

Be Part of Your Watershed

Activity 1: We're on the Map!

Goal

- ❖ To identify Maryland water systems by locating them on a map
- ❖ To discuss how the health of the water is affected by the community
- ❖ To instill a sense that students' actions are important

Voluntary State Curriculum

1.0 Skills & Processes

A. Scientific inquiry: 1

6.0 Environmental Science

C. Natural Resources & Human Needs: 1

D. Environmental Issues: 1



Time 45 minutes

Materials

- ✓ Maryland Maps showing major river systems (1 map for every 1-2 students)
- ✓ Local maps showing local streams (1 map for every 1-2 students)
- ✓ Large sheets of paper, masking tape, and magic markers

OR

- ✓ Blackboard and chalk
- ✓ Colored Pencils or Markers
- ✓ "We're On the Map" Student worksheet

Resource

National Geographic Online Map Machine.
Print out local topographical or street maps.

<http://plasma.nationalgeographic.com/mapmachine/>

Overview

Building background to develop concept of watersheds

Motivation

KWL chart – Healthy Water (include concept of pollution)

Procedure

1. Find out what students already know about the importance of clean water and water pollution. Ask questions to stimulate input and list responses on the blackboard or sheets of paper hung around the room. For example:
 - ❖ Why is clean water important?
 - ❖ What is pollution?
 - ❖ Why is so much of our water polluted?
2. Distribute the maps.
3. Point out the many rivers and streams in Maryland on the large map. Explain what it means to restore a stream; how the stream, the Chesapeake Bay, and the ocean are all connected.
4. Let students become familiar with the state map by asking them to find cities, rivers, the Chesapeake Bay, Atlantic Ocean, etc. Read aloud the name of a place and have them point to it. Use these as reference points later on.
5. Have students locate the areas that are listed below and write these names on the activity sheet.

Annapolis	Atlantic Ocean	Baltimore
Chesapeake Bay	Chester River	Choptank River
Elk River	Nanticoke River	Patapsco River
Patuxent River	Potomac River	Severn River
Susquehanna River	Washington, DC	Your town

6. Using the appropriate map(s), have students take colored pencils or markers and follow their stream from the headwaters to the mouth. Circle the stream's source and mouth.
7. Have students make a drawing of their stream on the activity sheet.

Vocabulary

Mouth - the point where a stream empties into a larger body of water

Pollution – contamination of the natural environment

Source – where a stream first begins; the headwaters of a stream

Tributary – a stream flowing into a larger stream or body of water

Wrap-Up

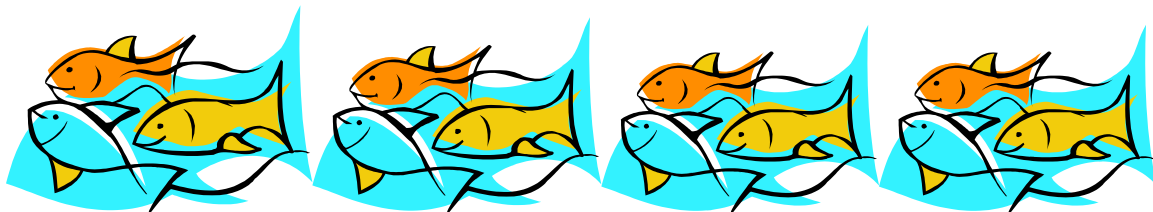
- ❖ Is your stream a tributary of a major river? Which one?
- ❖ How does your town affect your stream?
- ❖ How does your stream affect your town?

Assessment

- ❖ Completed activity sheet
- ❖ Participation
- ❖ Journal entry (What I have learned....)
"Water Log"

Optional Challenge/Extensions

- ❖ Follow a stream's flow from the mouth to the Chesapeake Bay. Note: 5 percent of Maryland's streams do not flow into the Bay. Guess where they might be? (Western Garrett County flows to the Mississippi River, Christina River flows into the Delaware River and eastern Worcester County flows into Assawoman Bay)
- ❖ Examine maps of other watershed and major rivers, within North America and worldwide, such as the Mississippi River; Colorado River (Grand Canyon); Danube River and Vienna, Austria; Nile River and Cairo, Egypt.
- ❖ Journaling.
- ❖ Project WET Activities – Branching Out; Capture, Store and Release; Rainy Day Hike; Color Me a Watershed
- ❖ Healthy Water, Healthy People Activities – A Snapshot in Time; Water Quality Monitoring: From Design to Data

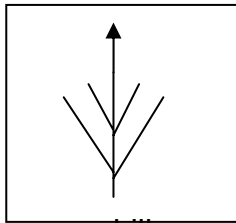


Sample Topographical Map & Watershed Outline

Determining watershed boundaries will be useful in discovering potential pollution sources of a particular waterway. What follows is a list of useful tips to help you draw the outline. Don't get discouraged. Even the experts have difficulty drawing watershed boundaries.

Tips and clues to help you draw watershed outlines:

- ❖ Color the streams you want to find in the watershed, and color streams surrounding your particular stream.
- ❖ Locate churches, schools and large buildings on the map. Many important buildings are built on hilltops.
- ❖ Look for small circles. These are hills, which will indicate watershed boundaries.
- ❖ You may see some V-shaped lines. These are streams or gulleys that will become streams in wet weather. The water travels through the V toward a stream like this:



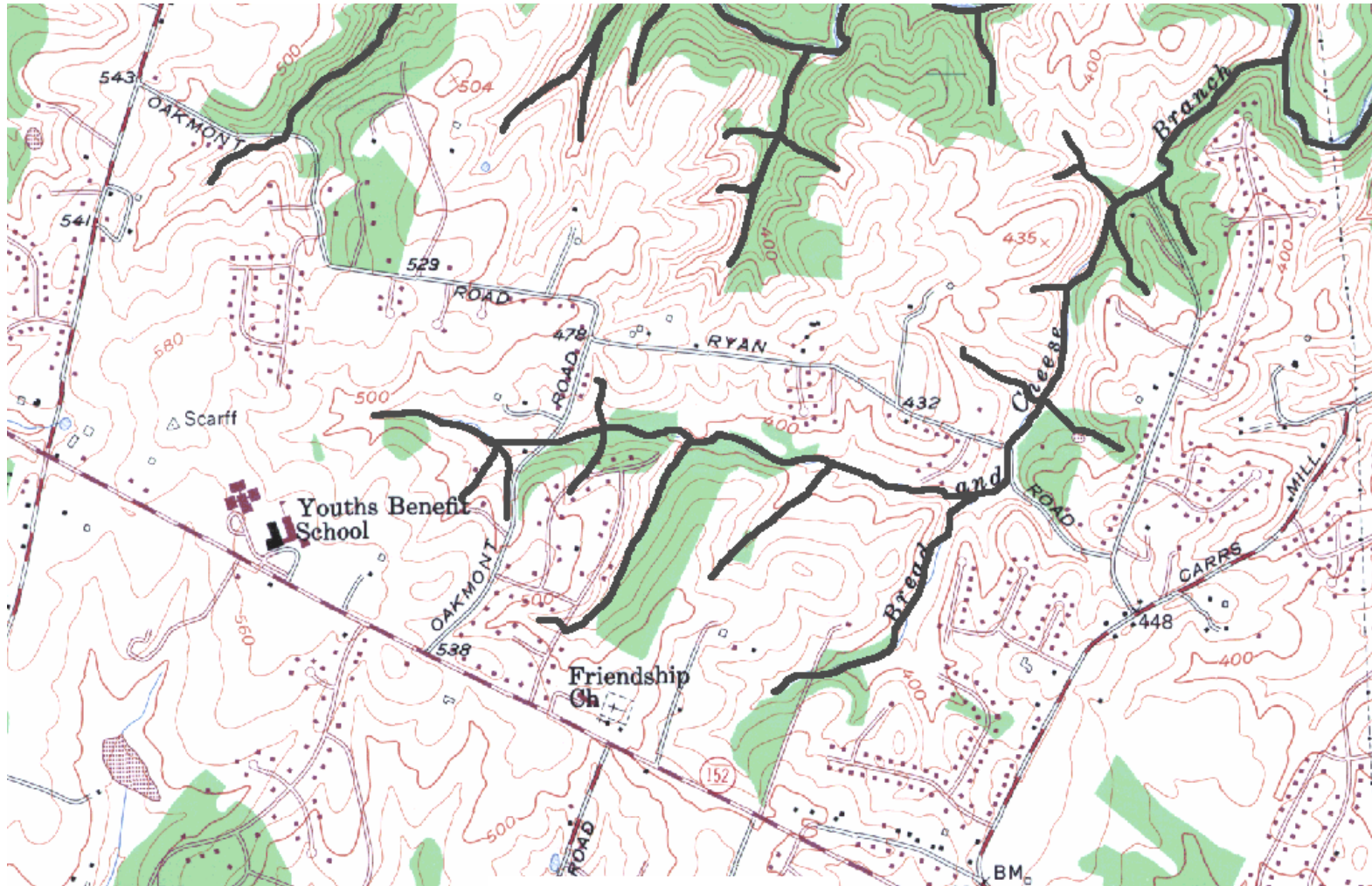
U-shaped lines are hills.

- ❖ After coloring the streams, look for roads as watershed boundaries. Roads tend to follow the ridge lines and therefore follow the watershed boundaries.
- ❖ Watershed boundaries usually follow the "in between rule": whenever you find two different streams, the watershed boundary may be in-between the two streams. Often a road will bisect the streams.
- ❖ You may have several hills to choose from within the borders of your stream or waterway. Plan ahead! Mark those hills that you are certain are boundaries and plot your watershed boundaries by connecting the hills.
- ❖ Go through the middle of the circles and watch on either side of the hill for V-shaped lines pointing up towards the hill. Avoid the V's but go through the U's.
- ❖ Watershed boundaries are almost never in a smooth line. Often you may have hairpin turns to avoid another stream's drainage.

Student Page

Watershed Outline Exercise

Below is a topographical map. Try to draw the watershed of the Bread and Cheese Branch Stream. Compare your outline with the completed watershed map on the next page.



Student Page

Completed Watershed Map

Compare your watershed outline to this one.



Student Page

We're On the Map!

Before you visit your stream, you need to have a "picture" in your mind of the stream. In what part of Maryland is the stream? How close is it to your home?

What You Will Need

- ☐ A large map of Maryland
- ☐ A map of your county
- ☐ Colored pencils or markers

Know the Meaning....

Tributary – a stream flowing into a larger stream or body of water.

Source – where a stream first begins; the headwaters of the stream.

Mouth – the point where a stream empties into another body of water.

What to Do

On your large map find the cities and rivers your teacher names. List them on your activity sheet. On your county map, locate your stream. Find its headwaters and its mouth if you can (you may need help to use both maps). Mark the stream on your map.

Talk about what your group can do to improve your stream.



We're On the Map!

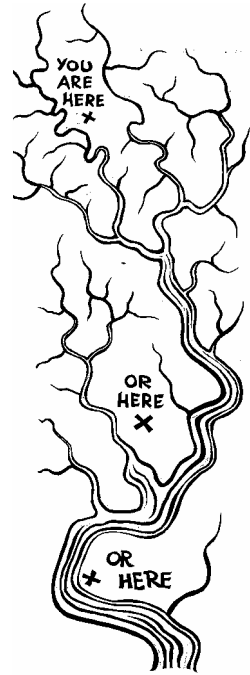
Worksheet

Name: _____ Date: _____

My town is _____

The name of our local stream is _____

I found these places on the map



Vocabulary

Mouth _____

Pollution _____

Source _____

Tributary _____

This is a drawing of _____ stream

Student Page

Name: _____ **Date:** _____

We're on the Map!

KWL Chart

Before you begin your research, list details in the first two columns. Fill in the last column after completing your research.

Topic		
What I know	What I want to know	What I learned

Student Page

Be Part of Your Watershed

Activity 2: What is a Watershed: Building a Watershed Model

Goal

- ❖ To demonstrate a watershed
- ❖ To understand that land use and people affect water use and quality

Voluntary State Curriculum

- 1.0 Skills & Processes
 - A. Scientific Inquiry: 4, 8, 9
 - B. Critical thinking: 5
- 6.0 Environmental Science
 - C. Natural Resources & Human Needs: 1
 - D. Environmental Issues: 1



Time 45 minutes

Materials

- ✓ 1 baking pan
- ✓ Sheet of aluminum foil, 1 ½ times length of pan
- ✓ Blocks or rocks
- ✓ Food coloring
- ✓ Loose soil—small amount
- ✓ Kool-aid powder
- ✓ Water
- ✓ Watering can with shower spout or paper cups with holes in the bottom
- ✓ Sample topographical map and watershed outline
- ✓ “Building a Watershed Model” Activity Sheet

Motivation

Building the initial watershed.

Procedure

1. Have students read “What’s a Watershed?”
2. Prepare the model by placing blocks or rocks at the corners of one end of the pan (to form the shape for mountains). Cover the blocks and remainder of the pan with aluminum foil making valleys and streams. (Use crumbled paper under the foil to make smaller hills if needed).
3. Use the cup or watering can to make it “rain” on the model. Have students identify the mountains, streams, rivers, and bay.
4. Using a few drops of food coloring to represent pollutants; loose soil for sediment from farming, construction and erosion; and powdered drink mix to represent natural nutrients and minerals, place small portions of these materials on the model, either one at a time or all together. Make it “rain” again.

Wrap Up

- ❖ Ask group to define “watersheds”. Write an agreed upon definition on paper or blackboard. Show students the sample topographical map and outlined watershed. Explain how the watershed boundaries were determined. Show students the topographical map with the outline of the stream’s watershed.
- ❖ How does water get to a stream?
- ❖ What does the water bring with it?
- ❖ What affects the water on its way?
- ❖ What were some of the pollutants we added?
- ❖ What might be some actual pollutants in our local stream?
- ❖ What are some natural things the water carries with it? (Soil, nutrients, minerals).
- ❖ What effect did the soil have on the flow of water?

Vocabulary

Elevation –

a measure of how high land is above sea level.

Nutrients and

minerals – natural substances that help plants and animals grow; too much of them can be harmful.

Pollutant –

something that contaminates the natural environment.

Runoff – water which is not absorbed by the land and which flows directly into streams or other bodies of water.

Sediment – soil that washes into a stream or river and settles on the bottom.

Watershed – an area of land that is drained by a river or stream.

Topography – the shape of the earth’s surface.

- ❖ What effect do pollutants have on the lakes, bay, plants and animals living in the watershed?
- ❖ How is it possible for someone who lives in the mountains to pollute the bay?

Modifications

- ❖ Work in a small group.
- ❖ Assign jobs for everyone.

Assessment

- ❖ Completed project
- ❖ Participation in discussion

Optional Challenge/Extensions

- ❖ Modify model by building a dam on a major stream in the model. How does it affect the land formation and water flow?
- ❖ Add sponges as buffer zones along the stream banks to see if they filter the water.
- ❖ Place the mountains in the center of the pan to illustrate two watersheds.
- ❖ Make clay models with towns, farms, boats, etc.
- ❖ Journaling
- ❖ Project WET Activities – Branching Out!; Capture, Store and Release; Rainy Day Hike, Color Me a Watershed
- ❖ Healthy Water, Healthy People Activities – A Snapshot in Time; Water Quality Monitoring: From Design to Data



What is A Watershed?

When we define a **watershed** we say that it is an area of land that is drained by a river or other body of water. But what *does* that *mean*? It's not easy to understand.

When you look at a map, you see lines for streams and rivers all over. All the land between the waterways "belongs" to the watershed of a particular stream or river or lake. How can you tell where one watershed ends and another begins?

The land between rivers and streams is never completely flat—even in places like Kansas. Some parts are always higher than others. We measure how high a particular spot of land is by how many feet it is above the level of the ocean. The measurement is called **elevation**.

For any area of land that lies between two bodies of water, the place that has the highest elevation will be the dividing line between the two watersheds.

Is it still hard to picture what a watershed is? Imagine you are on the beach. You make a mountain range on the beach by building a long mound of sand that runs toward the ocean. On each side of the "mountain

range" you now dig a line that will be your streambed. If you pour water on the very top of your "mountain range," some water will roll off on one side and flow into stream 1; some will slide off on the other side and flow into stream 2. Now you can see that each stream has its own watershed and the highest point on your "mountain range" is the dividing line. Both streams flow into the ocean. So the watershed for the ocean includes the watersheds of both streams.

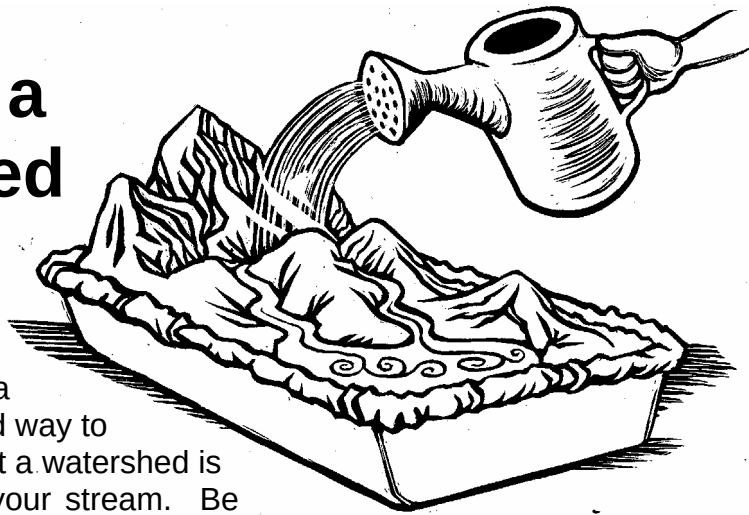
To find the boundaries of a watershed, you need a topographic map that shows the elevation of the land. Even with a topographic map, you can't always tell the exact dividing line between two watersheds, but you can make a good guess. Unless you live near the area of the highest elevation, you can probably tell which watershed your town is in.

Why is it important to know about watersheds? Every inch of land is part of some watershed. Anything that goes onto the land anywhere in the watershed will end up in the water. If you put toxic weed killer on your lawn, the poison will end up in the stream. If you pour used oil on the street or sidewalk, rain will wash it down the storm drain and then into the stream.

No matter how far away you are from the water, what you do on the land will affect some stream or other body of water. You can see why it's everybody's business to protect and restore our waterways.

Student Page

Building a Watershed Model



Building a model of a watershed is a good way to understand just what a watershed is and how it affects your stream. Be creative. Think about all the things in your community that might affect your stream. How many can you show in your watershed?

What You Will Need

- ☐ 1 baking pan ☐ Blocks or rocks
- ☐ Food coloring ☐ Loose soil
- ☐ Powdered drink mix ☐ Water
- ☐ Sheet of aluminum foil 1 ½ times the length of the baking pan
- ☐ Watering can with shower spout or paper cups with holes in the bottom

Know the Meaning...

Elevation – a measure of how high land is above sea level.

Nutrients and minerals – natural substances that help plants and animals grow; too much of them can be harmful.

Pollutant – something that contaminates the natural environment.

Runoff - water which is not absorbed by the land and which flows directly into streams or other bodies of water.

Sediment – soil that washes into a stream or river and settles on the bottom.

Watershed – an area of land that is drained by a river or stream.

What To Do

Build a model of a watershed. Use blocks or rocks for mountains. Cover the rocks and the rest of the pan with aluminum foil. Shape the foil to make valleys and streams and hills. Use the watering can or cup to make it “rain” on the model. Watch how the rain travels over the watershed. Pretend the food coloring is pollutants, soil is sediment from farming, construction and erosion, and the drink mix is nutrients and minerals. Place small bits of these materials on the model. Make it “rain” again. What happens? Talk about what your model tells you about a watershed.

Student Page

Building a Watershed Model

This is a sketch of our watershed model. Draw arrows showing how the water flows.



We think these pollutants might be getting into our stream.



Student Page