

Up on the Watershed

This activity is part of the **Water Attitudes** theme.

What's the purpose of this activity?

Students will become familiar with the concept of watersheds and the effect of surrounding landscapes on the flow of surface water. Becoming familiar with causes of flooding, such as spring snow melt, students become "water managers" and learn how the manipulation of surface water can be used as a management tool to decrease the effects of spring flooding. Climate change is creating increased erratic weather patterns resulting in more and more flooding activity. Students learn the importance of maintaining natural infrastructure, specifically wetlands, for flood attenuation and how they are important sources of slow release water throughout drier summers.

Key messages:

- A watershed is a system of wetlands, streams, rivers and lakes draining to a common point on the landscape.
- Surface water is water found in rivers, lakes and streams.
- People manage surface water using dams to control water quantity, including flooding
- Climate change results in more unpredictable weather patterns, causing increased flooding and draughts.
- Wetlands are beneficial for many reasons and are important in decreasing the effects of flooding
- Wetlands need to be conserved and



protected.

Materials

- 5 Funnel Models/Watershed Simulators:
 - 5 metal support stands with 5 Cast Iron Support rings attached
 - 5 funnels which sit in metal rings/clamps
 1. 1, 16 oz funnel (Nature/snow melt – place at top)
 2. 1, 8 oz funnel (1st lake, under Nature)
 3. 2, 4 oz funnels (2nd & 3rd lake below above funnel)
 4. 1, 2 oz funnel (at bottom, representing river/lake that town is located around)
 - 5 plastic catchment trays
 - 10 plastic buckets (2 per model)
 - Rubber stoppers with various sized holes (representing dams)
 - Sponges (representing wetlands)
 - 1 watershed divide (blue foam with metal core ... shaped like a "V")
 - 1 town (plastic ring with wooden houses)
 - 1 large bucket of water

- Water Cycle Poster
- Wetland poster
- Watershed poster

Set up:

- Spread out the Watershed Simulators/Funnel models
- Each Watershed Simulator should be set up like this:
 - Place 1 metal support stand in a plastic catchment tray
 - Place the funnels in this order:
 1. 1, 16 oz funnel (Nature/snow melt – at top)
 2. 1, 8 oz funnel (1st lake, under Nature)
 3. 2, 4 oz funnels (2nd & 3rd lake below above funnels)
 4. 1, 2 oz funnel (at bottom, representing river/lake that town is located around)
 - Make sure that all funnels are slightly offset so that the flow of water will hit the sides of the funnel and not directly into the spout hole
 - Place a plastic bucket under the last funnel to catch the water
- Put a variety of “dams”, rubber stoppers with different sized holes, in the catchment tray
- Fill and place the other plastic bucket beside model (to fill “Nature”)

What will I be doing?

- As groups of students arrive, you can divide them up so there are 2-4 at each watershed simulator. The goal is that they work together as a “management” team.
- This also allows opportunity to stagger groups as they arrive. If new groups of students arrive and there are open simulators, you can introduce the activity and have them start and carry out the activity.
 - This will allow for a continuous flow of students during busy time and avoid congestion.

- Explain what a watershed is and how it works by demonstrating with a watershed simulator and explain what each funnel represents.
 1. The top funnel represents “Nature”
 - “Nature” is the surrounding landscape that collects and accumulates snow & water
 2. The other funnels represent lakes within the watershed
 3. Plug the first (top) funnel with your finger or thumb and fill it to 1 cm below the top with water.
 - **The scenario:** Over the winter, snow accumulates! It’s fun, we ski, toboggan ... and the deeper it gets, the more fun we have!
 - **What happens in the spring?** ... ask the group
 - The snow melts! ... this melts very quickly because of increased temperatures
 - Sometimes, rainstorms also cause a huge flush of water into the watershed
 - A lot of water quickly enters the water bodies from the surrounding landscape!
 4. Release your finger/thumb from hole ... let the water rush through funnel system, the watershed.
- Now explain that many of our communities are located on floodplains, those flat, low lying areas around water bodies ... place the plastic ring with houses on the bottom funnel.
 1. Repeat the Spring Melt scenario!
 2. **What happened to the town at the bottom of the watershed?** ... it flooded! People are not happy!
- Ask the group ... **You are water managers, how do you control the flooding?**
 - By using dams! These are represented by the rubber stoppers with different sized holes.
 - Your job is to stop the flooding at all lakes and the town by placing the stoppers within the funnels.

- Note: the stoppers have different sized holes; therefore sequence of sizes may play an important role!
One dam per lake and no dams in Nature!!!
- Aside: you can prompt students by suggesting:
 - Funnels should be slightly offset.
 - Work from top down!
- **Stop the flooding!** ... let the groups work out a strategy.
 - When they think they have stopped the flooding ... bring in the town and test it!
- Once a group has successfully stopped the flooding with dams, introduce the sponges!
 - **What do you think the sponges represent?** ... Wetlands!
 - Wetlands are nature's flood control!
 - Wetlands are associated with lakes and they act like sponges, soaking up excess water and slowly releasing it throughout the summer.
- Let the groups continue and those who were successful with the dams now try to accomplish the same success with the sponges
 - See how many dams you can get rid of!
 - Dams cost millions of dollars. Wetlands occur naturally!

Debrief:

1. **Q:** Have you learned anything about watersheds yet today?
 - If yes, ask them what they have learned and guide their answers to what a watershed is?
 - If no ... go to #2
2. **Q:** What is a Watershed?

A: It an area of land that includes wetlands, streams, rivers and lakes that drains to a common point on the landscape.

- Show watershed poster
3. **Q:** What is a floodplain?
A: Low lying, flat areas around waterways.
 - Show watershed poster
 4. **Q:** Why are wetlands so important?
A: They help regulate water flow! They absorb water helping to prevent flooding and then slowly release it over the summer during drier months. Wetlands also provide habitat for many wildlife: fish, amphibians, insects, birds, plants, mammals.
 - Show wetland poster (if available)
 5. **Q:** What is Climate Change?
A: A significant change in the expected weather patterns over a significant period of time.
 6. **Q:** How does Climate Change affect flooding?
A: Because of more unpredictable weather and increased storms, there is more rain falling with a greater intensity ... downpours. It is hard for all of this rain to be absorbed by the ground and therefore it quickly runs off into rivers, streams and lakes ... causing flooding.
 7. **Q:** What is a watershed divide?
A: It is a high point of land which directs the flow of water.
Demonstrate using blue "V" divider ... Pour water onto the peak of the blue divider which is our watershed divide. Watch how some of the water flows down one side and some flows down the other. If rain falls on this side, it flows down that watershed. If rain falls on the other side of the watershed divide, it flows down that watershed.

Watershed Divides can be in the form of mountains or a difference of only a foot!

- Show watershed poster

8. **Q:** Can you name two watersheds in our area?

A: Trent Watershed, Severn Watershed

9. **Q:** What can you do to help make a difference in climate change?

A: Switch to energy-saving lightbulbs; walk or ride your bike instead of using the car for short distances; turn off electrical items when you are not using them; recycle and reduce your food waste.

Additional Background Information:

- The largest watershed in the world is the Amazon Basin (6,150,000 square km)
- There are different sizes of watersheds that nestle into one another
 - Watersheds keep nestling until all watersheds within Canada are found within 5 main watersheds which flow to one of the oceans: (Use Watersheds of Canada map):
 - Arctic Ocean
 - ~ 30% of Canada' water drains to the Hudson Bay Watershed which is ultimately considered a part of the Arctic Ocean Watershed
 - Atlantic Ocean
 - Gulf of Mexico
 - Hudson Bay
 - Pacific Ocean
 - We, in Haliburton County, Muskoka and Kawartha Lakes, are part of the Atlantic Ocean Watershed.
 - This means that all the water from Haliburton County, District of Muskoka and Kawartha Lakes will eventually flow into the Atlantic Ocean!

Some Definitions:

Watershed

A watershed describes an area of land that contains a common set of streams and rivers that all drain into a single larger body of water, such as a larger river, a lake or an ocean. A Watershed can also be referred to as a catchment basin.

Watercourse

A *watercourse* is a moving body of water such as a stream, river, brook, or creek.

Flood Attenuation

Attenuation is the process of storing and slowly releasing surface water run-off,

Climate Change

Climate change is any significant long-term change in the expected patterns of average weather of a region (or the whole Earth) over a significant period of time. Climate change is about abnormal variations to the climate, and the effects of these variations on other parts of the Earth.

- *The Earth's climate appears to be changing very quickly, something that has not happened since the end of the last ice age, 10,000 years ago.*
- *The Earth has warmed by an average of 1^oC in the last 100 years, which may not sound like a lot but it this "small" change causes a great shift in our climate which affects the global environment*
- *Although natural volcanic eruptions can affect Climate change it is human activities that has the most significant affect*
 - *Natural Cause – Volcanic eruptions are sporadic and have relatively short-term effects.*
 - *Human Causes – Burning of fossil fuels and conversion of land for forestry and agriculture purposes are the main causes of climate change.*

- *Since the beginning of the Industrial Revolution, human influences on the climate system have increase substantially*
- *Carbon dioxide is the main cause of human-induced climate change and global warming*
 - *Burning fossil fuels (oil and gas) produces carbon dioxide.*
 - *Carbon dioxide is a very long-lived “greenhouse gas” which means that it stays in our atmosphere for a very long time and produces a “greenhouse effect” on Earth*
 - *The greenhouse effect makes the earth warmer by allowing the suns energy in, but not allowing the heat to escape ... therefore the Earth warms and the result is global warming*
- *Global warming, the rise in the Earth's temperature causes more extreme and unpredictable weather*
- *Climate Change and global warming can affect our climate in many ways including:*
 - *More rainfall*
 - *Changing seasons*
 - *Shrinking sea ice*
 - *Rising sea levels*
 - *Wetter areas*
 - *Droughts*
 - *Wildlife unable to adapt to their changing habitat/climate*

Rubbermaid

- Lay the metal support stand with Iron Support rings down in plastic catchment trays
- Take the volunteer folder and volunteer pinnies/bibs back to Volunteer Sign In area and sign them out

Clean Up Procedures:

- Empty all water back into larger water bucket (to be used the next day)
- Place any posters back into volunteer folder or Rubbermaid
- Collect all rubber stoppers and sponges ... please check along the ground!. Place into appropriate containers and put into Rubbermaid
- Collect all funnels and place into Rubbermaid
- Collect plastic buckets and place into