

Watershed pollution activity

Goal

Learn about watersheds and how contaminants are introduced and flow through them.

Introduction

Work with students to create a watershed with introduced pollutants in order to demonstrate the movement of debris through their urban areas on a more tangible scale.

Next Generation Science Standards

Practices

- Planning and carrying out investigations

Core Ideas

- ESS3.C Human impacts on earth systems

Crosscutting Concepts

- Systems and system models
- Influence of Science, Engineering, and Technology on Society and the Natural World

Supplies

- Tarps (use balled up paper underneath if needed to create topography or find an appropriately uneven but sloped landscaped or natural area (ideally want peaks and valleys))
- Blocks (buildings)
- Toy animals and trees
- Sidewalk chalk (to draw roads if desired)
- Brown sprinkles (dog poop)
- Cocoa powder (loose soil)
- Green food coloring or sprinkles (fertilizer)
- Red food coloring (toxic substances)
- Coconut flakes (trash)
- Dish soap, Alka-Seltzer or baking soda (detergents)
- Cooking spray, cooking oil, soy sauce or honey (oil)
- Watering cans (1 per 3-5 students)

Instructions

1. Define a watershed and discuss how features, such as land use, vegetation, and topography, may influence what flows downstream. Have students make predictions about types of pollutants and flow patterns based on land use types and features.
2. This activity can be conducted outdoors with a tarp on a gentle slope or, if needed, inside on a tarp that has towels, buckets or other items beneath it to create a slope and

Trash Troop: tackling trash together!

Watershed Flows

- topography. If inside, also consider using towels and a basin to capture runoff.
3. Have students create a watershed with different land uses (city, farm/ag, rural and uses within each) using the blocks and toys provided.
 4. Observe flow by pouring or spraying water to see the patterns of flow and retention (directions and rate of flow).
 5. Discuss the following with the students:
 - What a watershed is (a region within which all water flows to the same point downstream into a stream or lake).
 - Groundwater vs surface water flows
 - How the different land uses may influence environmental runoff and waste
 - Difference between point source and non-point source pollution
 6. Add each of the contaminants that individuals may find in their watershed one at a time and let them sit there as you discuss predictions about what may happen when waste is not properly disposed of.
 - Coconut flakes = trash. Distribute the coconut flakes throughout the watershed in areas that are predicted to be associated with trash leakage or accumulations. Let the trash remain on the tarp or ground.
 - Brown sprinkles = dog/other animal waste. Let the sprinkles remain on tarp or ground.
 - Cocoa powder = loose dirt. Choose another area and sprinkle some cocoa powder, explaining to students that this part of the watershed was wooded but was then cleared (or a recently burned area that hasn't been revegetated) exposing loose soil that is carried with precipitation as runoff.
 - Green food coloring or sprinkles = fertilizer. In a third area of the watershed where there are homes with lawns, green parks, golf courses, agriculture that fertilized plants. Ask students about the chemicals that used on grass and other plants, discussing application of industrial fertilizer and how only a little gets taken up by plants while the rest may enter the storm drain as runoff.
 - Red food coloring = toxic waste. Discuss a family who finds a container of hazardous waste in their garage and wants to get rid of it in a hurry so they dump it down the storm drain in front of their house. Use only a few drops of food coloring for adequate effect.
 - Cooking spray or oil or honey or soy sauce = oil from cars or machinery. Discuss where oil may be found in a watershed- in areas of illegal dumping, gas stations/mechanics and from leaky cars. Discuss how car owners were not properly maintaining their cars and oil is leaking.
 - Dish soap, Alka-Seltzer or baking soda = detergents. Identify a few homes where people are washing their cars in front of their homes on the driveway, letting the soapy water run down the driveway into the storm drain.

7. Ask students to describe what they see happening to the pollutants in the watershed:
 - a. how contaminants mix with the bodies of water in the watershed
 - b. what pollutants remain on land and where, and what may happen to those
 - c. what will happen to those in the water?
8. Discuss approaches or techniques those human beings responsible for the different pollutants could have done differently.
 - How could you educate people about these pollutants and runoff affecting water quality in your watershed?
9. Possible best management practices or watershed management techniques that could be discussed:
 - a. Trash: Pick up trash, cover waste bins, plant plants, etc.
 - b. Dog and other animal waste: Pick up dog waste and put in compost, trash can or decomposing waste bags; Keep animals out of waterways (fences)
 - c. Erosion control: Plant tree saplings, shrubs or ground cover in areas where there is exposed soil
 - d. Fertilizer: Apply fertilizer according to container directions, try organic gardening or growing
 - e. Haz Waste: Contact your city or Environmental Protection Agency for Hazardous Waste Household Pick-Up Days or Waste Collection Programs
 - f. Oil: Keep your car maintained and watch for oil spots on your garage floor
 - g. Detergents: Wash your car at a facility that recycles wastewater or sends it directly to a treatment facility
 - h. Wetlands reconstruction or protection (benefits illustrated by placing felt or sponges in areas next to bodies of water that have runoff entering

References

Global Rivers Environmental Education Network. 2002.

https://www.in.gov/idem/riverwatch/files/resources_tarp_activity.pdf