

What's the *Point* (or *Non-point*)?

Key Concepts

1. Pollution sources can be classified into two types: point sources and nonpoint sources.
2. Point sources of pollution are well-defined locations or places of discharge such as oil refineries or stationary power plants.
3. Nonpoint sources are undefined locations of discharge which deliver pollutants to surface or ground waters in sudden surges, often in large quantities and associated with rainfall or snow melt.
4. While marine environments are subject to both types of sources, nonpoint sources are the hardest to control.



Background

Many governments have moved to eliminate gross pollution of rivers, lakes, and coastal waters by sewage, and industrial wastes. In the United States the Clean Water Act has helped return fish to waters that were once depleted of life. Recreational activities have returned to some rivers, lakes and ocean beaches that were once closed by health hazards.

The success, however, is only partial and we need to increase our understanding and awareness of sources and means of controlling pollution.

Nonpoint Sources: The United States Environmental Protection Agency is making a special effort to address nonpoint-source pollution. It is a tough problem. Unlike point-source pollution, nonpoint-source pollution is diffuse both in origin and in the manner in which it enters ground and surface water. It results from a wide variety of human activities that take place over a wide geographic area. The EPA estimates the primary source of pollutants in the ocean is not from point sources, but from various forms of runoff. Such pollutants are of several kinds and are illustrated in the following table.

Nonpoint Pollution

Pollutant Types	Sources	Effects
Solid marine debris and beach trash, e.g., plastics, glass, metals, and wood.	Runoff from roads, landfills, parking lots into storm drains <ul style="list-style-type: none"> • Sewer systems • Logging debris 	<ul style="list-style-type: none"> • Can injure or kill marine life • Can cause damage to boats
Sediments	<ul style="list-style-type: none"> • Construction sites • Farmlands • Logging areas • Sand from roadway snow dumping sites 	<ul style="list-style-type: none"> • Clouds water • Suffocates bottom dwelling organisms
Excess nutrients, e.g., lawn fertilizers, animal wastes, and sewage	<ul style="list-style-type: none"> • Livestock • Gardens • Lawns • Sewage treatment plants • Runoff from streets 	<ul style="list-style-type: none"> • Promotes phytoplankton or algae blooms • Causes eutrophication, depleted oxygen, and odor
Acids, bases, salts, and heavy metal compounds	<ul style="list-style-type: none"> • Runoff from roads, landfills, parking lots • Salt from roadway snow dumping sites 	<ul style="list-style-type: none"> • May be directly toxic to marine life • May be toxic by bioaccumulation in the food chain
Organic chemicals, e.g., pesticides, oil, anti-fouling boat paints, and detergents	<ul style="list-style-type: none"> • Forest runoff/debris • Farmland runoff/debris • Boats and boat yards • Residential lawns • Golf courses and parks • Sewage treatment plants • Runoff from streets 	<ul style="list-style-type: none"> • May be toxic to wildlife and humans • May be carcinogenic
Pathogens, e.g., coliform bacteria	<ul style="list-style-type: none"> • Municipal sewage • Boat sewage • Animal wastes • Leaking septic/sewer systems 	May cause typhoid, hepatitis, cholera, and dysentery

Materials

For the class:

- index cards: 6, marked with one “pollutant type” per card

Suggested words or phrases: “Plastics,” “Sediments,” “Nutrients,” “Heavy Metal,” “Oil,” and “Bacteria.”

For each group of 3 students:

- “Nonpoint Pollution Table”, copied and then cut out and placed in three separately marked envelopes per group as follows:
- the 6 cards for “Pollutant Types” in one envelope,
- the 6 cards for “Sources” in a second envelope,
- the 6 cards for “Effects” in a third envelope.

For each student:

- “What’s the *Point (Or Nonpoint)?*” activity sheet. (If you choose not to make the activity sheets available for the students, then photocopy 10 copies of the **blank** “Nonpoint Pollution Table”, one per group.)

Teaching Hints

In “What’s the *Point (Or Nonpoint)?*” students play a drawing game which introduces them to the vocabulary associated with types of non-point pollution and then use this information to match types of pollution, their sources, and effects.

Preparation:

Make an overhead transparency of the **blank** “Nonpoint Pollution Table” in the student handout or draw it on the blackboard. The objective of the following activities will be to fill in the blank table.

Part I - Picturing the Types of Pollutants

This drawing game introduces the students to vocabulary associated with the “Pollutant Types” of nonpoint pollution.

Divide the students into teams of 3 or 4. Each group will need a pencil and paper on which to draw. Tell them that the game is played for 6 rounds with a different student artist and vocabulary word for each round. Have each team select its first artist. At your command, all first round artists are to:

- Come to you for the word which you have written on an index card so that only they can see it,

- Return to their teams with pencil and paper ready, and on your mark but not before,
- Try to draw a representation of the vocabulary word while all the while their team members are trying to guess it.

When a member of a team gets the word, the artist should raise his or her hand to let you know that a team member guessed the word. (You will have little trouble determining when a team gets the word as the students really get enthusiastically into the guessing.)

At the end of each round write the word and corresponding “Pollutant Type” information (but NOT “Source” and “Effect” information) from the table and then briefly discuss it.

Continue with the next word, and then the next until all the words are described and the blank table’s first column is filled in.

Picturing the Types of Sources

This game is similar to “Picturing the Types of Pollutants” but uses the six cards from the “Sources” envelope.

Part II - Matching “Pollution Type,” “ Source,” and “Effect”

To each team distribute

- a blank “Nonpoint Pollution Table”
- three envelopes, one with the 6 “Pollutant Type” cards, a second with the 6 “Source” cards and a third with the 6 “Effect” cards.

Ask the students to take out the “Pollutant Type” cards and arrange them in the first column of the blank “Nonpoint Pollution Table”. Then ask them to take out the “Source” cards and match them with a “Pollutant Type” by placing the card in the appropriate spot in the table’s “Source” column.

Repeat the process for the “Effect” column.

When completed, ask the students to describe their matches for each “Pollutant Type.”

Key Words

bioaccumulation - the accumulation within living organisms of toxic substances occurring in the environment

carcinogen - any substance or agent that tends to produce a cancer

eutrophication - a condition found in some lakes or bays characterized by an abundant accumulation of nutrients that support a dense growth of algae and other organisms the decay of which depletes the shallow water of oxygen

heavy metals - metals such as lead, mercury, copper, and cadmium that are toxic to organisms and which have a specific gravity greater than 5.0

marine debris - human refuse that ends up in the marine environment, especially that of a persistent nature

nutrients - in this case, minerals such as potassium, and phosphates, nitrates, and other substances that increase the growth of plants

pathogens - disease causing microorganisms

phytoplankton - plant plankton

runoff - something that drains or flows off as rain flows off from the land in streams

sediments - in water, minerals etc. which settle to the bottom

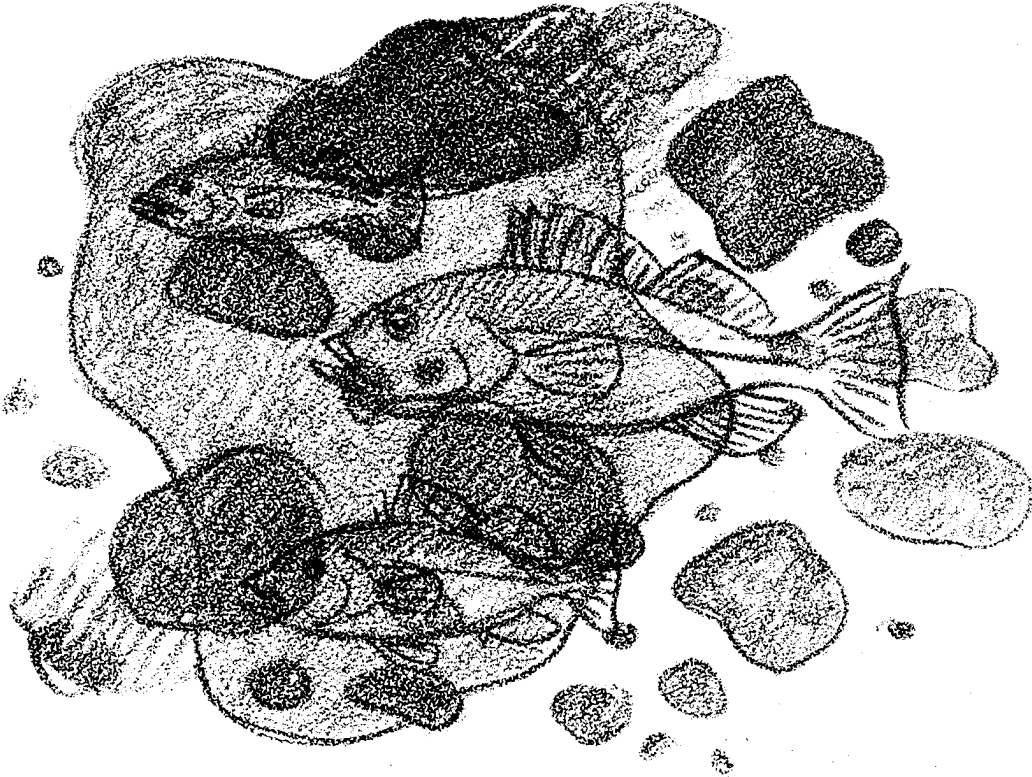
toxic - poisonous

Extensions

1. Distribute a local map and ask the students to locate areas that may be:
 - a. sources of nonpoint pollution, or
 - b. affected by nonpoint pollution.

"What's the *Point (Or Nonpoint)?*" is adapted from *Save Our Seas* produced by the California Coastal Commission.

What's the Point (or Non-point)?



Pollution can come from many places. Most of the time we think of factories or power plants or oil refineries. The Environmental Protection Agency has gone a long way in identifying such sources. In many cases, these sources have cut down on their outflow of pollutants. These are called *Point Sources* because they are located at specific sites.

Some other sources of pollution are harder to deal with. These sources are spread over larger areas like parking lots or roads or farm lands and are called *Nonpoint Sources* of pollution.

Moreover, nonpoint sources may only give up their pollutants sporadically like during a rainstorm. This type of pollution is a real challenge to clean up. It also comes from the sources each of us can often do something about. We can clean up the clutter on our beaches. We can be careful about what we allow to wash down our storm drains.

Where do you think the sources of nonpoint pollution might be? With your group, make a list of possible sources of nonpoint pollution. Think about things that wash off of streets, clutter our beaches, or wash down storm drains. Be ready to share your list with the class.

The drawing and matching games that follow will help you to better understand the types of nonpoint source pollutants, their sources, and their effects. The table on the following page is for the matching game.

Nonpoint Pollution

Pollutant Types	Sources	Effects