What is a Watershed?

Grades 5/6 • Pen Pals for Water

Lesson Details	
Grades	**5-6**
Subjects	**Science** ***Note:*** *Curriculum connections vary by grade and province/territory. Refer to the Curriculum Connections document for more information.*
Topic	**Understanding Freshwater Ecosystems**
Lesson 4	**40-60 minute lesson**
Date Taught	

LEARNING GOALS

By the end of this lesson, students will:

- Understand what a watershed is and how water flows from local areas to oceans.
- Recognize how human activities upstream impact water quality downstream.
- Explore the challenges of cleaning polluted water and discuss the important of water management.

MATERIALS

- Projector to watch video
- Paint tray or shallow container
- Spray bottle
- Aluminum foil
- Rocks (to create hills and valleys)
- Small plants, moss, or sticks (to represent vegetation)
- Permanent markers (to draw roads and structures)
- Two or three colours of unsweetened powdered drink mix and oil
- Water
- Paper towels, cotton balls or cleanup supplies
- Reflection worksheet

Lesson Flow – Quick Guide

1. **Watershed Mini-Lesson (10-15 minutes)**
   Purpose: Introduce what a watershed is, how water flows across the land, and how human actions upstream affect communities and ecosystems downstream.
   Activity: Discuss as a class "What is a watershed?" Watch a short video about watersheds, Google your local watershed and trace its flow to the Pacific or Atlantic Ocean, and explore the Great Divide. Highlight that everyone lives downstream and human actions impact water quality.
2. **Watershed Simulation Activity (30-40 minutes)**
   Purpose: Explain how water flows through a watershed, how pollution moves downstream, and why managing water is challenging but important.
   Activity: In groups, build a tray watershed with a lake, rocks, and twigs. Fill the lake with water, simulate an oil spill and pollution, use cotton balls to clean it. Discuss how difficult it was to clean the water and connect the experience to human responsibility and living downstream.

Assessment

- **Formative:** Participation in class discussion, simulation setup, and cleanup activity.
- **Summative:** Reflection or short paragraph answering: "What did I learn about how watersheds work and why water management is important?"
- **Self-Assessment:** "One thing I learned about watersheds is..."

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Lesson Info and Teaching Steps

Activity 1: Watershed Mini-Lesson / Introduction

Purpose: Introduce what a watershed is, how water flows across the land, and how human activities can affect communities and ecosystems downstream.

Step-by-step Teacher Guide:

1. Class Discussion- "What is a watershed?"
    - Ask students: "*Has anyone heard the word 'watershed' before? What do you think it means?*"
    - Record ideas on the board. Have students record personal notes for their Pen pal letters.
    - Explain simply: A watershed is an area of land where all water drains to the same river, lake, or ocean. There can be multiple smaller watersheds in one big watershed.
2. Videos- Watersheds and Water Flow
    a. Watch this short video showing how water moves through a watershed.
    b. Ask a few questions afterward:
        - *"Where does the water go?"*
        - *"What could happen if the water gets polluted upstream?"*
3. Google Activity- Explore Local Watersheds
    a. Together as a class, search: *"Which watershed is [town name] in?"*
    b. Once found, explore a map of the watershed on the projector or interactive board
    c. Discuss briefly:
        - Where does water come from and where does it go?
        - Does it eventually go to the Pacific or Atlantic Ocean?
        - How might people, animals, and plants downstream be affected by what happens here?
4. Highlight Key Idea
    a. Emphasize: "We all live downstream. Human actions upstream, like pollution or development, can affect everyone and everything

downstream."

Teacher Tips:

- Keep it interactive and relaxed, students can take turns typing or navigating the map if possible.
- Encourage students to notice local rivers, streams, or lakes on the map.
- Connect the discussion to the upcoming tray simulation: *"Next, we'll see how water and pollution move through a watershed and how hard it is to clean once it spreads."*

Activity 2: Watershed Simulation

Purpose: To model how water flows through a watershed, observe how runoff can carry pollutants into freshwater systems, and explore how activities throughout a watershed can affect water quality downstream.

Step-by-step Activity Guide:

1. **Step 1: Create the Landscape**
   a. Using a paint tray or shallow container as the base:
      - Arrange rocks to create hills, mountains, and valleys.
      - Cover the landscape with a large sheet of aluminum foil, shiny side facing up.
      - Gently press the foil around the rocks to create the shape of the landscape without tearing it.
      - Fold the extra foil over the edges of the tray.
      - Use low areas in the landscape to represent rivers, streams, or lakes. These can be outlined with permanent marker if desired.
      - Add small sticks or plants to represent vegetation.
2. **Step 2: Add Land Uses**
   a. Have students draw or identify different land uses throughout their watershed, such as:
      - Houses and neighbourhoods
      - Roads and parking lots
      - Farms and livestock areas
      - Construction sites
      - Parks and forests
      - Stores or factories

b. Ask students to consider how activities in each area could affect nearby freshwater.

3. **Step 3: Add the "Pollution"**
   a. Sprinkle small amounts of coloured powdered drink mix or cooking oil around different parts of the watershed. Each colour can represent a different potential source of pollution.
   b. For example:
      - Red: Fertilizers or pesticides
      - Green or Oil: Oil, fuel, or road salt
      - Brown: Soil or sediment from erosion or construction
      - Blue: Pet or livestock waste
   c. Use only small amounts so students can clearly observe how the colours move when water is added.
4. **Step 4: Make a Prediction**
   a. Before adding water, ask students:
      - What do you think will happen when it rains?
      - Where do you think the water will flow?
      - Where will the pollutants end up?
      - Will the pollutants stay where they started or move to other areas?
      - Which areas of the watershed might be most affected?
5. **Step 5: Create a Rainstorm**
   a. Using a spray bottle, gently spray water over the landscape to simulate rainfall.
   b. Continue spraying until water begins flowing downhill and collecting in lower areas.
   c. Avoid adding too much water at once so students can clearly observe how runoff develops and moves through the watershed.
6. **Step 6: Observe What Happens**
   a. Have students watch how the water and coloured materials move through the landscape.
   b. Ask them to observe:
      - Which direction the water flows.
      - Where small streams or channels begin to form.
      - Which pollutants reach the waterways.
      - Where pollutants collect.
      - Whether pollution from one area travels to another part of the watershed.
      - Students can attempt to clean the polution with cotton balls
   c. **Explain** that when rain or melting snow flows over the land rather than soaking into the ground, it becomes runoff. As runoff travels, it can pick up sediment and pollutants and carry them into streams, rivers, lakes, and wetlands.

7. **Step 7: Discussion and Reflection**
    a. Discuss the results as a class:
        - What happened when it rained?
        - Where did most of the water collect?
        - Which pollutants reached the waterways?
        - Did the pollutants stay where they started?
        - How could activities upstream affect water quality downstream?
        - How could polluted water affect communities, wildlife, or drinking-water sources?
        - What actions could help prevent or reduce pollution from entering freshwater systems

Key Takeaway: What happens on the land can affect water throughout the watershed. Because water flows across landscapes and connects upstream and downstream areas, protecting freshwater requires considering activities across the entire watershed.

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Watershed Simulation Worksheet

Name: _____
Date: _____
Group: _____

1. Explore Your Watershed

Look at the watershed your group created and the different land uses you added.

What land uses are included in your watershed?
□ Houses and neighbourhoods
□ Roads and parking lots
□ Farms or livestock areas
□ Construction sites
□ Parks or forests
□ Stores or factories
□ Other: _____

Choose one land use. **How could activities in this area affect nearby freshwater?**

2. Make a Prediction

Before creating your rainstorm, look carefully at your watershed.

Where do you think the water will flow when it rains? Why?

Where do you think the pollutants will end up?

Do you think the pollutants will stay where they started or move to other areas? Explain your prediction.

Which areas of your watershed do you think will be most affected?

3. Observe the Rainstorm

As you spray your watershed, watch carefully to see how the water and pollutants move.

Which direction did the water flow?

Where did streams or channels begin to form?

Which pollutants reached a river, stream, lake, or other waterbody?

Where did pollutants collect?

Did pollution from one area travel to another part of the watershed? Describe what you observed.

4. Compare Your Prediction

Was what happened similar to your prediction? What surprised you?

5. Think About the Whole Watershed

How could activities upstream affect water quality downstream?

How could polluted water affect people, wildlife, or drinking-water sources?

What are two actions that could help prevent or reduce pollution from entering freshwater systems?

1. _____

2. _____

Final Reflection

Complete the sentence:

One thing this activity taught me about watersheds is...

Key Idea: Water connects different parts of a watershed. As water moves across the landscape, runoff can carry sediment and pollutants into streams, rivers, lakes, and wetlands. Activities in one part of a watershed can therefore affect freshwater and communities farther downstream.