



Geoscape Ottawa-Gatineau

Grade 9 - 11 Lesson Plans to accompany the Geoscape Ottawa-Gatineau poster and website
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Theme 8 : FLOODING : JUST TOO MUCH WATER

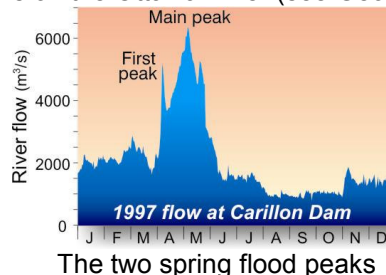
OVERVIEW

- Students identify and describe the issues surrounding water management concerns.
- Students engage in a problem solving exercise to prevent flooding.
- Students conclude the best possible solutions to prevent flooding.

DURATION 140 minutes (2 periods)

ACTIVITY

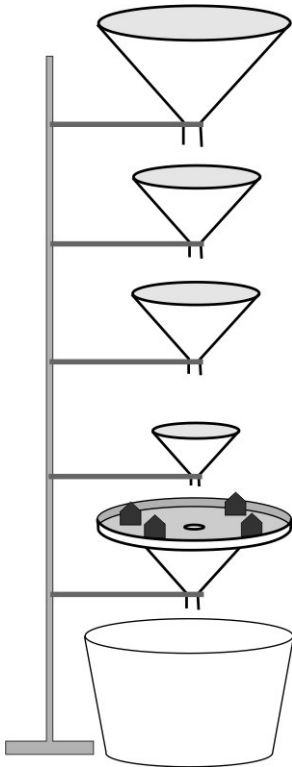
1. As a class, the teacher directs a review of the hydrologic cycle with an emphasis on run-off, groundwater, watertable, floodplain, 100-year flood level, and wetlands. Students take notes.
2. Students “brainstorm”:
 - A. causes and effects of flooding
 - B. the solutions and issues surrounding flooding
 - C. advantages and disadvantages of dams and reservoirs, both large and small scale
3. Lab Simulation Exercise is introduced. The teacher explains that the goal is to prevent the river and lakes from flooding the town. In small groups, the students follow the instructions. The teacher encourages the students initially to try to use the least number of stoppers to prevent flooding, even though they need all 3 dams to properly manage the river. (Answer: the only stopper order that prevents all flooding is: 11mm, 7.2mm, 5.5mm)
(This exercise may be played as a game or as a competition with student groups predicting the successful arrangement of stoppers and then testing their hypothesis.)
4. Students locate and mark flood prone areas on map completed in lesson 6, or another map, especially noting Brewers Park and Leamy Park. Add legend.
5. Students complete a reflection paper on:
 - A. the simulation exercise, including a discussion on the costs and benefits of damming and possible alternatives
 - B. the desirable and non-desirable land uses for flood prone areas
6. Optional: Daily discharge and water level data is available on the Water Survey of Canada website <http://www.wsc.ec.gc.ca/>. A natural and controlled (dam) station can be analyzed and compared. Or look for the 2 spring flood peaks on the Ottawa River (see Geoscape poster).



Materials :

- funnels: one 6" diameter, three 4" ,one 2.5"
- rubber stoppers. Drill a hole through each stopper - sizes 4.0mm, 5.5 mm, 7.2.mm, 11mm, 14mm
- 1 plastic lid from a 1litre yogurt container. Cut a hole in the middle of the lid smaller than the diameter of the bottom of a 4" funnel. Epoxy or glue the lid onto the top of a 4" funnel with the edges pointing up. This is the flood plain.
- Tiny "monopoly" houses or similar wooden blocks
- Support rod (beaker stand).
- 5 clamps to hold the funnels
- 1 bucket to catch the water
- 1 beaker to pour water
- sponges for mop-up

1. Attach funnels to the beaker stand so that funnel #1 (largest) is on top, funnel #4 (smallest) is second from the bottom, and funnel #5 with the lid is lowest. All funnels should be directly over top of the next and equally spaced. Put houses on the lid (flood plain). Put the bucket at the bottom to catch the water.



- Funnel #1 represents nature, -the input of water in a watershed system, and this water may be due to a heavy rain or snowmelt. This volume of water demands the placement of dams in all 3 lakes to prevent the river and town from flooding.
- Funnels #2, #3, and #4 represent lakes and smaller bodies of water with water storage capacity. One of the funnels should be smaller to show that not all lakes have the same storage capacity and that the design of a flow management system is dictated by the physical variables of the watershed. The stoppers represent dams, because the rate of flow across a dam can be controlled to a certain degree. Similarly, the varying diameters of holes in the stoppers control the flow of water through the funnels. Just as a dam operator can control how quickly or slowly a water body drains, you have control over the drainage of the funnels by choosing from the 5 available stoppers.
- Funnel #5 represents the river moving through your town. The lid represents the floodplain. Many settlements were situated on flood plains because of good soil and proximity to a river for its many uses.

2. Use equal volumes of water in the top funnel during each trial. Plug the top funnel spout with a finger when filling the funnel to the correct level. Remove the finger abruptly to start the water trial and observe the flow of water. When the lakes (funnels) overflow, the town below is washed out, and a new management system must be devised. Add and arrange the stoppers in the 3 lakes until all flooding is prevented. What is the optimal size and arrangement?