INVESTIGATING WATERSHEDS

Rainfall or any form of precipitation collects on lawns, streets, and fields and runs directly into streams or into storm drains (where it is piped to streams).

Where do you think the water goes from there?

Does the rain that falls in your backyard always end up in the same place? Why or why not?

Let’s Explore!

We need to start with some terminology. A watershed (or drainage basin) is the area of land that collects water which drains into a given body of water. Watersheds are separated by drainage divides, which are topographic highs or ridges between basins. In a simple model, the watershed is a funnel that drains into a container, like the Chesapeake Bay or the Mississippi River. The top edge of the funnel is the drainage divide. What goes into the funnel eventually drains into the bay or river.

Activity 1: Watersheds - from Global to Regional

On the maps on the next several pages, we will explore watersheds at a changing scale starting with large scale global drainage and working our way to your backyard, a much smaller, local watershed.

1. Obtain a set of colored pencils. The map on the next page shows the drainage of the continental areas into the various ocean basins (Atlantic, Pacific, or Indian Oceans). The black areas are deserts from which no drainage to the oceans will occur.

Color each drainage basin with a different color. When you are finished, answer the questions that follow.

Which ocean receives the largest amount of continental drainage?

Where does most of the rain that falls on the United States end up?
2. Now consider the drainage in the continental United States. The dashed lines on the U.S. map below represent the drainage divides. On the scale of a continent these are referred to as **continental divides**. Color the different basins separated by the dashed lines.
What is the largest drainage basin in the U.S.? What major river is it associated with?

What north-south geological features are responsible for the separation of the major U.S. basins?

Mark your present location on the map. Where does water that falls here go to?

Activity 2: Watersheds - from Regional to Local

A map of the drainage basin for the Chesapeake Bay is found on the next page. The states are outlines by dashed lines. The basin is outlined with a solid line and the waterways (creeks, streams, rivers) within the region are shown. Approximately 165,700 square kilometers of land drain into the Chesapeake Bay. The bay occupies about 5600 square kilometers. About 25,000 square kilometers (or 15%) of the watershed are in the state of Maryland. To assist you in answering the questions that follow, there are maps of Maryland, Pennsylvania, and Virginia posted in the room. Feel free to consult them as needed.

1. Which states contribute to the Chesapeake Bay?

Does all the stream drainage in the state of Maryland flow into the Chesapeake Bay? If not, where does it go? Shade any region in Maryland that does not drain into the Bay with red on the map.

Locate the following major rivers: James, Patuxent, Potomac, Rappahannock, Susquehanna, and York. Using different colored pencils, color each major river and the streams flowing into each river. Outline each river’s drainage basin within the Chesapeake Bay watershed.

Which states contribute water drainage to the Chesapeake Bay?

Which river contributes the largest amount of water based on basin area? Which river contributes the smallest amount?

Largest ___________________________  Smallest ___________________________

Compare the relative sizes of the Chesapeake Bay with the Delaware Bay and the Great Lakes. Place them in order from largest to smallest size.
2. The Patuxent River is Maryland's longest intrastate river (175 kilometers). The watershed of the Patuxent River is completely within the state of Maryland.

Based on the map below, which counties supply drainage to the Patuxent River?

Approximately what percentage of Prince George's County drains into the Patuxent?

In Prince George's county, all stream drainage flows into the Patuxent or Potomac Rivers. These rivers then flow into the Chesapeake Bay.
3. The map below shows the stream drainage in Montgomery County. The various subwatersheds have been identified with dashed lines and labeled. Note that the Patuxent River runs along the northeastern edge of the county.

In red, shade the area of Montgomery County that drains into the Patuxent River. What is the general direction of stream flow in this area?

The western edge of the area you shaded locates the drainage divide between the Patuxent and Potomac Rivers.

The Monocacy subwatershed eventually drains into the Potomac River. What is the general direction of stream flow in the Monocacy Subwatershed?

Which subwatershed in Montgomery County contributes substantial stream flow to Prince George's County?
4. Floodplain maps can be found in the water and sewage plans for most counties (call your county government offices for information). The map below shows the drainage in Prince George's County. Locations (towns) and stream names can be found on a county map available from your county Chamber of Commerce.

Locate the drainage divide that separates Patuxent and Potomac watersheds. Draw a dashed line in green to indicate the divide.

The largest stream draining into the Patuxent River in Prince George’s County is Western Branch. Locate the stream and outline its watershed.
Prince George’s Community College is located in the Southwest Branch subwatershed (of Western Branch) which drains into the Patuxent River just south of Upper Marlboro. Trace the flow of rainfall falling on campus to the ocean.

Look at the storm drains in your area. They will tell you where your water is going!

Answer: storm drains → small stream on northwest corner of campus → Southwest Branch → Western Branch → Patuxent River → Chesapeake Bay → Atlantic Ocean

Some Additional Notes:

The state of Maryland has approximately 27,000 kilometers of streams or 1 kilometer of stream per square kilometer of land. Approximately 90% of these streams drain water which eventually flows into the Chesapeake Bay. As the water makes its journey from Hagerstown or Easton, it passes through agricultural and/or urbanized areas, eventually reaching a larger river, such as the Potomac, Gunpowder or Choptank, and finally flows into the Bay. Along its journey, the water may pick up fertilizers, pesticides, deicing road salt, oil from parking lots, and suspended sediment from the erosion of land. How can you make a difference in the protection of one of Maryland's treasured natural resources?

In the battle to keep our waters clean, the overall goal is to further improve the health of the Chesapeake Bay by reducing nutrients (nitrogen and phosphorus), suspended sediments, and toxic chemicals entering the water. This goal is shared by all six states, and the District of Columbia, within the Chesapeake Bay watershed.

As educators, our major responsibility to the young residents of Maryland is to enhance their understanding and appreciation of watersheds. This information provides the connection of your local or backyard stream, and its surroundings, to the Bay and its watershed. Your local stream may be a small part, but it is vital part of the overall picture. Watershed appreciation has a two-fold benefit: cleaner, healthier local streams, and the restoration and protection of the Chesapeake Bay.
The state of Maryland has taken its portion of the Chesapeake Bay watershed (25,000 square kilometers) and identified the ten major tributary basins or subwatersheds. Maryland contains only 15% of the Chesapeake Bay watershed, but we have 30% of the watershed population. The drainage basins are shown in the map below. Each basin will develop its own strategy for improving watershed quality; however, the first step in each basin is reducing nutrients to 1985 levels. Information on the health of the Chesapeake Bay can be found at http://www.chesapeakebay.net/indicators.htm. Current Information about water programs in Maryland can be found at http://www.mde.state.md.us/Water/water_programs/index.asp.

When you get situated in a school, determine which basin your home or school is located in.

*This activity was adapted from a presentation developed by Scott A. Sinex, Physical Science Department, Prince George’s Community College.*