



## AREA BEST LINKED TO

City of Kawartha Lakes, County of Haliburton and District Municipality of Muskoka.



## OBJECTIVES

- To demonstrate how water and pollutants move through ground materials into ground and surface water from different sources.
- To engage students on the issue of how human activities cause pollutants



## CURRICULUM LINKS

### Grade Four:

#### Science:

- 1.1 analyse the positive and negative impacts of human interactions with natural habitats and communities.

### Grade Five:

#### Science:

- 1.1 assess the effects of social and environmental factors on human health, and propose ways in which individuals can reduce the harmful effects of these factors and take advantage of those that are beneficial

### Grade Six:

#### Science:

- 1.1 analyse a local issue related to biodiversity.



## BACKGROUND INFORMATION

Human activities can cause problems for our ground water, surface water by point source and non-point source. Ground water is defined as water that comes from rain, snow, sleet, and hail that goes into the ground. The water moves down into the ground because of gravity, passing between different layers of soil, sand, gravel, or rock until it reaches an impervious layer where water accumulates. The area that is filled with water is called the saturated zone and the top of this zone is called the water table where some people's drinking water comes from. Drinking water can also come from surface water which is water that collects on the surface of the ground like a pond or lake which is easier to access. It is important to realise that ground water often doesn't originate directly above where it falls as water can travel long distances underground from recharge zones. In the activity proposed there can be two sources of pollution that can affect surface and ground water which are point and non-point sources. Point sources are sources that have a specific outlet or discharge point where contamination enters the environment. Commercial and industrial businesses use hazardous materials in manufacturing or maintenance, and then discharge various wastes from their operations straight into the water systems. Whereas non-point source pollutants generally result from land runoff, precipitation, atmospheric deposition, drainage, seepage or hydrologic modification from a large undefined unmeasured area of land. Some examples of non-point pollutants are excess fertilizers from agricultural lands and residential areas or oil, grease and toxic chemicals from urban runoff and energy production, sediment from improperly managed construction sites, crop and forest lands, and eroding stream banks, salt from irrigation practices and acid drainage from abandoned mines, bacteria and nutrients from livestock, pet wastes and faulty septic systems and atmospheric deposition.



## MATERIALS

- Aquarium stones
- Clear plastic container
- Damp Sand
- Tap water
- Perforated Cup with holes for watering/ simulating rain
- Coloured sugar or jello crystals



## TIME LINE AND WORK PLAN

Get all the materials set up at different tables for the activity fig 1. Then have the students come up to the front and brainstorm all the important things they use water for in their lives. Then give the students an overview of the background information about ground and surface water and point and non-point source sources but have them brainstorm what human activities are polluting our water. (20 mins) (try and use local examples of pollutants)



**Figure 1:**

Assign the students groups of around 3 or 4 at the different table set ups with all the materials. The instructions will then be explained that there will be two experiments of point and non-point pollutants.

### THE FIRST ACTIVITY STEPS: NON-POINT SOURCE POLLUTION



**Step 1:** Put the aquarium stones in the plastic container. Slope the stones to form a lake at one end as an aquifer model.



**Step 2:** We can't see the water table and ground water because they are underground, so add a layer of sand over top then pat the sand down a bit.



**Step 3:** Sprinkle some spoonfuls of coloured sugar or jelly crystals onto the sand to represent the pollutant you are using on the ground. (example, say you want a nice lawn so you're spreading some fertilizer)

**Step 4:** Have the students write down predictions of what will happen with the pollutants.



**Step 5:** Now using water in a cup with holes punched in the bottom to provide a gentle flow, pretend it is raining.



**Step 6:** The rain dissolves the coloured sugar and takes it down through the soil into the ground water, and some of the sugar runs off into the surface. Then have the students describe how the pollutants reacted to the simulated rain water and how this affects the water. Water with about half a cup of water then wait about 2 mins to see the "lake" change colour.

(Estimated activity time: 20 mins)

## The second activity steps: point source pollution



**Step 7:** Set up the aquifer model using stones and sand again. The sand layer at the top of the model needs to be a little thicker this time.



**Step 8:** Make a small hole in the sand and add some coloured sugar.

**Step 9:** Then cover the sugar with the sand and pat it down again as this represents for example an old landfill or other brainstormed point of pollution. Have students predict how the pollutants will react in this second activity.



**Step 10:** Now make it pretend rain again. Nothing may appear to happen at first. Water the model with about half a cup of water.



**Step 11:** It takes time for the water to dissolve the pollutants in the “landfill”, but eventually, the colour change will be apparent in the lake and ground water. Students will need to lift up the container and look underneath to see the colour change.

**(20 mins estimated activity time)**

After both experiments, have the students explain they understand how pollutants get into water sources and how humans effect these relations and that these pollutants can cause algae blooms and contamination of drinking water causing harm to humans and species in water habitats. **(10 mins)**

## Create a plan for follow up, sharing and/or celebration at the end of the challenge

Have the students make posters on the information that they have learned about point and non-point source pollutions that they can put up in the school hallways to inform other students. Or send the posters back to the Haliburton-Muskoka-Kawartha Children’s Water Festival along with pictures of the experiments. (Example: what are household pollutants that they can be aware gets into their drinking water or aquatic habitats)

Or

Have students create a debate to present to their parents if they use fertilizers about how household pollutants get into their drinking water and possible create a video of the debate to send back to the Haliburton-Muskoka-Kawartha Children’s Water Festival.



## RESOURCES/REFERENCES

- <http://hmwaterfestival.ca/>
- <http://www.groundwater.org/kc/whatis.html>
- <http://www.waterencyclopedia.com/Po-Re/Pollution-Sources-Point-and-Nonpoint.html>
- <http://water.epa.gov/polwaste/nps/whatis.cfm>
- <http://pangea.stanford.edu/~keith/111.pdf>
- <http://www.sciencelearn.org.nz/layout/set/lightbox/Contexts/H2O-On-the-Go/Teaching-and-Learning-Approaches/Walking-on-water>



## FEEDBACK

**We appreciate your feedback! Please let us know...**

- Did this activity continue the learning your students engaged in at the Water Festival?
- What curriculum requirements did this activity satisfy?
- Was the activity easy to facilitate to your class?
- Did students have fun and learn something new about water?
- Please send photos of your class using these activities!

Please send comments and photos to: [iheaven@outtolearn.ca](mailto:iheaven@outtolearn.ca)