

Water Pollution Scavenger Hunt

Adapted from: An original Creek Connections activity.
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Grade Level: Basic

Duration: 40 minutes for all questions but duration depends on setting in which the activity is used

Setting: school grounds, sampling site, bus ride

Summary: Students observe their surroundings and look for evidence of various types of pollution. They also consider measures taken to reduce the effects of such pollution.

Objectives: Students will be able to locate sources and evidence of point and non-point source pollution in their surroundings. They will also be able to identify measures taken to reduce the effects of such pollution.

Vocabulary: point source pollution, non-point source pollution, best management practices, thermal pollution, microhabitat, eutrophication

Related Module Resources:

- Other Module activities
- See the “Additional Module Resources” section for fact sheets and articles relevant to your review needs

Materials (Included in Module):

- Water Pollution Scavenger Hunt
- Water Pollution Answer Key

Additional Materials (NOT Included in Module):

- clipboards, pencils

ACADEMIC STANDARDS: (ENVIRONMENT & ECOLOGY)

7th Grade

4.1.7.B. Understand the role of the watershed.

- Explain factors that affect water quantity and flow through a watershed.

4.2.7.C. Explain natural resource distribution.

- Analyze the effects of management practices on air, land and water in forestry, agriculture, fisheries, wildlife, mining and food and fiber production that is unique to different climates.

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 source pollution.
- Explain how nonpoint source pollution can affect the water supply and air quality.

10th Grade

4.1.10.E. Identify and describe natural and human events on watersheds 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:

By participating in the activities included in the Creek Connections Water Pollution Module, students cover myriads of topics related to water pollution: the difference between and examples of point and non-point source pollution, pollution related to nutrients, bacteria and sediment, eutrophication, the concept of parts per million, best management practices (BMPs) used to mitigate the effects of such pollution, and how land use affects water quality, among others. Although these topics may be covered in the classroom, it is also useful for students to apply their new knowledge in the field. Therefore, this activity serves as a review activity of other Creek Connections Water Pollution Module activities and also encourages students to apply knowledge from those activities by making observations in the field.

For extensive background information on water pollution, see the Fact Sheets section in the module resource binder as well as the Background sections of each of the other Water Pollution Module activities.

OVERVIEW:

Students use their knowledge of water pollution to complete a scavenger hunt while traveling on a bus to their sampling site. The scavenger hunt may also be completed at their sampling site, on school grounds or in their backyards.

PROCEDURE:

Teacher Preparation:

1. Locate the Water Pollution Scavenger Hunt Worksheet and Answer Key at the end of this activity write-up. Make copies of the Water Pollution Scavenger Hunt for your students.
2. Procure clipboards and pencils for your students or make sure they have these materials with them.

Student Experiment or Activity:

1. Stimulate a discussion with students to quickly review the major water pollution concepts covered to date.
2. Distribute the Water Pollution Scavenger Hunt Worksheets to students.
3. Have them work individually or in teams to do the worksheet. Depending on the conditions under which you do this activity, have students complete all questions or as many questions as possible in the allotted time. Be sure to remind students that there are no specific right or wrong answers. They are to use their powers of observation and to complete the questions based on what they see around them.
4. You may decide to give prizes to the students with the most completed Scavenger Hunt questions.
5. Go over students' responses to the Scavenger Hunt questions using the Answer Key suggestions and your site-specific observations.

DISCUSSION:

Stimulate discussion based on students' responses and your observations.

EVALUATION:

- Appropriately completed worksheet.
- Define and distinguish between point and non-point source pollution.

EXTENSIONS AND MODIFICATIONS:

- Have students write their own scavenger hunt questions.

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



WORKSHEET : WATER POLLUTION SCAVENGER HUNT

Name _____ Date _____

1. List some examples of point source pollution that you see or know of that affect your waterway.

2. Can you find any evidence that might indicate that there is excess nitrate or phosphorus in your waterway?

3. a. What do you see that would be an example of a non-point source pollutant containing phosphorus?

- b. What do you see that would be an example of point source pollution containing phosphorus?

4. List something that you would see that might elevate nitrate readings in your waterway.

5. Can you find some examples of non-point source pollution?

6. What type of evidence do you see that would help decrease the effects of non-point source pollution?

7. What type of habitat disruption can you find that might increase the temperature of the waterway?

8. Can you find any habitat disruption that might destroy or create aquatic or riparian (streamside) *microhabitats* (the small specific habitat of an organism within a larger habitat, e.g., under a log in a pine forest)?

9. What kind of evidence can you see that might increase turbidity levels?

10. What type of environmental structures or areas can you find that would store excess nitrogen and phosphorus, and/or soak up extra runoff and trap sediment?

11. Can you find any evidence that would suggest that your waterway contains coliform bacteria? Is there a source of coliform bacteria upstream or at your site?

12. What can you find that would affect pH levels in your waterway?

13. Think of your yard at home. Are there any sources of point source pollution or non-point source pollution there? What could you do to lower the negative affects of these sources of pollution?

14. How do the roads you are traveling on/traveled on affect waterways?

15. Which type of pollution (point source or non-point source) seems to be more problematic at your site? Why?

16. Can you see any other human impacts that you haven't already mentioned that would decrease water quality?

17. Do you see any evidence of Best Management Practices?



ANSWER KEY : WATER POLLUTION SCAVENGER HUNT

The answers below are only a few of the potential responses your students might come up with. They are merely suggestions. Most of your students' answers will depend on where they are when they complete the scavenger hunt.

1. List some examples of point source pollution that you see or know of that affect your waterway.

Sewage drainage, drainage from city street, discharge from an industry, acid mine drainage, etc.

2. Can you find any evidence that might indicate that there is excess nitrate or phosphorus in your waterway?

Examples of eutrophication, e.g., algal bloom (green, soupy water)

3. a. What do you see that would be an example of a non-point source pollutant containing phosphorus?

Run-off from farms

- b. What do you see that would be an example of point source pollution containing phosphorus?

Sewage dumping, detergent in runoff

4. List something that you would see that might elevate nitrate readings in your waterway.

Sewage drainage, farm nearby, possibly lawns, livestock tracks or excrement in or near the waterway, etc.

5. Can you find some examples of non-point source pollution?

Soil eroded from construction and agricultural sites, fertilizers from farms and lawns, metals and oils from automobiles, road salts, acid rain, etc.

6. What type of evidence do you see that would help decrease the effects of non-point source pollution?

Good riparian zone and/or a wetland

7. What type of habitat disruption can you find that might increase the temperature of the waterway (thermal pollution)?

Examples such as deforestation, bottom disruption increase sediments in water column, which increases the amount of heat absorbed by the water, industry discharging warm water into the waterway, paved surfaces over which runoff flows and is heated before it enters a waterway, etc.

8. Can you find any habitat disruption that might destroy or create aquatic or riparian (streamside) *microhabitats* (the small specific habitat of an organism within a larger habitat, e.g., under a log in a pine forest)?

Tires, barrels, channeling, deforestation, etc.

9. What kind of evidence can you see that might increase turbidity levels?

Soil erosion, ATV tracks, disrupted or lack of riparian buffer

10. What environmental structures or areas can you find that would store excess nitrogen and phosphorus, and/or soak up extra runoff and trap sediment?

Good riparian zone and/or wetland.

11. Can you find any evidence that would suggest that your waterway contains coliform bacteria? Is there a source of coliform bacteria upstream or at your site?

Answers will vary, but may include signs of eutrophication and missing or dead fish. The source of bacteria would probably be sewage drainage.

12. What can you find that would affect pH levels in your waterway?

CaCO₃ rich substrate would stabilize or increase pH levels. Acid mine drainage, industrial waste, and acid rain would decrease pH levels.

13. Think of your yard at home. Are there any sources of point source pollution or non-point source pollution? What could you do to lower the negative affects of these sources of pollution?

Nonpoint Source Pollution: lawn fertilizer, herbicides, pesticides, motor oil, etc.

Point source: Trick question! Unless, of course the waterway runs directly through your backyard. To decrease the effects of these pollutants, don't use lawn chemicals and get your vehicle routinely serviced, don't pour motor oil down the drain, etc.

14. How do the roads you are traveling on/traveled on affect waterways?

The impermeable surface leads to increased runoff and less infiltration; runoff is heated as it flows over roads eventually increasing stream temperatures; road salt, oil, and gas wash into waterways, polluting them. Road salt in particular spikes TDS levels.

15. Which type of pollution (point source or non-point source) seems to be more problematic at your site? Why?

Answers will vary.

16. Can you see any other human impacts that you haven't already mentioned that would decrease water quality?

Answers will vary.

17. Do you see any evidence of Best Management Practices?

Examples include planted trees around the waterway to reduce erosion, fencing along the banks to keep livestock out of the waterway, a sediment catch basin that collects storm water runoff, and stabilization of mining waste areas to prevent release of materials into the waterway, etc.