

Freshwater Resources ▪ *Guided Reading and Study*

Freshwater Pollution

This section describes ways that fresh water can become polluted. The section also describes how freshwater pollution can be cleaned up and how it can be prevented.

Use Target Reading Skills

As you read, make an outline about freshwater pollution.

Freshwater Pollution	
I.	What is pollution? A. Point and nonpoint sources B.
II.	A. B.
III.	A. B. C.
IV.	A. B.
V.	A. B.

Freshwater Resources

What Is Pollution?

1. The addition of any substance that has a negative effect on water or the living things that depend on water is called _____.
2. Circle the letter of each sentence that is true about water pollution.
 - a. It can affect surface water.
 - b. It cannot affect groundwater.
 - c. It results from human activities.
 - d. It does not result from natural causes.
3. The substances that cause pollution are called _____.
4. Is the following sentence true or false? It is safe to bathe or swim in polluted water as long as you do not drink it.

5. What are some types of pollutants found in water?

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Freshwater Pollution *(continued)*

6. List the four major sources of water pollution.

- a. _____ b. _____
c. _____ d. _____

7. What is the difference between a point source and a nonpoint source of water pollution?

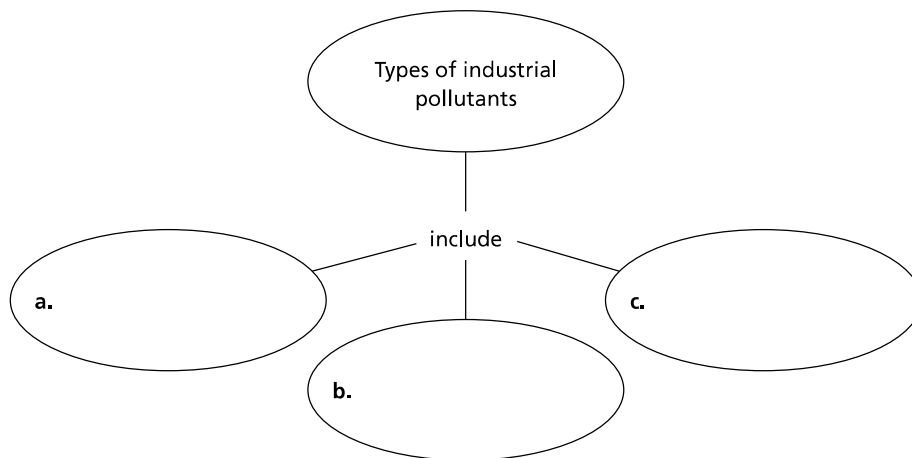
Human Wastes

8. How can a flood cause polluted surface water?

9. Is the following sentence true or false? Disposing of human waste is a problem only in big cities. _____

Industrial Wastes

10. Complete the concept map.



11. Circle the letter of each sentence that is true about toxic chemical wastes from industry.

- a. Few industrial processes involve toxic chemicals.
- b. Some toxic wastes are side effects of manufacturing and mining.
- c. Chemical pollution from factories is now controlled by law.
- d. Factories no longer release toxic chemicals directly into rivers and lakes.

12. Rain that is more acidic than normal is called _____.

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13. Circle the letter of each sentence that describes an outcome of acid rain.

- a. Fish die off.
- b. Groundwater is polluted with oil and gasoline.
- c. Stone buildings and statues are eaten away.
- d. Lake water becomes acidic.

14. How could warm water act as a pollutant?

Chemical Runoff

15. Is the following sentence true or false? Fertilizers in runoff are a point source of pollution. _____

16. Chemicals intended to kill insects and other organisms that damage crops are called _____.

17. List three pollutants that are found in runoff from roads.

- a. _____
- b. _____
- c. _____

18. Is the following sentence true or false? Road runoff is a nonpoint source of pollution. _____



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Freshwater Pollution *(continued)*

Water Pollution Solutions

19. Circle the letter of each sentence that describes a way that polluted fresh water is cleaned naturally.
- a. Runoff waters from farm fields dilute the pollution in rivers and lakes.
 - b. Plants absorb metals and chemicals from lake and pond water.
 - c. Bacteria eat toxic chemicals and oil spills.
 - d. Sand and rock layers filter groundwater as it flows down through them.
20. Is the following sentence true or false? Most pollutants are not very difficult to remove. _____
21. Is the following sentence true or false? It is often easier to avoid causing pollution in the first place than it is to clean it up. _____
22. Describe some ways that industry and agriculture can help lessen pollution.

POLLUTANT INFORMATION SHEET

SEDIMENTS

Particles of soils, sand, silt, clay and minerals wash from land and paved areas into creeks and tributaries. In large unnatural quantities, these natural materials can be considered a pollutant. Construction projects often contribute large amounts of sediment. Certain lumbering practices affect sediments in runoff. Sediments may fill stream channels and harbors that later require dredging. Sediments suffocate fish and shellfish populations by covering fish nests and clogging the gills of bottom fish and shellfish.

PETROLEUM PRODUCTS

Oil and other petroleum products like gasoline and kerosene can find their way into water from ships, oil drilling rigs, oil refineries, automobile service stations and streets. Oil spills kill aquatic life (fish, birds, shellfish and vegetation). Birds are unable to fly when oil loads the feathers. Shellfish and small fish are poisoned. If it is washed on the beach, the oil requires much labor to clean up. Fuel oil, gasoline and kerosene may leak into ground water through damaged underground storage tanks.

ANIMAL WASTE

Human wastes that are not properly treated at a waste treatment plant and then released to water may contain harmful bacteria and viruses. Typhoid fever, polio, cholera, dysentery (diarrhea), hepatitis, flu and common cold germs are examples of diseases caused by bacteria and viruses in contaminated water. The main source of this problem is sewage getting into the water. People can come into contact with these microorganisms by drinking the polluted water or through swimming, fishing, or eating shellfish in polluted waters. Often unexpected flooding of barnyards or stock pens can suddenly increase the toxic effects of animal waste in water. Animal waste can also act as a fertilizer and create damage by increasing nutrients. (see Fertilizers)

ORGANIC WASTES

Domestic sewage treatment plants, food processing plants, paper mill plants and leather tanning factories release organic wastes that bacteria consume. If too much waste is released, the bacterial populations increase and use up the oxygen in the water. Fish die if too much oxygen is consumed by decomposing organic matter.

INORGANIC CHEMICALS

Inorganic chemicals and mineral substances, solid matter and metal salts commonly dissolve into water. They often come from mining and manufacturing industries, oil field operations, agriculture, and natural sources. These chemicals interfere with natural stream purification; they destroy fish and other aquatic life. They also corrode expensive water treatment equipment; and increase the cost of boat maintenance.

DETERGENTS, PESTICIDES AND FERTILIZERS

Many of these substances are toxic to fish and harmful to humans. They cause taste and odor problems and often cannot be treated effectively. Some are very poisonous at low concentrations. The major source of pollution from agriculture comes from surplus fertilizers in the runoff. Fertilizers contain nitrogen and phosphorous that can cause large amounts of algae to grow. The large algae blooms cover the water's surface. The algae die after they have used all of the nutrients. Once dead, they sink to the bottom where bacteria feed on them. The bacterial populations increase and use up most of the oxygen in the water. Once the free oxygen is gone, many aquatic animals die. This process is called eutrophication.

HEATED OR COOLED WATER

Heat reduces the ability of water to dissolve oxygen. Electric power plants use large quantities of water in their steam turbines. The heated water is often returned to streams, lagoons, or reservoirs. With less oxygen in the water, fish and other aquatic life can be harmed. Water temperatures that are much lower than normal can also cause habitat damage. Deep dams often let extra water flow downstream. When the water comes from the bottom of the dam, it is much colder than normal.

ACID PRECIPITATION

Aquatic animals and plants are adjusted to a rather narrow range of pH levels. pH is a measure of the acidity of a solution. When water becomes too acid, due to inorganic chemical pollution or from acid rain, fish and other organisms die.

PESTICIDES, HERBICIDES, FUNGICIDES

Agricultural chemicals designed to kill or limit the growth of life forms are a common form of pollution. This pollution results from attempts to limit the negative effects of undesirable species on agricultural crop production. Irrigation, groundwater flow and natural runoff brings these toxic substances to rivers, streams, lakes and oceans.

Freshwater Resources ▪ *Review and Reinforce*

Freshwater Pollution

Understanding Main Ideas

Fill in the spaces in the table below.

Freshwater Pollutants

Pollutant	Major Source of Pollution	Point or Nonpoint Source
Sewage leaking from pipe	Human Waste	1. _____
Toxic wastes leaking from barrels	2. _____	Point source
Salt sprinkled on roads	Runoff from roads	3. _____
Chemicals from factory dumped into a river	Industrial waste	4. _____
Fertilizer in runoff	5. _____	Nonpoint source

Answer the following on a separate sheet of paper.

- How can water pollution be cleaned up naturally?
- Explain how runoff from farms can affect ponds and streams.

Building Vocabulary

Fill in the space to complete each statement.

- Chemicals intended to kill insects and other organisms that damage crops are called _____.
- The addition of any substance that has a negative effect on water or the living things that depend on water is called _____.
- Rain and other forms of precipitation that are more acidic than normal are called _____.