

Student Data Sheet 1

Surf Your Watershed!

Watershed plans outline the steps needed to reach goals of water quality and safety. They include effective nonpoint source pollution control programs to maintain beneficial use of water and improve and protect habitat for living resources. Plans have milestones or targets so that over time nutrients and sediment that enter the Bay are decreased over time. You will design a simple plan for your part of the Chesapeake Watershed.

Every location on land is part of one or more watersheds, which can range in size from a few acres to millions of square miles. Most watersheds are part of larger watersheds. All watersheds in the United States have a specific name and an identifying number known as a “watershed address.” Have students visit <http://www.epa.gov/owow/watershed/address.html> to find the watershed address for their local water test site location in the U.S. as well as information on pollution and other issues related to that watershed.

What is your watershed address? _____

Draw a simple diagram of your watershed area.

Healthy forests, streams and rivers are critical to the health of the Chesapeake Bay. Protecting forests will protect clean air and water, while lowering nutrient and sediment pollution entering the Bay.

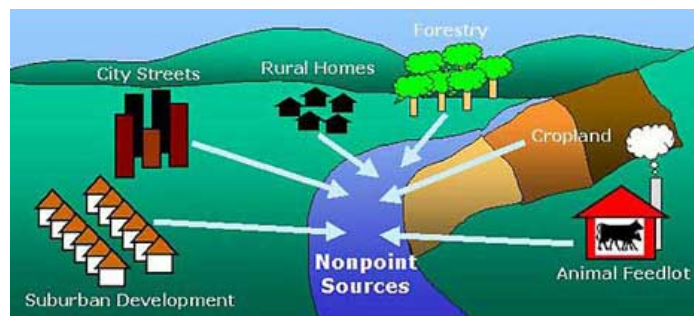
Point Source Pollution

What is it? It is a single source from which pollutants are discharged, such as a pipe, ditch, ship or factory smokestack. Factories and sewage treatment plants are two common types of point sources.

Non-point Pollution

Most nonpoint source pollution occurs as a result of runoff. When rain or melted snow moves over and through the ground, the water absorbs and assimilates any pollutants it comes into contact with. Major sources include:

- Runoff from urban and suburban areas picks up pollutants with the rainwater such as oil left by cars driving and parking on the asphalt, pet waste, and chemicals used in lawn care.



- Erosion of soil from large tracts of land plowed to grow crops. Plowing the land exposes and disturbs the soil, making it more vulnerable to erosion during rainstorms.
- Fertilizers and pesticides from agricultural or rural areas.
- Industrial facilities often discharge pollutants into the atmosphere, typically through some type of smokestack. These airborne pollutants (hydrocarbons, metals, etc.) can travel long distances and are then deposited on surfaces or washed out of the atmosphere in rain or snowfall
- Drainage or runoff from abandoned mining operations
- Marinas and boating such as chemicals used to maintain and repair boats

Look at the map of the Chesapeake Bay watershed and answer the following questions.

1. How many states are in the Chesapeake Watershed?
2. You will notice that the western side of the watershed is highly forested. What major land feature corresponds to this?
3. What major pollutants come from forested lands?
4. The middle part of the Chesapeake Bay is dominated by 2 highly developed areas. What are they?
5. What major pollutants come from highly developed lands?
6. Go to <http://www.chesapeakebay.net/trackprogress/river> and find the river monitoring station closest to your school or home. When you click on the marker, you will see a grade and information about the major sources of water pollution in the area. Record that information below.

My River's Grade _____

7. What are the major Sources of non-point pollution at this site?
 8. What actions do you think would help to reduce these sources of non-pollution?
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Classification of Watersheds

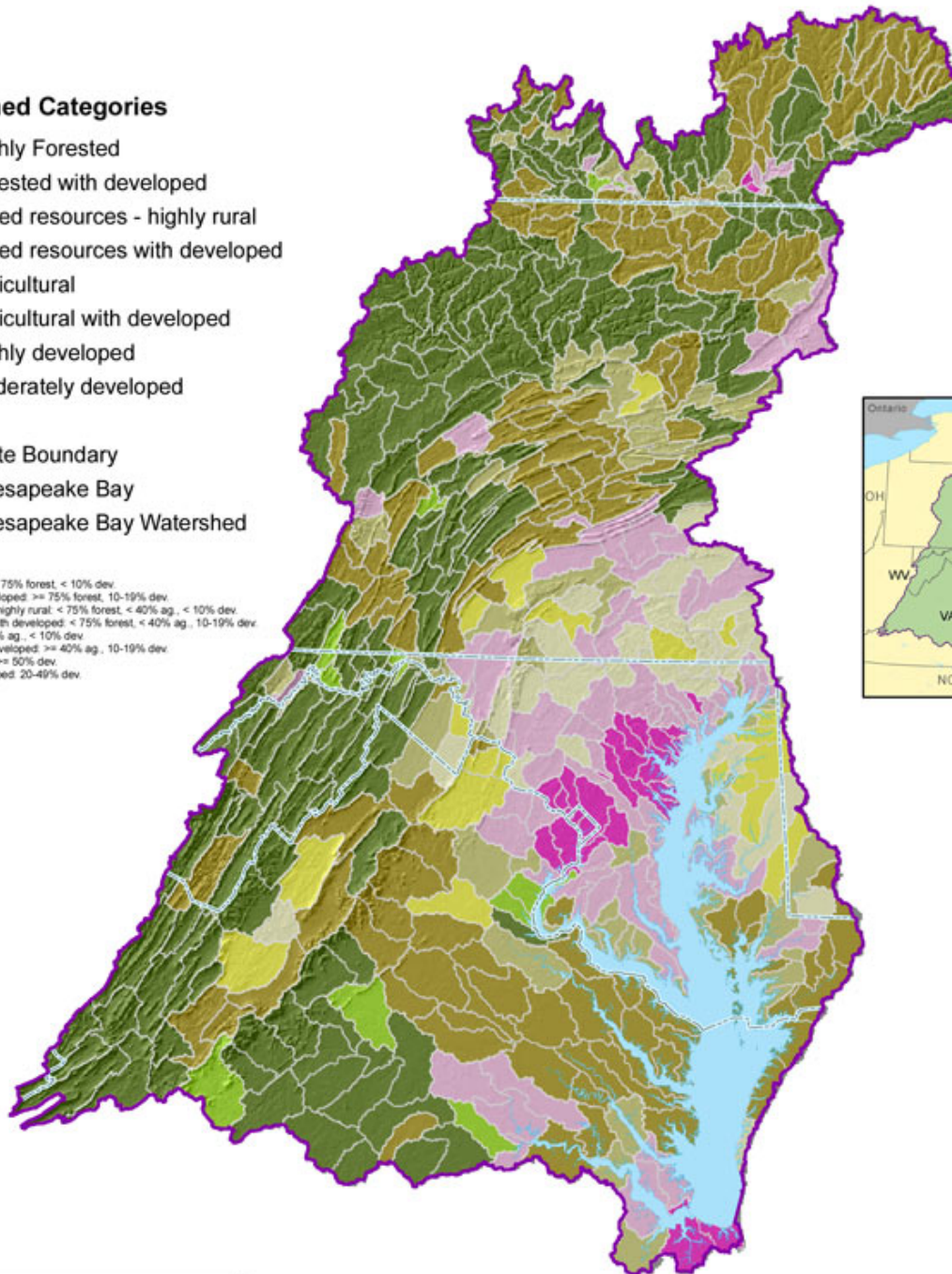
Based on 2000 Land Cover



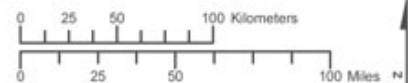
Watershed Categories

- Highly Forested
- Forested with developed
- Mixed resources - highly rural
- Mixed resources with developed
- Agricultural
- Agricultural with developed
- Highly developed
- Moderately developed
- State Boundary
- Chesapeake Bay
- Chesapeake Bay Watershed

Highly forested: $\geq 75\%$ forest, $< 10\%$ dev.
Forested with developed: $\geq 75\%$ forest, 10-19% dev.
Mixed resources - highly rural: $< 75\%$ forest, $< 40\%$ ag., $< 10\%$ dev.
Mixed resources with developed: $< 75\%$ forest, $< 40\%$ ag., 10-19% dev.
Agricultural: $\geq 40\%$ ag., $< 10\%$ dev.
Agricultural with developed: $\geq 40\%$ ag., 10-19% dev.
Highly developed: $\geq 50\%$ dev.
Moderately developed: 20-49% dev.



Data Sources: Chesapeake Bay Program
For more information, visit www.chesapeakebay.net
Disclaimer: www.chesapeakebay.net/termsofuse.htm



Created by HW, 2/1/08

UTM Zone 18N, NAD 83

Data Sheet 2

Water Quality and Pollutants

Nutrient pollution (too much nitrogen and phosphorus) and excess sediment are among the leading causes of the Bay’s poor health. Nitrogen and phosphorus can fuel the growth of harmful algae blooms, and sediment can cloud the water and suffocate shellfish like oysters that are beneficial to the Bay. The nutrients reach the Bay through three sources: wastewater treatment plants, urban and suburban and agricultural runoff and air pollution.

Excess sediment (loose particles of sand, silt, and clay) can cloud the water harming grasses, fish and oysters. Sediment enters the Bay when land, stream banks and shorelines erode. Erosion increases when land is cleared for development and agriculture.

Using the water quality information from Student Data Sheet 1, Activity III, *Water, Water* complete the last column of the table below with at least two potential sources pollutants from local land uses that you identified in *Water, Water*, Data Sheet 1.

Data from your water test site	Possible Sources of Pollutants
Data from your water test site Nitrogen _____ Phosphorus _____	1. 2.
Data from your water test site Turbidity _____	1. 2.
Erosion Assessment of your site (impacts of heavy water runoff)	1. 2.
Land use that might add pesticides and/or herbicides	1. 2.
Land Use that might add oil, gas, metals	1. 2.

Data Sheet 3

Research Project: Designing Your Own Investigation

1. **Develop a research question** about trends of pollution in the Chesapeake Bay Watershed, or the relationship between a pollutant and land use. Then form a hypothesis to investigate. Be sure to review your hypothesis with your teacher before you begin collecting data.

Research question:

Hypothesis: What do think the results will show?

2. **Go online and get data.** These sites can provide data related to water quality:

<http://www.chesapeakebay.net/trackprogress/river>

<http://www.chesapeakebay.net/trackprogress/river>

<https://www.epa.gov/nutrient-policy-data/chesapeake-bay>

www.dataintheclassroom.org (Water Quality module)

b) Follow the link to “Get Data.”

c) Using the form, select the locations and parameters you wish to look at.

d) Click the “Get Data” button.

3. **Use the Data Log Sheet to keep a record of the data you select, so you can refer to it later.**

4. **Collect and organize any additional sources of data. Use the Data Log sheet if it is useful to your project.**

5. **Analyze the data.**

6. **Draw conclusions.** Use your data to help you decide whether your hypothesis is supported. If your hypothesis is not supported, think about other data you might need to collect.

7. **Identify how you or your group will present your findings to the rest of the class.**

Data Log Sheet

1. What data are you collecting to answer your research question?
2. Record the websites from which you are collecting data, the pollutant or land use data you are collecting and observations about your findings from the website. Depending on your research question, you may not need all of the cells of the table. Some sites provide graphical evidence and these might be downloaded and displayed with your findings. You can also make graphs from the data that you collected to support your conclusions. Complete the project report form.

Resource Site	Pollutant or land use	Observations

Data Sheet 4

Putting the Chesapeake on a Pollution Diet

A pollution diet (formally called a Total Maximum Daily Load) spells out the amount of nitrogen, phosphorus and sediment that needs to be reduced to bring the Bay back to health. The plan includes details from the states surrounding the Bay that need to put controls into place to reach the goal. Some of the management strategies that are part of the pollution diet are listed below.

In small groups, review the best management ideas and decide as a group what actions you will select to complete the table and answer the follow-up questions.

The information in this table is used in Activity III. *Save the Oyster*.

Best Management Practices:

Construction Sites – Place erosion control fabric on streambanks to prevent sediment from reaching the stream (also called silt fences).

Farming/crops – Seed a cover crop or leave crop stubble to hold the soil in place over the winter and during snow melt; leave shrubs and trees with expansive root systems and plant cover on the ground along a stream or river to hold soil during periods of flooding or heavy rain. Manage animal waste, protect drinking water by using less pesticides and fertilizers, use planned grazing system on pasture, dispose of chemicals in an approved manner.

Forest buffers – Trees, shrubs and other plants that grow along streams and rivers prevent pollution from entering waterways, prevent erosion and provide critters with habitat. Land owners should leave a 50-100-foot buffer along the stream channel (even greater if steep slopes) to filter out contaminants in runoff and prevent streambank erosion. Lands are also set aside in permanent protection from development. 21% of the land in the Chesapeake Bay have been protected.

Homes – Use fertilizers and pesticides on lawns sparingly or not at all. Leave shrubs and trees with expansive rooting systems and abundant plant cover on the ground along a stream or river, rather than replacing with 100% grass, which is far less effective at holding soil in place during periods of flooding.

Livestock grazing – Build a concrete-lined pit to safely store manure and later spread on fields; leave shrubs and trees along the stream or river to slow runoff, filter pollutants, and hold soil in place.

Motorized recreation – Do not drive All-Terrain Vehicles (ATVs) through wetlands, along lakeshores, or through streams and rivers. ATVs can damage plants, compact soils, cause erosion, and result in sediment reaching lakes and rivers.

Planting Underwater Bay Grasses – Grass beds provide food and shelter to fish, crustaceans and other species, add oxygen to the water absorb nutrient pollution reduce shoreline erosion and help sediment to settle to the bottom. Their abundance is a good indicator of Bay health.

Restore Oyster Reefs – Oyster reefs provide many benefits to the health of the Chesapeake Bay. To rebuild reefs, both oyster shell and alternative materials like crushed concrete are placed on hard-bottom areas in tributaries.

Restore wetlands – Wetlands trap polluted runoff and slow the flow of nutrients, sediment and chemical contaminants into rivers, streams and the Bay. Wetlands also soak up storm water, slow erosion and shorelines, and provide habitats for many living organisms.

Urban Areas – Provide a settling basin to prevent runoff from parking lots from washing directly into a stream and allowing time for the runoff to infiltrate into the ground where soil can naturally filter the contaminants. Keep litter, pet wastes and debris out of street gutters and storm drains. Apply lawn and garden chemicals sparingly. Clean up spilled brake fluid, oil, grease and antifreeze. Control soil erosion by planting ground cover. Purchase household detergents and cleaners that are low in phosphorus to reduce the amount of nutrients coming into the Bay.

Pollution	Land Use Sources	Best Management Practices to reduce Pollution from those sources
1. Nutrients (nitrogen and phosphorus)		
2. Sediment		

3. Heavy Runoff		
4. Pesticides and Herbicides		
5. Oils, gas, metals		

1. What activities have a large effect on water quality?

2. List 3 ways that soil erosion can be minimized in a watershed.

3. How could activities in your local area be affecting the water quality?

4. What are some things that you can do in your neighborhood to protect water quality?