

Activity Theme: Water Pollution

Grade 4

Activity Type: Demonstration 

Enviroscape

Activity Overview: This activity will introduce elementary students to the concept of water pollution using a watershed model. It will teach the students about the causes of water pollution and enable them to identify environmentally responsible actions that they can take in their daily lives to keep their watersheds clean and healthy.

Objectives:

- To learn how to identify sources, effects, and ways to prevent water pollution
- To learn ways to clean up the environment

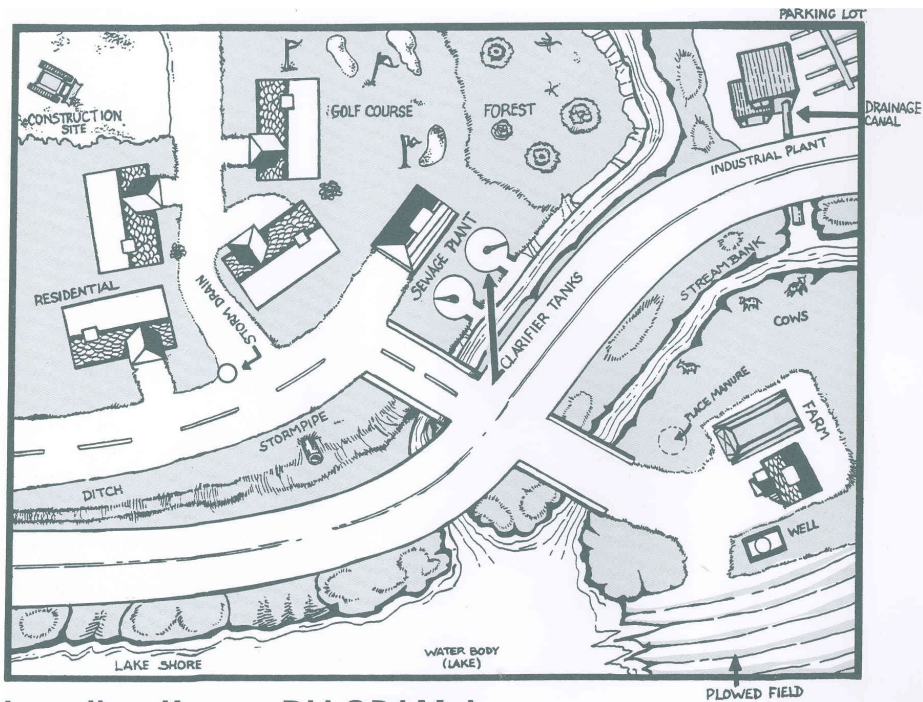
Materials (stored in a suitcase):

- Enviroscape watershed model & accessories (bridges, vehicles, cows, tall trees, round trees, containers)
- Bucket (to hold a small amount of water)
- Spray bottles
- Coloured beads (yellow & red)

Setup

To set up the watershed model:

1. Take the model out of storage along with the sloped plastic stand. Place the sloped plastic stand on the table and then place the model on the stand. This will allow water to drain properly.
2. Place the buildings on the model in the spaces provided (Diagram A).
3. Place bridges, vehicles and cows on the model in appropriate places.
4. Place the tall trees in the trunks of the clear-cut forests; place the round trees in the trunks on the residential areas (use modelling clay to attach).
5. Put the plug in the lake's drainage hole and fill the lake with approximately 1 cup of water (don't press too hard on the plug)
6. Fill spray bottle with water.



Location Key — DIAGRAM A



Takedown

Drain all water from model. Place all materials for set up (ie. bridges, cows) in the plastic containers provided.

Safety

Ensure that the model is on an even surface.

What Will I Be Doing? (Procedure)

Before you start your presentation check with the teacher or chaperone that the entire group is present and ready to start.

*Remember that **doing** an experiment and **discovering** the answer is more powerful than watching and listening to someone, so try to involve as many children as possible. (You can have the students participate by sprinkling the beads or by spraying the bottle when it's time to "rain".)*

Activity Introduction

Say: "Welcome to Enviroscape. This activity will teach you about different types of pollution. We need to keep our lakes and well water pollution-free by keeping our environment clean and healthy."

Ask: "What do you think of when you hear the word **pollution**?"
Listen to their answers and define pollution for them (see vocabulary below)

Say: "A watershed is a piece of land where water drains off and goes into the same place. A water body is a stream, river, pond, lake or ocean where the runoff waters from watersheds all go. There are many different sources of water pollution that can come from anywhere in the watershed."

Part 1: Point Source Pollution

Say: "There are two sources of pollution. The first type of pollution is called point source pollution and this is if the pollution comes directly from a source. For example, if a company puts a pipe into a river, this is point source pollution." (Point these out on the model as you discuss them)

Say: "There are three sources of direct pollution on this model: The Industrial Plant, the Sewage Treatment Plant and the Stormwater Drain and Sewer Pipe."

*First point out the Industrial Plant (located in the top right corner) and pour **yellow** beads in the top of the industrial plant and watch it run from the plant to the stream or river.*

Ask: "What do you see?"
Discuss that the wastes from the industrial plant directly enter the waterbody, adding to the pollution.

Ask: "Why do you think this happened?"
Answer: The plant/factory was doing something illegal and was not following laws set in place to keep our environment healthy.

*Next point out the Sewage Treatment Plant (located at the base of the forest and golf course). Pour the **yellow** beads into the sewage plant (the two round indentations in front of the treatment plant). Spray water into the tanks to make them overflow.*

Say: "The water in these tanks is normally treated, but sometimes mistakes happen, and wastewater skips treatment, or is not treated enough. If these tanks overflow, they can pollute our environment."

*Point out the Stormwater Drain and Sewer Pipe (located on the residential road between houses).
Pour some 'oil' (using the **yellow** coloured beads down the drain).*

Ask: "Should you ever pour oil or anything down the stormwater drain?" (Answer: no)

Ask: "Where does the water that goes down a storm drain go?" Answer: Our lakes and rivers – it is NOT treated in Peel.

Part 2: Non-Point Pollution

Say: "The second type of pollution is called non-point pollution. This means that when water is running over land, it can pick up contaminants on its way to a water body. This pollution can come from many different human activities on the land and occurs when rainfall carries contaminants such as fertilizer and pesticide, oils, grease and trash from yards, fields and roads."

*Demonstrate this pollution by sprinkling the **red** coloured beads on the Enviroscope Watershed Model. Try getting your audience involved by having them sprinkle on the 'contaminants'.
Demonstrate each type of nonpoint source pollution listed below.*

Erosion

Ask: "Can soil be a pollutant"? (Answer: yes)

Explain: "Soil is a pollutant when it is somewhere it shouldn't be, such as clogging a stream, or making the water dark and muddy for animals that live there."

Ask: "Where on the model might erosion occur?" (Answer: construction site, lakeshore, forest, plowed field on the farm).

*Pour the **red** beads in the stream area.*

Pesticides

Ask: "Does anyone know what a pesticide is?" (Answer: something put on your lawn or garden to kill bugs. NOTE: pesticides are now prohibited for use on residential properties in Ontario.)

*Pour **red** beads on the front lawn of the home.*

Ask: "Can someone show me where pesticides might be found on this model?" (Answer: lawns, golf course, ploughed field on the farm)

Oils and Grease

Say: "Oils and grease also contaminate our waters."

Ask: "Where might oils and grease come from?" (Answer: roads, highway, industrial plant parking lot).

*Pour some **red** beads on the roads and the industrial parking lot.*

Manure

Ask: "Does anyone know what manure is and where we might find it?" (Answer: poop from animals, found on the farm. Pet waste left on the lawns or street can also cause pollution)

Remind the students what pollutants are now on the model (soil, pesticides, oils and grease, manure).

Ask: "What do you think will happen if it rains?" (Answer: it will all go into the water).

Make it rain! Spray each area using the spray bottled filled with water. You can get your audience involved in making it rain.

As it rains, point out how you can see the water pick up the soil and contaminants and carry them to the waterbody. When rain and water pick up contaminants and move them like this, it is called runoff.

Discuss what is happening on the model by describing and pointing out the following examples:

- *Construction Site* - There are no trees, plants or fences on the construction site to hold the soil in place. So, when it rains, the water transports the soil particles very easily.
- *Lawns and Golf Course* - When too much pesticide or fertilizer is used, it is not all absorbed by the grass and plants and the surplus is carried away by the rain into the nearest water body. These chemicals can also go into the ground and cause pollution of our groundwater.
- *Roads and Parking Lot* - Paved surfaces collect oil, grease and other chemicals such as salt used to melt snow and ice. When it rains, the water cannot soak into the soil and instead flows over the parking lot and can carry these contaminants into the nearest water body.
- *Streams* - Stream banks with no vegetation to hold the soil in place make it easy for water and wind to move the soil. This is called erosion.
- *Forest Clearing* - The roots of plants and trees help hold soil in place. If a forest is cleared of its leaves, loose soil can be washed away by the rain. Wind can also carry the soil away.
- *Ploughed Fields* - If fields are not ploughed properly or if no vegetation or plants remain, rain can carry loose soil into the nearest water body.
- *Manure* - Daily spreading of animal waste is a common practice on farms since manure is a natural fertilizer. If too much manure is applied it can be carried away to our water bodies.

Ask: “Are there any ways that we can help reduce the amount of non-point source pollution in our everyday lives?”

Answers:

- Don't use pesticides on lawns.
- Don't litter!
- Never put dangerous materials (household cleaners, motor oil, medications) into the sink or in the storm drains. Take them to municipal hazardous waste depots (called Community Recycling Centres in Peel).
- Plant trees and shrubs in your neighbourhood to reduce runoff.
- Save paper and buy recycled paper so that we don't cut down more trees.
- Use as little water as possible to help in reducing cost of treatment of dirty water.
- Now that you know what to do, talk to your friends and family about what they can do too!

Recall with the students what you have taught them in this activity.

Specifically remind them and say:

- There are many ways to stop the less direct sources of pollution.
- We need to keep our lakes and well water pollution-free by keeping our environment clean and healthy.

Background Information for High School Volunteer

There are 2 sources of water pollution:

1. **Point source** - is pollution from an identifiable source such as an industry outlet pipe that drains directly into a water body.
2. **Non-point** - from which the source is harder to identify. Non-point source pollution generally comes from land runoff. Examples of non-point source pollutions are the transport of fertilizers and pesticides, road salts, oil, grease and trash from roads and yards. Non-point sources contribute a great deal to the pollution in our water bodies. The combined effect of pollution from many small sources can have a big impact on the quality of our water resources.

The Enviroscope Watershed Model shows two streams flowing into a larger water body such as a lake. The Model comes complete with a kit containing everything needed to demonstrate the movement of water through a watershed and the pollution that runoff may cause. Pollution and runoff are visually apparent when rain falling over the landscape carries soil (coloured beads), chemicals (coloured beads) and oil (coloured beads) through a watershed to a body of water.

Vocabulary:

Water body - A stream, river, pond, lake or ocean which receives runoff waters from a watershed

Runoff - Rainfall not absorbed by the soil, which runs across the land into rivers, streams, and lakes

Watershed - A watershed is a piece of land where water drains off and goes into the same place. The park that we are in today (Heart Lake Conservation Area) is in the Etobicoke Creek watershed.

Pollution - Adding items to a water body or other feature that causes the water body or feature to become dirty and unusable.

YouTube video: <http://www.youtube.com/watch?v=1cEPz5qNLYg>

