Watershed Tarp Activity

Grade Level: 3rd – High School

Duration:
Prep: 15 minutes
Activity: 25-35 minutes

Objectives:
Students will be able to define a watershed, identify the physical boundary of a watershed and common stormwater pollutants and ways to reduce stormwater pollution.

Materials:
2 tarps or plastic picnic table covers – one blue, one white
2 Plastic spray bottle, filled with water
Newspapers
Containers for pollutants
- 10 film canisters or glad 1 cup to go containers

Pollutants:
- #1 - cocoa powder (dirt)
- #2 - steak sauce or molasses (animal manure)
- #3 - dish soap (detergents from laundry and car wash soapy water)
- #4 - cold coffee (oil from cars on pavement)
- #5 - green drink mix or jello (fertilizer)
- #6 - red drink mix or jello (pesticide)
- #7 - purple drink mix or jello (household hazardous waste)
- #8 - brown cake sprinkles or jimmies (dog waste)
- #9 - paper punches or paper from a shredder (litter)
- #10 - pickle juice or vinegar with bits of toilet paper (sewer overflow)

Plastic tile separators *(Xs)* for houses
Crepe paper streamers for roads
Black foam rectangle for parking lots
Plastic animals, toy cars
Optional:
- string (municipal boundaries)
- green felt or sponge strips (wetlands)

Paper towels and baby wipes for cleaning up any spills!

Prep:

- Collect "pollutants" from list, using household or readily accessible foodstuff. Place into containers. Number the containers. Fill spray bottles with water. The water can be tinted pale blue with food coloring for better visibility.

Directions:

1. Lay blue table cover flat on ground. Ask participants to stand around edge of the blue table cover. Hand newspapers to students. Ask them to take one sheet and pass the rest along.

2. Have participants crumple their newspaper and throw it onto the cover towards the middle. Arrange paper around the center, away from edges of cover.

3. Ask two volunteers to open the white table cover and lay it over the newspaper. Push down on the top white cover where there are gaps between the materials, creating "topography." Ensure there is as least one fairly large watershed.

4. Ask the students to define a watershed.
    - Watershed – land that drains or "sheds" water to the same river, lake or stream; a basin.

5. Ask the participants to cup their hands. Explain that they have created a basin and a model watershed. If water is sprayed into their hands it will drain to the same place (i.e. the lowest part of their hands). Explain that their watershed boundary is defined by the highest parts of their hands (i.e. top of their thumb and fingers). In a landscape this is the ridgeline.

6. Call on one student to identify a watershed in the landscape that was just created. Ask this same student to identify the ridgeline that defines that watershed. Ask if there are other watersheds in the landscape and have students identify them.

7. Explain that watersheds can be closed or "open" they flow into other watersheds. Also explain that watersheds can be big and small. Point out different sized watersheds in the landscape. Explain that some watersheds are very large. For instance, the Mississippi River Watershed comprises over 40% of the lower 48 states. The river starts in Minnesota and flows all the way down through Louisiana.

8. Pass out the spray bottles and ask those individuals to make it "rain," directing them to spray towards the middle of the cover. [Try putting the spray bottle on "stream" and then on "spray" to simulate different rainfall levels.] Once water begins to run down the hills and collect in depressions in the landscape, stop the rain.

9. Point to a hillside and ask where rain would flow if landed there; and if it falls on the other side of a hill, where does it go? This demonstrates how a watershed "works," topography and gravity determine where water eventually flows when it falls on the land. Any pollutants on streets, roofs, sidewalks will eventually drain into streams, lakes or wetlands when rain falls or snow melts. These pollutants are nonpoint source pollutants also known as stormwater runoff.

    Optional: Place string on top of cover to illustrate municipality boundaries; ask participants if the watershed boundaries and runoff reflect these boundaries. Discuss the importance of watershed management between municipalities.

10. Explain that this is a simulation of what happens every day in our communities. The activity will demonstrate the changes in the watershed as land is more developed. Follow the script or improvise to suit your local community conditions. *(See script sheet.)*

11. Ask students to identify what they see happening to the pollutants in the watershed, what pollutants are remaining, what will happen to the remaining pollutants still on the land and in the water? How will the pollutants impact the natural system?
12. Discuss how stormwater pollution or nonpoint source pollution is different from single source pollution. Stormwater pollution is a lot of different pollutants from lots of places. We all contribute the problem. The good news is that we can all be part of the solution.

13. Discuss what people in the different situations could have done differently. Possible best management practices or watershed management techniques that could be discussed:
    - Pick up dog waste with a biodegradable or plastic bag and put in trash.
    - Plant tree saplings, shrubs or ground cover in areas where there is exposed soil.
    - Apply fertilizer according to container directions, try organic gardening.
    - Go to www.earth 911 to find local recycle center for household hazardous materials and contact your municipality for waste collection programs near you.
    - Keep your car maintained and watch for oil spots on your garage floor or driveway.
    - Wash your car at a facility that recycles wastewater or sends it directly to a treatment facility.
    - Wetlands reconstruction or protection (benefits illustrated by placing felt or sponges in areas next to bodies of water that have runoff entering.
    - Keep farm animals out of waterways (fences).
    - Always keep trash from becoming litter by putting it in its place.

Cleanup: House markers, animals, cars, foam sheets and film canisters are reusable. Clean with soap and water and air dry. Carefully pick up the four corners and the middle of each side of top cover, making sure wastewater pools to the middle. Pour wastewater into wastebasket or down the sink. The blue and white table covers can be rinsed off and reused. Crepe paper should be disposed of in the trash – because they may be wet or contaminated. If the newspaper isn't wet, it can be recycled.

Get Involved:

- Rivers Alive River Cleanup Events - Rivers Alive is Georgia's volunteer waterway cleanup program that targets all waterways in the State including streams, rivers, lakes, beaches, and wetlands. Participate in or organize a river clean up. Go to www.riversalive.org to find or register an event near you.
- Storm Drain Stenciling or Marking – Get the word out! Marking a storm drain with a stencil or curb decal is an excellent way to remind community members that storm drains are only for storm water. Community groups, scout troops, individuals or schools can organize a storm drain stenciling event. Many communities have organizations that can help groups in planning and conducting these types of events. Email info@cleanwatercampaign.com for more information.
- Become an Adopt-A-Stream monitor – Conduct biological or chemical monitoring with your students. Free workshops are provided at regular intervals in the Atlanta region and as needed in other areas of the State. Volunteers can monitor their waterways without attending a workshop, but those who attend and pass a QA/QC test will then be considered quality data collectors under the Georgia Adopt-A-Stream Quality Assurance Plan. QA/QC data is posted on the Adopt-A-Stream database. Go to www.georgiaadoptastream.org for more information.

Adapted from the Earth Force Watershed Model Activity
www.earthforce.org

Watershed Tarp Script

1. *Farmers decide to settle in the watershed. As the farms are established land is cleared and soil is exposed.*
    - Have a student choose a place for farms – with natural water source and space for fields. Place tile separators (Xs) where the farm buildings are located.
    - Canister 1. Sprinkle cocoa powder around them.

2. *Animals produce waste in the form of manure. Some of it gets into creeks, and farmers use some of it to fertilize their fields.*
    - Place a few farm animals on the spot where the farms are established.
    - Canister 2. Pour some steak sauce around animals.

2. *A small town grows up in one of the valleys. The farmer goes to a town to buy a few things.*
    - Place some tile separators (Xs) together to represent the town
    - Canister 1. Sprinkle cocoa powder around them.

3. *But how will the farmer get to the town?*
    - Add some crepe paper or streamers to represent roads.

4. *Now that it is easy to get out to the country, many more people think they'd like to live here. Lots of houses get built. In order to build the houses, more soil is exposed.*
    - Place more houses on the landscape.
    - Canister 1. Sprinkle cocoa powder around them.

5. *The new houses need driveways for their cars. Everyone needs places to buy food, and clothes, and go to movies and stuff, so we need more shopping centers, right? We need room to park all of the cars.*
    - Place a piece of foam to represent the shopping center and its parking lot.
    - Place a few cars around the house sites and on the roads.
    - Explain that the more buildings, parking lots and roads there are, the more impervious surfaces and storm water pollution there is.

6. *It's winter and a bad storm is headed our way.*
    - Pick up the spray bottles hand them to two students
    - Have students spray water on to the landscape.

7. *Finally there's a sunny day, and everybody decides to wash their cars.*
    - Canister 3. Pour soapy water on the cars.

8. *Somebody changes their oil and dumps it in the street. A couple of cars have transmission leaks.*
    - Canister 4. Pour some cold coffee around cars.
    - Ask the students what other fluids can leak out of a car. Pour more from canister 4.

9. *Its spring and people look around and say, enough of this bare dirt, we want nice grass. So they fertilize the lawn with chemical fertilizer to make the grass grow faster.*
    - Canister 5. Sprinkle green drink mix around houses.

    People really want green grass, so if a little fertilizer is good, more must be better, right?!
    - Sprinkle more green drink mix.

Watershed Tarp Script

- Note that over application of fertilizer does not improve the growth of the grass or shrubs and may enter the storm drain as runoff. Remind students that fertilizers are also applied to golf courses, parks and gardens.

10. *People also want to get rid of weeds and pests in their yard and gardens so they apply pesticides. In this community they think more is better and aren't very good about reading the instructions on the label.*
    - Canister 6. Pour some red drink mix near the houses.

11. *When cleaning out the garage, somebody found a can of something – maybe it was old paint thinner, or maybe it was some leftover paint - and poured it down the storm drain.*
    - Canister 7. Pour some purple drink mix near one of the houses

12. *It rains again!*
    - Spray some more.

13. *Finally there's a sunny day, and people decide to take their dogs for a walk. These dog owners do not pick up after their pets.*
    - Place dogs around the landscape
    - Canister 8. Pour brown sprinkles where the dogs have walked.

14. *People drop litter as they walk. Sometimes trash blows away unintentionally.*
    - Canister 9. Spread paper scraps around.

15. *People are pouring bacon grease down their kitchen sink; not just bacon grease, but cooking oil, salad dressing, marinades and ice cream. All of these are high in fat. As they cool they also harden, clogging pipes, which cause sewage to backup into homes or overflow from manholes into our rivers and streams.*
    - Canister 10. Pour out vinegar or pickle juice near the house markers.

16. Start spraying lots of water to simulate heavy rainfall.