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Division of Water Supply Protection
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April 2020

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ACTIVITY GUIDE
MAKE YOUR OWN WATERSHED MODELS

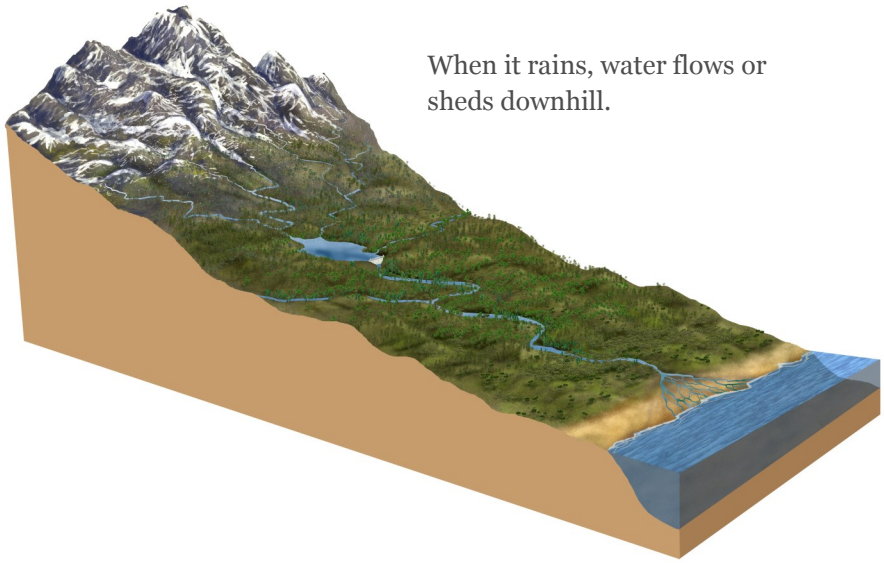
These easy to do activities can be done at home or in your own backyard with simple materials you may have on hand.

WHAT IS A WATERSHED?

Cup your hands to hold water. You just made a watershed!

A watershed is an area of land where all water drains to a common location or waterway. Water moves, or sheds, downhill. In some parts of a watershed, water flows. In other parts of a watershed, water is stored.

Using your hands as a model, cup your hands to hold water. Your thumbs and fingertips are the watershed boundaries. The high areas would be ridgelines. All the water falling inside your watershed flows down to a common area in your palm.



When it rains, water flows or sheds downhill.

INSIDE THIS ISSUE

MATERIALS:

- Wax paper or aluminum foil
- Marker
- Spray bottle or a teaspoon and water
- Tray, cookie sheet, or bin lid
- Towel or sponge for clean up

OPTION 1:
WAX PAPER OR ALUMINUM FOIL MODEL

Fold the wax paper or foil in half, making a crease. This is your watershed. Set the model on a tray, cookie sheet , or plastic storage box lid to catch any water.

Take the marker and color along the top of the fold. The colored line is a ridge line or the highest point of the landscape.

Next, make it rain by spraying water along the ridgeline. If you don't have a spray bottle, slowly spill drops of water on the fold from the teaspoon. Notice the water picks up the color from the marker. The water drops will shed downhill.

The ridge line fold represents the watershed boundary. Precipitation falling on one side of the ridge will run off downhill to the lowest point on one side, and water on the other side will fall into a separate watershed basin.

Experiment with propping your paper up to create different slopes. *Does the water run off the top of the slope as you expected it to?*

A watershed is an area of land that drains to a common river, lake, or reservoir.

REFLECTIONS

What are you curious about?

We want to hear from you! Send us a photo of your model watershed results, and any questions or thoughts you may have!

Contact Watershed Education Staff : Kathryn.Parent@mass.gov

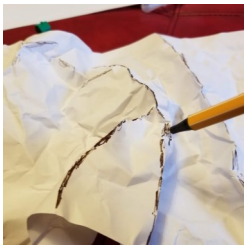
Trees growing along the shores of Wachusett Reservoir prevent erosion by stabilizing the soil with their root systems.

OPTION 2: CRUMPLED PAPER MODEL

1. Crumple a piece of paper into a ball.

2. Carefully unfold the paper by finding the four corners, do not flatten all the way. Set your paper model on the tray. This will be your watershed landscape of hills and valleys.

3. Take a darker colored marker and color along all the highest folds– think of these as mountain ridgelines, peaks, hilltops.



4. Next use a blue marker to color where you think river and streams would flow along creases into the low valleys. Now you have a basic landscape of hilltops and valleys. Can you see where rain water would run off the land? Do you see a common location that water will collect?

5. Add features to your landscape by drawing in houses and buildings with markers or model houses from a board game.

6. Make it rain! <u>Make sure your tray is underneath.</u> Spray the watershed using a spray bottle. If you don't have a spray bottle, you can drop water carefully by teaspoon, or soak a sponge or cotton ball and squeeze out some water drop by drop all over the paper.

Let your paper watershed dry to create a colorful pattern. The flow of water can be compared to branches of a tree.

*Adapted from Project WET Branching Out

MATERIALS:

- Piece of paper
- Markers
- Spray bottle or teaspoon and water
- Tray, cookie sheet or bin lid
- Towel

Optional :

- Cotton balls or sponges
- Board game houses

REFLECTIONS

Ask the following questions while creating your paper model:

Is the water flowing downhill in the creases as you expected?

Is it gathering in rivers, lakes or reservoirs as predicted?

Does your watershed have waterfalls, where water would fall quickly down a steep slope?

Do you have flat areas that would be considered flood plains?

Where would you build a house? Would you like a mountain view, along a river, near a pond? Why?

Imagine the entire landscape without trees.

How would that change your decisions on where to build a house?

Trees provide several benefits by capturing water, slowing heavy rainfall, providing cooling shade, and transpiring water back into the water cycle.

MATERIALS:

- Tray, dishpan, cookie sheet, or lid from a bin. Or space outside
- Newspaper and recycled materials
- Shower curtain, trash bag, or tablecloth
- Spray bottle or teaspoon
- Sponges
- Paper towels, or cloth napkin.
- Optional: instant coffee, tea, liquid soap, cooking oil, salt shaker, dried herbs, food coloring, drink mix, **food coloring and drink mix may stain skin and clothing!**
- Optional: medicine dropper or pipette

REFLECTIONS

Ask the following questions while creating your watershed model:

Can the landscape be changed to stop the pollution from getting in the rivers, ponds, lakes, reservoirs, or oceans?

Once the water is polluted, how can it be cleaned?

What role do trees play in the water cycle?

OPTION 3: TABLECLOTH, TRASH BAG, OR SHOWER CURTAIN WATERSHED MODEL

Make a larger scale model to discover ways to keep pollution out of watershed basins.

1. Check your recycle bin for any materials that will create the hills and valleys of a watershed. Crumpled up newspaper and egg cartons work well. If inside, place these on a tray or in a dish pan, whatever you have to hold water that will be sprayed over the top. If outside, create a large model on the ground.
2. After creating a watershed landscape with high and low areas, cover with something waterproof. You can use a shower curtain, plastic table cloth, or a trash bag. Tuck the covering in around the high areas and keep the edges within the tray or pan so water doesn't get everywhere.
3. Make it rain with the spray bottle, squeeze a sponge, or spoon drops of water across the landscape.
4. Notice where the precipitation is falling and pooling up in the low areas.
5. Add a challenge! Use any of the following or combination to create areas of pollution on the watershed: tiny drops of food coloring, small sprinkle of powdered drink mix, instant coffee, tea, liquid soap, cooking oil, salt, or dried herbs. All you need is a tiny bit. In the above photo, one tea bag was opened and spilled across the area. Look on page 5 under Nonpoint Source Pollutants for suggestions.
6. Predict what will happen to the water that is collected at the lowest points.
7. Make it rain!
8. Stop using the spray bottle and switch to sponges and droppers. Soak up the water and cycle it through by squeezing out again.
9. Imagine the role of trees and plants in the water cycle. Make your watershed more realistic by placing a paper towel or napkin up the sides. This represents soil and plants. Let it rain again and notice what happens.

Get down to Earth, take your supplies outside and create a large model on the ground.

RAINY DAY DETECTIVE

Put on your raincoat and take a walk around your yard or neighborhood during or just after a rain. If it's not raining, walk around with a notebook and make predictions for when it rains.

- Where is the water running off to?
- Are there any storm drains?
- Is water collecting in large puddles?
- Do you see anything that shouldn't be washed downstream?

Puddles are mini-watersheds that collect water. When the puddle overflows the water is released to flow downhill to meet more water runoff from other places. This water eventually makes its way to a common location– a river, lake, reservoir, or the ocean.

As the water flows downstream, it collects and carries materials along the way. While some materials decompose, settle out, or are filtered by soil, other matter continues downstream. Organic materials carried by the water can nourish aquatic life, but some substances are toxic and can hurt any living thing that drinks or lives in the water.

It can be difficult at times to locate contaminates that will pollute the water.

Point source pollution is easier to identify as it comes from a single source. Some examples of point sources are oil refineries, paper mills, and auto plants that use water as part of their manufacturing processes. Polluted wastewater is discharged into rivers, lakes, or the ocean.

Nonpoint source pollution is pollution resulting from many sources.

On your walk, try to locate possible pollution sources.
Notice different surfaces of grass, soil, and pavement and how the water runs off or soaks into the ground.

When you get back inside, sketch a map of your surroundings.

*Adapted from Project WET Rainy Day Hike

SUNNY DAY PREDICTIONS

In a safe area of a driveway or sidewalk, spill some water on low areas to create a puddle.

Predict how long it will take for the puddle to disappear.

Use sidewalk chalk to outline the puddle. Check often and continue outlining as it evaporates.

How close was your prediction?

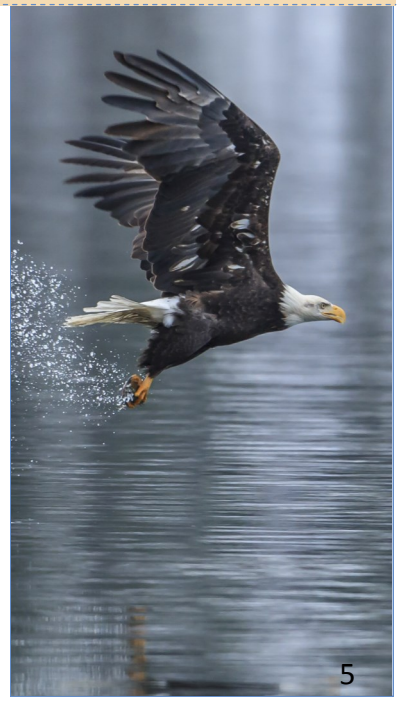
The watershed boundaries include all the plants, animals, and water interacting within that watershed.

NONPOINT SOURCE POLLUTION

Nonpoint source pollution is caused when rain or snowmelt moves downhill, picks up natural and human-made pollutants, and carries them downstream.

What pollutants did you use on your watershed model? From safe items you may have in your home, consider what ingredients could represent nonpoint source pollution. Here are some suggestions:

INGREDIENT	REPRESENTS POLLUTION
Food coloring **may stain skin and clothing!**	Toxic chemical from urban runoff
Drink mix **may stain skin and clothing!**	Virus, bacteria from animal waste
Instant coffee or tea	Erosion from construction sites
Liquid soap	Car washing
Cooking oil	Oil from motor vehicles
Salt	Road salt treatment
Dried herbs	Fertilizers, herbicides, insecticides



GLOSSARY:

EROSION: A process where rocks and sediments are picked up and moved to another place by ice, water, wind, or gravity.

EVAPORATION: Evaporation takes place when liquid turns into gas. Water leaves the Earth's surface and enters the atmosphere as a gas or water vapor.

FLOODPLAIN: Low flat land along a stream that is flooded when the stream overflows.

HYDROLOGIC CYCLE: The Water Cycle. The path that all water follows as it moves around Earth in different states.

NONPOINT SOURCE POLLUTION: This pollution is caused by rainfall or snowmelt moving over and through the ground. As the runoff moves, it picks up and carries away natural and human-made pollutants, bringing them into lakes, rivers, groundwater, wetlands, and coastal waters.

POINT SOURCE POLLUTION: Pollution that can be tracked back to a single source or point that is released directly into the environment. Some examples of point sources are industrial places that use water as part of their manufacturing processes. Polluted wastewater is released into rivers, lakes, or the ocean.

PRECIPITATION: Any liquid or frozen water that forms in the atmosphere and falls back to the Earth. Precipitation forms in the clouds when water vapor condenses into bigger droplets of water. When the drops are heavy enough, they fall to the Earth.

RESERVOIR: A large natural or artificial lake used as a source of water supply.

RUNOFF: Excess water from rain or melting snow that runs downhill over the landscape.

TRANSPIRATION: The process where plants absorb water through the roots and then give off water vapor through pores in their leaves.

WATERSHED: An area of land that drains to a common river, lake, or reservoir.

WORD SEARCH

E F A S X D N R O F F E D K I
C T S F N E F I N O A U T I M
R R M F E H A O O M B V X N N
U A K O R S Z V I G S U E O O
O N J N Q R E R T R J I R N I
S S U U X E F E A V F A O P T
K P X R N T O S R V G F S O A
V I R H O A U E O U B V I I T
N R X M I W D R P K J C O N I
C A U E T H S Z A V O Q N T P
P T P A U G D A V O U U D X I
S I M A L M Z W E N K M X N C
H O C F L Z S O V X P F K Z E
C N J U O C G S O U S Z Q I R
N I A L P D O O L F H B V E P

EROSION

EVAPORATION

FLOODPLAIN

NONPOINT

SOURCE

POLLUTION

PRECIPITATION

RESERVOIR

RUNOFF

TRANSPIRATION

WATERSHED

DEPARTMENT OF CONSERVATION AND RECREATION

DIVISION OF WATER SUPPLY PROTECTION

The Division of Water Supply Protection offers education programs to teach the public about the importance of protecting public drinking water supplies and resources. These programs are offered at the Quabbin and Wachusett Reservoirs where staff, exhibits, and materials help teach people about the history and important features of our watersheds. These programs are provided for the general public, school groups and special interest groups.

www.mass.gov/watershed-education-programs

DISTANCE LEARNING RESOURCES

Project WET
www.projectwet.org/distancelearning

Project Learning Tree
www.plt.org/activities-for-families/in-your-own-backyard/

Project WILD
www.fishwildlife.org/projectwild/wild-parents

Massachusetts Water Resources Authority
www.mwra.com/02org/html/edresources.htm

The National Environmental Education Foundation
www.neefusa.org/resource/water-quality-backyard-activity-guide

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