Enviroscape Watershed Model

The Enviroscape is a scaled-down model of a watershed that enables students to learn visually about water quality, watersheds, nonpoint source pollution, and stewardship through a speaker led presentation.

Grade Level Middle

Time Frame
10-minutes prep time
45-minutes

Learning Objectives	Vocabulary	Science TEKS	Materials
Students will: • Investigate what a watershed is and how the landscape dictates the watershed boundary. • Explore how watersheds work and their value. • Describe point and non-point pollution sources and how each impacts a watershed.	*Groundwater* *Surface water,* *Run-off,* *Well,* *Aquifer,* *Pollution* *Point source pollution,* *Non-point source pollution,*	6.1(B),6.2(A),(B),6.3(B),(C);7.1(B), 7.2(A),(B), 7.3(A),(B),(C), 7.6(A), 7.8(A),(B),(C)	Enviroscape Model Kit Model Includes (Model w/ cover and 2 nylon straps Carrying case, 1 Cardboard supply box and 1 clear plastic container with the following: 1 Instruction Manual, Tractors (2) and animals (3) Roads (4) Cars (2) Houses (5), barn (1), factory (1), treatment plant (1); 1 rubber stopper – Black, Molding Clay, Trees (4) Fences (2) Pesticides, Fertilizer and Loose soil Plastic Containers – Black Color (3)Spray Bottle (1), Grass/ wetland Green Stripes – 1 Sheet, Clear bottle for Sewage/ Waste

Background
A watershed is a region or area draining to a particular watercourse or body of water. Watersheds can be small or large, and most are interconnected, eventually draining to the ultimate water bodies. A water body is any river, lake, stream, ocean, pond or basin; water bodies receive runoff waters from a watershed.

5E Instructional Model

Engage

1. A simple check can be ask to your audience what they think of when they hear the word "pollution". Their answer will give you a good indication of their perceptions and cognitive level.
2. *What is Pollution?*

    - Allow students to brainstorm different types of pollution.
    - Then explain to them what pollution is: A substance that is dissolved or placed in the environment, such as pesticides, paints, oil, harmful bacteria etc. that is harmful to the air, soil, water, or other natural resources.
    - Some types of pollution can be seen, smelled or felt; others may be colorless and odorless but still dangerous.

Explore

3. ***Everyone lives in a watershed***
    - Point out the various areas in the watershed model: the construction area, farm, subdivision, industrial plant, riverbanks, and golf course.
4. *Enviroscape Action:*

    For Industrial waste:
    - Pour sprinkles or sludge into the factory to represent the industrial waste that is sometimes discharged directly into waterways.
    - Note: We have environmental protection laws that prohibit the direct release of waste into our waterways, but sometimes accidents happen.
    - Encourage the students to consider global connections: polluted rivers may lead to the oceans that we all share.
5. **For Accidents:**
    - Pour colored sprinkles and/or sludge on the road to represent an accident with an oil tanker where hundreds of gallons of fuel were spilled on the road.

    What happens when it rains?
    - In a watershed, all the water flows toward a common destination.
    - As the water drains, it carries sediments and pollution with it.
6. **To illustrate loose soil, sprinkle cocoa on the listed site as discussed.**
    - Construction Site- Loose soil is often found where there is construction because the environment has been disturbed.
    - Deforested Areas- A forested area has many trees and vegetation, a deforested area does not. Think of when new developments are being built. The land is cleared, so there is new loose soil.
    - Shores of Rivers, Lakes, and Creek Areas- Along the banks animals often trample vegetation, causing soil to loosen. Rainwater washing over the banks also causes erosion.
    - Plowed Farm Field- The farmer has plowed the field to prepare for planting a good crop, which loosens the soil.

7. **To illustrate Fertilizer (Green Color Mix) and Pesticides (Red Color Mix) sprinkle each color on the listed site as discussed.**
    - Farm, golf course, residential yards - herbicides used to control weeds, pesticides used to control insects and fertilizer used to promote crop growth and grass growth.
    - Ask the students about the quantities of herbicides, pesticides and fertilizer used in each of these places (i.e. the yard, golf course and farm).
8. **To illustrate oils and grease, squirt a few drops of cocoa and water mixture on Highways, Roads and Industrial plant parking lot –**
    - Mention that cars, trucks, construction vehicles, etc. leak lubricants (oil, antifreeze, grease, etc.) when not properly maintained.
9. **To illustrate Pet Waste using the cocoa/water "slurry" bottle, squirt on areas as discussed.**
    - Pet Waste- We often walk our pets in our neighborhoods and even along stream banks. Usually we do not pick up after our pets, but we must learn to do so.

Discuss what Happens When it Rains

What happens when it rains?

- In a watershed, all the water flows toward a common destination.
- As the water drains, it carries sediments and pollution with it.

10. *Enviroscape Action:*

Demonstrate what happens to the pollution when it rains.

- Mist the entire model with a spray bottle until there is enough water to see how the rain and the pollutants flow.
- Ask the students what they think about what is happening in their watershed model.

Elaborate

11. **Discuss ways to reduce water pollution and promote water conservation**
    - Do not litter. Place all trash in bags and store in a trash can with a secure lid.
- Wash your cars at a commercial carwash that handles wastewater properly. Do not wash your car at home on the driveway or other paved surfaces. Wastewater from washing your car may contain oil, grease, road grime, and detergents.
    - If your family's car is leaking, get if fixed promptly. Recycle waste oil.
    - Do not pour anything down a storm drain.
    - Pick up after your pets; bag it and throw it away in the trash.
    - Use fertilizers and pesticides according to the directions. Do not over apply and do not apply to paved areas.
    - Compost yard waste (leaves, grass, etc.). Do not blow waste into the street or storm drains.
    - Follow the watering schedule and check the sprinklers often and adjust so only the lawn is watered and not the sidewalk or street.
    - Turn the water off when you shampoo your hair, and then turn it back on to rinse.
    - Turn the water off when brushing your teeth.
    - Use mulch around plants to reduce evaporation.
    - Take five-minute showers.
    - Throw trash in a trashcan and do not flush it down the toilet.
    - Run the washing machine or dishwasher only when the loads are full.
    - If washing by hand, do not let the water run while washing and rinsing. Fill one sink with wash water and one with rinse water.

Conservation & Sustainability

- Ask students to give examples of *pollution* to *groundwater*.
- Solicit other ideas from the students.

Useful websites
Groundwater Fact Sheet: http://bit.ly/1gHBUQh
Urban Run Off Fact Sheet: http://1.usa.gov/1OZLxQN
Non Point Source Pollution Fact Sheet: http://1.usa.gov/1mTzfgo