ENVIROSCAPE™ MODEL: Stormwater Runoff and Nonpoint Source Pollution in Watersheds

ESTIMATED TIME: 15-20 minutes

OBJECTIVES:

Students will be able to:

- Understand concepts such as watershed, land use, and model
- Understand what a watershed is and how we all live in a watershed
- Understand the types of land use and how the land is connected to the sea
- Identify the types of land use (i.e., developed, developing, and undeveloped)
- Understand the characteristics of the types of land use (i.e., developed, developing, and undeveloped)
- Increase their environmental awareness

MATERIALS:

- Enviroscape™ watershed model and associated materials [Candy/sprinkles/etc (to represent examples of nonpoint source pollution)]
- Spray bottle filled with water

PROCEDURE:

Stormwater Runoff - Enviroscape™

Estimated Time: 15-20 minutes

Preparation:

1. Remove all items from the Enviroscape™ case. Place the base on a table.
2. Place vehicles on the roads, tractor, figurines, and cows in the farm area, construction vehicles and figurines in the construction area.
3. Put the black plug in the water body drain (do not force) and fill the lake/river with water and fill the spray bottles with water as well.
4. In the small blue bottle, mix cocoa and water to make a "sludge" mixture. This will be used to illustrate oil leaks from the vehicles (highway, farm and construction site).
5. Use sprinkles for litter, green sprinkles for fertilizer, and pink sprinkles for pesticides/herbicides.
6. Check to ensure the storm drain is in place, and the tubing is in the factory.

Directions:

1. Ask the student to share with the class what they think water pollution is.
2. Tell the story of Messy Town using the Enviroscape™ watershed model, following these guidelines:
   Introduce Messy Town – a pretend town in New Jersey that consists of homes, a factory, a wooded area, highways, a farm, and a lake.

Farm

Has anyone ever been to a farm?
What type of animals do you usually see?
What do they eat?
What do they do after they eat?
Sometimes farm animals walk directly in the streams after they eat and drink and defecate (i.e., poop) in the stream. *Sprinkle brown sprinkles near where the cows are located on the model.*
The farmer ("Farmer Joe") has not kept up with his tractors
What kind of liquids do you think are leaking? (*Use cocoa & water mixture and squirt on the tractors)*
What is grown on farms?
What type of chemicals do they use to help the plants?
The farmer wants his crop to stay free of pests and to grow well so he has a good crop to sell so he uses fertilizers to give nutrients to the crops (*Sprinkle green sprinkles on the farm)* and uses pesticides/ herbicides to get rid of all the bugs and weeds that make it harder for the crop to grow *(Sprinkle red sprinkles on the farm*).

Factory

Does anyone play with bubbles outside?
Well, this is the "Bubbles Factory" which makes all the different bubbles that you play with at home. They use some of the water from the stream to help make the bubbles. Sometimes they can have accidents and some of the chemicals from the factory discharge directly into the stream/water. This discharge is considered a point source since we know the specific source of the discharge. *Squirt the cocoa mixture into the top of the plant and watch it flow through the pipe and into the stream/water*. When this happens, the "Bubbles Factory" quickly cleans up the discharge because they are required to by law. If they do not clean up, the government can give them a fine (similar to a ticket) and make the factory clean up the chemicals from the stream/water.
Go to the highway

The people of Messy Town do not take very good care of their cars and they often leak what liquids? *Use cocoa and water mixture in "sludge bottle" and squirt on the highway/roads/bridges, driveways, parking lots.*

Residential area

Here is where people live in Messy Town

Dog feces:

Does anyone have a dog?

What does the dog do when you walk him?

What is the right thing to do with the feces (i.e., poop)?

The people in Messy Town do not pick up after their pets and leave the feces on the ground. *(Sprinkle brown sprinkles near where the houses are located on the model)*

Litter:

Does anyone eat while driving in the car?

Does anyone know what it is called when you throw garbage out the window? *(Sprinkle the colored sprinkles around the residential area to illustrate litter)*

What could you do instead?

Construction site

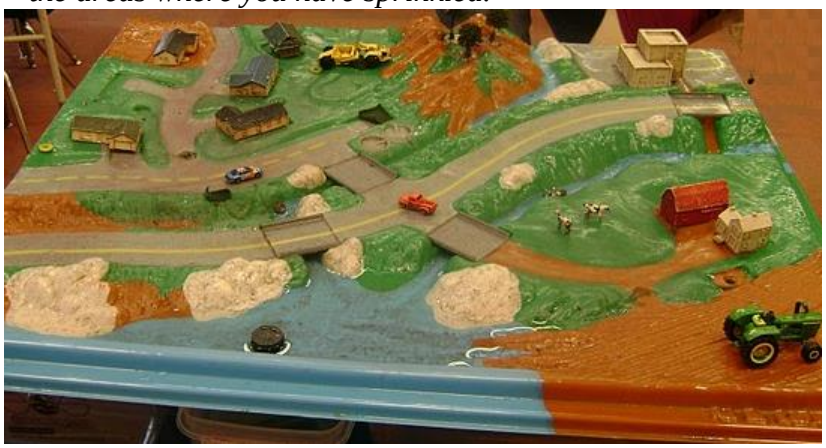
More people want to move to Messy Town so the forest is clear cut, and trees are removed.

What happens to the soil when the trees are removed? *Sprinkle cocoa powder on the forest to show soil erosion.*

The construction site does not take care of their truck. What kind of liquids might leak out of their truck? *Use cocoa and water mixture in "sludge bottle" and squirt on the construction site.*

Rain storm begins

Calling on two students, use two of the water bottles, make it "rain" over the areas where you have sprinkled.



When it rains, the rain water runs off the roof tops, down the streets, and carries pollutants with it. The rainwater travels either directly into a river/stream/lake or travels down the storm drains. Look how dirty the water got in Messy Town.

Would you want to swim in water that looks like that?

If you were a fish, would you want to live in this lake?

Solutions to nonpoint source pollution

How can the farmer ("Farmer Joe") help clean Messy Town?

Reading the labels to the pesticides/herbicides

Putting a fence around the cows so they cannot defecate in the stream.

Keeping up with his tractor – make sure it is not leaking oil.

How can the people living in Messy Town help clean their watershed?

By not littering

Keeping up with their cars - make sure it's not leaking any liquids.

Picking up after their pets.

Putting in rain gardens that are designed to mange stormwater runoff, mainly from rooftops, but also from driveways, lawns, roads, and parking lots. Rain gardens are similar to a sponge; they soak up polluted/dirty water and clean it through filtration. During a storm, a rain garden fills with water, and the water slowly goes into the ground rather than running into storm sewers. By capturing stormwater, rain gardens help reduce nonpoint source pollution, like fertilizers, pesticides, or herbicides used by the farmer or the bacteria found in feces that might be left on the ground by the people in Messy Town after they walk their dogs. Therefore, rain gardens help to protect our local waterways.

Putting in rain barrels that collect rain water. Collecting rain water helps save water and helps prevent basement flooding. By collecting rain water, homeowners are also helping to reduce flooding and pollution in local waterways. When rain water runs off of hard surfaces like rooftops, driveways, roadways, and parking lots, it carries with it pollution to our local waterways. Harvesting the rain water in a rain barrel is just one of the ways homeowners can reduce rain water from running off their property and possibly causing pollution and flooding problems in local waterways.