

School District 47 Outdoor & Ecological Learning

www.outdoors.sd47.bc.ca

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Water Matters!

The Five Senses, Particles and Properties of Water



Outdoor Learning Curriculum for Grade 4 Students

Curricular Workshops at the Powell Lake Outdoor Learning Center
A Tool for School District 47 Teachers

Created in Partnership with Wild BC (Habitat Conservation Trust Foundation) and the Powell Lake Outdoor Learning Center (2014)



Water Matters



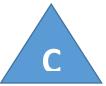
Workshop Background

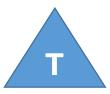
This interdisciplinary, place-based curriculum will provide learners with an experiential opportunity to explore the relationship between themselves, living things in the Temperate Rainforest, and water. With a focus on particles, the properties of water, and the interactions between water and the environment, students will become familiar with the molecular structure of water, the water cycle, and its relationship to living and non-living components of their environment.

Curriculum Connections: BC's Education Plan (Winter 2014 – Draft)

The table below lists all relevant curriculum connections between Water Matters and BC's Education Plan (Winter 2014 – Draft). As *Water Matters* is designed as a series of lessons to be delivered cohesively during one outdoor learning experience, all Big Ideas are addressed in the holistic delivery of this entire workshop curriculum and are therefore listed together below.

CORE COMPETANCIES





Thinking





Communication

Personal & Social

Ecological Literacy

Area of Learning: SCIENCE

Big Ideas

All matter is made of particles.

Different kinds of matter have different particles and therefore different properties Energy comes in a variety of forms that can be transferred from one object to another Living things sense and respond to stimuli in their environment

Area of Learning: LANGUAGE ARTS

Big Ideas

Language and literature help us find meaning and joy

Responding to and creating text develops and deepens our understanding of language while developing our ability to think critically, creatively, and reflectively

Area of Learning: ARTS EDUCATION

Big Ideas

Interaction and reflection deepen our understanding of the meaning in our own and others' art

Area of Learning: MATHEMATICS

Big Ideas

Information can be collected and represented in various forms that allow us to make interpretations.

Area of Learning: PHYSICAL AND HEALTH EDUCATION

Big Ideas

Daily physical activity builds strength, endurance, and flexibility.

Personal choices can have short- and long-term effects on our well-being.

Water Matters

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Show Me the Energy

Grab-and-Go Bin Checklist

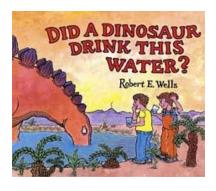
IMPORTANT: Students should bring their Water Log Books / Nature Journals and a Personal Pencil with them on their outing. School clipboards would also be handy for this outing.

Activity Bag: Molecules in Motion	Activity Bag: Incredible Journey	
Bin Materials: 2 Flashlights with Red and Blue Filters School-Based Materials:	Bin Materials: 9 Station Dice 9 Station Signs	
Water Log Books / Student JournalsPersonal Pencils		
Activity Bag: Water Cycle Walk About	Activity Bag: Stream Sense	
Bin Materials: Copies of "Water Cycle Walk About" School-Based Materials: Either a Class Set of clipboards or Student Water Log Books / Student Journals Personal Pencils	Bin Materials: Student Copy Page of Observation Sheet Class Set of Pencils Class Set of Clipboards 15 Dip Nets 15 Magnifiers on cords 1 Pond Life Pocket Field Guide 1 Quick Guide to Fresh Water Invertebrates 5 Ice Cube Trays 5 Tweezers School-Based Materials: Either a Class Set of clipboards or Student Water Log Books / Student Journals Personal Pencils	
Activity Bag: Body Part Debrief Bin Materials:	Activity Bag: Poetic Reflection Bin Materials:	
☐ 1 Set of Body Parts	□ None School-Based Materials: □ Student Water Log Books / Student Journals □ Personal Pencils	
Additional Bin Materials Include: Book: Did a Dinosaur Drink this Water? Pencil case with extra pencils	□ Book: The Snowflake: A Watercycle Story	

CLASSROOM BEGINNINGS

A Novel Idea: Did a Dinosaur Drink this Water?

This title covers a lot of ground, all related to the earth's water supply. About half the book is devoted to the water cycle, with the main characters flying around in an odd little helicopter to see the water cycle in action. In addition to discussing the water cycle, this book touches on other water-related topics like ocean currents, ocean and freshwater habitats, hydroelectricity, water conservation, and more. This book does an excellent job of teaching how the water we have on earth today is the same water that has been cycling through the different stages of the water cycle for millennia. Your kids will never look at water the same way again!



Find a copy in the Grab-and-Go Bin



Water Cycle Group Poster

- A Piece of blue poster board per group
- 2. Crayons, paints, or markers, cotton balls, tissue paper, etc.
- 3. Chart paper for planning

Invite students to think about consider the journey of a water droplet. As a whole class, revisit the concept of the water cycle recording student knowledge on a large piece of chart paper. Be sure that all essential components of the

water cycle are included. Divide students into small groups. Give each group a piece of chart paper to use in order to plan a large visual representation of the water cycle. When groups are ready, they begin to develop their poster on the poster board. They may require a number of art and science classes to complete their poster. Remind students that their final poster must include labels and explanations. When finished, encourage groups to share their posters with the class.

Water Log Book / Nature Journal

Encourage students to record their feelings, thoughts, or experiences in a Water Log Book / Nature Journal. Entries can be written or drawn. Students can either be encouraged to write or draw in them at any time, or they may be guided through a specific or regular entry. Recordings can include everything from concepts just learned in a lesson to a poem written during a snow storm. At various times throughout the unit study on water, students are invited to share sections of the log with the teacher and / or class. The water log can be used to assess student learning.

The Water Cycle Rap

A fun, memorable and engaging way to learn the fundamentals of the Water Cycle.

https://www.youtube.com/wat ch?v=i3NeMVBcXXU

An important goal of teaching place-based awareness and life science is an appreciation and respect for the living world. Memorizing names from a worksheet is less likely to bring a child to that goal than spending time enjoying nature and noticing all the wonders of water and the natural world. When outside, encourage students to apply their classroom knowledge, but also to use their senses to engage with water and nature. Learning to enjoy water and nature and having an appreciation for life is one important goal of life science for young learners.

Keeping Water Logs / Nature Journals dry is a challenge. To protect them from them elements, Water Logs / Nature Journals can either be stored in a clean, reused freezer bag or they can be attached to a clipboard with a clear piece of plastic over it.

Bring your Water Logs / Nature Journals on any outdoor learning outing.

Source: Project Wet, Wild BC
Page 19-21

Water Matters Activity 1: Molecules in Motion



Background

Water is made of molecules; each water molecule contains two hydrogen atoms and one atom of oxygen. Molecules constantly move. When water molecules are heated, they move more quickly. When water molecules are cooled, they move more slowly. In a gaseous sate, water molecules have a large amount of energy and move rapidly. This rapid movement causes molecules to bounce off each other, resulting in greater distances between the molecules. Conversely, water molecules in a liquid or solid form move more slowly and spread out.

Purpose: To introduce students to the 3 states of matter and to help them understand that water is comprised of molecules.

Flow Learning: Awaken Enthusiasm

Location: An open classroom or playing field.

Bin Materials

2 Flashlights with Red and Blue Filters

School-Based Materials

- Water Log Books / Student Journals
- Personal Pencils

Warm Up Discussion

Ask students what happens to an ice cube on a window ledge as the weather turns warmer. Students can share their ideas aloud or record their ideas in their Water Log Book. Discuss the three states of water siting examples such as drinking water (liquid), human breath (gas/vapour), and snow (solid). Note that energy is transferred when water goes from one state to another. The water molecules as gas have more energy and move faster. What happens when water evaporates? Where does it go? Help students to understand that water has been broken down to its tiniest form – a water molecule. Tell students that water is made up of millions of tiny molecules. A cookie appears to be one solid piece, but when crumbled it is made up of many tiny pieces. This analogy helps to create understanding around the particulate nature of matter.

Activity

Tell the class they are going to become water molecules. They will begin as water in its solid form, ice. As ice, students stand together, almost touching and move very little.

- 1. Inform students that for this activity, a flashlight with the red filter will be used to represent the addition of heat energy. Shining the light on a student represents heat energy traveling from an outside source to that water molecule (student), resulting in increased temperature and molecular motion (kinetic energy).
- 2. **Beam the flashlight on a few students.** When a student receives energy from the light she can begin to move slowly. When she touches another student some of her energy is transferred to the next student. She slows down and the next student can move a little bit. Through a chain reaction, all students begin moving.
- 3. Tell students they are now liquid. As a liquid, students should stand about an arms-length apart.
- 4. **Add more heat; the liquid turns into a gas.** In its gaseous state, water molecules move freely. Students step away from each other and roam randomly around the activity space. (Music may enhance the flow of "molecules.")
- 5. **Explain that eventually heat energy will be lost.** The loss of heat energy is represented by the flashlight with the blue filter. (Heat travels from the molecule to the colder object).
- 6. **Shine the blue flashlight on a group of students.** Water droplets form around the room as molecules lose energy and move together. After all students are liquid, continue to shine blue light on students until they become ice.

Conclusion/Debrief

Students can be tasked to summarize their understanding in their Water Log books or the teacher can facilitate a group discussion. Ask students to either share aloud or record the following in their Water Log books:

What are the 3 states of matter and water? How does water behave in each state: solid, liquid, and gas?

Source: Project Wet, Wild BC

Water Matters Activity 2: The Incredible Journey



Background

The water cycle is a variable path. Heat energy fuels this cycle, but gravity influences water's movement over, under, and above the Earth's surface. Water's most dramatic movement takes place in its gaseous state where it is constantly evaporating and condensing. Water condensation can be seen as dew on plants or water droplets on the outside of a glass. Living organism also move water within their bodies. Plants absorb water through their roots. It is evaporated through the leaves.

Purpose: To provide an interactive and physical introduction to the water cycle.

Flow Learning: Focus Attention

Location: A large, open and outdoor or indoor space.

Bin Materials

• 9 Station Dice

9 Station Signs

Warm Up Discussion

Tell students they are going to become water molecules moving through the water cycle.

Categorize places water can move through into nine stations: Clouds, Plants, Animals, Rivers, Oceans, Lakes, Ground Water, Soil, and Glaciers. Show students the accompanying station signs. Place these station signs around the playing area. Students should discuss the form in which water moves from one location to another. Most movement from one station to another will take place in liquid form. However, anytime water moves to the clouds, it is in the form of water vapour, with molecules moving rapidly and apart from each other.

Activity

- 1. Assign an even number of students to each station. (The cloud station can have an uneven number). Have students identify the different places water can go from their station in the water cycle. Discuss the conditions that cause water to move. (I.e. Solar energy, gravity, etc.). After students have come up with lists, have each group share their work. The die for each station can be handed to that group and they can check to see if they covered all the places water can go.
- 2. Tell students they will be demonstrating water's movement from one location to another. When they move as liquid water, they will move as pairs. When they move to the clouds, they will separate from their partners and move alone as individual water molecules. When water rains from the clouds, the students will grab a partner and move to the next location.
- 3. In this game, a roll of the die determines where water will go. Students line up behind the die at the station. At the cloud station they will line up in single file, at the rest of the stations they should line up in pairs. Students roll the die and go to the location indicated by the label facing up. If they roll stay, they move to the back of the line. In the clouds, students roll the die individually, but if they leave the clouds they grab a partner and move to the next station.
- **4. Students should keep track of their movements.** Students can record their journey, including stays, in their Water Logs.
- **5.** Tell students the game will begin and end with a sound of a bell, whistle, or buzzer.

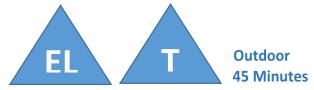
Conclusion/Debrief

Invite students to retell their journey to another classmate. Discuss any cycling that took place. Have students identify the states of water.

Back in Class

Have students use their travel records to write stories about the places water has been.

Water Matters Activity 3: Water Cycle Walk About



Purpose: To help students make connections between the water cycle, the Temperate Rainforest, and themselves.

Flow Learning: Direct Experience

Location: Roving Exploratory

Bin Materials

Copies of the Water Cycle Walk About Handout

School-Based Materials

- Either a Class Set of clipboards or Student Water Log Books / Student Journals
- Personal Pencils

Warm Up Discussion

Ask students where water can be found in the rainforest. (I.e. Ice, water, underground, etc.). Ask student what senses we can use to experience water when we are in the rainforest. (I.e. Feeling water with the skin, hearing water, lap against the shore, or splash beneath your feet).

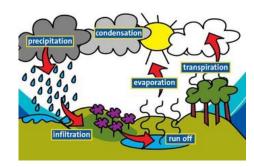
Activity

- 1. Hand out 1 copy of the *Water Cycle Walk About* Handout to each student. If provided, students can either clip their handout to a clipboard or use their Water Log Book as a hard surface to record their data. Personal pencils are necessary for this activity.
- 2. Review the components of the water cycle by reading aloud the first page of the Water Cycle Walk About.
- 3. Divide students equally in accordance with the number of adults attending your outing.
- 4. Tell students they will have 30 minutes to go on a walk about within set boundaries to look for evidence of the water cycle in the outdoor classroom.
- 5. Encourage students to look beyond the surface of the environment and take a careful look for all states of water and all components of the water cycle.
- 6. Clearly state the signal students should listen for indicating the end of the Walk About and time to return to the starting point.
- 7. Once all students are accounted for, construct new groups with one member from each Walk About group represented. Have students share their results with each other.

Conclusion/Debrief

Debrief as a whole group with the following questions:

- i. What surprised you?
- ii. Which components of the Water Cycle were the hardest to find? Which components were the most obvious?
- iii. Did this Walk About raise any unanswered questions for you about the Water Cycle?
- iv. Which results from another group did you find the most interesting?
- v. Is there anything related to the Water Cycle that you would like to learn more about?



Source: Karin Westland Original

Water Matters Activity 4: Stream Sense



Purpose: To help students recognize how their senses provide them with details about aquatic ecosystems

Flow Learning: Focus Attention

Location: Water's Edge

Materials:

- Student Copy Page of Observation Sheet
- Class Set of Pencils
- Class Set of Clipboards
- 15 Dip Nets
- 15 Magnifiers on cords
- 1 Pond Life Pocket Field Guide
- 1 Quick Guide to Fresh Water Invertebrates
- 5 Ice Cube Trays (for collecting water specimens)
- 5 Tweezers

Stream Walk Safety Rules

- 1. All students are assigned buddies.
- 2. Students should stay with their assigned buddy at all times.
- 3. Talking between buddies is discouraged.
- 4. Students will not enter the water.
- 5. Students will not touch wildlife or taste anything (plants or water) unless permitted by the teacher.

School-Based Materials:

- Either a Class Set of clipboards or Student Water Log Books / Student Journals
- Personal Pencils

Warm Up Discussion

Review the five senses (sight, sound, touch, smell, and taste) and discuss how they are used in daily life. Ask students about previous trips or visits to natural areas. How were their senses involved in these visits?

Activity

- 1. Guide students to the water's edge. Tell them they will be visiting the water's edge and will be recording how they use their senses to observe the water.
- 2. Discuss the Stream Walk Safety Rules. Assign or let students choose a buddy.
- 3. Hand out copies of the Sensory Observation Sheet. A pencil and either the Water Log or Clipboard are necessary.
- 4. Explain that when they record their observations, students should write things down or draw things as they perceive them. (I.e. when they look at things, they should describe shapes and colours. When they hear things they can write down imitations of that sound such as peep, gurgle, swish etc.).
- 5. Throughout the trip, remind students about using their senses. Ask students to find a quiet spot near the water's edge and have them sit very still to look, smell, listen, and feel. (15 minutes is probably adequate time).
- 6. Supply students with ways to improve the ability of their senses (i.e. 1 magnifier and 1 dip net per buddy group).
- 7. The following are questions that could be asked of students before, during, or after the stream visit:

Sight: What plants and animals do they see? Does the appearance of the water vary from different locations? Is the water moving?

Sound: What sounds does the water make? Can they hear animals? What does the wind sound like?

Smell: How do the smells near the water compare to those on the road or in a home? Does the water smell the same as the tap water?

Touch: What does the stream water feel like? How does the soil near the stream feel compared to soil in the woods? Are the rocks near the water's edge smooth or rough?

Procedure Part 3: Conclusion or Debrief

Have students share their Sensory Observation Sheets with the class.

Source: Project Wet, Wild BC

Water Matters Activity 5: Poetic Reflection



Summary

This is a reflective activity where students have a unique opportunity to incorporate their water-side sensory experience in *Stream Sense* into a short piece of poetry on the topic of water.

Flow Learning: Share Inspiration

Location: Anywhere a circle can be made with your entire group.

Bin Materials: None

School Based Materials:

Student Water Log Books / Student Journals

Personal Pencils

Warm Up Discussion

Share the following stanza aloud with your class:

I am the daughter of Earth and Water,
And the nursling of the Sky;
I pass through the pores of the ocean and shores
I change, but I cannot die.

- From The Cloud by Percy Bysshe Shelly

Ask what the students think the poet is talking about.



Activity

Using what they know about the movement of water atoms in the environment have the students write four lines inspired by their time in the forest.

Reassure students that their four lines of poetry need not rhyme.

Give students approximately 10 minutes to construct their stanzas and invite willing participants to share aloud their poetic reflections.

Special Note

This activity can be used as your final daily debrief and may require more time than allocated.

Source: Janet May Original

Compiled by Karin Westland

Water Matters Activity 6: Body Part Debrief



Summary

This is a debriefing activity where students have an opportunity to share a special experience from the day. The basic concept of this activity is that you have different balls or objects that are shaped like body parts. Each part can represent a metaphor related to that part.

Flow Learning: Share Inspiration

Location: Anywhere a circle can be made with your entire group

Bin Materials:

1 Set of Body Parts

Procedure:

- 1. Invite the class to form a circle.
- 2. Place the body parts in a pile in the middle of the circle.
- 3. Introduce each body part and possible framing around each one. Try to encourage students to stay topical, however be sure they feel welcome to share experiences that reflect physical nature of their outing. For example:

"Eye"

Could represent something new that you saw in the place you experienced or in yourself that day. What vision do you have for water in the future?

"Stomach"

Could represent something that took guts for you to do.

What pushed you outside your comfort zone?

"Brain"

Could represent something new that you learned.

Could represent a new idea or question you have about water.

"Heart"

Could represent a feeling that you experienced.

What things come from the heart?

Something that sets your heart pounding?

"Hand"

Could represent a new tactile experience you had.

Could represent someone you would like to give a hand to for a job well done.

"Ear"

Could represent something you listened to or a good idea you heard.

Could represent something that was hard to hear—either something in the environment or constructive feedback or not-so-constructive feedback that was hard to hear.

- 4. Invite a student to go first.
- 5. Students select their body part, share their metaphor, and then return the body part to the middle.
- 6. The activity is complete when all students have had a turn.

Conclusion/Debrief

Students can always be encouraged to document their final reflection in their Water Log Book / Nature Journal

Source: www.training-wheels.com





Rainy Day Back-Up Bin

Water Matters Project Wet (Grade 4)

How to Use This Resource

Each activity bag includes only the items listed below. If you anticipate needing to use the Rainy Day Back Up Bin, be sure to review your preferred activities in Project Wet before you depart from school. Bring along any additional supplies to compliment your chosen rainy day backup activity.

Activity Bag 1: The Life Box?	Activity Bag 2: Just Passing Through	
Reference: Project Wet (page 76)	Reference: Project Wet (page 166)	
 3 Plastic "Life Boxes" 	 1 Rope – braided Nylon 10m/32 ft. 	
3 Small Bottles of Soil	1 Plastic Tray for Soil	
 3 Small Bottles for Water 	2 Plant Pots	
	1 Bag Shredded Paper	
Activity Bag 3: A Drop in the Bucket	Activity Bag 4: A-maze-ing Water	
Reference: Project Wet (page 161)	Reference: Project Wet (page 219)	
1 Earth Ball	 1 Small Bottle labelled Oil 	
1 Graduated Cylinder 1000ml	 2 Pieces of Sidewalk Chalk 	
1 Graduated Cylinder 100ml	 1 Post-It Notepad (small) 	
1 Graduated Cylinder 10ml	1 Roll of Wax Paper	
1 Plastic Pipette	 1 Package of Modelling Clay 	
1 Bottle Blue Food Colouring	2 Permanent Markers	
1 Small Metal Bucket	• 5 Pipettes	
6 Tent Card Signs	1 Bottle Blue Food Colouring	
 Student Copy Page of Water Availability 	*Not included: 1 Piece of Heavy	
Table/Chart	Cardboard Per Student	
Activity Bag 5: Macroinvertebrate Mayhem	Activity Bag 6: Water Match	
Reference: Project Wet (page 322)	Reference: Project Wet (page 50)	
 1 Colour Key for Tolerance Ratings 	 6 Sets of 22 Match Cards 	
 23 Reversible Name Badges 		
 10 One-sided Name Badges 		
1 Set of 18 Macroinvertebrate ID		
Flashcards		
• 4 Cones		
Activity Bag 7: Sum of the Parts		
Reference: Project Wet (page 267)		
 32 Markers (6 each of 8 colours) 		
60 Pollutions Tokens		

Water Matters: Classroom & School Extensions

Rainy Day Hike: Mapping, Watersheds, and Your School Ground

In planning for a rainy day, have students create a map of the school grounds. Divide the grounds into sections and assign groups to map each area. Orient students to which direction is north so all maps face the same direction.

Remind groups to include the following: school buildings, parking lots, designated playgrounds, natural areas, with emphasis on water features like streams, temporary and permanent ponds, and constructed water features like bird baths and fountains.

After their mapping is completed as students the following:

- 1. Can they determine where the water that falls on the roofs goes?
- 2. Does flow off the roof into gutters or does it fall on the ground directly.

Have students place an X on the buildings to indicate the location of waterspouts.

Make two copies of student maps, one for the fair-weather hike where students make predictions of water flow, and one for the rainy day hike when students check their predictions.

For the fair-weather hike, give each group a copy of their mapped section and accompanying Legend (see Project Wet, page 190). Have each group predict the direction water will flow through their section. Have students survey the ground area for sources of point and non-point contamination. Assemble the map sections from the groups and post in the classroom. Have them summarize their predictions.

On a rainy day, have students dress properly; take them outside and begin a simple tour of the school grounds. Have students identify patterns of water flow. Discuss what influences the direction water moves. Have students:

- 1. Note slopes, depressions, cracks, rocks, buildings, gardens, trees, etc.
- 2. Compare how fast or slow water flows in different places.
- 3. Identify ways water affects the surface of the school grounds (i.e. watering plants, eroding soil, piling up litter, washing away litter).
- 4. Note water flowing from roofs of buildings and water spouts.

Divide the class into their original groups and give each group an unmarked copy of their map section and Legend. Have students indicate the following on their maps: direction and patterns of flowing water; natural and unnatural materials being carried, and areas of standing water. When students have completed their map sections, assemble the map sections and post. Arrows of adjacent map sections should line-up. If they don't, discuss reasons for discrepancies.

Debrief according to the lesson plan titled Rainy Day Hike, Project Wet (pages 186-190).

A Novel Idea: The Snowflake: A Water Cycle Story

This "beautiful take on the water cycle" traces a single water droplet over a year as it changes from a snowflake to various other forms, until at year's end, it returns to a snowflake once more. Each double-page spread is devoted to one month of the year and features beautiful, cool toned paintings and few lyrical sentences about the form the little droplet has taken in that month.



Find a copy in the Grab-and-Go Bin