the United States. These problems affect drinking water supplies, recreational areas, fisheries, and wildlife. The federal government does monitor nonpoint sources to a certain extent but each state is also responsible for reducing nonpoint pollution. For example, Pennsylvania regulates mining and logging to minimize their effects on water supplies. There are also state and local laws in place to prevent point source pollution.

It is sometimes difficult to determine whether a source should be labeled point or nonpoint. To make the distinction, think of a point source as one that could be stopped if a cap was put over the discharge pipe. To stop a nonpoint source, however, a large barrier would need to surround the source. Another tricky aspect is that certain pollutants could be a point source in one situation and a nonpoint source in another. Farm pesticides, for instance, would be a nonpoint source when sprayed onto acres of crops. The pesticides can runoff into local waterways from the farmland. On the other hand, if the farmer stores containers of pesticides in the barn and the containers leak, this could be considered a point source.

### **OVERVIEW:**

Students will generate a list of pollution sources and then teams compete to figure out if a photo shows a point or nonpoint source.

## **PROCEDURE:**

### **Teacher Preparation:**

1. Locate the Pollution Source Photos or the Point/Non-Point Source Photo CD-ROM in the module. If you plan to use the CD-ROM, procure and set up a computer with projection unit and a screen. Find the Point and Nonpoint Source pollution cards in the module.
2. Decide how to group your students for the game portion of this activity. Smaller teams are more interactive but it is tough to determine which team is first when several teams are competing. Five cards are supplied to support five teams.

### **Student Activity:**

1. Students should make a list in their notebooks of possible sources of pollution.
2. Ask students to share items from the list. As they respond, write their answers on the board. Without telling them why, write the sources in two lists, one that contains point sources and one of nonpoint sources.
3. Ask students to figure out why you made two separate lists. Suggest that they determine what all the items in one list have in common with each other and how those characteristics differ from the other list.
4. Label the lists "point" and "nonpoint" respectively and explain the difference between these two types of pollution. Point sources come from a single source such as a discharge pipe from a factory while nonpoint sources are not so easily traced. Instead, nonpoint sources come from diffuse sources and are more difficult to control. (Refer to the Background section of this activity for more information on point and nonpoint sources of pollution)
5. Split the class into teams.
6. Give each team a card with "Point Source" on one side and "Nonpoint Source" on the other side. Make a chart on the board to keep track of the points accumulated by each team.
7. Show the class a photo of pollution using either the physical photos or the CD-ROM PowerPoint presentation. (Note that the PowerPoint presents an image and description on the image followed by the same image and description with a designation of the image as a point or non-point source of pollution.) Explain to the students that each team needs to work together to determine whether the photo is an example of point or nonpoint source pollution and hold up the appropriate side of the "Point Source"/"Nonpoint Source" card.
8. Each time a team gets one correct, their team earns one point. The first team to show the correct answer, for each photo earns two additional points for a total of three points.

9. The team with the most points wins.

**DISCUSSION:**

How did your team determine whether a photo was a point or nonpoint source? *Answers will vary.*

Which are more challenging to clean up: point or nonpoint sources? Why? *Nonpoint sources tend to be more difficult because the pollution may be coming from a larger area and it may not be easily pinpointed. Because it covers so much ground, it is not easily contained. Since the pollution may travel, and there may be multiple potential sources, it is challenging to trace it back to its original source.*

**EVALUATION:**

- Students should fold a piece of unlined paper in half. Label one side “Point Source” and the other side “Nonpoint Source.” Provide a definition for each underneath the label. Then draw a picture to display an example of each.
- Each student draws a picture of a pollution source on a 3x5” index card. Collect the cards. Redistribute to the class, making sure no one gets their own. Have each student determine whether the card they received is an example of Point or Nonpoint source pollution and label it. Return the cards to their owners and have them check the label.
- Quiz: Students decide whether pollution sources are point or nonpoint.

**EXTENSIONS AND MODIFICATIONS:**

- After each photo, call on one student from the winning team to explain why the photo is an example of a point or nonpoint source.
- Have students research solutions for each of the pollution sources in the photos.

**NOTES (PLEASE WRITE ANY SUGGESTIONS YOU HAVE FOR TEACHERS USING THIS ACTIVITY IN THE FUTURE)**

**Point**

**Nonpoint**

